United States Department of Agriculture

Natural Resources Conservation Service

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

Soil Survey Supplement of Tulsa County, Oklahoma

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How To Use This Soil Survey

This document supplements the Soil Survey of Tulsa County, Oklahoma, published in 1977 (USDA, 1977). Advancements in technology and more intensive and varied land uses require updated soils information. To prepare for this publication, the correlation for the Tulsa County soil survey was amended in January 1997 and September 2000.

This publication includes the recorrelated map unit legend, information on the use and management of the soils, major soil properties, and the detailed soil maps.

The map unit symbols have not changed. The map unit name and series name may be different from the first publication, but the map unit symbols and the soil map delineations have not changed.

The detailed soil map unit descriptions are archived in the original Soil Survey of Tulsa County, Oklahoma. These descriptions can be useful in planning and management of small areas, and are available in many libraries or from the Natural Resources Conservation Service and the Tulsa County Conservation District office in Tulsa, Oklahoma.

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

Locate your area of interest on the map sheet. Note the map unit symbols that are in the area. The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

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

Major fieldwork for this soil survey was completed in 1968-74. Soil names and descriptions were approved in 2000. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2000. 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 Tulsa County Conservation District.

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

The program and activities conducted under the memorandum of understanding for this survey are in compliance with the nondiscrimination provisions contained in the Titles VI and VII of the Civil Rights Act of 1964, as amended, and other nondiscrimination statutes, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, and the Age Discrimination Act of 1975. The program and activities also are in accordance with regulations of the Secretary of Agriculture (7 CFR-15, Subparts A and B), which provide that no person in the United States shall on the grounds of race, color, national origin, age, sex, religion, marital status, or handicap be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the Department of Agriculture or any agency thereof.

Cover: This photo has the Tulsa skyline in the background. The foreground is an area of Eram-Coweta complex, 5 to 15 percent slopes. The valley soils are Dennis silt loam, 1 to 3 percent slopes, and Okemah-Parsons-Pharoah complex, 0 to 1 percent slopes.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Foreword

The Soil Survey of Tulsa County contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use it to plan land use, select sites for construction, develop soil resources, or identify special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Many people assume that soils are all more or less alike. They are unaware that great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each kind of soil is shown on detailed soil maps. Each soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

We believe that this soil survey supplement can help bring us a better environment and a better life. Its widespread use can greatly assist us in the conservation, development, and productive use of our soil, water, and other resources.

M. Darrel Dominick
State Conservationist
Natural Resources Conservation Service

Soil Survey Supplement of Tulsa County, Oklahoma

By Everett L. Cole, Donald G. Bartolina, and Bill G. Swafford, Natural Resources Conservation Service

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

Tulsa County is in the northeastern part of Oklahoma (fig. 1). The county is bounded on the west by Osage and Creek Counties; on the north by Pawnee, Osage, and Washington Counties; on the east by Rogers and Wagoner Counties; and on the south by Wagoner and Okmulgee Counties. Tulsa, the county seat, is in the central part of the county. The county has an area of 375,674 acres, or 587 square miles.

Figure 1.—Location of Tulsa County in Oklahoma.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

A guide for classifying and naming the soils was prepared, and the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries. The detailed soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all.

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and their interpretations are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

Only part of a soil survey is complete when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. Organizing this mass of detailed information is necessary to make it useful to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, home buyers, and those seeking recreation.

Use and Management of the Soil

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this survey is useful in planning use and management of soils for crops and pasture, rangeland, and woodland, and as sites for buildings, highways and other transportation systems, sanitary facilities, parks and other recreation facilities, and wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, camp sites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

General Nature of the County

Additional information about the soil survey area is given in this section. It will be most useful to persons not familiar with Tulsa County. This section describes the climate, settlement and development, relief and drainage, natural resources, and transportation and industry.

Climate

The consistent pattern of climate in Tulsa County is one of cold winters and long, hot summers. Heavy rains occur mainly in spring and early in summer, when moist air from the Gulf of Mexico interacts with drier continental air. The annual rainfall is normally adequate for wheat, soybeans, and all other grain crops.

The table “Temperature and Precipitation” gives data on temperature and precipitation for the survey area as recorded at Tulsa for the period 1951 to 1974. The table “Freeze Dates in Spring and Fall” shows probable dates of the first freeze in fall and the last freeze in spring. The table “Growing Season” provides data on length of the growing season.

In winter, the average temperature is 39 degrees F and the average daily minimum is 28 degrees. The lowest temperature on record, which occurred at Tulsa on December 23, 1963, was -5 degrees. In summer, the average temperature is 81 degrees, and the average daily maximum is 91 degrees. The highest temperature recorded on July 14, 1954, was 112 degrees.

Growing degree days are shown in the table “Temperature and Precipitation.” They are equivalent to “heat units.” Beginning in spring, 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.

Of the total annual precipitation, 25 inches, or 64 percent, usually falls in April through September, which includes the growing season for most crops. The April through September rainfall is less than 18 inches in two years out of 10. The heaviest 1-day rainfall during the period of record was 7.54 inches at Pawhuska on July 27, 1963. Thunderstorms number about 55 each year; 22 occur in summer.

Temperature and Precipitation

(Recorded in the period 1951-74 at Tulsa, Oklahoma)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	oF	oF	oF	oF	oF	Units	In	In	In		In
January-----	46.6	25.5	36.1	74	1	9	1.31	0.65	1.84	3	2.4
February----	52.5	30.0	41.3	79	7	19	1.72	0.84	2.44	4	2.5
March-------	60.6	37.5	49.1	89	13	146	2.86	1.03	4.32	5	2.2
April-------	72.1	49.3	60.7	92	28	333	4.04	2.25	5.49	6	0.1
May---------	79.9	58.5	69.2	93	39	595	4.66	2.67	6.27	7	0.0
June--------	87.8	67.3	77.6	99	51	828	4.22	2.13	5.93	6	0.0
July--------	93.4	72.0	82.7	105	56	1,014	3.90	0.88	6.27	5	0.0
August------	92.7	69.9	81.3	106	56	970	3.01	1.39	4.32	4	0.0
September---	84.6	62.2	73.4	100	44	702	4.82	1.60	7.37	5	0.0
October-----	74.7	50.7	62.7	93	32	400	3.76	0.97	6.00	4	0.0
November----	60.3	38.0	49.2	82	82	96	2.44	0.54	3.92	4	0.8
December----	50.0	29.4	39.7	74	3	19	1.98	0.82	2.90	4	1.9
Yearly:											
Average---	71.3	49.2	60.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	107	0	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,131	38.72	29.10	47.70	57	9.9

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

Freeze Dates in Spring and Fall

(Recorded in the period 1951-74 at Tulsa, 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--	Mar. 30	Apr. 4	Apr. 14
2 year in 10 later than--	Mar. 24	Mar. 30	Apr. 10
5 year in 10 later than--	Mar. 12	Mar. 20	Apr. 1
First freezing temperature in fall:			
1 yr in 10 earlier than--	Nov. 7	Oct. 28	Oct. 21
2 yr in 10 earlier than--	Nov. 13	Nov. 3	Oct. 26
5 yr in 10 earlier than--	Nov. 26	Nov. 14	Nov. 4

Growing Season

(Recorded in the period 1951-74 at Tulsa, Oklahoma)

Probability	Daily minimum temperature during growing season: Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	227	212	195
8 years in 10	237	221	203
5 years in 10	258	238	217
2 years in 10	279	255	230
1 year in 10	289	264	238

Average seasonal snowfall is 10 inches. The greatest snow depth at any one time during the period of record was 10 inches. On the average, 3 days per year have at least 1 inch of snow on the ground, but the number of days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night in all seasons, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 54 percent in winter. Prevailing winds are southerly. Average windspeed is highest, 13 miles per hour, in March.

Tornadoes and severe thunderstorms occur occasionally but are local and of short duration. Damage varies and is spotty. Hailstorms occur at times during the warmer part of the year but in an irregular pattern and only in small areas.

Settlement and Development

Cherokee Indians were the early settlers of the area that now is Tulsa County. Land was allotted to the Indians on the basis of its cash value; the largest allotments were in areas of the rolling, timbered soils. Land could also be leased for farming subject to the supervision of the Indian agency. The sale or lease of the land brought farmers into the county.

Most of these new settlers farmed a small subsistence acreage. Cotton, grain sorghum, peanuts, small grains, and alfalfa hay were the major cash crops; other crops were grown only to feed horses, mules, hogs, chickens, and beef and milk cattle. Some farmers sold their land because they found that they could not make a living on it. Farmers in other areas acquired these lands, and farm units increased in size. Farmers specialized in certain types of crop and livestock enterprises to more efficiently manage larger farm units. They became more mechanized, started using irrigation to supplement moisture needs of field crops, and converted old cultivated areas to tame pasture.

One large reservoir was built on the Arkansas River for municipal and industrial purposes. Some industries were established.

Relief and Drainage

The soils of Tulsa County, except for those on the panhandle, are predominantly nearly level to gently sloping; more strongly sloping soils are along drainageways. Soils in the panhandle in the western part of the county are predominantly gently sloping through steep. The general slope is from north to south. The Arkansas and Caney Rivers drain most of the county. Bird, Joe, Polecat, Hominy, Snake, Mingo, and Duck Creeks are the main tributary streams. The rivers and creeks have entrenched to a depth of about 20 to 100 feet.

Landforms in the county include prairies, woodlands, and flood plains. The prairies and woodlands are on divides between nearly level to gently sloping flood plains, which range from 200 feet wide along the smallest streams to about 3 miles wide along some of the rivers. The slopes that extend into the flood plains are strongly sloping through steep.

Natural Resources

The soil is one of the most important natural resources in the county. It produces grass for livestock, timber, crops, and mineral resources that are necessary to sustain a substantial part of the economy in the county.

The water supply for the city of Tulsa comes mostly from Spavinaw and Eucha Lakes in Delaware County, Oklahoma. The water supply for suburban areas of Tulsa and for other towns and communities comes mainly from wells and small reservoirs. Hydroelectric and flood-control reservoirs furnish recreation and electricity. Farm ponds supply water for livestock.

Income from the sale of timber has been considerably reduced in recent years. Most of the timber has been culled, and the trees that were left to propagate new stands are of poor quality. The timber is used mostly for lumber.

Pockets of oil are scattered throughout the county. Oil furnishes additional income and provides jobs for the community.

Limestone is the most common surface mineral. It is mined in the east-central part of the county for roads and for industrial and commercial purposes.

Wildlife and game live outside of the metropolitan area. Quail, dove, rabbit, and duck are hunted in season. Fishing is mostly in the Keystone Reservoir, the Arkansas River, and farm ponds.

In the survey area, sand is obtained from the soils adjacent to the Arkansas River. Water-washed sand is taken from the streambed.

A good mineral resource in the county is bituminous coal. The coal fields, however, are mostly inactive.

The Keystone Reservoir, Arkansas River, and numerous small ponds attract thousands of visitors each year. Visitors are most numerous in the Keystone Reservoir area during the spring and summer.

Transportation and Industry

Railroads, State and Federal highways, and county roads form a network of transportation facilities in the county. The Midland Valley and Atchison-Topeka and Santa Fe Railroads transect the county north and south, and the Missouri-Kansas-Texas and St. Louis-San Francisco Railroads furnish transit east and west. U.S. Highway 64 and State Routes 51, 67, 33, and 20 extend east and west across the survey area, and U.S. Highways 169 and 75 and State Routes 11 and 97 are the main north-south roads. U.S. Highway 66 and Interstate Highway 44 cross the county from southwest to northeast. In farm areas, paved county roads provide access to State and Federal highways.

Small grains, sorghum, vegetables, soybeans, timber, and livestock are marketed in the county. Most of the grain is shipped by rail or truck or through the Port of Catoosa. Limestone is mined commercially in the east-central part of the county. Most of the industries are based on coal, oil, recreation, or commerce and are located near Tulsa.

Formation and Classification of the Soils

This section relates the soils in this survey area to the major factors of soil formation and describes the system of soil classification. The classification and extent of the soils in the survey area are shown in the tables “Classification of the Soils” and “Acreage and Proportionate Extent of the Soils,” which are at the end of this section.

Formation of the Soils

In this section, the five major factors that affect the formation of soils are described. 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 mineral composition of the parent material; the climate under which the soil material has accumulated and has existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the parent material.

Climate and vegetation are the active factors in soil formation. They act on the parent material 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. The parent material also affects the nature of the profile and, in extreme instances, determines most of its characteristics. Finally, time is needed to change the parent material into a soil profile. It may be much or little, but generally much time is required to develop a profile that has distinct horizons.

The five factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made about the effect of any one unless conditions are specified for the other four. Many of the processes of soil development are unknown.

Climate.—The climate of the survey area is temperate and humid. Winds are southerly. Rainfall is generally well distributed throughout the year, but dry periods of 2 to 6 weeks occur during summer. The average annual rainfall is about 36 inches and is enough to support trees, which have contributed to soil development in about 37 percent of the area. Intensive rains, which commonly occur during spring, erode most slopes. Erosion has occurred on most cultivated soils.

The average annual temperature is about 60 degrees F, but extremes range from higher than 90 degrees to less than 0 degrees. The frost-free season is about 215 days. Freezing and thawing have especially altered the rock structure in the upper 2 feet of the soil, which developed in sandstone material.

The climate is fairly uniform throughout the survey area and is partly responsible for the dominance of prairie grasses or trees. The influence of climate in weathering the soil material and in developing horizons is greatly altered by the effects on soil of parent material, vegetation and animals, relief, time, and man.

Parent material.—Parent material is weathered, unconsolidated rock or mineral material from which the soil forms. In the formation of soils, parent material affects color, texture, structure, natural fertility, and other soil characteristics

Residuum and alluvium are two general kinds of parent material in the survey area. On the prairie, soils that formed in residuum were derived from shales, sandstone, and limestone of the Pennsylvanian age. Dennis, Eram, and Okemah soils formed mostly in shales and sandstone material. Bates and Coweta soils formed over sandstone. Bates soils have loamy, clay-enriched horizons, and Coweta soils have a loamy horizon that is shallow over sandstone.

Apperson, Catoosa, Lula, Newtonia, and Shidler soils formed in loamy and clayey material over limestone. Parsons and Pharoah soils formed in clayey valley fill, which is alluvium. These soils have a clay-enriched horizon that is similar to the parent material but that has been strongly weathered. Also on the prairie are the Okay soils, which formed in loamy material on the uplands that parallel some of the large streams in the county.

In wooded areas on uplands, the soils formed in shale and sandstone. Darnell, Hector, and Linker soils were derived from the sandstone, which is on most ridges. Endsaw and Niotaze soils formed in clayey parent material; they have a clayey subsoil, which corresponds to the parent material.

In wooded areas on flood plains, the soils formed in sandy, loamy, or clayey sediments. Kiomatia soils formed mostly in sandy sediments, and Choska, Cleora, Mason, Radley, Severn, Tullahassee, and Wynona soils formed mostly in loamy alluvial sediments. Latanier and Osage soils formed mostly in clayey alluvium.

Plant and animal life.—Plants and animals are active in soil formation. Plants and micro-organisms grow in the weathered parent material and help break down rock structure. They also produce organic residue. As this residue is produced, an organic layer (A horizon) is formed and gradually thickens.

The organic layer is the most fertile part of the soil. In this layer, bacteria, fungi, and other micro-organisms decompose organic matter, convert humus to simpler forms, liberate plant nutrients, and fix nitrogen. Larger organisms, such as the earthworms that are plentiful in the soils, contribute to the translocation of plant residue, to soil aeration, and to the development of soil structure.

The kind and amount of vegetation regulate the thickness of the A horizon. The kind of vegetation depends largely on the moisture supply and on the texture and acidity of the surface layer.

In wooded areas on uplands, the soils have a thin A horizon, usually an E horizon, and they have a low or medium base saturation. Darnell, Hector, Endsaw, Glenpool, Kamie, Larton, Linker, and Niotaze soils are examples.

In wooded areas on flood plains, the soils generally have a thick, dark-colored A horizon because they receive extra water for more plant growth. Timber on the Kiomatia and Severn soils has added only a small amount of organic matter because these soils are very young and have a thin A horizon. Soils that are on flood plains and that have a thick A horizon are Choska, Cleora, Latanier, Osage, Radley, Tullahassee, and Wynona soils.

The other soils in the county formed under native grass and have a thick, dark A horizon. Large amounts of plant residue and basic elements are returned to the surface layer, since about one-third of the grass roots die and are regrown each year. Soils on the prairie are normally less acid than soils that formed under trees in upland areas.

Relief.—Relief alters the effect of climate on soil development and horizon formation. If the slope is steep, runoff removes soil material almost as fast as it forms, but if slope is gentle or nearly level, soil material accumulates. For example, Parsons soils, which are nearly level, are more developed than Dennis or Bates soils, which are gently sloping on uplands. Parsons soils receive additional water and have more water percolating through the profile to influence loss, gain, and transfer of soil constituents. They have lost clay, iron, aluminum, and base elements from a bleached eluvial (E) horizon. The eluvial horizon and the upper clay-enriched (Bt) horizon are usually more acid and have lower base saturation than horizons in most of the other soils on the prairie. The accumulation of clay in the clay-enriched horizon has become sufficient to restrict internal drainage in Parsons soils and cause a reversal in the leaching of basic elements. One of the most easily leached elements, sodium, has begun to accumulate; with time, Parsons soils may develop a sodium-enriched Bt horizon similar to the one in Pharoah soils.

The gently sloping Dennis soils, on uplands, have a thicker and more clayey, clay-enriched (Bt) horizon than the moderately deep Bates soils on similar slopes primarily because their parent material is more weatherable. Coweta soils are shallow over sandstone, have more runoff and less accumulation of soil material than Bates soils. Other soils on the uplands formed in a manner similar to Parsons, Dennis, Bates, and Coweta soils.

Relief also alters the effect of climate on soil development and horizon formation in soils on flood plains, which receive floodwater that contributes to the thickening of the A horizon and to the high base saturation. These soils have not had sufficient time to develop a clay-enriched Bt horizon.

Time.—The length of time required for a soil to form depends on the combined effects of other soil-forming factors. The soils in the survey area range from immature to old. The age of the soils is indicated by the degree of horizon development. If the soil-forming factors have not been active long enough for genetically related horizons to form, the soils are considered young or immature. Mature soils have genetically related horizons, and old soils show advanced horizon development or degradation of some horizon within the pedon. Severn, Choska, and Coweta soils are immature soils in Tulsa County; Dennis, Endsaw, and Newtonia soils are considered mature soils, since they have a Bt horizon. The old soils in the county, such as Parsons soils, have developed an E horizon.

Classification of the Soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (USDA, 1993; USDA, 1998; and USDA, 1999).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In the table “Classifications of the Soils,” the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Twelve soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udoll (*Ud,* meaning himid, 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 expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Hapludolls (*Hapl,* meaning minimal horizonation, plus *udoll,* the suborder of the Mollisols that has a udic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups 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 Fluventic Hapludolls.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is coarse-silty, mixed, active, thermic Fluventic Hapludolls.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Classification of the Soils

Soil name	Family or higher taxonomic class
Apperson	Fine, smectitic, thermic Aquic Hapluderts
Bates	Fine-loamy, siliceous, active, thermic Typic Argiudolls
Catoosa	Fine-silty, mixed, superactive, thermic Typic Argiudolls
Choska	Coarse-silty, mixed, active, thermic Fluventic Hapludolls
Cleora	Coarse-loamy, mixed, active, thermic Fluventic Hapludolls
Coweta	Loamy, siliceous, superactive, thermic, shallow Typic Hapludolls
Darnell	Loamy, siliceous, active, thermic, shallow Udic Haplustepts
Dennis	Fine, mixed, active, thermic Aquic Argiudolls
Endsaw	Fine, mixed, active, thermic Oxyaquic Hapludalfs
Eram	Fine, mixed, active, thermic Aquic Argiudolls
Glenpool	Siliceous, thermic Psammentic Paleudalfs
Hector	Loamy, siliceous, subactive, thermic Lithic Dystrudepts
Kamie	Fine-loamy, mixed, active, thermic Typic Paleudalfs
Kanima	Loamy-skeletal, mixed, active, nonacid, thermic Alfic Udarents
Kiomatia	Sandy, mixed, thermic Typic Udifluvents
Larton	Loamy, siliceous, active, thermic Arenic Paleudalfs
Latanier	Clayey over loamy, smectitic over mixed, superactive, thermic Oxyaquic Hapluderts
Linker	Fine-loamy, siliceous, semiactive, thermic Typic Hapludults
Lula	Fine-silty, mixed, active, thermic Typic Argiudolls
Mason	Fine-silty, mixed, active, thermic Pachic Argiudolls
Newtonia	Fine-silty, mixed, superactive, thermic Typic Paleudolls
Niotaze	Fine, smectitic, thermic Aquic Paleustalfs
Okay	Fine-loamy, mixed, active, thermic Typic Argiudolls
Okemah	Fine, mixed, active, thermic Aquic Paleudolls
Osage	Fine, smectitic, thermic Typic Epiaquerts
Parsons	Fine, mixed, active, thermic Mollic Albaqualfs
Pharoah	Fine, mixed, superactive, thermic Vertic Argiaquolls
Radley	Fine-silty, mixed, active, thermic Fluventic Hapludolls
Severn	Coarse-silty, mixed, superactive, calcareous, thermic Typic Udifluvents
Shidler	Loamy, mixed, active, thermic Lithic Haplustolls
Tullahassee	Coarse-loamy, mixed, active, nonacid, thermic Aquic Udifluvents
Wynona	Fine-silty, mixed, active, thermic Cumulic Epiaquolls

Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1	Apperson silty clay loam, 1 to 3 percent slopes	4,153	1.1
2	Apperson silty clay loam, 3 to 5 percent slopes	612	0.2
3	Bates loam, 1 to 3 percent slopes	1,978	0.5
4	Bates-Coweta complex, 3 to 5 percent slopes	4,565	1.2
5	Catoosa silt loam, 1 to 3 percent slopes	2,000	0.5
6	Catoosa-Shidler-Rock outcrop complex, 1 to 8 percent slopes	4,508	1.2
7	Choska very fine sandy loam, 0 to 1 percent slopes, rarely flooded	10,925	2.9
8	Choska-Severn-Urban land complex, 0 to 1 percent slopes, rarely flooded	6,482	1.7
9	Cleora fine sandy loam, 0 to 1 percent slopes, occasionally flooded	567	0.2
10	Coweta-Bates complex, 3 to 5 percent slopes	10,191	2.7
11	Coweta-Urban land-Eram complex, 3 to 12 percent slopes	9,934	2.6
12	Dennis silt loam, 1 to 3 percent slopes	28,782	7.7
13	Dennis silt loam, 3 to 5 percent slopes	8,083	2.2
14	Dennis silt loam, 3 to 5 percent slopes, eroded	12,519	3.3
15	Dennis-Pharoah complex, 1 to 3 percent slopes	20,530	5.5
16	Dennis-Radley complex, 0 to 12 percent slopes	24,456	6.5
17	Urban land-Dennis complex, 0 to 5 percent slopes	15,289	4.1
18	Endsaw-Hector complex, 5 to 30 percent slopes	3,944	1.0
19	Eram silty clay loam, 3 to 5 percent slopes	988	0.3
20	Eram-Coweta complex, 5 to 15 percent slopes	18,002	4.8
21	Glenpool loamy fine sand, 3 to 15 percent slopes	3,207	0.9
22	Hector-Linker complex, 1 to 5 percent slopes	2,485	0.7
23	Kamie loamy fine sand, 3 to 8 percent slopes	4,113	1.1
24	Kamie fine sandy loam, 1 to 3 percent slopes	1,361	0.4
25	Kamie-Urban land complex, 1 to 8 percent slopes	4,706	1.3
26	Kanima gravelly silty clay loam, 3 to 50 percent slopes	1,552	0.4
27	Kiomatia loamy fine sand, 0 to 1 percent slopes, frequently flooded	2,522	0.7
28	Larton-Glenpool complex, 0 to 3 percent slopes	2,289	0.6
29	Latanier clay, 0 to 1 percent slopes, occasionally flooded	3,298	0.9
30	Lula silt loam, 1 to 3 percent slopes	688	0.2
31	Mason silt loam, 0 to 1 percent slopes, rarely flooded	1,161	0.3
32	Newtonia silt loam, 1 to 3 percent slopes	3,760	1.0
33	Newtonia silt loam, 3 to 5 percent slopes	1,684	0.4
34	Niotaze-Darnell complex, 3 to 15 percent slopes	9,630	2.6
35	Niotaze-Darnell complex, 15 to 25 percent slopes	18,571	4.9
36	Niotaze-Darnell complex, 25 to 45 percent slopes	4,624	1.2
37	Niotaze-Darnell-Urban land complex, 3 to 25 percent slopes	381	0.1
38	Oil waste land	470	0.1
39	Okay loam, 0 to 1 percent slopes	1,027	0.3
40	Okay loam, 1 to 3 percent slopes	3,962	1.1
41	Okay loam, 3 to 5 percent slopes	4,199	1.1
42	Okay loam, 3 to 5 percent slopes, eroded	2,697	0.7
43	Okemah silt loam, 0 to 1 percent slopes	7,977	2.1
44	Okemah-Parsons-Pharoah complex, 0 to 1 percent slopes	27,305	7.3
45	Osage silty clay, 0 to 1 percent slopes, occasionally flooded	12,556	3.3
46	Pits	1,378	0.4
47	Radley silt loam, 0 to 1 percent slopes, occasionally flooded	5,383	1.4
48	Radley silt loam, 0 to 1 percent slopes, frequently flooded	13,396	3.6
49	Severn very fine sandy loam, 0 to 3 percent slopes, rarely flooded	7,705	2.1
50	Shidler-Rock outcrop complex, 1 to 12 percent slopes	1,462	0.4
51	Tullahassee fine sandy loam, 0 to 1 percent slopes, frequently flooded	1,438	0.4
52	Urban land	1,468	0.4
53	Wynona silty clay loam, 0 to 1 percent slopes, occasionally flooded	13,074	3.5
54	Wynona-Urban land complex, 0 to 1 percent slopes, occasionally flooded	1,508	0.4
DAM	Large dam	57	*
DUM	Dumps	84	*
M-W	Miscellaneous water	589	0.2
W	Water	13,399	3.6
	Total	375,674	100.0

* Less than 0.1 percent.

Soil Series and Detailed Soil Map Units

In this section, each soil series shown on the detailed soil maps at the back of this publication is described. The descriptions, together with the soil maps, can be useful in determining the potential of managing a soil for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment.

Preceding the name of each map unit is the symbol that identifies the unit on the detailed soil map. Each map unit description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated and the management concerns and practices needed are discussed.

A map unit represents an area on the landscape and consists mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have profiles that are almost alike make up a soil series. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in extent of the component in the map unit, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. All the soils in the United States having the same series name have essentially the same properties that affect their use and their response to management practices.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect the use of the soils. On the basis of such differences, a soil series is divided into phases. The name of a soil phase commonly indicates a feature that affects use or management. For example, Dennis silt loam, 1 to 3 percent slopes, is one of several phases within the Dennis series.

Some map units are made up of two or more dominant kinds of soil. These areas are called *complexes*. A complex consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Dennis-Pharoah complex, 1 to 3 percent slopes, is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. The soils that are included in mapping are recognized in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called miscellaneous areas. They are delineated on the soil map and given descriptive names. Pits is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each mapping unit are given in the table “Acreage and Proportionate Extent of the Soils,” and additional information on properties, limitations, capabilities, and potentials for many soil uses are given for each kind of soil in other tables in this survey. (See “Summary of Tables.”) Many of the terms used in describing soils are defined in the Glossary.

Apperson Series

Major land resource area: Cherokee Prairies (112)
Depth class: Deep
Drainage class: Moderately well drained
Parent material and geologic age: Calcareous residuum derived from limestone of Pennsylvanian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits, shoulders, and backslopes
Slope: 0 to 5 percent

Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 57 to 64 degrees F
Thornthwaite PE index: 60 to 78

Taxonomic class: Fine, smectitic, thermic Aquic Hapluderts

Associated Soils

These are the Lula, Shidler, and Summit soils. Lula and Shidler soils have less than 35 percent clay in the control section. In addition, Lula soils do not have redoximorphic features and have redder hues in the Bt horizon, and Shidler soils have a lithic contact between depths of 4 and 20 inches.

Typical Pedon

Apperson silty clay loam, in an area of rangeland; Osage County, Oklahoma; about 1 mile north of Foraker; 165 feet north and 160 feet east of the southwest corner of sec. 21, T. 28 N., R. 7 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, very dark gray (10YR 4/1) dry; moderate coarse granular structure; hard, firm; slightly acid; gradual smooth boundary. (3 to 14 inches thick)

BA—10 to 15 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure parting to strong coarse granular; hard, firm; moderately alkaline; gradual smooth boundary. (4 to 9 inches thick)

Btss1—15 to 22 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; few fine distinct yellowish brown (10YR 5/4) redoximorphic concentration masses; moderate fine blocky structure; very hard, very firm; few slickensides and shiny pressure faces; nearly continuous clay films on faces of peds; slightly alkaline; diffuse smooth boundary. (5 to 13 inches thick)

Btss2—22 to 34 inches; dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) dry; many fine distinct black (10YR 2/1) redoximorphic concentration masses, gray (10YR 5/1) redoximorphic depletion masses, and olive brown (2.5Y 4/4) redoximorphic concentration masses; weak fine blocky structure; extremely hard, extremely firm; few slickensides with shiny pressure faces; nearly continuous clay films on faces of peds; few chert fragments less than 3 inches in diameter; slightly alkaline; diffuse smooth boundary. (5 to 14 inches thick)

BCss—34 to 44 inches; dark grayish brown (2.5Y 4/2) silty clay, light grayish brown (2.5Y 6/2) dry; many medium distinct gray (10YR 5/1) redoximorphic depletion masses and olive brown (2.5Y 4/4) redoximorphic concentration masses; weak coarse blocky structure; extremely hard, extremely firm; few slickensides; few chert fragments less than 3 inches in diameter; moderately alkaline; abrupt irregular boundary. (0 to 17 inches thick)

R—44 inches; hard, grayish limestone bedrock.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 23 inches
Thickness of the solum: 40 to 60 inches
Depth to bedrock: 40 to 60 inches

A horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1
Texture—silty clay loam
Reaction—slightly acid to moderately acid

BA horizon:
Color—hue of 10YR, value of 2 to 3, and chroma of 1 to 2
Texture—silty clay loam or silty clay
Reaction—moderately acid to slightly alkaline

Btss1 horizon:
Color—hue of 10YR, value of 2 to 4, and chroma of 1 or 2
Texture—silty clay
Reaction—slightly acid to slightly alkaline
Other features—red and brown redoximorphic concentration masses

Btss2 horizon:
Color—hue of 2.5YR or 10YR, value of 3 or 4, and chroma of 1 to 3
Texture—silty clay
Reaction—slightly acid to moderately alkaline
Other features—red, brown, and gray redoximorphic concentration and depletion masses

BCss horizon:
Color—hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—silty clay
Reaction—slightly acid to moderately alkaline
Other features—yellow, brown, and gray redoximorphic concentration and depletion masses

R horizon:
Kind of bedrock—hard limestone

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

Map Unit Setting

Major land resource area: 112
Elevation: 800 to 1,200 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Apperson and similar soils

Extent of the component in the map unit: 100 percent
Slope: 1 to 3 percent
Runoff rate: Very high
Depth: 40 to 60 inches to lithic bedrock
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 8.6 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3w
Ecological site number and name—112XY010OK, Claypan Prairie

Typical profile:
A—0 to 8 inches; silty clay loam
BA—8 to 16 inches; silty clay loam
Bt1—16 to 28 inches; silty clay
Bt2—28 to 42 inches; silty clay
Bt3—42 to 52 inches; silty clay
Cr—52 to 60 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

2—Apperson silty clay loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 800 to 1,200 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Apperson and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to lithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 8.7 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY010OK, Claypan Prairie

Typical profile:
Ap—0 to 12 inches; silty clay loam
BA—12 to 18 inches; silty clay loam
Bt1—18 to 28 inches; silty clay
Bt2—28 to 48 inches; silty clay
Bt3—48 to 52 inches; silty clay
Cr—52 to 60 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Bates Series

Major land resource area: Cherokee Prairies (112)
Depth class: Moderately deep
Drainage class: Well drained
Parent material and geologic age: Residuum from sandstone interbedded with silty or sandy shale of Pennsylvanian age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits, shoulder slopes, or backslopes
Slope: 1 to 8 percent
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 57 to 64 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Fine-loamy, siliceous, active, thermic Typic Argiudolls

Associated Soils

These are the Collinsville, Coweta, Dennis, Eram, and Lula soils. Collinsville and Coweta soils are typically steeper and are at depths less than 20 inches to bedrock. Dennis and Eram soils are on similar topographic positions as Bates soils, but have a fine textured argillic horizon. Lula soils are on adjacent areas underlain by limestone.

Typical Pedon

Bates loam, on a 3 percent slope, in an area of rangeland; Crawford County, Kansas; 2 miles northwest of Farlington; 3,300 feet west and 1,600 feet south of the northeast corner of sec. 1, T. 28 S., R. 23 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 9 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine and medium granular structure; slightly hard, very friable, slightly plastic and slightly sticky; many fine roots; strongly acid; gradual smooth boundary. (7 to 14 inches thick)

BA—9 to 16 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium granular structure; slightly hard, friable; slightly plastic and slightly sticky; many fine roots; 1 percent fragments of soft sandstone; strongly acid; gradual smooth boundary. (0 to 10 inches thick)

Bt—16 to 23 inches; dark yellowish brown (10YR 3/4) clay loam, yellowish brown (10YR 5/4) dry, brown (7.5YR 4/4) crushed; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; hard, firm; plastic and sticky; few fine roots; thin discontinuous clay films on many faces of peds; 3 percent small fragments of soft sandstone; strongly acid; gradual smooth boundary. (5 to 18 inches thick)

BC—23 to 33 inches; dark brown (7.5YR 4/4) clay loam, brown (7.5YR 5/4) dry, strong brown (7.5YR 5/6) crushed; common coarse distinct yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; hard, firm; few fine roots; many small black concretions in the lower 2 inches; strongly acid; abrupt smooth boundary. (0 to 15 inches thick)

Cr—33 to 37 inches; soft, fine grained sandstone containing thin beds of silty shale.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 24 inches
Thickness of the solum: 20 to 40 inches

A horizon:
Color—hue of 10YR or 7.5YR, value of 2 or 3 (3 to 5 dry) and chroma of 2 or 3
Texture—loam, fine sandy loam, or clay loam
Reaction—slightly acid to strongly acid
Content of rock fragments, by volume—0 to 15 percent sandstone less than 3 inches in diameter

BA horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5 (4 to 6 dry) and chroma of 3 to 6
Texture—loam or clay loam
Reaction—slightly acid to strongly acid
Content of rock fragments, by volume—0 to 15 percent sandstone less than 3 inches in diameter

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5 (4 to 6 dry) and chroma of 3 to 6
Texture—loam, clay loam, or sandy clay loam
Reaction—slightly acid to strongly acid
Content of clay—18 to 35 percent
Content of rock fragments, by volume—0 to 15 percent sandstone fragments less than 3 inches in diameter

BC horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5 (5 to 7 dry) and chroma of 4 to 6
Texture—loam, clay loam, sandy clay loam, gravelly loam, gravelly clay loam, or gravelly sandy clay loam

Reaction—slightly acid to strongly acid
Content of clay—18 to 30 percent
Content of rock fragments, by volume—0 to 35 percent sandstone fragments less than 3 inches in diameter
Redoximorphic features—common coarse distinct yellowish brown and dark yellowish brown masses of redoximorphic accumulation

Cr horizon:
Kind of bedrock—soft, paralithic, fine-grained sandstone containing thin beds of silty shale

3—Bates loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 112
Elevation: 800 to 1,360 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days

Major Component Description

Bates and similar soils

Extent of the component in the map unit: 100 percent
Slope: 1 to 3 percent
Runoff rate: Medium
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 6.1 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
Ap—0 to 10 inches; loam
BA—10 to 14 inches; clay loam
Bt—14 to 24 inches; clay loam
BC—24 to 34 inches; clay loam
Cr—34 to 40 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

4—Bates-Coweta complex, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 700 to 1,360 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days

Major Component Description

Bates and similar soils

Extent of the component in the map unit: 66 percent
Slope: 3 to 5 percent
Runoff rate: Medium
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 5.8 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups::
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
Ap—0 to 9 inches; loam
BA—9 to 12 inches; clay loam
Bt—12 to 21 inches; clay loam
BC—21 to 32 inches; clay loam
Cr—32 to 36 inches; bedrock

Coweta and similar soils

Extent of the component in the map unit: 34 percent
Slope: 3 to 5 percent
Runoff rate: Medium
Depth to paralithic bedrock: 10 to 20 inches

Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 2.5 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—112XY086OK, Shallow Prairie (eastern)

Typical profile:
A—0 to 7 inches; loam
Bw—7 to 16 inches; gravelly loam
Cr—16 to 28 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Catoosa Series

Major land resource area: Cherokee Prairies (112)
Depth class: Moderately deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from limestone of Pennsylvanian age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits, shoulder slopes, and backslopes
Slope: 0 to 8 percent
Mean annual precipitation: 37 to 45 inches
Mean annual air temperature: 57 to 64 degrees F
Thornthwaite PE index: More than 64

Taxonomic class: Fine-silty, mixed, superactive, thermic Typic Argiudolls

Associated Soils

These are the Claremore, Lenapah, Lula, Newtonia, Shidler, Scullin, and Summit soils. Claremore soils occur on ridges or on areas nearest a bluff. Lenapah, Scullin, and Summit soils have a fine control section. Lenapah and Scullin soils occur on areas similar to those of the Catoosa soils. Lula and Newtonia soils occur on broad, slightly concave flats. Summit soils occur on side slopes. Shidler soils have a solum less than 20 inches thick and occur on ridges.

Typical Pedon

Tulsa County, Oklahoma; about 5 miles north of Broken Arrow; 2,200 feet south and 1,750 feet west of the northeast corner of sec. 15, T. 19 N., R. 14E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 10 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; moderate fine granular structure; slightly hard, friable; slightly acid; gradual smooth boundary. (6 to 14 inches thick)
BA—10 to 15 inches; dark reddish brown (5YR 3/3) silty clay loam, reddish brown (5YR 4/3) dry; moderate medium granular structure; hard, friable; medium acid; gradual smooth boundary. (3 to 10 inches thick)
Bt—15 to 28 inches; dark reddish brown (5YR 3/4) silty clay loam, reddish brown (5YR 4/4) dry; few fine distinct dark red mottles; moderate medium subangular blocky structure; hard, firm; clay films on faces of peds; few fine black concretions; slightly acid; abrupt wavy boundary. (10 to 28 inches thick)
R—28 to 40 inches; hard limestone bedrock.

Range in Characteristics

Thickness of the mollic epipedon: 9 to 20 inches
Thickness of the solum: 20 to 40 inches

A horizon:
Color—hue of 5YR to 10YR, value of 2 or 3, and chroma of 2 or 3
Texture—loam or silt loam
Reaction—slightly acid or moderately acid

BA horizon:
Color—hue of 5YR to 7.5YR, value of 2 to 4, and chroma of 2 to 4
Texture—loam, silt loam, clay loam, or silty clay loam
Reaction—slightly acid or moderately acid

Bt horizon:
Color—hue of 2.5YR to 7.5YR, value of 2 to 4, and chroma of 2 to 6

Texture—silty clay loam or clay loam
Reaction—neutral to strongly acid
Content of clay—32 to 39 percent
Content of rock fragments, by volume—0 to 10 percent limestone gravel less than 3 inches in diameter

R horizon:
Kind of bedrock—grayish hard limestone 2 to several feet thick

5—Catoosa silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 37 to 45 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Catoosa and similar soils

Extent of the component in the map unit: 100 percent
Slope: 1 to 3 percent
Runoff rate: Very high
Depth to lithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 5.5 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated—2e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 10 inches; silt loam
BA—10 to 15 inches; silty clay loam
Bt—15 to 28 inches; silty clay loam
R—28 to 40 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

6—Catoosa-Shidler-Rock outcrop complex, 1 to 8 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 2,200 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 240 days

Major Component Description

Catoosa and similar soils

Extent of the component in the map unit: 60 percent
Slope: 1 to 8 percent
Runoff rate: Very high
Depth to lithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 5.4 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 7 inches; silt loam
BA—7 to 12 inches; silty clay loam
Bt—12 to 20 inches; silty clay loam
BC—20 to 28 inches; silty clay loam
R—28 to 30 inches; bedrock

Shidler and similar soils

Extent of the component in the map unit: 25 percent
Slope: 1 to 8 percent

Runoff rate: Very high
Depth to lithic bedrock: 4 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.4 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7s
Ecological site number and name—112XY098OK, Very Shallow

Typical profile:
A—0 to 7 inches; silt loam
R—7 to 20 inches; bedrock

Rock outcrop

Extent of the component in the map unit: 15 percent
Slope: 1 to 8 percent
Runoff rate: Very high
Slowest permeability class within a depth of 60 inches: Very slow
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Choska Series

Major land resource area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy alluvium of Pleistocene age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plains
Landscape: Valleys
Landform: Terraces
Position: Risers and treads
Slope: 0 to 2 percent
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 57 to 68 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Coarse-silty, mixed, active, thermic Fluventic Hapludolls

Associated Soils

These are the Kiomatia, Latanier, and Mason soils. Kiomatia soils are in the lower positions, lack a mollic epipedon, and have sandy textures in the control section. Latanier soils are on the back part of the terrace, have vertic properties, and have a clayey over loamy control section. Mason soils have an argillic horizon and have more than 18 percent clay in the control section.

Typical Pedon

Wagoner County, Oklahoma; about 4 miles south of Coweta on the east side of the river; 150 feet south and 1,400 feet east of the northwest corner of sec. 5, T. 16 N., R. 16 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 14 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; moderate fine granular structure; soft, very friable; few fine roots; few medium pores; slightly acid; clear smooth boundary. (7 to 20 inches thick)
Bw1—14 to 36 inches; yellowish red (5YR 4/6) very fine sandy loam, yellowish red (5YR 5/6) dry; massive; soft, very friable; thin strata of loamy fine sand to silty clay loam; neutral; clear smooth boundary. (8 to 30 inches thick)
Bw2—36 to 48 inches; yellowish red (5YR 4/6) silt loam, yellowish red (5YR 5/6) dry; massive; slightly hard, friable; thin strata of loamy fine sand to clay; calcareous, moderately alkaline; clear smooth boundary. (8 to 30 inches thick)
C—48 to 66 inches; reddish brown (5YR 5/4) loamy fine sand, light reddish brown (5YR 6/4) dry; single grained; loose; evident bedding planes; calcareous, moderately alkaline

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches

Thickness of the solum: 15 to 50 inches

A horizon:
Color—hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3
Texture—silt loam, very fine sandy loam, loam, or fine sandy loam
Reaction—slightly acid to slightly alkaline

Bw1 horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6
Texture—silt loam or very fine sandy loam
Reaction—slightly alkaline or moderately alkaline
Content of clay—5 to 18 percent

Bw2 horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6
Texture—silt loam or very fine sandy loam with thin strata of loamy fine sand to silty clay loam
Reaction—neutral to moderately alkaline
Content of clay—8 to 35 percent
Carbonates—calcareous or noncalcareous

C horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6
Texture—loamy fine sand with thin strata of fine sandy loam to loam
Reaction—moderately alkaline
Content of clay—7 to 27 percent

7—Choska very fine sandy loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Choska and similar soils

Extent of the component in the map unit: 99 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.4 inches
Water table: More than 6 feet
Flooding: Rare
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—112XY050OK, Loamy Bottomland

Typical profile:
A—0 to 14 inches; very fine sandy loam
C1—14 to 35 inches; very fine sandy loam
2C2—35 to 48 inches; silt loam
3C3—48 to 80 inches; stratified loamy fine sand to silt loam

Additional Components

- Wet depressions: 1 percent

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

8—Choska-Severn-Urban land complex, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 112
Elevation: 100 to 2,000 feet
Mean annual precipitation: 22 to 54 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 185 to 240 days

Major Component Description

Choska and similar soils

Extent of the component in the map unit: 42 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained

Available water capacity: About 9.5 inches
Water table: More than 6 feet
Flooding: Rare
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site—not assigned

Typical profile:
A—0 to 14 inches; very fine sandy loam
C1—14 to 25 inches; very fine sandy loam
2C2—25 to 35 inches; silt loam
3C3—35 to 80 inches; stratified loamy fine sand to silt loam

Severn and similar soils

Extent of the component in the map unit: 31 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 10.3 inches
Water table: More than 6 feet
Flooding: Rare
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site—not assigned

Typical profile:
A—0 to 8 inches; very fine sandy loam
C1—8 to 28 inches; stratified loamy very fine sand to silty clay loam
2C2—28 to 48 inches; very fine sandy loam
3C3—48 to 80 inches; stratified loamy very fine sand to silty clay loam

Urban land

Extent of the component in the map unit: 27 percent
Slope: 0 to 1 percent
Runoff rate: Very high
Flooding: Rare
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Cleora Series

Major land resource area: Arkansas Valley and Ridges (118)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Stratified moderately coarse textured alluvium of Pleistocene age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plains
Landscape: Valleys
Landform: Flood plains
Slope: 0 to 3 percent
Mean annual precipitation: 36 to 56 inches
Mean annual air temperature: 57 to 68 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Coarse-loamy, mixed, active, thermic Fluventic Hapludolls

Associated Soils

These are the Osage, Radley, and Verdigris soils. Osage soils contain more than 35 percent clay in the control section and crack at the surface during dry periods. Radley and Verdigris soils contain more than 18 percent clay and less than 15 percent fine sand or coarser particles in the control section

Typical Pedon

Sequoyah County, Oklahoma; on Little Skin Bayou Creek about 0.5 mile west of Muldrow, Oklahoma; about 1,100 feet north and 900 feet east of the southwest corner of sec. 24, T. 11 N., R. 25 W. (Colors are for moist soil unless otherwise indicated.)

A—0 to 15 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; weak fine granular structure; slightly hard, friable; few fine roots; moderately acid; gradual smooth boundary. (10 to 24 inches thick)
AC—15 to 30 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; few thin strata of pale

brown fine sandy loam; massive; slightly hard, very friable; few fine roots; moderately acid; gradual smooth boundary. (6 to 30 inches thick)

C—30 to 70 inches; dark yellowish brown (10YR 4/4) fine sandy loam, light yellowish brown (10YR 6/4) dry; thin strata of very pale brown fine sandy loam; massive; slightly hard, very friable; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the solum: Less than 40 inches

A horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 2
Texture—loam, loamy fine sand, or fine sandy loam
Reaction—neutral to moderately acid

AC or Bw horizon:
Color—hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 3 or 4
Texture—loam or fine sandy loam stratified with thin strata of sand to clay loam
Reaction—neutral to moderately acid

C horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—loam, loamy fine sand, or fine sandy loam with thin strata of sand to clay loam
Reaction—neutral to moderately acid

9—Cleora fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 84A
Elevation: 300 to 1,000 feet
Mean annual precipitation: 38 to 56 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Cleora and similar soils

Extent of the component in the map unit: 100 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 8.6 inches
Water table: More than 6 feet
Flooding: Occasional
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—112XY050OK, Loamy Bottomland

Typical profile:
A—0 to 11 inches; fine sandy loam
AC—11 to 31 inches; fine sandy loam
C—31 to 62 inches; stratified loamy fine sand to loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Coweta Series

Major land resource area: Cherokee Prairies (112)
Depth class: Shallow
Drainage class: Well drained to somewhat excessively drained
Parent material and geologic age: Residuum from sandstone interbedded with shale of Pennsylvanian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits, shoulder slopes, and backslopes
Slope: 1 to 30 percent
Mean annual precipitation: 37 to 45 inches
Mean annual air temperature: 57 to 62 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Loamy, siliceous, superactive, thermic, shallow Typic Hapludolls

Associated Soils

These are the Bates, Collinsville, Dennis, Eram, Talihina, and Vinita soils. Bates, Dennis, Eram, and Vinita soils are on the lower slopes, and they have an argillic horizon and a solum thicker than 20 inches. Collinsville soils have a lithic contact within 20 inches. Talihina soils have a content of clay more than 35 percent in the control section.

Typical Pedon

Coweta loam, in an area of rangeland; Wagoner County, Oklahoma; about 11 miles northeast of Coweta; 2,050 feet west and 50 feet south of the northeast corner of sec. 29, T. 19 N., T. 15 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 8 inches; dark brown (7.5YR 3/2) loam, brown (7.5YR 5/2) dry; moderate fine granular structure; slightly hard, friable; many fine and medium roots; few sandstone fragments; moderately acid; gradual wavy boundary. (4 to 14 inches thick)

Bw—8 to 15 inches; brown (7.5YR 4/4) gravelly fine sandy loam, brown (7.5YR 5/4) dry; weak fine granular structure; slightly hard, friable; common fine roots; 20 percent, by volume, soft sandstone fragments less than 3 inches in diameter; 10 percent sandstone fragments 3 to 10 inches in diameter; moderately acid; abrupt wavy boundary. (6 to 12 inches thick)

Cr—15 to 30 inches; strong brown (7.5YR 5/6) and yellowish red (5YR 5/8) soft sandstone interbedded with shale; strongly acid.

Range in Characteristics

Thickness of the mollic epipedon: 4 to 14 inches
Thickness of the solum: 10 to 20 inches
Depth to bedrock: 10 to 20 inches

A horizon:
- Color—hue of 7.5YR or 10YR, value of 3, and chroma of 2 or 3
- Texture—loam, fine sandy loam, gravelly loam, gravelly fine sandy loam, cobbly loam, cobbly fine sandy loam, stony fine sandy loam, or stony loam
- Reaction—slightly acid to strongly acid
- Content of rock fragments, by volume—0 to 35 percent coarse fragments; 0 to 20 percent coarse fragments less than 76 mm in diameter; 0 to 30 percent coarse fragments 76 mm to 250 mm in diameter; 0 to 30 percent coarse fragments more than 250 mm in diameter

Bw horizon:
- Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 8
- Texture—loam, fine sandy loam, clay loam, gravelly loam, gravelly fine sandy loam, or gravelly clay loam
- Reaction—slightly acid to strongly acid
- Content of rock fragments, by volume—5 to 35 percent coarse fragments; 5 to 30 percent coarse fragments less than 76 mm in diameter; 0 to 15 percent coarse fragments more than 76 mm in diameter

Cr horizon:
- Color—strong brown
- Kind of bedrock—soft acid sandstone interbedded with shale, and has a hardness of less than 3 (Mohs scale); hard sandstone occurs between depths of 24 and 60 inches in some pedons (excavation difficulty is high)

10—Coweta-Bates complex, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 700 to 1,360 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days

Major Component Description

Coweta and similar soils

Extent of the component in the map unit: 60 percent
Slope: 3 to 5 percent
Runoff rate: Medium
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 2.5 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
- Land capability classification (nonirrigated)—4e
- Ecological site number and name—112XY086OK, Shallow Prairie (eastern)

Typical profile:
- A—0 to 6 inches; loam

Bw—6 to 17 inches; gravelly clay loam
Cr—17 to 31 inches; bedrock

Bates and similar soils

Extent of the component in the map unit: 35 percent
Slope: 3 to 5 percent
Runoff rate: Medium
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 4.6 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 9 inches; loam
BA—9 to 12 inches; loam
Bt—12 to 25 inches; clay loam
Cr—25 to 32 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

11—Coweta-Urban land-Eram complex, 3 to 12 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 2,000 feet
Mean annual precipitation: 22 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 185 to 230 days

Major Component Description

Coweta and similar soils

Extent of the component in the map unit: 30 percent
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 2.5 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site—not assigned

Typical profile:
A—0 to 6 inches; loam
Bw—6 to 17 inches; gravelly loam
Cr—17 to 31 inches; bedrock

Urban land

Extent of the component in the map unit: 30 percent
Slope: 3 to 12 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Eram and similar soils

Extent of the component in the map unit: 20 percent
Slope: 3 to 12 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 5.8 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site—not 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

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Darnell Series

Major land resource area: Northern Cross Timbers (84A)
Depth class: Shallow
Drainage class: Well to somewhat excessively drained
Parent material and geologic age: Sandstone of Permian age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 1 to 45 percent
Slope shape: Convex-convex
Elevation: 750 to 1,300 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 58 to 64 degrees F
Frost-free days: 200 to 230
Thornthwaite PE index: 44 to 64

Taxonomic class: Loamy, siliceous, active, thermic, shallow Udic Haplustepts

Associated Soils

These are the Darsil, Harrah, Littleaxe, Newalla, Niotaze, Noble, and Stephenville soils. Darsil soils occur intermingled in the same landscape, and have a texture of loamy fine sand or coarser. Harrah, Littleaxe, and Stephenville soils occur on broad, flat summits, shoulders, or backslopes and have Bt horizons. In addition, Harrah soils have a solum more than 60 inches thick, Littleaxe soils have a solum 40 to 60 inches thick, and Stephenville soils have a solum 20 to 40 inches thick. Newalla and Niotaze soils occur on broad flats or upper side slopes, have Bt horizons, and have a fine control section. In addition, Newalla and Niotaze soils have a solum more than 20 inches thick.

Typical Pedon

Darnell fine sandy loam, in a scrub oak forest; Lincoln County, Oklahoma; about 8 miles west of Tryon; 900 feet west and 100 feet north of the southeast corner of sec. 17 T. 16 N., R. 2 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, very friable; many roots; moderately acid; gradual smooth boundary. (4 to 10 inches thick)
Bw—5 to 15 inches; light brown (7.5YR 6/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable; many roots; few fragments of sandstone less than 1 inch in diameter; moderately acid; gradual wavy boundary. (4 to 12 inches thick)
Cr—15 to 30 inches; red (2.5YR 4/6) sandstone, dark red (2.5YR 3/6) moist; difficult to auger; moderately acid.

Range in Characteristics

Thickness of the ochric epipedon: 4 to 10 inches
Thickness of the solum: 10 to 20 inches
Depth to bedrock: 10 to 20 inches

A horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4
Texture—fine sandy loam, sandy loam, loam, stony fine sandy loam, or stony loam
Reaction—neutral to strongly acid
Content of clay—10 to 20 percent
Content of rock fragments, by volume—0 to 20 percent; 0 to 5 percent fragments less than 3 inches in diameter; 0 to 15 percent fragments 3 to 10 inches in diameter

Bw horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 8, and chroma of 2 to 6
Texture—fine sandy loam, sandy loam, gravelly loam, or gravelly fine sandy loam
Reaction—strongly acid to neutral
Content of clay—10 to 25 percent
Content of rock fragments, by volume—0 to 20 percent; 0 to 20 percent fragments less than 3 inches in diameter; 0 to 5 percent fragments 3 to 10 inches in diameter

Cr horizon:
Color—hue of 10R to 10YR, value of 4 to 7, and chroma of 3 to 8
Kind of bedrock—weakly to strongly consolidated sandstone; has high to very high excavation difficulty; fractures are more than 10 cm apart; root restrictive
Reaction—strongly acid to neutral

Dennis Series

Major land resource area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Material weathered from shale of Pennsylvanian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits, shoulder slopes, and backslopes
Slope: 0 to 8 percent
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 57 to 62 degrees F
Thornthwaite PE index: More than 64

Taxonomic class: Fine, mixed, active, thermic Aquic Argiudolls

Associated soils

These are the Bates, Collinsville, Eram, Okemah, and Parsons soils. Bates soils have a fine-loamy control section and have a thinner solum. Bates soils are on the slightly higher side slopes. Collinsville soils lack an argillic horizon, have sandstone within 20 inches of the soil surface, and are on slightly higher ridge crests and side slopes. Eram soils are moderately deep over shale and are on adjacent slightly concave areas. Okemah soils are on adjacent slightly concave areas. Parsons soils have an ochric epipedon and an abrupt change of texture from the A horizon to the Bt horizon. Parsons soils are on adjacent slightly concave areas.

Typical Pedon

Dennis silt loam, in an area of rangeland; Rogers County, Oklahoma; about 0.5 mile north of Claremore; 650 feet north and 490 feet east of the center of sec. 4, T. 21 N., R. 16 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium and fine granular structure; slightly hard, friable; common wormcasts; moderately acid; gradual smooth boundary. (10 to 15 inches thick)

AB—11 to 13 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; slightly hard, friable; common very dark grayish brown wormcasts; strongly acid; clear smooth boundary. (0 to 4 inches thick)

BA—13 to 17 inches; brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; common medium and fine faint dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) redoximorphic depletion masses; moderate medium subangular blocky structure; hard and friable in the upper part, and firm in the lower part; few very dark grayish brown wormcasts; few fine dark concretions; strongly acid; gradual smooth boundary. (3 to 10 inches thick)

Bt1—17 to 22 inches; yellowish brown (10YR 5/4) clay, light yellowish brown (10YR 6/4) dry; many medium faint yellowish brown (10YR 5/6) and few fine prominent yellowish red redoximorphic concentration masses and common medium faint grayish brown (10YR 5/2) redoximorphic depletion masses; moderate medium blocky structure; very hard, firm; thin nearly continuous clay films on faces of peds; few fine dark concretions; strongly acid; gradual smooth boundary. (3 to 8 inches thick)

Bt2—22 to 30 inches; yellowish brown (10YR 5/4) clay, brownish yellow (10YR 6/5) dry; many medium distinct light brownish gray (10YR 6/2) and light gray (10YR 6/1) redoximorphic depletion masses, common fine prominent yellowish red redoximorphic concentration masses; moderate medium blocky structure; very hard, very firm; thin nearly continuous clay films on faces of peds; few fine dark concretions; strongly acid; gradual smooth boundary. (5 to 12 inches thick)

Bt3—30 to 36 inches; yellowish brown (10YR 5/6) clay, brownish yellow (10YR 6/6) dry; many medium and coarse distinct gray (10YR 6/1) redoximorphic depletion masses; weak coarse blocky structure; very hard, very firm; patchy clay films on faces of peds; few fine dark concretions; strongly acid; gradual smooth boundary. (0 to 8 inches thick)

Bt4—36 to 50 inches; mixed matrix yellowish brown (10YR 5/6) and gray (10YR 6/1) clay, brownish yellow (10YR 6/6) and light gray (10YR 7/1) dry redoximorphic concentration and depletion masses; weak coarse blocky structure; very hard, very firm; patchy clay films on faces of peds; few fine dark concretions; many soft black films and bodies; moderately acid; gradual smooth boundary. (10 to 20 inches thick)

Bt5—50 to 68 inches; mixed matrix of yellowish brown (10YR 5/8), brownish yellow (10YR 6/6) dry, and gray (10YR 6/1) redoximorphic concentration and depletion masses; silty clay loam; weak coarse blocky structure; very hard, firm; patchy clay films on faces of peds; few fine dark concretions; few soft black films and bodies; slightly acid; gradual smooth boundary. (0 to 20 inches thick)

C—68 to 78 inches; yellowish brown (10YR 5/8) silty clay loam, brownish yellow (10YR 6/8) dry; common distinct horizontal streaks of gray (10YR 6/1) redoximorphic depletion masses; weak horizontal lamination and thin seams of siltstone; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 15 inches
Thickness of the solum: More than 60 inches

A or Ap horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 2 or 3
Texture—loam, silt loam, or silty clay loam
Reaction—moderately acid or strongly acid

AB horizon:
Color—hue of 10YR, value of 4, and chroma of 3
Texture—loam or silt loam
Reaction—moderately acid or strongly acid

BA horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4
Texture—silty clay loam or clay loam
Reaction—moderately acid to very strongly acid
Other features—common medium and fine faint dark grayish brown and grayish brown masses of redoximorphic depletion

Bt1, Bt2, and Bt3 horizons:
Color—hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6
Texture—silty clay loam, silty clay, or clay
Reaction—slightly acid to strongly acid
Other features—common redoximorphic features in shades of gray, brown, yellow, or red

Bt4 and Bt5 horizons:
Color—hue of 10YR or 2.5Y, value of 5, and chroma of 6 to 8
Texture—silty clay loam, clay loam, silty clay, or clay
Reaction—slightly alkaline to moderately acid
Other features—common redoximorphic features in shades of brown, red, gray, or yellow

C horizon:
Color—hue of 10YR or 2.5Y, value of 5, and chroma of 6 to 8
Texture—silty clay loam, clay loam, silty clay, or clay
Reaction—moderately alkaline to moderately acid
Other features—common redoximorphic features in shades of gray, brown, yellow, or red

12—Dennis silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Dennis and similar soils

Extent of the component in the map unit: 100 percent
Slope: 1 to 3 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.6 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A1—0 to 8 inches; silt loam
A2—8 to 15 inches; silt loam
BA—15 to 25 inches; silty clay loam
Bt1—25 to 35 inches; silty clay
Bt2—35 to 47 inches; silty clay
BC—47 to 80 inches; silty clay

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

13—Dennis silt loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Dennis and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 5 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.6 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A1—0 to 8 inches; silt loam
A2—8 to 12 inches; silt loam
BA—12 to 16 inches; silty clay loam
Bt1—16 to 24 inches; silty clay loam
Bt2—24 to 46 inches; clay
BC—46 to 80 inches; clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

14—Dennis silt loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Dennis and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 5 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.3 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY856OK, Reseeded Loamy Prairie

Typical profile:
A—0 to 6 inches; silt loam
BA—6 to 10 inches; clay loam
Bt—10 to 44 inches; clay loam
BC—44 to 80 inches; clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

15—Dennis-Pharoah complex, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Dennis and similar soils

Extent of the component in the map unit: 77 percent
Slope: 1 to 3 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A1—0 to 8 inches; silt loam
A2—8 to 14 inches; silt loam
BA—14 to 18 inches; silty clay loam
Bt1—18 to 34 inches; silty clay
Bt2—34 to 54 inches; silty clay
BC—54 to 80 inches; silty clay

Pharoah and similar soils

Extent of the component in the map unit: 23 percent
Slope: 1 to 3 percent
Runoff rate: Very high
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 9.9 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3w
Ecological site number and name—112XY010OK, Claypan Prairie

Typical profile:
A—0 to 9 inches; silt loam
E—9 to 12 inches; silt loam
Bt1—12 to 26 inches; silty clay
Bt2—26 to 47 inches; silty clay
BC—47 to 80 inches; silty clay

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

16—Dennis-Radley complex, 0 to 12 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Dennis and similar soils

Extent of the component in the map unit: 66 percent
Slope: 1 to 5 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow

Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

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 80 inches; clay

Radley and similar soils

Extent of the component in the map unit: 34 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Moderately well drained
Available water capacity: About 11.8 inches
Water table: More than 6 feet
Flooding: Frequent
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site—not assigned

Typical profile:
A—0 to 10 inches; silt loam
Bw—10 to 20 inches; silt loam
C—20 to 80 inches; silty clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

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

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 2,000 feet
Mean annual precipitation: 22 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 185 to 230 days

Major Component Description

Urban land

Extent of the component in the map unit: 57 percent
Slope: 0 to 5 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Dennis and similar soils

Extent of the component in the map unit: 43 percent
Slope: 0 to 5 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site—not assigned

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

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Endsaw Series

Major land resource area: Arkansas Valley and Ridges (118) and Ouachita Mountains (119)
Depth class: Deep
Drainage class: Well drained
Parent material and geologic age: Loamy colluvium and clayey material derived from shale of the Pennsylvanian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Shoulder slopes or backslopes
Slope: 3 to 40 percent
Mean annual precipitation: 40 to 44 inches
Mean annual air temperature: 60 to 64 degrees F
Thornthwaite PE index: 64 to 74

Taxonomic class: Fine, mixed, active, thermic Oxyaquic Hapludalfs

Associated Soils

These are the Enders, Clearview, Hector, Homa, and Linker soils. Enders and Homa soils are on similar landscapes and Clearview and Linker soils are on smooth ridges and side slopes. Hector soils are on ridge crests and are shallow over sandstone. Clearview and Linker soils have less than 35 percent clay in the control section. Homa soils have vertic properties.

Typical Pedon

Endsaw fine sandy loam, in an area of forest; Okfuskee County, Oklahoma; 2,500 feet south and 2,000 feet east of the northwest corner of sec. 11, T. 10 N., R. 12 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) cobbly fine sandy loam; weak fine granular structure; very friable; fragments of sandstone less than 75 mm (3 inches) in diameter make up 10 percent, by volume; cobbles make up 10 percent, by volume; few stones; moderately acid; clear smooth boundary. (2 to 5 inches thick)

E—4 to 14 inches; light yellowish brown (10YR 6/4) cobbly fine sandy loam; weak fine granular structure; very friable; fragments of sandstone less than 75mm (3 inches) in diameter make up 10 percent, by volume; cobbles make up 20 percent, by volume; few stones; strongly acid; clear smooth boundary. (2 to 10 inches thick)

2Bt1—14 to 19 inches; yellowish red (5YR 4/6) clay; moderate fine blocky structure; very firm; thick continuous clay films on faces of peds; fragments of sandstone less 75mm (3 inches) in diameter make up 2 percent, by volume; very strongly acid; clear smooth boundary. (18 to 25 inches thick)

2Bt2—19 to 34 inches; yellowish red (5YR 4/6) clay; many medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderate medium blocky structure; very firm; thick continuous clay films on faces of peds; fragments of sandstone less than 75mm (3 inches) in diameter make up 2 percent, by volume; very strongly acid; clear smooth boundary. (18 to 24 inches thick)

2BC—34 to 42 inches; mottled yellowish brown (10YR5/6) and gray (10YR 5/1) clay; weak coarse blocky structure; very firm; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary. (0 to 24 inches thick)

2Cr—42 to 60 inches; olive gray (5Y 5/2) and gray (10YR 5/1) soft shale; slightly acid; tilted 10 degrees from horizontal.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Tilt of bedrock: 0 to 20 degrees

A horizon:
Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3
Texture—loam or fine sandy loam
Content of rock fragments, by volume—5 to 25 percent sandstone fragments 2 mm to 76 mm in diameter; 0 to 15 percent sandstone fragments 76 mm to 25 cm in diameter; 0 to 5 percent stones; 5 to 50 percent total coarse fragments
Reaction—moderately acid or strongly acid

E horizon:
Color—hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6
Texture—loam or fine sandy loam
Content of rock fragments, by volume—5 to 25 percent sandstone fragments 2 mm to 76 mm in diameter; 0 to 15 percent sandstone fragments 76 mm to 25 cm in diameter; 0 to 5 percent stones; 5 to 50 percent total coarse fragments

Reaction—moderately acid or strongly acid

2Bt horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8; with redoximorphic concentrations and depletions in shades of yellow, brown, red, or gray
Texture—silty clay or clay with a clay content commonly of 40 to 55 percent but ranging to 60 percent
Content of rock fragments, by volume—0 to 10 percent sandstone fragments 2 mm to 76 mm in diameter; 0 to 5 percent sandstone fragments from 76 mm to 25 cm; 0 to 25 percent total coarse fragments
Reaction—strongly acid or very strongly acid

2BC horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 1 to 8; with redoximorphic concentrations and depletions in shades of brown, red, and gray
Texture—silty clay or clay
Content of rock fragments, by volume—0 to 20 percent sandstone or shale fragments 2 mm to 76 mm in diameter; 0 to 10 percent sandstone or shale fragments 76 mm to 25 cm in diameter; 0 to 30 percent total coarse fragments
Reaction—moderately acid to very strongly acid

2Cr horizon:
Kind of bedrock—grayish or yellowish shale that is tilted 0 to 20 degrees from horizontal
Reaction—neutral to very strongly acid

18—Endsaw-Hector complex, 5 to 30 percent slopes

Map Unit Setting

Major land resource area: 118B
Elevation: 400 to 2,400 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 175 to 230 days

Major Component Description

Endsaw and similar soils

Extent of the component in the map unit: 75 percent
Slope: 5 to 30 percent
Runoff rate: Very high
Depth to paralithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 5.6 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7s
Ecological site number and name—118XY075OK, Sandy Savannah

Typical profile:
A—0 to 8 inches; stony loam
2Bt1—8 to 38 inches; clay
2Bt2—38 to 42 inches; clay
2Cr—42 to 60 inches; bedrock

Hector and similar soils

Extent of the component in the map unit: 25 percent
Slope: 5 to 8 percent
Runoff rate: Very high
Depth to lithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.0 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—6s
Ecological site number and name—118XY088OK, Shallow Savannah

Typical profile:
A—0 to 4 inches; stony loam
E—4 to 7 inches; stony loam
Bw—7 to 18 inches; gravelly loam
Cr—18 to 20 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Eram Series

Major land resource area: Cherokee Prairies (112)
Depth class: Moderately deep
Drainage class: Moderately well drained
Parent material and geologic age: Shale interbedded with thin layers of sandstone of Pennsylvanian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits, shoulders, and backslopes
Slope: 1 to 20 percent
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 62 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Fine, mixed, active, thermic Aquic Argiudolls

Associated Soils

These are the Collinsville, Coweta, Dennis, Kenoma, Okemah, Talihina, and Woodson soils. Dennis, Kenoma, and Okemah soils occur on the lower broad, smooth slopes. Talihina soils occur on higher ridge crests. Collinsville and Coweta soils lack Bt horizons, have a solum less than 20 inches thick over sandstone bedrock, and occur on the higher ridge crests. Woodson soils have an abrupt textural boundary between the A and Bt horizon and occur on the lower broad, smooth slopes.

Typical Pedon

Eram clay loam, in an area of rangeland; Okmulgee County, Oklahoma; about 5 miles northeast of Beggs; 550 feet north and 300 feet east of the southwest corner of sec. 3, T. 15 N., R. 12 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 10 inches; very dark grayish brown (10YR 3/2) clay loam; dark grayish brown (10YR 4/2) dry; moderate medium granular structure; hard, firm; slightly acid; gradual smooth boundary. (6 to 14 inches thick)

Bt—10 to 18 inches; very dark grayish brown (10YR 3/2) clay; few fine faint light olive brown redoximorphic concentration masses; moderate medium blocky structure; extremely hard, very firm; nearly continuous clay films on faces of peds; slightly acid; gradual smooth boundary. (6 to 14 inches thick)

BC—18 to 30 inches; brown (10YR 4/3) clay; few fine faint gray redoximorphic depletion masses; weak coarse blocky structure; extremely hard, very firm; slightly acid; gradual smooth boundary. (6 to 16 inches thick)

Cr—30 to 40 inches; gray and olive shale; slightly acid in upper part becoming alkaline with depth.

Range in Characteristics

Thickness of the mollic epipedon: 12 to 20 inches
Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches

A horizon:
Color—hue of 7.5YR to 5Y, value of 2 or 3, and chroma of 2 or 3
Texture—silt loam, clay loam, silty clay loam, or silty clay
Content of rock fragments, by volume—0 to 15 percent sandstone fragments less than 3 inches in diameter
Reaction—moderately acid or slightly acid

Bt horizon:
Color—hue of 5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4
Texture—clay loam, silty clay loam, silty clay, or clay
Content of clay—35 to 55 percent
Reaction—strongly acid to neutral
Other features—few redoximorphic features in shades of brown, yellow, or gray

BC horizon:
Color—hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 6
Texture—clay loam, silty clay loam, silty clay, or clay
Reaction—strongly acid to neutral
Other features—few redoximorphic features in shades of brown, yellow, or gray

Cr horizon:
Color—gray or olive shale
Kind of bedrock—shale or compacted clay beds interbedded with thin layers of sandstone
Reaction—slightly acid to moderately alkaline

19—Eram silty clay loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,100 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F

Frost-free period: 200 to 220 days

Major Component Description

Eram and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 6.2 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 14 inches; silty clay loam
Bt—14 to 25 inches; silty clay loam
BC—25 to 36 inches; silty clay loam
Cr—36 to 40 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

20—Eram-Coweta complex, 5 to 15 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,100 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Eram and similar soils

Extent of the component in the map unit: 58 percent
Slope: 5 to 15 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 4.5 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 12 inches; silty clay loam
Bt—12 to 18 inches; silty clay loam
BC—18 to 26 inches; silty clay loam
Cr—26 to 30 inches; bedrock

Coweta and similar soils

Extent of the component in the map unit: 42 percent
Slope: 5 to 8 percent
Runoff rate: High
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 2.7 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—112XY086OK, Shallow Prairie (eastern)

Typical profile:
A—0 to 11 inches; loam
Bw—11 to 17 inches; gravelly clay loam
Cr—17 to 28 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Glenpool Series

Major land resource area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Somewhat excessively drained
Parent material and geologic age: Sandy and loamy sediments of Pleistocene age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Terraces
Position: Summits and backslopes
Slope: 0 to 15 percent
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 57 to about 63 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Siliceous, thermic Psammentic Paleudalfs

Associated Soils

These are the Kamie, Karma, and Larton soils. Kamie and Larton soils are on the same terrace in the slightly lower parts of the landscape. Karma soils are on the lower terraces.

Typical Pedon

Glenpool loamy fine sand, in a forested area; Tulsa County, Oklahoma; about 4 miles northwest of Bixby; 2,400 feet south and 150 feet west of the northeast corner of sec. 33, T. 18 N., R. 13 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak fine granular structure; very friable; moderately acid; gradual smooth boundary. (0 to 6 inches thick)

E—4 to 41 inches; brown (7.5YR 5/4) fine sand; weak fine granular structure; loose; moderately acid; gradual smooth boundary. (34 to 54 inches thick)

Bt—41 to 48 inches; strong brown (7.5YR 5/6) loamy fine sand; weak fine granular structure; very friable; clay films bridging sand grains; moderately; clear wavy boundary. (0 to 25 inches thick)

E and Bt1—48 to 55 inches; red (2.5YR 5/6) loamy fine sand; single grained; loose (E); with alternating lamellae of red (2.5YR 4/6) fine sandy loam (Bt1); the lamellae are very fine and fine subangular blocky structure; very friable; wavy and discontinuous 1/4 to 3/4 inch thick and 4 to 10 inches apart; the lamellae have clay bridges between the sand grains; strongly acid; gradual smooth boundary. (6 to 24 inches thick)

E and Bt2—55 to 80 inches; reddish yellow (5YR 6/6) loamy fine sand; single grained; loose (E); with lamellae of yellowish red (5YR 4/6) fine sandy loam (Bt2); the lamellae are weak fine subangular blocky structure; very friable; wavy and discontinuous 1/4 to 3/4 inch thick and 6 to 15 inches apart; the lamellae have clay bridges between the sand grains; strongly acid.

Range in Characteristics

Thickness of the solum: More than 60 inches
Thickness of the A and E horizons: 40 to 60 inches

A horizon:
Color—hue of 7.5YR or 10YR, value 3 to 6, and chroma of 2 to 4
Texture—loamy fine sand or fine sand
Reaction—strongly acid to slightly acid

E horizon:
Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6
Texture—loamy fine sand or fine sand
Reaction—very strongly acid to slightly acid

Bt horizon:
Color—hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6
Texture—loamy fine sand
Reaction—moderately acid to very strongly acid

E part of the E and Bt horizons:
Color—hue of 2.5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—loamy fine sand
Reaction—moderately acid to very strongly acid

Bt part of the E and Bt horizons:
Color—hue of 2.5YR or 5YR, value 4 or 5, and chroma of 4 to 6
Texture—fine sandy loam or loamy fine sand; lamellae up to 1 inch thick and from about 1 to 16 inches apart
Reaction—moderately acid to very strongly acid
Skeletans—less than 5 percent, by volume

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

Map Unit Setting

Major land resource area: 118B
Elevation: 500 to 1,000 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Glenpool and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 15 percent
Runoff rate: Very low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 5.3 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—118XY020OK, Deep Sand Savannah

Typical profile:
A—0 to 4 inches; loamy fine sand
E—4 to 41 inches; fine sand
Bt—41 to 48 inches; loamy fine sand
E and Bt1—48 to 55 inches; fine sandy loam
E and Bt2—55 to 80 inches; loamy fine sand

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Hector Series

Major land resources area: Arkansas Valley and Ridges—Western (118B) and Boston Mountains (117)
Depth class: Shallow
Drainage class: Well drained
Parent material and geologic age: Residuum from sandstone of Pennsylvanian age
Physiographic region: Interior Highlands
Physiographic province: Ouachita
Physiographic subprovince: Arkansas Valley
Landscape: Uplands
Landform: Hills
Position: Summits and shoulders
Slope: 2 to 60 percent
Mean annual precipitation: 42 to 50 inches
Mean annual air temperature: 59 to 63 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Loamy, siliceous, subactive, thermic Lithic Dystrudepts.

Associated Soils

These are the Enders, Fayetteville, Hartsells, Leesburg, Linker, Mountainburg, and Nella soils. Enders, Fayetteville, Hartsells, Leesburg, Linker, and Nella soils are deeper to bedrock and have argillic horizons. Mountainburg soils are loamy-skeletal and have an argillic horizon.

Typical Pedon

Hector gravelly fine sandy loam, in a forested area; Washington County Arkansas; southeast quarter of the southeast quarter of the northeast quarter of sec. 1, T. 15 N., R. 33 W. (Colors are for moist soil unless otherwise indicated.)

A—0 to 2 inches; dark brown (10YR 3/3) gravely fine sandy loam, brown (10YR 5/3) dry; moderate medium granular structure; very friable; many roots; about 25 percent, by volume, fragments of sandstone less than 3 inches in diameter; slightly acid; clear smooth boundary. (0 to 3 inches thick)

E—2 to 6 inches; brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; moderate medium granular structure; very friable; many roots; about 30 percent, by volume, fragments of sandstone less than 3 inches in diameter; moderately acid; clear smooth boundary. (3 to 8 inches)

Bw—6 to 15 inches; strong brown (7.5YR 5/6) fine sandy loam, reddish yellow (7.5YR 7/6) dry; very

weak medium subangular blocky structure; friable; common roots; about 14 percent, by volume, fragments of sandstone dominantly less than 3 inches in diameter, but few to 10 inches in diameter; strongly acid; abrupt irregular boundary. (4 to 10 inches thick)
R—15 inches; hard, massive sandstone bedrock.

Range in Characteristics

Thickness of the solum: 14 to 20 inches
Depth to bedrock: 14 to 20 inches

A horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—sandy loam, fine sandy loam, loam, and stony, cobbly, very cobbly, gravelly, and very gravelly counterparts of these textures
Content of rock fragments, by volume—0 to 50 percent
Reaction—slightly acid to strongly acid

Bw horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value of 4 or 5; and chroma of 3 to 6
Texture—sandy loam, fine sandy loam, loam, and stony, cobbly, and gravelly counterparts of these textures
Content of rock fragments, by volume—0 to 35 percent
Reaction—strongly acid or very strongly acid

22—Hector-Linker complex, 1 to 5 percent slopes

Map Unit Setting

Major land resource area: 118B
Elevation: 500 to 2,800 feet
Mean annual precipitation: 43 to 50 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 175 to 210 days

Major Component Description

Hector and similar soils

Extent of the component in the map unit: 60 percent
Slope: 2 to 5 percent
Runoff rate: Very high
Depth to lithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.8 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—118XY088OK, Shallow Savannah

Typical profile:
A—0 to 2 inches; gravelly loam
E—2 to 9 inches; gravelly loam
Bw—9 to 15 inches; gravelly loam
Cr—15 to 20 inches; bedrock

Linker and similar soils

Extent of the component in the map unit: 40 percent
Slope: 1 to 5 percent
Runoff rate: Very high
Depth to lithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 4.4 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—118XY075OK, Sandy Savannah

Typical profile:
A—0 to 5 inches; loam
BA—5 to 12 inches; gravelly loam
Bt—12 to 26 inches; sandy clay loam
BC—26 to 31 inches; gravelly sandy clay loam
Cr—31 to 33 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Kamie Series

Major land resource area: Ouachita Mountains (119), Cherokee Prairies (112), and Boston Mountains (117)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from predominantly loamy alluvium of Pleistocene age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Hills
Landform: Terraces
Position: Treads and risers
Slope: 1 to 20 percent
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 59 to 64 degrees F
Thornthwaite PE index: More than 64

Taxonomic class: Fine-loamy, mixed, active, thermic Typic Paleudalfs

Associated Soils

These are the Glenpool, Karma, Larton, Muskogee, Okay, Sallisaw, and Vian soils. Glenpool and Larton soils are on the slightly lower terraces and have a thicker A horizon. Karma soils are on the lower terraces. Muskogee, Okay, and Vian soils are on nearby landscapes. Muskogee and Vian soils are fine-silty and have gray mottles in the upper part of the argillic horizon. Okay soils have a mollic epipedon. Sallisaw soils are on the lower terraces of local streams.

Typical Pedon

Kamie fine sandy loam, in an area of tame pasture; Wagoner County, Oklahoma; about 2 miles southwest of Coweta; 1,000 feet west and 100 feet south of the northeast corner of sec. 26, T. 17 N., R. 15 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 6 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine roots; medium acid; clear smooth boundary. (4 to 8 inches thick)

E—6 to 18 inches; brown (7.5YR 5/4) fine sandy loam, weak fine granular structure; very friable; few fine roots; medium acid; clear smooth boundary. (4 to 14 inches thick)

Bt1—18 to 42 inches; dark red (2.5YR 3/6) sandy clay loam; moderate medium subangular blocky structure; firm; few patchy clay films on faces of peds and bridging sand grains; strongly acid; diffuse wavy boundary. (10 to 30 inches thick)

Bt2—42 to 56 inches; yellowish red (5YR 4/8) sandy clay loam; moderate medium subangular blocky structure; firm; few patchy clay films on faces of peds and bridging sand grains; medium acid; diffuse wavy boundary. (10 to 28 inches thick)

BC—56 to 70 inches; reddish yellow (5YR 6/6) fine sandy loam in about 75 percent of the volume, and red (2.5YR 4/6) sandy clay loam in a mixed pattern in about 21 percent of the volume; weak medium subangular blocky structure; very friable; thin patchy clay films on faces of peds and bridging sand grains; skeletans or pockets of clean sand grains occupy about 4 percent of the volume; strongly acid.

Range in Characteristics

Thickness of the solum: More than 60 inches

Ap or A horizon:
Color—hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 2 to 4
Texture—fine sandy loam or loamy fine sand
Reaction—neutral to strongly acid

E horizon:
Color—hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 3 to 6
Texture—fine sandy loam or loamy fine sand
Reaction—neutral to strongly acid

Bt horizon:
Color—hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 8
Texture—sandy clay loam or clay loam
Reaction—slightly acid or strongly acid
Content of clay—20 to 35 percent

BC horizon:
Color—hue of 7.5YR, value of 5, and chroma of 6 to 8; or hue of 2.5 YR or 5YR, value of 4 to 6, and chroma of 6 to 8
Texture—fine sandy loam, loam, or sandy clay loam
Reaction—slightly acid to very strongly acid
Content of clay—18 to 32 percent

23—Kamie loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

Major land resource area: 118B
Elevation: 500 to 1,000 feet

Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Kamie and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 8 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.1 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—4e
Ecological site number and name—118XY075OK, Sandy Savannah

Typical profile:
A—0 to 6 inches; loamy fine sand
E—6 to 18 inches; loamy fine sand
Bt—18 to 54 inches; sandy clay loam
BC—54 to 64 inches; sandy clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

24—Kamie fine sandy loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 118B
Elevation: 500 to 1,000 feet
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Kamie and similar soils

Extent of the component in the map unit: 100 percent
Slope: 1 to 3 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.9 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—118XY075OK, Sandy Savannah

Typical profile:
A—0 to 8 inches; fine sandy loam
E—8 to 16 inches; fine sandy loam
Bt—16 to 54 inches; sandy clay loam
BC—54 to 66 inches; sandy clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

25—Kamie-Urban land complex, 1 to 8 percent slopes

Map Unit Setting

Major land resource area: 118B
Elevation: 500 to 2,000 feet
Mean annual precipitation: 22 to 43 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 185 to 230 days

Major Component Description

Kamie and similar soils

Extent of the component in the map unit: 62 percent
Slope: 1 to 8 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.1 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site—not 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

Urban land

Extent of the component in the map unit: 38 percent
Slope: 1 to 8 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Kanima Series

Major land resource area: Cherokee Prairies (112), Arkansas Valley and Ridges (118), and Ouachita Mountains (119)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Excavated loamy material weathered from sandstone, shale, and limestone of Pennsylvanian age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Shoulders and backslopes
Slope: 1 to 70 percent
Mean annual precipitation: 45 inches
Mean annual air temperature: 61 degrees F
Thornthwaite PE Index: More than 64

Taxonomic class: Loamy-skeletal, mixed, active, nonacid, thermic Alfic Udarents

Associated Soils

These are the Bokoshe, Burwell, Carytown, Counts, Dennis, Liberal, Okemah, Parsons, Sobal, Stigler, Tamaha, Vian, Wing, and Wister soils. Bokoshe soils have fragipans and occupy the side slopes on adjacent topography. Burwell soils have Bt horizons and are on the mounds. Carytown and Wing soils have natric horizons and are on adjacent topography. Counts, Dennis, Liberal, Okemah, Parsons, Sobal, Stigler, Tamaha, Vian, and Wister soils have Bt horizons and are on adjacent topography. In addition, Dennis and Okemah soils have mollic epipedons.

Typical Pedon

Kanima gravelly silty clay loam, in an area of idle land; Haskell County, Oklahoma; about 3 miles south of Tamaha, 2,100 feet south and 1,300 feet west of the northeast corner of sec. 8, T. 10 N., R. 22 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (2.5Y 3/2) gravelly silty clay loam; massive; friable; shale gravel fragments make up 20 percent, by volume; few fine coal fragments; neutral; diffuse wavy boundary. (4 to 12 inches thick)
C—6 to 72 inches; very dark grayish brown (2.5Y 3/2) extremely gravelly silty clay loam; massive; friable; very dark gray (N 3/0) shale gravel fragments make

up 70 percent, by volume, in the upper part and 85 percent, by volume, in the lower part; coal fragments make up 2 percent, by volume; few fragments of very dark grayish brown (10YR 3/2) granular silt loam and yellowish brown (10YR 5/4) silty clay loam having thin patchy clay films; neutral.

Range in Characteristics

Coal fragments: 0 to 5 percent in all horizons

A horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4
Texture—gravelly clay loam, gravelly silty clay loam, gravelly loam, gravelly silt loam, very gravelly clay loam, very gravelly silty clay loam, very gravelly loam, very gravelly silt loam, extremely gravelly clay loam, extremely gravelly silty clay loam, extremely gravelly loam, extremely gravelly silt loam, stony clay loam, stony loam, stony silty clay loam, gravelly silty clay, stony silt loam, or very channery silt loam
Reaction—moderately acid to moderately alkaline
Content of rock fragments, by volume—15 to 90 percent fragments less than 76 mm in diameter; 0 to 25 percent fragments more than 76 mm in diameter

C horizon:
Color—hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4
Texture—very gravelly loam, very gravelly silt loam, very gravelly clay loam, very gravelly silty clay loam, extremely gravelly clay loam, extremely gravelly silty clay loam, extremely gravelly loam, extremely gravelly silt loam, or extremely channery silt loam
Reaction—moderately acid to moderately alkaline
Content of rock fragments, by volume—35 to 90 percent fragments less than 76 mm in diameter; 5 to 30 percent fragments more than 76 mm in diameter; rock fragments are gray, brown, yellow, or white

26—Kanima gravelly silty clay loam, 3 to 50 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 38 to 52 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 240 days

Major Component Description

Kanima and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 50 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 4.3 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7s
Ecological site number and name—119XY899OK, Reseeded Disturbed Land

Typical profile:
A—0 to 3 inches; gravelly silty clay loam
C—3 to 80 inches; very gravelly silty clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Kiomatia Series

Major land resources area: Western Coastal Plains (133B)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Sandy alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Low flood plains
Slope: 0 to 5 percent
Mean annual precipitation: 45 inches

Mean annual air temperature: 64 degrees F
Thornthwaite PE index: 80

Taxonomic class: Sandy, mixed, thermic Typic Udifluvents

Associated Soils

These are the Idabel, Oklared, Redlake, and Roebuck soils. They are in flood plains; however, Roebuck soils are in depressional positions. Redlake and Roebuck soils are clayey throughout. Idabel and Oklared soils have average textures finer than loamy fine sand in the control section.

Typical Pedon

Kiomatia loamy fine sand, in a pasture; Red River County, Texas; about 15 miles northeast of Clarksville, 1 mile east of Clarksville on Highway 82 to insertion of Farm Road 114, east on 114 to English, then north on Farm Road 1699 to Martin Shiloh Church, north on county road to Chapman Ranch and continue on private road 3 miles; in a pasture about 200 yards south of the Red River. (Colors are for moist soil unless otherwise indicated.)

A—0 to 4 inches; brown (7.5YR 5/4) loamy fine sand; single grained; slightly hard, very friable; few fine roots; contains few fine strata of reddish brown (5YR 5/4) fine sandy loam; calcareous; moderately alkaline; abrupt smooth boundary. (2 to 10 inches thick)

C1—4 to 9 inches; light brown (7.5YR 6/4) fine sand; single grained; loose; common fine and medium strata of reddish brown (2.5YR 5/4) loamy fine sand and fine sandy loam; calcareous; moderately alkaline; abrupt smooth boundary. (4 to 9 inches thick)

C2—9 to 15 inches; brown (7.5YR 5/4) very fine sandy loam; single grained; soft, very friable; few fine and medium strata of dark grayish brown (10YR 4/2) fine sandy loam; calcareous; moderately alkaline; abrupt smooth boundary. (0 to 8 inches thick)

C3—15 to 60 inches; light brown (7.5YR 6/4) fine sand; single grained; loose; many fine and medium strata of reddish brown (5YR 5/4) very fine sandy loam, fine sandy loam, and pale brown (10YR 6/3) loamy fine sand; calcareous; moderately alkaline.

Range in Characteristics

Reaction: Slightly acid to moderately alkaline; noncalcareous or calcareous

A horizon:
Color—hue of 5YR or 7.5YR, value of 4 to 7, and chroma of 3 to 6
Texture—very fine sandy loam, fine sandy loam, loamy fine sand, or silty clay loam

C horizon:
Color—hue of 5YR or 7.5YR, value of 4 to 8, and chroma of 4 to 8
Texture—fine sand or loamy fine sand stratified with loamy very fine sand and finer textures

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

Map Unit Setting

Major land resource area: 118B
Elevation: 80 to 750 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 220 to 280 days

Major Component Description

Kiomatia and similar soils

Extent of the component in the map unit: 98 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 5.2 inches
Water table: Present
Flooding: Frequent
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site—not assigned

Typical profile:
A—0 to 10 inches; loamy fine sand
C—10 to 61 inches; stratified fine sand to loam

Additional Components

- Wet depressions: 2 percent

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Larton Series

Major land resource area: Western Coastal Plains (133B) and Arkansas Valley and Ridges (118)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from loamy and sandy alluvium; on eolian materials of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Coastal Plain
Physiographic subprovince: West Gulf Coastal Plain
Landscape: Valleys
Landform: High terraces
Position: Side slopes
Slope: 0 to 20 percent
Mean annual precipitation: 38 to 45 inches
Mean annual air temperature: 57 to 67 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Loamy, siliceous, active, thermic Arenic Paleudalfs

Associated Soils

These are the Boxville, Karma, Muskogee, and Okay soils. Boxville soils are on terraces of similar elevation and they have a clayey particle-size control section. Muskogee soils are on the higher terraces and are fine-silty. Karma soils are on the lower terraces and have an argillic horizon that decreases by more than 20 percent clay from the maximum within a depth of 60 inches. Okay soils are on terraces of similar elevations and have a mollic epipedon.

Typical Pedon

Larton loamy fine sand, in a cultivated area; Bryan County, Oklahoma; about 12 miles southwest of Durant; 2,210 feet east and 60 feet north of the southwest corner of sec. 2, T. 8 S., R. 7 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 9 inches; brown (7.5YR 4/4) loamy fine sand, light brown (7.5YR 6/4) dry; single grained; loose, dry or moist; slightly acid; abrupt smooth boundary. (0 to 9 inches thick)

E—9 to 25 inches; brown (7.5YR 5/4) loamy fine sand, light brown (7.5YR 6/4) dry; weak fine granular structure; slightly hard, friable; few organic stains; moderately acid; clear wavy boundary. (10 to 31 inches thick)

Bt1—25 to 31 inches; red (2.5YR 5/6) fine sandy loam, light red (2.5YR 6/6) dry; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable; thin nearly continuous clay films on faces of peds and bridging sand grains; organic stains in few root channels; few streaks of material from above horizons; moderately acid; gradual smooth boundary. (6 to 14 inches thick)

Bt2—31 to 48 inches; yellowish red (5YR 5/6) fine sandy loam, reddish yellow (5YR 6/6) dry; moderate medium subangular blocky structure; hard, friable; thin nearly continuous clay films on faces of peds; moderately acid; gradual smooth boundary. (10 to 24 inches thick)

Bt3—48 to 60 inches; yellowish red (5YR 5/6) fine sandy loam, reddish yellow (5YR 6/6) dry; weak medium subangular blocky structure; hard, friable; thin patchy clay films on faces of peds; few organic stains; few bodies of clean sand grains; moderately acid; gradual smooth boundary. (10 to 20 inches thick)

Bt4—60 to 73 inches; mixed yellowish red (5YR 5/6), red (2.5YR 5/6), and pale brown (10YR 6/3) relict redoximorphic concentration masses; sandy clay loam; weak coarse subangular blocky structure; hard, firm; thin patchy clay films on faces of peds; few bodies of clean sand grains; organic stains in root channels; slightly acid.

Range in Characteristics

Depth to the solum: 60 to more than 80 inches

Ap horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 4
Texture—loamy fine sand
Reaction—slightly acid to strongly acid

E horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 4
Texture—loamy fine sand
Reaction—slightly acid to strongly acid

Bt1 horizon:
Color—hue of 2.5YR, 5YR, or 7.5YR; value of 4 or 5; and chroma of 4 to 8
Texture—fine sandy loam, loam, or sandy clay loam
Reaction—moderately acid to very strongly acid

Bt2 horizon:
Color—hue of 2.5YR, 5YR, or 7.5YR; value of 4 or 5; and chroma of 4 to 8

Texture—fine sandy loam, loam, or sandy clay loam
Reaction—moderately acid to very strongly acid

Bt3 horizon:
Color—hue of 2.5YR, 5YR, or 7.5YR; value of 4 or 5; and chroma of 4 to 8
Texture—fine sandy loam, loam, or sandy clay loam
Reaction—moderately acid to very strongly acid

Bt4 horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8
Texture—sandy clay loam
Reaction—slightly acid to strongly acid

28—Larton-Glenpool complex, 0 to 3 percent slopes

Map Unit Setting

Major land resource area: 118B
Elevation: 500 to 1,000 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 57 to 66 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Larton and similar soils

Extent of the component in the map unit: 80 percent
Slope: 0 to 1 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 7.2 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—118XY020OK, Deep Sand Savannah

Typical profile:
A—0 to 11 inches; loamy fine sand
E—11 to 30 inches; loamy fine sand
Bt1—30 to 36 inches; sandy clay loam
Bt2—36 to 54 inches; sandy clay loam
Bt3—54 to 66 inches; sandy clay loam

Glenpool and similar soils

Extent of the component in the map unit: 20 percent
Slope: 0 to 3 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 5.3 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—4s
Ecological site number and name—118XY020OK, Deep Sand Savannah

Typical profile:
A—0 to 4 inches; loamy fine sand
E—4 to 41 inches; fine sand
E and Bt—41 to 80 inches; loamy fine sand

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Latanier Series

Major land resource area: Arkansas Valley and Ridges (118)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Reddish clayey alluvium that overlies reddish loamy alluvium of Pleistoncene age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Flood plains
Slope: 0 to 3 percent
Mean annual precipitation: 38 to 60 inches
Mean annual air temperature: 57 to 70 degrees F
Thornthwaite PE index: More than 64

Taxonomic class: Clayey over loamy, smectitic over mixed, superactive, thermic Oxyaquic Hapluderts

Associated Soils

These include the competing Moreland series and the Coushatta, Lela, Oklared, and Redlake series. Lela soils do not have a discontinuity with an abrupt textural change. Coushatta soils are fine-silty throughout. Oklared soils are coarse-loamy throughout, and Redlake soils do not have an abrupt textural change within the control section.

Typical Pedon

Latanier clay, in a pasture; Rapides Parish, Louisiana; 1.4 mile southeast of Chambers; 100 feet east of drainage ditch; 400 feet north of the southeast corner of Spanish Land Grant in sec. 54, T. 2 N., R. 1 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; dark reddish brown (5YR 3/3) clay; strong coarse subangular blocky structure; very firm; neutral; gradual wavy boundary. (4 to 8 inches thick)

Bwss1—6 to 25 inches; dark reddish brown (5YR 3/3) clay; moderate coarse prismatic structure parting to moderate medium and fine angular blocky; firm; slightly effervescent; slightly alkaline; abrupt wavy boundary. (8 to 28 inches thick)

Bwss2—25 to 30 inches; dark reddish brown (5YR 3/4) silty clay; weak coarse subangular blocky structure; firm; strongly effervescent; moderately alkaline; clear wavy boundary. (0 to 10 inches thick)

2C1—30 to 41 inches; light reddish brown (5YR 6/4) silt loam; massive; friable; strongly effervescent; moderately alkaline; abrupt wavy boundary. (8 to 20 inches thick)

2C2—41 to 45 inches; light reddish brown (5YR 5/4) silty clay loam; massive; plastic; strongly effervescent; moderately alkaline; abrupt wavy boundary.

2C3—45 to 60 inches; reddish brown (5YR 4/4) silt loam; massive; very friable; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to contrasting texture: 20 to 40 inches
Calcareous: Some horizons between a depth of 8 and 36 inches

A horizon:
Color—hue of 7.5YR or 5YR, value of 3, and chroma of 2 or 3
Texture—clay, silty clay, or silty clay loam
Reaction—neutral, mildly alkaline, or moderately alkaline

Bwss horizon:
Color—hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 2 to 4
Texture—clay or silty clay
Reaction—neutral, mildly alkaline, or moderately alkaline
Slickensides—few to common

2B horizon (if it occurs):
Color—hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 2 to 4
Texture—monotextured or stratified very fine sandy loam, silt loam, or silty clay loam; thin strata of clay or silty clay between depths of 50 and 60 inches in some pedons
Reaction—neutral, mildly alkaline, or moderately alkaline; calcareous

2C horizon:
Color—hue of 5YR, value of 4 to 6, and chroma of 3 to 6
Texture—monotextured or stratified very fine sandy loam, silt loam, or silty clay loam; thin strata of clay or silty clay between depths of 50 and 60 inches in some pedons
Reaction—neutral, mildly alkaline, or moderately alkaline; calcareous

29—Latanier clay, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 112
Elevation: 10 to 120 feet
Mean annual precipitation: 38 to 60 inches
Mean annual air temperature: 50 to 70 degrees F
Frost-free period: 220 to 300 days

Major Component Description

Latanier and similar soils

Extent of the component in the map unit: 99 percent
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.9 inches
Water table: Present
Flooding: Occasional
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—4w
Ecological site—not assigned

Typical profile:
Ap—0 to 11 inches; clay
Bw—11 to 32 inches; clay
2C1—32 to 42 inches; silt loam
3C2—42 to 66 inches; very fine sandy loam

Additional Components

- Wet depressions: 1 percent

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Linker Series

Major land resource area: Arkansas Valleys and Ridges (118)
Depth class: Moderately deep
Drainage class: Well drained
Parent material and geologic age: Loamy residuum derived from sandstone or interbedded sandstone, siltstone, and shale of Pennsylvanian age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Shoulders and backslopes
Slope: 1 to 15 percent
Mean annual precipitation: 49 inches
Mean annual air temperature: 60 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Fine-loamy, siliceous, semiactive, thermic Typic Hapludults

Associated Soils

These are the competing Hartsells series and the Hector soils. Hector soils are less than 20 inches deep to bedrock and contain more sand than the Linker soils.

Typical Pedon

Linker fine sandy loam, on a slope of 3 percent, in an area of pasture; Pope County, Arkansas; 2.4 miles north of Moreland on Buck Mountain; 300 feet east and 50 feet north of road turn, on crest of ridge, on the southwest quarter of the southwest quarter of the northwest quarter of sec. 35, T. 9. N., R. 19 W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 5 inches; brown (10YR 5/3) fine sandy loam; weak medium granular structure; very friable; common roots; few sandstone flags on the surface and in the soil; common fine pores; few wormcasts; strongly acid; clear wavy boundary. (4 to 7 inches thick)
BA—5 to 10 inches; yellowish red (5YR 4/6) loam; weak medium subangular blocky structure; friable; common fine roots; many medium pores; clay coatings and bridging on sand grains and in some pores; few wormcasts; very strongly acid; clear wavy boundary. (0 to 7 inches thick)
Bt—10 to 25 inches; yellowish red (5YR 4/8) loam; moderate medium subangular blocky structure; friable; few fine roots; common fine pores; common patchy thin clay films on faces of peds and in pores; very strongly acid; clear wavy boundary. (12 to 20 inches thick)
BC—25 to 35 inches; yellowish red (5YR 4/8) gravelly fine sandy loam; common medium distinct red (2.5YR 4/6), strong brown (7.5YR 5/6), and common medium prominent pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; common fine pores; few patchy thin clay films on faces of peds; about 20 percent pebbles and flagstones of sandstone; very strongly acid; abrupt wavy boundary. (0 to 15 inches thick)
R—35 to 37 inches; level-bedded, acid sandstone.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Reaction: Extremely acid to strongly acid throughout, except for surface layers that have been limed
Other features: Some pedons have Cr horizons, 1 to 6 inches thick, of reddish, brownish, or grayish weathered sandstone.

Ap horizon:
Color—hue of 10YR, value 4 or 5, and chroma of 3; or value of 4, and chroma of 2 to 4; or hue of 7.5YR, value of 4 or 5, and chroma of 4; or value of 4, and chroma of 2. Some pedons have A1

horizons, 2 to 4 inches thick, with hue of 10YR, value 3 or 4, and chroma of 2 to 4. Some pedons have A2 horizons with hue of 10YR, value of 5, and chroma of 2, 3, or 4; or hue of 7.5YR, value of 5, and chroma of 2 to 4.
Texture—fine sandy loam or loam with gravelly, flaggy, and stony modifiers

BA horizon:
Color—hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 7.5YR, value of 4 or 5, and chroma of 6
Texture—fine sandy loam, sandy clay loam, or loam
Content of clay—18 to 28 percent
Content of sand—20 percent fine and coarser sand
Content of rock fragments, by volume—0 to 10 percent sandstone fragments

Bt horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8
Texture—sandy clay loam, clay loam, or loam
Clay content—18 to 28 percent
Sand content—20 percent fine and coarser sand
Content of rock fragments, by volume—0 to 10 percent sandstone fragments

BC horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8
Texture—sandy clay loam, clay loam, or loam
Content of rock fragments, by volume—0 to 25 percent
Redoximorphic features—red, brown, and gray

Lula Series

Major land resource area: Cherokee Prairies (112)
Depth class: Deep
Drainage class: Well drained
Parent material and geologic age: Weathered from limestone of Pennsylvanian age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Shoulders and backslopes
Slope: 0 to 5 percent
Mean annual precipitation: 37 to 45 inches
Mean annual air temperature: 57 to 64 degrees F
Thornthwaite PE index: More than 64

Taxonomic class: Fine-silty, mixed, active, thermic Typic Argiudolls

Associated Soils

These are the competing Catoosa, Claremore, Clareson, and Newtonia soils and the Scullin, Shidler, and Summit soils. Catoosa, Claremore, Clareson, Newtonia, Scullin, and Shidler soils occur on similar areas of the landscape. In addition, Scullin soils have a fine control section and a solum less than 40 inches thick. Shidler soils have a solum less than 20 inches thick. Summit soils occur on side slopes usually in areas below the Lula soils and a have fine control section.

Typical Pedon

Lula silt loam, in an area of rangeland; Craig County, Oklahoma; about 4 miles west and 1 mile north of Centralia; 2,000 feet east and 1,000 feet south of the northwest corner of sec. 19, T. 27 N., R. 18 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; hard, friable; medium acid; gradual smooth boundary. (6 to 16 inches thick)
BA—10 to 18 inches; dark reddish brown (5YR 3/3) silty clay loam, reddish brown (5YR 4/3) dry; strong medium granular structure; hard, friable; medium acid; gradual smooth boundary. (6 to 14 inches thick)
Bt1—18 to 32 inches; dark reddish brown (2.5YR 3/4) silty clay loam, reddish brown (2.5YR 4/4) dry; common fine faint dark red mottles; moderate medium blocky structure; hard, firm; clay films on faces of peds; few fine black concretions; strongly acid; gradual smooth boundary. (10 to 28 inches thick)
Bt2—32 to 52 inches; dark reddish brown (2.5YR 3/4) silty clay loam, reddish brown (2.5YR 4/4) dry; few fine faint dark red mottles; moderate medium blocky structure; very hard, firm; clay films on faces of peds; few fine black concretions; few coarse chert and limestone fragments less than 76 mm in diameter; neutral; abrupt wavy boundary. (0 to 24 inches thick)
R—52 to 55 inches; hard limestone bedrock.

Range in Characteristics

Thickness of the mollic epipedon: 10 to more than 20 inches
Thickness of the solum: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Tilt of bedrock: Less than 20 degrees

A horizon:
Color—hue of 5YR to 10YR, value of 2 or 3, and chroma of 2 or 3

Texture—loam or silt loam
Reaction—moderately acid or slightly acid

BA horizon:
Color—hue of 5YR to 10YR, value of 3 or 4, and chroma of 3 or 4
Texture—loam, silt loam, clay loam, or silty clay loam
Reaction—moderately acid or slightly acid
Content of clay—20 to 35 percent

Bt horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 4 to 6
Texture—clay loam or silty clay loam
Reaction—strongly acid to slightly acid in the upper part; moderately acid to neutral in the lower part

30—Lula silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Lula and similar soils

Extent of the component in the map unit: 100 percent
Slope: 1 to 3 percent
Runoff rate: Very high
Depth to lithic bedrock: 40 to 60 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 10.0 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 14 inches; silt loam
BA—14 to 19 inches; silty clay loam
Bt—19 to 54 inches; silty clay loam
R—54 to 60 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Mason Series

Major land resources area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Moderately well drained
Parent material and geologic age: Silty alluvium of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landform: Flood plains
Slope: 0 to 3 percent
Mean annual precipitation: 36 to 43 inches
Mean annual air temperature: 58 to 62 degrees F
Thornthwaite PE index: 64 to 78

Taxonomic class: Fine-silty, mixed, active, thermic Pachic Argiudolls

Associated Soils

These are the Caspiana, Garton, Muldrow, Okay, Pledger, and Roebuck soils along rivers; and the Lightning, Osage, Radley, Verdigris, and Wynona soils on major creeks in lower positions. The Caspiana soils are in higher positions and are closer to the river; Garton soils are in slightly lower positions and are farther from the river; Muldrow, Pledger, and Roebuck soils are also farther from the river in the back swamp positions. Okay soils are on terraces. Garton, Lightning, Muldrow, Osage, Pledger, and Roebuck soils have a fine control section. Okay soils do not have a mollic epipedon more than 20 inches thick. Radley, Verdigris, and Wynona soils do not have an argillic horizon.

Typical Pedon

Mason silt loam, in a cultivated area; Washington County, Oklahoma; about 8 miles east of Bartlesville; 1,290 feet east and 200 feet north of the southwest corner of sec. 16, T. 26 N., R. 14 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard, friable; slightly acid; gradual smooth boundary. (6 to 10 inches thick)

A—8 to 14 inches; dark brown (10YR 3/3) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; slightly hard, friable; slightly acid; gradual smooth boundary. (5 to 12 inches thick)

Bt1—14 to 22 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 4/3) dry; moderate medium subangular blocky structure; slightly hard, friable; patchy clay films on faces of peds; slightly acid; gradual smooth boundary. (6 to 22 inches thick)

Bt2—22 to 30 inches; brown (10YR 4/3) silty clay loam, dark yellowish brown (10YR 4/4) dry; moderate medium subangular blocky structure; very hard, firm; nearly continuous clay films on faces of peds; few dark-colored concretions; moderately acid; gradual smooth boundary. (0 to 18 inches thick)

BC—30 to 48 inches; dark yellowish brown (10YR 4/4) clay loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; hard, firm; moderately acid; gradual smooth boundary. (8 to 23 inches thick)

C—48 to 65 inches; dark yellowish brown (10YR 4/4) clay loam, yellowish brown (10YR 5/4) dry; massive; hard, firm; moderately acid.

Range in Characteristics

A horizon:
Color—hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 or 3
Texture—loam, silt loam, silty clay loam, or clay loam
Reaction—strongly acid to neutral

Bt1 horizon:
Color—hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 or 3
Texture—loam, silt loam, silty clay loam, or clay loam
Reaction—moderately acid to neutral

Bt2 horizon:
Color—hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4
Texture—loam, silt loam, silty clay loam, or clay loam
Reaction—strongly acid to neutral

BC horizon:
Color—hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4
Texture—loam, silt loam, silty clay loam, or clay loam
Reaction—strongly acid to neutral
Redoximorphic features—shades of brown, red, or gray

C horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4
Texture—loam, silt loam, clay loam, or silty clay loam; or strata of these textures
Reaction—strongly acid to slightly alkaline
Redoximorphic features—shades of brown, red, or gray

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

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 36 to 43 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Mason and similar soils

Extent of the component in the map unit: 100 percent
Slope: 0 to 1 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately slow
Drainage class: Moderately well drained
Available water capacity: About 10.9 inches
Water table: More than 6 feet
Flooding: Rare
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—112XY050OK, Loamy Bottomland

Typical profile:
A—0 to 13 inches; silt loam
Bt—13 to 37 inches; silty clay loam
BC—37 to 56 inches; silty clay loam
C—56 to 80 inches; silty clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Newtonia Series

Major land resource area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loess, loamy and clayey sediments, and residuum
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Shoulders and backslopes
Slope: 0 to 8 percent
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 57 to 62 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Fine-silty, mixed, superactive, thermic Typic Paleudolls

Associated Soils

These are the competing Choteau, Dennis, Eldorado, and Okemah soils. Catoosa soils are underlain by limestone bedrock between depths of 20 to 40 inches, Claremore soils have hard limestone within a depth of 20 inches, Lula soils are underlain with hard limestone between depths of 40 and 60 inches, Maplegrove soils are fine textured and are moderately well drained, Osage soils are fine textured and are poorly drained, Shidler soils have hard limestone within a depth of 20 inches, Summit soils are fine textured on the lower third of the side slope, and Talpa soils have hard limestone within a depth of 20 inches.

Typical Pedon

Newtonia silt loam, in an area of rangeland; Tulsa County, Oklahoma; about 0.5 mile east of Tulsa International Airport; about 2,080 feet east of 200 feet south of the northwest corner of sec. 19, T. 20 N., R. 14 E. Colors are for moist soil unless otherwise indicated.)

A—0 to 11 inches; dark brown (7.5YR 3/2) silt loam; moderate fine granular structure; slightly hard, friable; slightly acid; gradual smooth boundary. (6 to 14 inches thick)
BA—11 to 18 inches; dark reddish brown (5YR 3/3) silt loam; moderate fine and medium subangular blocky structure; hard, friable; few wormcasts; moderately acid; gradual smooth boundary. (4 to 12 inches thick)
Bt1—18 to 26 inches; dark reddish brown (2.5YR 3/4) silty clay loam; moderate fine and medium subangular blocky structure; hard, friable; few wormcasts; nearly continuous clay films on faces of peds; strongly acid; gradual smooth boundary. (6 to 12 inches thick)
Bt2—26 to 46 inches; dark red (2.5YR 3/6) silty clay loam; moderate fine and medium subangular blocky structure; hard, friable; nearly continuous clay films on faces of peds; moderately acid; gradual smooth boundary. (10 to 20 inches thick)
Bt3—46 to 62 inches; red (2.5YR 4/6) silty clay loam; moderate fine subangular blocky structure; hard, friable; nearly continuous clay films on faces of peds; slightly acid.

Range in Characteristics

Thickness of the solum: More than 60 inches
Depth to the argillic horizon: 10 to 26 inches
Content of clay in the particle-size control section (weighted average): 30 to 35 percent
Content of sand in the particle-size control section (weighted average): 4 to 16 percent
Content of rock fragments in the particle-size control section (weighted average): 0 to 5 percent imestone and chert less than 3 inches in diameter

A or Ap horizon:
Color—hue of 7.5YR to 10YR, value of 2 or 3, and chroma of 1 to 3
Texture—silt loam, loam, or silty clay loam
Reaction—neutral to strongly acid
Base saturation—75 to 100 percent
Content of clay—14 to 24 percent
Content of rock fragments, by volume—0 to 1 percent
Content of gravel size fragments—0 to 1 percent

BA horizon:
Color—hue of 5YR to 7.5YR, value of 3 or 4, and chroma of 2 to 4
Texture—silt loam or silty clay loam
Reaction—sightly acid to strongly acid

Bt horizon (upper part):
Color—hue of 2.5 YR, 5YR or 7.5YR; value of 3 to 5; and chroma of 3 to 8
Texture—silty clay loam
Reaction—moderately acid or strongly acid
Base saturation—50 to 90 percent
Content of clay—20 to 35 percent
Content of rock fragments, by volume—0 to 3 percent
Content of gravel size fragments, by volume—0 to 3 percent

Bt horizon (lower part):
Color—hue of 2.5YR, 5YR or 7.5YR; value of 3 to 5; and chroma of 3 to 8
Texture—silty clay loam, silty clay, or clay
Reaction—moderately acid or strongly acid
Base saturation—50 to 90 percent
Content of clay—30 to 55 percent
Content of rock fragments, by volume—0 to 55 percent
Content of gravel size fragments, by volume—0 to 50 percent
Content of cobble size fragments, by volume—0 to 20 percent

2Bt horizon (if it occurs):
Color—hue of 2.5 YR, 5YR or 7.5YR; value of 3 to 5, and chroma of 3 to 8
Texture—silty clay loam, silty clay, or clay
Reaction—strongly acid to neutral
Base saturation—50 to 90 percent
Content of clay—30 to 55 percent
Content of rock fragments, by volume—0 to 55 percent
Content of gravel size fragments, by volume—0 to 50 percent
Content of cobble size fragments, by volume—0 to 20 percent

3Bt horizon (if it occurs):
Color—hue of 2.5 YR, 5YR or 7.5YR; value of 3 to 5; and chroma of 3 to 8
Texture—silty clay loam, silty clay, or clay
Reaction—strongly acid to neutral
Base saturation—50 to 90 percent
Content of clay—30 to 55 percent
Content of rock fragments, by volume—0 to 55 percent
Content of gravel size fragments, by volume—0 to 50 percent
Content of cobble size fragments, by volume—0 to 20 percent

32—Newtonia silt loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Newtonia and similar soils

Extent of the component in the map unit: 100 percent
Slope: 1 to 3 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.4 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 11 inches; silt loam
BA—11 to 18 inches; silt loam
Bt1—18 to 26 inches; silty clay loam
Bt2—26 to 46 inches; silty clay loam
BC—46 to 80 inches; silty clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

33—Newtonia silt loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Newtonia and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.6 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 12 inches; silt loam
BA—12 to 17 inches; silty clay loam
Bt1—17 to 30 inches; silty clay loam
Bt2—30 to 46 inches; silty clay loam
BC—46 to 80 inches; silty clay

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Niotaze Series

Major land resources area: Northern Cross Timbers (84A)
Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Weathered shales interbedded with sandstone of the Pennsylvanian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Side slopes and summits
Slope: 3 to 45 percent
Mean annual precipitation: 32 to 40 inches
Mean annual air temperature: 57 to 62 degrees F
Thornthwaite PE index: 48 to 75

Taxonomic class: Fine, smectitic, thermic Aquic Paleustalfs

Associated Soils

These are the Darnell, Stephenville, and Wewoka soils. Darnell soils are on similar positions to Niotaze soils but have sandstone within a depth of 20 inches. Stephenville soils are on less sloping areas than Niotaze soils. Wewoka soils are on broad to narrow ridges and have a sandy-skeletal control section.

Typical Pedon

Niotaze cobbly fine sandy loam, in a wooded area; Chautauqua County, Kansas; 1 mile southeast of the town of Chautauqua; 850 feet south and 900 feet of the northeast corner of sec. 14, T. 35 S., R. 11 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 3 inches; grayish brown (10YR 5/2) cobbly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; slightly hard, very friable; many fine roots; 40 percent, by volume, subangular fragments of sandstone; moderately acid; clear irregular boundary. (2 to 5 inches thick)
E—3 to 10 inches; pale brown (10YR 6/3) cobbly fine sandy loam, brown (10YR 5/3) moist; weak very fine granular structure; slightly hard, very friable; few fine roots; 30 percent, by volume, subangular fragments of sandstone; strongly acid; abrupt smooth boundary. (2 to 10 inches thick)
2Bt—10 to 18 inches; brown (7.5YR 5/4) silty clay, reddish brown (5YR 4/4) moist; weak medium

subangular blocky and moderate fine angular blocky structure; very hard, very firm; few fine roots; continuous clay films on faces of peds, grayish coatings on faces peds in upper 3 inches; strongly acid; gradual smooth boundary. (6 to 19 inches thick)

2BC—18 to 28 inches; mixed light brown (7.5YR 6/4) and gray (10YR 6/1) silty clay loam, brown (7.5YR 4/4) moist; common fine distinct mottles of strong brown (7.5YR 5/8) and gray (10YR 5/1); weak coarse subangular blocky structure; hard, firm; few fine roots; thin continuous clay films on faces of peds; lower portion having some laminated shale; moderately acid; gradual wavy boundary. (6 to 20 inches thick)

2Cr—28 inches; soft, weakly laminated gray silty shale.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches

horizon:
Color—hue of 10YR, value of 4 to 6 (2 to 4 moist), and chroma of 1 to 3
Texture—cobbly fine sandy loam or fine sandy loam; includes loam, silt loam, very fine sandy loam, or the cobbly or stony counterparts of these textures
Content of rock fragments, by volume—0 to 35 percent sandstone fragments less than 3 inches in diameter; 0 to 35 percent sandstone fragments more than 3 inches in diameter
Reaction—moderately acid or strongly acid
Other features—organic litter up to 1 inch thick on top of the mineral horizon in some pedons

E horizon:
Color—hue of 10YR or 7.5YR, value 5 to 7 (4 to 6 moist), and chroma of 2 to 4
Texture—cobbly fine sandy loam or fine sandy loam; includes loam, silt loam, very fine sandy loam, or the cobbly or stony counterparts of these textures
Content of rock fragments, by volume—0 to 35 percent sandstone fragments less than 3 inches in diameter; 0 to 35 percent sandstone fragments more than 3 inches in diameter
Reaction—moderately acid or strongly acid

Bt horizon:
Color—hue of 2.5YR to 2.5Y, value of 4 to 6 (3 to 5 moist), and chroma of 3 to 6
Texture—silty clay, clay, or silty clay loam containing 35 to 55 percent clay
Reaction—slightly acid to very strongly acid

2BC horizon:
Color—hue of 2.5YR to 2.5Y, value of 4 to 6 (3 to 5 moist), and chroma of 1 to 6
Texture—silty clay, clay, or silty clay loam containing 35 to 55 percent clay
Reaction—neutral to strongly acid
Other features—2BC horizon and lower Bt horizon, in pedons that have a thicker Bt horizon, have grayish redoximorphic depletions with value of 4 or more and chroma of 2 or less and brownish or reddish redoximorphic concentrations having values of 4 or more and chroma of 3 to 8

34—Niotaze-Darnell complex, 3 to 15 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 750 to 1,400 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 230 days

Major Component Description

Niotaze and similar soils

Extent of the component in the map unit: 72 percent
Slope: 3 to 15 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 4.4 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7s
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 5 inches; cobbly fine sandy loam
E—5 to 11 inches; cobbly fine sandy loam
Bt—11 to 34 inches; clay
Cr—34 to 48 inches; bedrock

Darnell and similar soils

Extent of the component in the map unit: 25 percent
Slope: 3 to 15 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches

Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.2 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—6e
Ecological site number and name—084AY088OK, Shallow Savannah

Typical profile:
A—0 to 4 inches; cobbly fine sandy loam
Bw—4 to 17 inches; fine sandy loam
Cr—17 to 20 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

35—Niotaze-Darnell complex, 15 to 25 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 750 to 1,400 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 230 days

Major Component Description

Niotaze and similar soils

Extent of the component in the map unit: 75 percent
Slope: 15 to 25 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 4.5 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7e
Ecological site number and name—084AY076OK, Sandy Savannah (central)

Typical profile:
A—0 to 5 inches; cobbly fine sandy loam
E—5 to 12 inches; cobbly fine sandy loam
Bt—12 to 35 inches; clay
Cr—35 to 64 inches; bedrock

Darnell and similar soils

Extent of the component in the map unit: 25 percent
Slope: 15 to 25 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 2.1 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7e
Ecological site number and name—084AY088OK, Shallow Savannah

Typical profile:
A—0 to 4 inches; fine sandy loam
Bw—4 to 15 inches; fine sandy loam
Cr—15 to 26 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

36—Niotaze-Darnell complex, 25 to 45 percent slopes

Map Unit Setting

Major land resource area: 84A
Elevation: 750 to 1,400 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 230 days

Major Component Description

Niotaze and similar soils

Extent of the component in the map unit: 66 percent
Slope: 25 to 45 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 4.0 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7e
Ecological site number and name—084AY079OK, Savannah Breaks

Typical profile:
A—0 to 4 inches; stony fine sandy loam
E—4 to 13 inches; stony fine sandy loam
Bt—13 to 32 inches; clay
Cr—32 to 40 inches; bedrock

Darnell and similar soils

Extent of the component in the map unit: 34 percent
Slope: 25 to 45 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.6 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7e
Ecological site number and name—084AY079OK, Savannah Breaks

Typical profile:
A—0 to 3 inches; fine sandy loam
Bw—3 to 12 inches; gravelly fine sandy loam
Cr—12 to 22 inches; bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

37—Niotaze-Darnell-Urban land complex, 3 to 25 percent slopes

Map Unit Setting

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

Major Component Description

Niotaze and similar soils

Extent of the component in the map unit: 57 percent
Slope: 3 to 25 percent
Runoff rate: Very high
Depth to paralithic bedrock: 20 to 40 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 4.0 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7s
Ecological site—not assigned

Typical profile:
A—0 to 4 inches; cobbly fine sandy loam
E—4 to 13 inches; cobbly fine sandy loam
Bt—13 to 32 inches; clay
Cr—32 to 40 inches; bedrock

Darnell and similar soils

Extent of the component in the map unit: 21 percent
Slope: 3 to 5 percent
Runoff rate: Very high
Depth to paralithic bedrock: 10 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.6 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3s
Ecological site—not assigned

Typical profile:
A—0 to 3 inches; fine sandy loam
Bw—3 to 12 inches; gravelly fine sandy loam
Cr—12 to 22 inches; bedrock

Urban land

Extent of the component in the map unit: 20 percent
Slope: 3 to 15 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

38—Oil waste land

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 2,200 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 240 days

Major Component Description

Oil waste land

Extent of the component in the map unit: 100 percent
Slope: 0 to 4 percent
Runoff rate: Very high
Salt affected: Saline within a depth of 30 inches
Sodium affected: Sodic within a depth of 30 inches

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Okay Series

Major land resource area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Material weathered from loamy alluvium of Pleistocene age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valley
Landform: Terraces
Position: Treads and risers
Slope: 0 to 5 percent
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 64 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Fine-loamy, mixed, active, thermic Typic Argiudolls

Associated Soils

These are the Caspiana, Kamie, Karma, and Mason soils. Caspiana and Mason soils are on the same terrace, but are in slightly lower positions on the landscape and are farther from the main stream. Kamie soils are on the higher terraces. Karma soils are on the lower terraces or on the same terrace but are slightly higher on the landscape and closer to the main stream.

Typical Pedon

Okay loam, in a cultivated area; Tulsa County, Oklahoma; 6 miles south of Broken Arrow; 2,600 feet south and 100 feet west of the northeast corner of sec. 12, T. 17 N., R. 14 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 12 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate fine granular structure; slightly hard, friable; many fine roots; slightly acid; gradual smooth boundary. (8 to 16 inches thick)

Bt1—12 to 18 inches; dark brown (7.5YR 3/2) loam, dark brown (7.5YR 4/2) dry; moderate fine subangular blocky structure; hard, friable; few fine roots; thin patchy clay film on faces of peds; slightly acid; gradual smooth boundary. (0 to 8 inches thick)

Bt2—18 to 38 inches; reddish brown (5YR 4/4) clay loam, reddish brown (5YR 5/4) dry; moderate medium subangular blocky structure; very hard, firm; few fine roots; nearly continuous clay films on faces of peds; slightly acid; gradual smooth boundary. (8 to 25 inches thick)

Bt3—38 to 46 inches; reddish brown (5YR 5/4) clay loam, light reddish brown (5YR 6/4) dry; moderate medium subangular blocky structure; very hard, firm; nearly continuous clay films on faces of peds; slightly acid; gradual smooth boundary. (6 to 20 inches thick)

BC—46 to 70 inches; reddish brown (5YR 5/4) loam, light reddish brown (5YR 6/4) dry; weak medium subangular blocky structure; hard, friable; few pockets of clean sand grains in the lower part; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the solum: More than 60 inches

A horizon:
Color—hue of 5YR to 10YR, value of 2 or 3, and chroma of 2 or 3
Texture—loam, very fine sandy loam, or fine sandy loam
Reaction—moderately acid to neutral

BA horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4
Texture—very fine sandy loam, loam, or clay loam
Reaction—moderately acid to neutral
Content of clay—20 to 35 percent

Bt1 horizon:
Color—hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4
Texture—loam or clay loam
Reaction—moderately acid to neutral
Content of clay—20 to 35 percent

Bt2 and 3 horizons:
Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 4 to 8
Texture—loam, clay loam, or sandy clay loam
Reaction—strongly acid to slightly acid
Content of clay—20 to 35 percent

BC horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 4 to 8
Texture—fine sandy loam, loam, or sandy clay loam
Reaction—strongly acid to neutral
Content of clay—15 to 27 percent

39—Okay loam, 0 to 1 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,500 feet
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Okay and similar soils

Extent of the component in the map unit: 100 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.1 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 15 inches; loam

BA—15 to 20 inches; loam
Bt—20 to 42 inches; clay loam
BC—42 to 64 inches; loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

40—Okay loam, 1 to 3 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,500 feet
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Okay and similar soils

Extent of the component in the map unit: 100 percent
Slope: 1 to 3 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.1 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 12 inches; loam
BA—12 to 18 inches; loam
Bt—18 to 46 inches; clay loam
BC—46 to 70 inches; loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

41—Okay loam, 3 to 5 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,500 feet
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Okay and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.0 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 11 inches; loam
BA—11 to 19 inches; loam
Bt1—19 to 29 inches; clay loam
Bt2—29 to 44 inches; clay loam
BC—44 to 74 inches; loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

42—Okay loam, 3 to 5 percent slopes, eroded

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,500 feet
Mean annual precipitation: 37 to 43 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 220 days

Major Component Description

Okay and similar soils

Extent of the component in the map unit: 100 percent
Slope: 3 to 5 percent
Runoff rate: Low
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Well drained
Available water capacity: About 9.0 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3e
Ecological site number and name—112XY856OK, Reseeded Loamy Prairie

Typical profile:
A—0 to 8 inches; loam
BA—8 to 12 inches; loam
Bt—12 to 53 inches; sandy clay loam
BC—53 to 80 inches; fine sandy loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Okemah Series

Major land resources area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Loamy and clayey alluvium or colluvium, or from shale of Pennsylvanian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Smooth, high terraces or ridges
Position: Risers of terraces or footslopes of ridges
Slope: 0 to 5 percent
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Fine, mixed, active, thermic Aquic Paleudolls

Associated Soils

These are the Apperson, Choteau, Dennis, Summit, Bates, Collinsville, Parsons, and Taloka soils. Apperson, Choteau, Dennis, and Summit soils are on the same landscapes in the slightly higher positions. Bates and Collinsville soils are on ridge crests and the upper part of side slopes. Bates soils are fine-loamy and have sandstone at a depth of 20 to 40 inches. Collinsville soils are loamy and have sandstone within a depth of 20 inches. Parsons and Taloka soils are on the same landscape in the slightly lower positions. Parsons and Taloka soils have an ochric epipedon and an abrupt change in texture from the A horizon to the Bt horizon.

Typical Pedon

Okemah silt loam, in an area of native hayland; Okmulgee County, Oklahoma; about 5.5 miles west of Beggs; 1,350 feet south and 100 feet west of the northeast corner of sec. 31, T. 15 N., R. 11 E. (Colors are for moist soil unless otherwise indicated.)

A1—0 to 4 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; strong fine subangular blocky structure parting to moderate medium and coarse granular; slightly hard, friable; common wormcasts; moderately acid; diffuse smooth boundary. (0 to 15 inches thick)

A2—4 to 12 inches; very dark brown (10YR 2/2) silt loam, dark gray (10YR 4/1) dry; strong fine subangular blocky structure parting to moderate medium and coarse granular; slightly hard, friable; common wormcasts; moderately acid; clear wavy boundary. (0 to 22 inches thick)

A3—12 to 21 inches; very dark brown (10YR 2/2) silt loam, dark gray (10YR 4/1) dry; few fine faint grayish brown and few fine distinct yellowish brown redoximorphic concentrations; weak medium subangular blocky structure parting to moderate medium and coarse granular; hard, firm; few fine dark concretions; moderately acid; clear wavy boundary. (0 to 10 inches thick)

Bt1—21 to 29 inches; mixed matrix of very dark gray (10YR 3/1) redoximorphic depletion masses, dark yellowish brown (10YR 4/4), reddish brown (5YR 4/4), and olive brown (2.5Y 4/4) redoximorphic concentration masses; silty clay; weak medium blocky structure; very hard, very firm; clay films on faces of peds; a few slickensides; few fine dark concretions; slightly acid; gradual smooth boundary. (4 to 15 inches thick)

Bt2—29 to 43 inches; mixed matrix of dark gray (10YR 4/1) redoximorphic depletion masses, olive brown (2.5Y 4/4), reddish brown (2.5YR 4/4), and yellowish brown (10YR 5/4) redoximorphic concentration masses, silty clay; weak coarse blocky structure; very hard, very firm; clay films on faces of peds; few fine dark concretions; neutral; gradual smooth boundary. (8 to 24 inches thick)

Bt3—43 to 62 inches; coarsely mixed matrix of very dark brown (10YR 2/2), olive brown (2.5Y 4/4), yellowish brown (10YR 5/4), and dark reddish brown (2.5YR 3/4) silty clay; weak coarse blocky structure; very hard, very firm; thin clay films on faces of peds; moderately alkaline; gradual smooth boundary. (8 to 24 inches thick)

BC—62 to 79 inches; olive brown (2.5Y 4/4) clay, light olive brown (2.5Y 5/4) dry; few medium distinct gray (N/5) redoximorphic depletions, and dark yellowish brown (10YR 4/6) redoximorphic concentrations; massive; very hard, very firm; few fine dark concretions; few fine concretions of calcium carbonate; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 15 to 28 inches

Thickness of the solum: More than 60 inches

A horizon:

Color—hue of 10YR, value of 2 or 3, and chroma of 1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid to neutral
Other features—some pedons have a BA horizon that has a finer texture or more evident structure, or both, than those described for the A3 horizon.

Bt horizon:

Color—dominant matrix colors in hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2
Texture—clay loam, silty clay loam, silty clay, or clay
Reaction—moderately acid to moderately alkaline
Redoximorphic features—shades of gray through red; in areas where the Bt horizon lacks a dominant matrix color, coarse redoximorphic features are present in shades of brown, gray, olive, or red; many coarse redoximorphic concentrations with hues redder than 7.5YR or chroma of more than 5 in the lower part

BC horizon:

Color—dominant matrix colors in hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2
Texture—silty clay loam, silty clay, or clay
Reaction—neutral to moderately alkaline
Redoximorphic features—shades of gray through red; in areas where the Bt horizon lacks a dominant matrix color, coarse redoximorphic features are present in shades of brown, gray, olive, or red; many coarse redoximorphic concentrations with hues redder than 7.5YR or chroma of more than 5 in the lower part
Other features—crystals of gypsum in some pedons

43—Okemah silt loam, 0 to 1 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Okemah and similar soils

Extent of the component in the map unit: 100 percent

Slope: 0 to 1 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.6 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 9 inches; silt loam
BA—9 to 20 inches; silt loam
Bt1—20 to 28 inches; silty clay
Bt2—28 to 48 inches; silty clay
BC—48 to 80 inches; silty clay

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

44—Okemah-Parsons-Pharoah complex, 0 to 1 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Okemah and similar soils

Extent of the component in the map unit: 50 percent
Slope: 0 to 1 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.5 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site number and name—112XY059OK, Loamy Prairie (northeast)

Typical profile:
A—0 to 14 inches; silt loam
BA—14 to 17 inches; silt loam
Bt—17 to 54 inches; silty clay loam
BC—54 to 80 inches; silty clay

Parsons and similar soils

Extent of the component in the map unit: 30 percent
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.5 inches
Water table: Present
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site number and name—112XY010OK, Claypan Prairie

Typical profile:
A—0 to 8 inches; silt loam
E—8 to 14 inches; silt loam
Btg1—14 to 25 inches; clay
Btg2—25 to 54 inches; clay
BC—54 to 80 inches; clay

Pharoah and similar soils

Extent of the component in the map unit: 20 percent
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 9.7 inches
Water table: Present

Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—3w
Ecological site number and name—112XY010OK, Claypan Prairie

Typical profile:
A—0 to 7 inches; silt loam
Bt1—7 to 14 inches; silty clay
Bt2—14 to 23 inches; silty clay
Bt3—23 to 51 inches; silty clay
BC—51 to 80 inches; silty clay

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Osage Series

Major land resource area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Poorly drained
Parent material and geologic age: Clayey alluvium of Pleistocene age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Flood plains
Slope: 0 to 2 percent
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 59 to 65 degrees F
Thornthwaite PE index: More than 64

Taxonomic class: Fine, smectitic, thermic Typic Epiaquerts

Associated Soils

These are the coarser textured Cleora, Hepler, Lanton, Mason, McCune, Verdigris, and Wynona soils and the lighter colored Lighting soils that are on nearby flood plains or low terraces.

Typical Pedon

Osage silty clay, on a level area in a cultivated field; Vernon County, Missouri; 100 feet north and 100 feet east of the center of sec. 35, T. 38 N., R. 31 W. (Colors are for moist soil unless otherwise indicated.)

Ap1—0 to 4 inches; very dark gray (10YR 3/1) rubbed clay, gray (10YR 5/1) rubbed, dry; moderate fine granular structure; firm, moderately sticky and moderately plastic; many very fine and fine roots throughout; many fine and medium high continuity interstitial pores; common fine irregular yellowish brown (10YR 5/8) masses of iron accumulation between peds; moderately acid; abrupt smooth boundary.

Ap2—4 to 8 inches; very dark gray (10YR 3/1) rubbed silty clay, gray (10YR 5/1) rubbed, dry; weak coarse angular blocky structure; extremely firm, very sticky and very plastic; common very fine roots between peds; common very fine low continuity tubular pores and few medium low continuity tubular pores; common fine irregular reddish brown (5YR 4/4) masses of iron accumulation between peds; slightly acid; abrupt smooth boundary.

A—8 to 13 inches; very dark gray (10YR 3/1) rubbed clay, gray (10YR 5/1) rubbed, dry; moderate fine and medium angular blocky structure; extremely firm, very sticky and very plastic; common very fine roots between peds; common very fine low continuity tubular pores and few medium low continuity tubular pores; few fine rounded strong brown (7.5YR 5/8) masses of iron accumulation between peds; slightly acid; clear smooth boundary.

Bgss1—13 to 23 inches; very dark gray (10YR 3/1) rubbed clay, gray (10YR 5/1) rubbed, dry; moderate medium prismatic structure parting to moderate fine and medium angular blocky; extremely firm, very sticky and very plastic; common very fine roots between peds; common very fine and fine low continuity tubular pores; few distinct continuous intersecting slickensides on faces of peds; many medium irregular yellowish brown (10YR 5/6) masses of iron accumulation between peds and few medium rounded black (N 2/0) iron-manganese concretions throughout; moderately acid; clear wavy boundary.

Bgss2—23 to 36 inches; dark gray (2.5Y 4/1) interior clay; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm, very sticky and very plastic; common very fine roots between peds; common very fine and fine low continuity tubular pores; many prominent continuous intersecting slickensides on faces of peds; many medium irregular yellowish brown (10YR 5/6) masses of iron accumulation between peds and few fine rounded black (N 2/0) iron-manganese concretions between peds; slightly acid; gradual wavy boundary.

Bgss3—36 to 45 inches; dark gray (2.5Y 4/1) interior clay; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm, very sticky and very plastic; few very fine roots between peds; common very fine and fine low continuity tubular pores; common prominent continuous intersecting slickensides on faces of peds; many coarse irregular yellowish brown (10YR 5/6) masses of iron accumulation between peds; slightly acid; gradual wavy boundary.

Bgss4—45 to 60 inches; very dark gray (2.5Y 3/1) interior clay; moderate medium subangular blocky structure; very firm, very sticky and very plastic; few very fine roots between peds; common very fine and fine low continuity tubular pores; few distinct continuous intersecting slickensides on faces of peds; many coarse irregular yellowish brown (10YR 5/6) masses of iron accumulation between peds; slightly acid; gradual wavy boundary.

Bg—60 to 80 inches; dark gray (5Y 4/1) interior silty clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; common very fine and fine low continuity tubular pores; many coarse irregular yellowish brown (10YR 5/6) masses of iron accumulation between peds; neutral.

Range in Characteristics

Thickness of the solum: 40 to more than 60 inches

A horizon:

Color—hue of 10YR or 2.5Y, value 2 or 3 (4 or 5 dry), and chroma of 1 or 2
Texture—silty clay loam, silty clay, or clay
Reaction—slightly acid to moderately alkaline
Content of rock fragments, by volume—0 to 7 percent gravel
Redoximorphic features—none to common iron accumulations and none to common iron-manganese accumulations

Bgss horizon:

Color—hue of 10YR, 2.5Y, and 5Y; value of 3, 4, or 5 dry; and chroma of 2 or less
Texture—clay or silty clay
Reaction—moderately acid to neutral in upper part; slightly acid to moderately alkaline in the lower part
Content of clay—40 to 60 percent
Content of sand—less than 5 percent
Content of rock fragments, by volume—0 to 7 percent
Calcium carbonate—none to common carbonate concretions
Redoximorphic features—few to common iron accumulations in shades of brown or yellow; none to common iron-manganese accumulations

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

Map Unit Setting

Major land resource area: 112
Elevation: 740 to 800 feet
Mean annual precipitation: 37 to 42 inches
Mean annual air temperature: 55 to 61 degrees F
Frost-free period: 190 to 200 days

Major Component Description

Osage and similar soils

Extent of the component in the map unit: 100 percent
Geomorphic setting: Flood plains
Slope: 0 to 1 percent
Runoff rate: High
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Very slow
Drainage class: Poorly drained
Available water capacity: About 8.9 inches
Water table: Present
Flooding: Occasional
Ponding: None

Interpretive groups:

Land capability classification (nonirrigated)—3w
Ecological site—not assigned

Typical profile:

A1—0 to 8 inches; silty clay
A2—8 to 18 inches; silty clay
Bg1—18 to 38 inches; silty clay
Bg2—38 to 80 inches; silty clay

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Parsons Series

Major land resource area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Clayey alluvium or weathered fissile shale of Pennsylvanian age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Terraces
Position: Risers and treads
Slope: 0 to 3 percent
Mean annual precipitation: 38 to 45 inches
Mean annual air temperature: 57 to 65 degrees F
Thornthwaite PE index: 62 to 84

Taxonomic class: Fine, mixed, active, thermic Mollic Albaqualfs

Associated Soils

These are the Barden, Dennis, Okemah, and Taloka soils. Barden and Taloka soils are in similar positions on the landscape and the Dennis and Okemah soils are in higher positions on the landscape. Barden soils do not have an E horizon and have a BA horizon.

Typical Pedon

Parsons silt loam, in an area of native hayland; Wagoner County, Oklahoma; 1.75 miles north of Wagoner; 1,000 feet south and 175 feet east of the northwest corner of sec. 34, T. 18 N., R. 18 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; slightly hard, friable; few fine dark concretions; strongly acid; gradual smooth boundary. (4 to 12 inches thick)

E—9 to 12 inches; grayish brown (10YR 5/2) silt loam, light brownish gray (10YR 6/2) dry; many medium faint brown (10YR 4/3) redoximorphic iron concentration masses; weak medium granular structure; slightly hard, friable; many fine dark concretions; strongly acid; abrupt smooth boundary. (2 to 7 inches thick)

Btg1—12 to 22 inches; very dark grayish brown (10YR 3/2) clay, grayish brown (10YR 5/2) dry; common medium distinct strong brown (7.5YR 5/6) and reddish brown (5YR 4/4) redoximorphic iron concentration masses; weak coarse blocky structure; extremely hard, very firm; thin clay films on faces of peds; thin light gray coatings on sides of peds; strongly acid; gradual smooth boundary. (6 to 20 inches thick)

Btg2—22 to 36 inches; grayish brown (10YR 5/2) clay, light brownish gray (10YR 6/2) dry; many coarse distinct reddish brown (5YR 4/4) and strong brown (7.5YR 5/6) redoximorphic iron concentration masses; weak coarse blocky structure; extremely hard, very firm; thin clay films on faces of peds; few fine dark concretions; moderately acid, gradual smooth boundary. (10 to 20 inches thick)

Btg3—36 to 45 inches; mixed matrix of coarse gray (10YR 6/1) redoximorphic iron depletion masses and yellowish brown (10YR 5/6) and yellowish red (5YR 4/6) redoximorphic iron concentration masses; clay; weak coarse blocky structure; very hard, very firm; patchy clay films on faces of peds; moderately acid; gradual smooth boundary. (0 to 20 inches thick)

BC—45 to 58 inches; mixed matrix of coarse gray (10YR 5/1) redoximorphic iron depletion masses and yellowish brown (10YR 5/6) and yellowish red (5YR 4/6) redoximorphic iron concentration masses; clay; weak coarse blocky structure; very hard, very firm; common fine gypsum crystals, few fine fragments of siltstone; few fine dark concretions; neutral; gradual smooth boundary. (10 to 30 inches thick)

C—58 to 80 inches; mixed matrix of coarse gray (10YR 6/1) and very dark gray (10YR 3/1) redoximorphic iron depletion masses and yellowish brown (10YR 5/6) redoximorphic iron concentration masses; clay; massive; very hard, very firm; few fine rounded fragments of siltstone; many fine dark concretions; neutral.

Range in Characteristics

Thickness of the ochric epipedon: 8 to 16 inches
Thickness of the mollic colors after mixing: Less than 10 inches
Organic carbon content of the A and E horizons: Less than 1 percent

Thickness of the solum: 40 to more than 60 inches

A horizon:
Color—hue of 10YR, value of 3 or 4, and chroma of 1 or 2
Texture—silt loam
Reaction—slightly acid to strongly acid

E horizon:
Color—hue of 10YR, value of 4 or 5, and chroma of 1 or 2
Texture—loam or silt loam
Reaction—slightly acid to strongly acid
Other features—few or common redoximorphic masses of iron concentration in shades of brown

Bt horizon:
Color—hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 1 or 2
Texture—clay loam, silty clay loam, silty clay, or clay
Reaction—slightly acid to strongly acid
Content of clay—35 to 60 percent
Other features—common to many medium to coarse redoximorphic iron depletions in shades of gray; redoximorphic masses of iron concentration in shades of brown or red

BC and C horizons:
Color—hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 or 2
Texture—clay loam, silty clay loam, silty clay, or clay
Reaction—strongly acid to moderately alkaline
Content of clay—35 to 60 percent
Other features—common to many medium to coarse redoximorphic iron depletion masses in shades of gray; redoximorphic masses of iron concentration in shades of brown or red

Pharoah Series

Major land resource area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Fine textured residuum or old alluvium
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Dissected terraces
Position: Summits and backslopes
Slope: 0 to 3 percent
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 57 to 63 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Fine, mixed, superactive, thermic Vertic Argiaquolls

Associated Soils

These are the Dennis, Okemah, and Parsons soils. Dennis and Okemah soils do not have an exchangeable sodium percentage of more than 2 in any horizon. The Parsons soils are in the higher positions on the landscape.

Typical Pedon

Pharaoh silt loam, in an area of pasture; Okfuskee County, Oklahoma; about 1 mile north and 1 mile east of Pharoah, Oklahoma; 600 feet north and 1,000 feet west of the southeast corner of sec. 11, T. 11 N., R. 11 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; common fine and medium roots; slightly acid, clear wavy boundary. (5 to 14 inches thick)
BA—7 to 12 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; medium granular structure; firm; common fine and very fine roots; neutral; clear wavy boundary. (0 to 8 inches thick)
Bt1—12 to 23 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; common fine distinct brown (7.5YR 4/4) redoximorphic concentration masses; moderate medium angular blocky structure; very firm; common fine and coarse roots; continuous clay films on faces of peds; slightly alkaline; gradual wavy boundary. (8 to 15 inches thick)
Bt2—23 to 37 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; brown (10YR 4/3) common prominent redoximorphic concentration masses; moderate medium angular blocky structure; very firm; common fine and very fine roots in cracks; many continuous clay films on faces of peds; few slickensides; slightly alkaline; gradual wavy boundary. (0 to 18 inches thick)
Bt3—37 to 47 inches; dark gray (10YR 4/1) silty clay, gray (10YR 5/1) dry; brown (10YR 4/3) common prominent medium redoximorphic concentration masses; moderate medium angular blocky structure; very firm; common fine and very fine roots in cracks; many continuous clay films on faces of peds; few slickensides; slightly alkaline; gradual wavy boundary. (0 to 14 inches thick)
Bt4—47 to 59 inches; black (10YR 2/1) clay, very dark

gray (10YR 3/1) dry; common prominent medium redoximorphic iron depletion masses in shades of gray and redoximorphic iron concentration masses in shades of red or brown; moderate coarse blocky structure; very firm; few very fine roots in cracks; many prominent continuous clay films on faces of peds; moderately alkaline; gradual wavy boundary. (0 to 14 inches thick)

BC—59 to 74 inches; black (10YR 2/1) clay, very dark gray (10YR 3/1) dry; many prominent coarse redoximorphic iron depletion masses in shades of gray and redoximorphic iron concentration masses in shades of red or brown; moderate fine subangular blocky structure; very firm; few very fine roots in cracks; common distinct continuous clay films on faces of peds and pressure faces; few medium threads of gypsum crystals; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 30 inches
Thickness of the solum: 40 to more than 60 inches

A horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1, 2, or 3
Texture—silt loam, fine sandy loam, or silty clay loam
Reaction—slightly acid to slightly alkaline
Salinity—up to 4 mmhos/cm
Exchangeable sodium percentage—2 to 4

E horizon (if it occurs):
Color—hue of 10YR, value of 3 to 5, and chroma of 2 to 3
Texture—silt loam
Reaction—strongly acid to slightly alkaline
Salinity—up to 4 mmhos/cm
Exchangeable sodium percentage—2 to 4

BA horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 3
Texture—silty clay loam or silty clay
Reaction—moderately acid to moderately alkaline
Salinity—2 to 8 mmhos/cm
Exchangeable sodium percentage—4 to 8

Bt1 horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 3
Texture—silty clay loam or silty clay
Reaction—moderately acid to moderately alkaline
Other features—distinct redoximorphic concentration masses in shades of brown
Salinity—2 to 8 mmhos/cm
Exchangeable sodium percentage—4 to 8

Bt2 horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 3
Texture—silty clay
Reaction—moderately acid to moderately alkaline
Other features—distinct and prominent redoximorphic concentration masses in shades of red and brown; redoximorphic depletion masses in shades of gray
Salinity—4 to 8 mmhos/cm
Exchangeable sodium percentage—4 to 13

Bt3 horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 3
Texture—silty clay
Reaction—moderately acid to moderately alkaline
Other features—distinct and prominent redoximorphic concentration masses in shades of red and brown; redoximorphic depletion masses in shades of gray
Salinity—4 to 8 mmhos/cm
Exchangeable sodium percentage—4 to 13

Bt4 horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 3
Texture—silty clay
Reaction—moderately acid to moderately alkaline
Other features—distinct and prominent redoximorphic concentration masses in shades of red and brown; redoximorphic depletion masses in shades of gray
Salinity—4 to 8 mmhos/cm
Exchangeable sodium percentage—4 to 13

BC horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 4
Texture—silty clay
Reaction—moderately acid to moderately alkaline
Other features—distinct and prominent redoximorphic concentration masses in shades of red and brown; redoximorphic depletion masses in shades of gray
Salinity—4 to 8 mmhos/cm
Exchangeable sodium percentage—4 to 13

46—Pits

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 2,200 feet

Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 240 days

Major Component Description

Pits

Extent of the component in the map unit: 100 percent
Slope: 0 to 4 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Radley Series

Major land resources area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Moderately well drained
Parent material and geologic age: Stratified silty alluvium of the Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Flood plains
Slope: 0 to 3 percent
Mean annual precipitation: 38 to 47 inches
Mean annual air temperature: 57 to 64 degrees F
Thornthwaite PE index: 64 to 82

Taxonomic class: Fine-silty, mixed, active, thermic Fluventic Hapludolls

Associated Soils

These are the Cherokee, Dennis, Lula, McCune, Osage, Parsons, Verdigris, and Zaar soils. Verdigris soils and the more clayey Osage soils are on nearby flood plains and the lighter colored McCune soils are in areas farther from the stream channel. Cherokee, Dennis, Lula, and Zaar soils are on uplands. With the exception of the more clayey Zaar soils, these soils have argillic horizons.

Typical Pedon

Radley silt loam, in a cultivated area; Crawford County, Kansas; about 0.5 mile north and 1 mile west of Monmouth; 800 feet west and 200 feet south of the northeast corner of sec. 11, T. 31 S., R. 22 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; hard, friable; moderately acid; clear smooth boundary. (10 to 24 inches thick)

Bw—12 to 23 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; hard, friable; moderately acid; gradual smooth boundary. (0 to 20 inches thick)

C—23 to 42 inches; brown (10YR 4/3) silt loam with less clay than the horizon above, pale brown (10YR 6/3) dry; massive; hard, friable; few fine strata of slightly lighter colored material containing more fine and very fine sand; moderately acid; gradual smooth boundary. (10 to 30 inches thick)

Ab—42 to 80 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; massive; hard, friable; common fine strata as in horizon above; moderately acid. (10 inches to several feet thick)

Range in Characteristics

Thickness of the solum: 10 to 30 inches
Reaction: Moderately acid to neutral

A horizon:
Color—hue of 7.5YR, 10YR, or 2.5Y; value of 2 or 3 (3 to 5 dry); and chroma of 1 to 3
Texture—silt loam or silty clay loam

Bw horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5 (5 to 7 dry); and chroma of 2 to 4
Texture—silt loam or light silty clay loam
Redoximorphic features—mottled with colors having chroma more than 2, but not within depths of 20 inches, in some pedons

C and Ab horizons:
Color—hue of 10YR or 7.5YR, value of 3 to 5 (5 to

7 dry); and chroma of 2 to 4; contains thin strata with colors of higher and lower value
Texture—silt loam or light silty clay loam; contains thin strata with varying textures

47—Radley silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 38 to 47 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Radley and similar soils

Extent of the component in the map unit: 99 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Moderately well drained
Available water capacity: About 11.8 inches
Water table: More than 6 feet
Flooding: Occasional
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site—not assigned

Typical profile:
A—0 to 10 inches; silt loam
Bw—10 to 18 inches; silt loam
C1—18 to 36 inches; silt loam
C2—36 to 80 inches; silt loam

Additional Components

- Wet depressions: 1 percent

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

48—Radley silt loam, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 38 to 47 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Radley and similar soils

Extent of the component in the map unit: 99 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderate
Drainage class: Moderately well drained
Available water capacity: About 11.8 inches
Water table: More than 6 feet
Flooding: Frequent
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site—not assigned

Typical profile:
A—0 to 14 inches; silt loam
Bw—14 to 34 inches; silty clay loam
C—34 to 80 inches; silt loam

Additional Components

- Wet depressions: 1 percent

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section

- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Severn Series

Major land resources area: Arkansas Valley and Ridges (118)
Depth class: Very deep
Drainage class: Well drained
Parent material and geologic age: Loamy and silty calcareous alluvium carried from the Permian Red Beds; alluvium of Recent age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Flood plains
Slope: 0 to 6 percent
Mean annual precipitation: 38 to 52 inches
Mean annual air temperature: 59 to 65 degrees F
Thornthwaite PE index: 64 to 80

Taxonomic class: Coarse-silty, mixed, superactive, calcareous, thermic Typic Udifluvents

Associated Soils

These are the Choska, Kiomatia, Oklared, Coushatta, Idabel, Redlake, and Roebuck soils. The Choska, Coushatta, Idabel, and Oklared soils are at similar elevations. Kiomatia soils are in the lower areas. Redlake soils are farther from the streams. Roebuck soils are in the back slough positions. All of these soils have a cambic horizon, except for the Oklared series. Coushatta soils contain more than 18 percent clay in the control section. Idabel soils contain more than 15 percent sand coarser than very fine sand in the control section. Redlake and Roebuck soils contain more than 35 percent clay in the control section. In addition, Roebuck soils have a mollic epipedon.

Typical Pedon

Severn very fine sandy loam, in a cultivated area; McCurtain County, Oklahoma; about 6 miles south of Idabel; 500 feet east and 200 feet north of the southwest corner of sec. 34, T. 8 S., R. 23 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 10 inches; reddish brown (5YR 4/3) very fine sandy loam; weak medium and fine granular structure; very friable; few fine roots; calcareous; moderately alkaline; gradual smooth boundary. (0 to 16 inches thick)
C1—10 to 27 inches; reddish brown (5YR 4/4) very fine sandy loam; massive; very friable; few fine roots; few fine pores; common thin strata of loam; calcareous; moderately alkaline; clear smooth boundary. (10 to 35 inches thick)
C2—27 to 40 inches; reddish brown (5YR 5/4) very fine sandy loam; massive; very friable; few fine pores; common thin strata of silt loam and loam; calcareous; moderately alkaline; clear smooth boundary. (0 to 20 inches thick)
C3—40 to 65 inches; reddish brown (5YR 4/4) very fine sandy loam; massive; very friable; few fine and medium pores; thin patchy white coats; few thin strata of loam and loamy fine sand; calcareous; moderately alkaline.

Range in Characteristics

Thickness of the ochric epipedon: 0 to 10 inches
Thickness of the solum: 60 to over 80 inches
Other features: Soil is calcareous in all horizons below a depth of 10 inches; stratified layers are within a depth of 40 inches from the soil surface.

A horizon:
Color—hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4
Texture—very fine sandy loam, fine sandy loam, loam, silt loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline

C horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 to 6, and chroma of 3 to 8
Texture—stratified very fine sandy loam, silt loam, or loamy very fine sand; cumulative thickness of layers containing more than 18 percent clay is less than 8 inches within the control section; buried horizons are common below a depth of 24 inches; colors and textures are similar to those of the A and C horizons.

49—Severn very fine sandy loam, 0 to 3 percent slopes, rarely flooded

Map Unit Setting

Major land resource area: 112
Elevation: 100 to 800 feet
Mean annual precipitation: 40 to 54 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 210 to 240 days

Major Component Description

Severn and similar soils

Extent of the component in the map unit: 100 percent
Slope: 0 to 3 percent
Runoff rate: Negligible

Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 10.3 inches
Water table: More than 6 feet
Flooding: Rare
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—1
Ecological site—not assigned

Typical profile:
Ap—0 to 8 inches; very fine sandy loam
C1—8 to 28 inches; stratified loamy very fine sand to silty clay loam
C2—28 to 48 inches; very fine sandy loam
C3—48 to 80 inches; stratified loamy very fine sand to silty clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Shidler Series

Major land resource area: Bluestem Hills (76)
Depth class: Very shallow
Drainage class: Well drained
Parent material and geologic age: Material weathered from limestone and chert of Permian and Pennsylvanian age
Physiography region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Uplands
Landform: Hills
Position: Summits and backslopes
Slope: 0 to 8 percent
Mean annual precipitation: 34 to 38 inches
Mean annual air temperature: 58 to 62 degrees F
Thornthwaite PE index: 44 to 64

Taxonomic class: Loamy, mixed, active, thermic Lithic Haplustolls

Associated Soils

These are the competing Claremore soils and Apperson, Catoosa, Clarita, Foraker, Grainola, Lula, Scullin, and Westsum soils. Claremore soils occur on similar areas. Apperson, Foraker, Grainola, and Westsum soils have argillic horizons, a solum more than 20 inches thick, and more than 35 percent content of clay in the control section. Apperson soils occur on the broad flats and Foraker, Grainola, and Summit soils occur on the side slopes. Catoosa, Lula, and Scullin soils have argillic horizons, a solum more than 20 inches thick, and occur on similar areas. Clarita soils have more than 35 percent content of clay in the control section, have cyclic properties, have a solum more than 20 inches thick, and occur on the side slopes.

Typical Pedon

Shidler flaggy silty clay loam, in an area of rangeland; Osage County, Oklahoma; about 2 miles west and 1 mile south of Pawhuska; 600 feet south and 50 feet east of the northwest corner of sec. 18, T 25 N., R. 9 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 7 inches; very dark grayish brown (10YR 3/2) flaggy silty clay loam; very dark brown (10YR 2/2) moist; strong fine and medium granular structure; hard, friable; limestone fragments make up 30 percent, by volume; slightly alkaline; abrupt irregular boundary. (4 to 20 inches thick)
R—7 to 20 inches; light gray (10YR 6/1) hard fractured limestone; fractures are 5 mm wide and occur at intervals of about 60 cm; fractures contain soil material similar to the horizon above and extend to a depth of 46 cm.

Range in Characteristics

Thickness of the solum: 4 to 20 inches
Depth to bedrock: 4 to 20 inches

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 3; some pedons have colors of (N 4/0)
Texture—silt loam, silty clay loam, flaggy silt loam, flaggy silty clay loam, stony silt loam, or stony silty clay loam
Reaction—slightly acid to slightly alkaline; some pedons are calcareous and moderately alkaline just above the bedrock
Content of clay—18 to 35 percent
Content of rock fragments, by volume—0 to 35

percent limestone and chert fragments; 0 to 30 percent less than 2 mm in diameter; 0 to 30 percent more than 76 mm in diameter

R horizon:
Intervals of vertical fractures—30 to 180 cm
Fracture width—1 to 150 mm
Fracture depth—40 to 60 cm
Bedrock horizontal bedding planes—5 to 122 cm apart, but commonly are 10 to 20 cm
Thickness of bedrock—2 to several feet

50—Shidler-Rock outcrop complex, 1 to 12 percent slopes

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 2,200 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 240 days

Major Component Description

Shidler and similar soils

Extent of the component in the map unit: 65 percent
Slope: 1 to 8 percent
Runoff rate: Very high
Depth to lithic bedrock: 4 to 20 inches
Slowest permeability class within a depth of 60 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 3.2 inches
Water table: More than 6 feet
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—7s
Ecological site number and name—112XY098OK, Very Shallow

Typical profile:
A1—0 to 9 inches; silty clay loam
A2—9 to 16 inches; silty clay loam
R—16 to 20 inches; bedrock

Rock outcrop

Extent of the component in the map unit: 30 percent
Slope: 1 to 12 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Tullahassee Series

Major land resources area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Material weathered from mainly loamy alluvium of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Flood plains
Slope: 0 to 1 percent
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 58 to 64 degrees F
Thornthwaite PE index: 64 to 76

Taxonomic class: Coarse-loamy, mixed, active, nonacid, thermic Aquic Udifluvents

Associated Soils

These are the Choska, Kiomatia, Latanier, Moreland, and Okay soils. The Choska, Latanier, Moreland, and Okay soils are higher in elevation and they have a mollic epipedon. Kiomatia soils are in lower positions on sandy flood plains and have a sandy control section with rapid permeability.

Typical Pedon

Tullahassee fine sandy loam, in an area of pasture; Wagoner County, Oklahoma; about 2 miles south and 4.5 miles west of Coweta; 2,640 feet west and 100 feet north of the southeast corner of sec. 20, T. 17 N., R. 15 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 16 inches; brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; soft, very friable; many fine roots; bedding planes in lower part; slightly acid; gradual smooth boundary. (6 to 20 inches thick)

C1—16 to 30 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; common medium distinct light gray (10YR 7/2) and yellowish brown (10YR 5/6) redoximorphic depletions and concentrations; massive with bedding planes; soft, friable; slightly acid; gradual smooth boundary. (12 to 18 inches thick)

C2—30 to 56 inches; pale brown (10YR 6/3) fine sandy loam, very pale brown (10YR 7/3) dry; common medium faint light brownish gray (10YR 6/2) and few fine distinct reddish brown redoximorphic depletions and concentrations; massive with bedding planes; slightly hard, friable; slightly acid; gradual smooth boundary. (15 to 30 inches thick)

C3—56 to 64 inches; dark grayish brown (10YR 4/2) stratified fine sandy loam and loam, grayish brown (10YR 5/2) dry; few fine faint dark brown mottles; massive; hard, firm; slightly acid.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 20 inches
Thickness of the solum: More than 60 inches
Reaction: All horizons are moderately acid to neutral

A horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—fine sandy loam, loamy fine sand, or loam
Redoximorphic features—colors of brown or gray in some pedons

C1 horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—fine sandy loam or loam with thin strata of coarser or finer material
Content of clay—5 to 18 percent

C2 and C3 horizons:
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4
Texture—fine sandy loam or loam with thin strata of coarser or finer material
Content of clay—5 to 18 percent
Redoximorphic features—colors of brown, gray, yellow, or red

51—Tullahassee fine sandy loam, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Tullahassee and similar soils

Extent of the component in the map unit: 100 percent
Slope: 0 to 1 percent
Runoff rate: Negligible
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Moderately rapid
Drainage class: Somewhat poorly drained
Available water capacity: About 9.4 inches
Water table: Present
Flooding: Frequent
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—5w
Ecological site number and name—112XY095OK, Subirrigated

Typical profile:
A—0 to 8 inches; fine sandy loam
C1—8 to 21 inches; fine sandy loam
C2—21 to 45 inches; fine sandy loam
C3—45 to 80 inches; fine sandy loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

52—Urban land

Map Unit Setting

Major land resource area: 112
Elevation: 700 to 2,000 feet
Mean annual precipitation: 22 to 40 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 185 to 230 days

Major Component Description

Urban land

Extent of the component in the map unit: 100 percent
Slope: 0 to 8 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Wynona Series

Major land resources area: Cherokee Prairies (112)
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material and geologic age: Silty alluvium of Pleistocene age
Physiographic region: Interior Lowlands
Physiographic province: Central Lowland
Physiographic subprovince: Osage Plain
Landscape: Valleys
Landform: Flood plains
Slope: 0 to 3 percent
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Thornthwaite PE index: 60 to 76

Taxonomic class: Fine-silty, mixed, active, thermic Cumulic Epiaquolls

Associated Soils

These are the Mason and Osage soils. Mason soils have argillic horizons and lack redoximorphic features in the mollic epipedon. Osage soils have a fine control section and have high shrink-swell properties.

Typical Pedon

Wynona silty clay loam, in an area of tame pasture; Osage County, Oklahoma; about 4 miles south and 1 mile west of Skiatook; about 1,900 feet south and 70 feet west of the northeast corner of sec. 9, T. 21 N., 12 E. (Colors are for moist soil unless otherwise indicated.)

A1—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; slightly hard, friable; slightly acid; gradual smooth boundary. (0 to 22 inches thick)

A2—8 to 23 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; with few fine distinct yellowish red redoximorphic concentrations; weak medium subangular blocky structure parting to moderate medium granular structure; hard, firm; moderately acid; gradual smooth boundary. (0 to 15 inches thick)

A3—23 to 35 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; common fine distinct strong brown redoximorphic concentrations; weak medium subangular blocky structure; hard, firm; moderately acid; gradual smooth boundary. (8 to 25 inches thick)

Bg1—35 to 47 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common medium distinct strong brown (7.5YR 5/6) redoximorphic concentrations; weak medium blocky structure; hard, firm; common fine black concentrations; moderately acid; gradual smooth boundary. (0 to 28 inches thick)

Bg2—47 to 63 inches; dark gray (10YR 4/1) silty clay, gray (10YR 5/1) dry; common coarse distinct strong brown (7.5YR 5/6) and few fine distinct light brownish gray redoximorphic concentrations and depletions; weak medium blocky structure; hard, firm; few fine black concentration; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: 24 to more than 40 inches
Thickness of the solum: 40 to more than 60 inches
Depth to bedrock: More than 72 inches
Other features: Buried horizons below a depth of 40 inches in some pedons

A1 horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid or slightly acid

A2 horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 1 or 2; mottled with red or brown
Texture—silt loam or silty clay loam
Reaction—strongly acid to slightly acid

A3 horizon:
Color—hue of 10YR, value of 3, and chroma of 1 or 2
Texture—silty clay loam
Content of clay—27 to 35 percent
Redoximorphic features—colors of gray, brown, or red
Reaction—moderately acid or strongly acid

Bg horizon:
Color—dominant matrix hue of 10YR, value of 3 or 4, and chroma of 1 or 2 in some pedons
Texture—silty clay loam or silty clay
Reaction—slightly acid to strongly acid
Redoximorphic features—colors of red, brown, or gray

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

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 36 to 42 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 190 to 220 days

Major Component Description

Wynona and similar soils

Extent of the component in the map unit: 100 percent
Slope: 0 to 1 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 11.0 inches
Water table: Present
Flooding: Occasional
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site—not assigned

Typical profile:
Ap—0 to 10 inches; silty clay loam
A—10 to 23 inches; silty clay loam
Bg1—23 to 42 inches; silty clay loam
Bg2—42 to 80 inches; silty clay loam

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

54—Wynona-Urban land complex, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Major land resource area: 112
Elevation: 500 to 2,000 feet
Mean annual precipitation: 22 to 42 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 185 to 230 days

Major Component Description

Wynona and similar soils

Extent of the component in the map unit: 45 percent
Slope: 0 to 1 percent
Runoff rate: Medium
Depth: More than 60 inches
Slowest permeability class within a depth of 60 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 11.0 inches
Water table: Present
Flooding: Occasional
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—2w
Ecological site—not assigned

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

Urban land

Extent of the component in the map unit: 20 percent
Slope: 0 to 1 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section.

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

DAM—Large dam

Map Unit Setting

Major land resource area: 112
Elevation: 700 to 2,000 feet
Mean annual precipitation: 22 to 40 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 185 to 230 days

Major Component Description

Dam

Extent of the component in the map unit: 100 percent
Geomorphic setting: Hills on uplands
Parent material: Mine spoil or earthy fill derived from sandstone and shale
Slope: 0 to 45 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

DUM—Dumps

Map Unit Setting

Major land resource area: 112
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 60 to 61 degrees F
Frost-free period: 200 to 210 days

Major Component Description

Dumps

Extent of the component in the map unit: 100 percent
Definition: This area is composed of trash dumps that include, household refuse, tree and grass trimmings, old tires, and other trash.
Geomorphic setting: Hills on uplands
Parent material: Mine spoil or earthy fill
Slope: 0 to 50 percent
Runoff rate: Very high
Flooding: None
Ponding: None

Interpretive groups:
Land capability classification (nonirrigated)—8s
Ecological site—not assigned

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

M-W—Miscellaneous water

Map Unit Setting

Major land resource area: 112
Elevation: 250 to 4,000 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 240 days

Major Component Description

Water

Extent of the component in the map unit: 100 percent

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

W—Water

Map Unit Setting

Major land resource area: 112
Elevation: 250 to 4,000 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 240 days

Major Component Description

Water

Extent of the component in the map unit: 100 percent

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Soil Properties

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

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

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

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

Engineering Index Properties

The table "Engineering Index Properties" gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions section of this survey.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000) and the Unified soil classification system (ASTM, 2001).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

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

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

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

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

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

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

Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
1:												
Apperson--------	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	75-98	33-44	12-20
	8-16	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	80-99	41-70	26-45
	16-28	Silty clay	CH, CL	A-7	0	0	90-100	90-100	85-100	75-99	41-70	26-45
	28-42	Silty clay	CH, CL	A-7	0	0	90-100	90-100	85-100	75-99	41-70	26-45
	42-52	Silty clay	CH, CL	A-7	0	0	85-100	85-100	80-100	75-99	41-70	26-45
	52-60	Bedrock	---	---	---	---	---	---	---	---	---	---
2:												
Apperson--------	0-12	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	75-98	33-44	12-20
	12-18	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	80-99	41-70	26-45
	18-28	Silty clay	CH, CL	A-7	0	0	90-100	90-100	85-100	75-99	41-70	26-45
	28-48	Silty clay	CH, CL	A-7	0	0	90-100	90-100	85-100	75-99	41-70	26-45
	48-52	Silty clay	CH, CL	A-7	0	0	85-100	85-100	80-100	75-99	41-70	26-45
	52-60	Bedrock	---	---	---	---	---	---	---	---	---	---
3:												
Bates-----------	0-10	Loam	CL, CL-ML, ML	A-4, A-6	0	0	90-100	85-100	75-95	55-75	20-40	3-15
	10-14	Clay loam, loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6, A-7	0	0	85-100	85-100	70-95	35-80	25-45	3-20
	14-24	Clay loam, loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6, A-7	0	0	85-100	85-100	70-95	35-80	25-45	3-20
	24-34	Clay loam, loam, sandy clay loam, gravelly clay loam, gravelly loam, gravelly sandy clay loam	CL, SC, SC-SM	A-2, A-4, A-6	0	0-10	55-80	45-80	35-75	15-65	20-35	5-15
	34-40	Bedrock	---	---	---	---	---	---	---	---	---	---
4:												
Bates-----------	0-9	Loam	CL, CL-ML, ML	A-4, A-6	0	0	90-100	85-100	75-95	55-75	20-40	3-15
	9-12	Clay loam, loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6, A-7	0	0	85-100	85-100	70-95	35-80	25-45	3-20
	12-21	Clay loam, loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6, A-7	0	0	85-100	85-100	70-95	35-80	25-45	3-20
	21-32	Clay loam, loam, sandy clay loam, gravelly clay loam, gravelly loam, gravelly sandy clay loam	CL, SC, SC-SM	A-2, A-4, A-6	0	0-15	55-80	45-80	35-75	15-65	20-35	5-15
	32-36	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
4:												
Coweta----------	0-7	Loam	CL-ML, ML, CL	A-4	0	0-15	90-100	85-100	80-90	55-85	15-31	NP-10
	7-16	Gravelly loam, gravelly clay loam, gravelly fine sandy loam	CL, ML, SC, SM	A-2, A-4, A-6	0	0-25	60-95	55-90	50-90	20-80	15-35	2-15
	16-28	Bedrock	---	---	---	---	---	---	---	---	---	---
5:												
Catoosa---------	0-10	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	10-15	Silty clay loam, clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	15-28	Silty clay loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	85-100	70-98	33-48	12-22
	28-40	Bedrock	---	---	---	---	---	---	---	---	---	---
6:												
Catoosa---------	0-7	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	7-12	Silty clay loam, loam, clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	65-98	30-43	8-20
	12-20	Silty clay loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	85-100	70-98	33-48	12-22
	20-28	Silty clay loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	85-100	70-98	33-48	12-22
	28-30	Bedrock	---	---	---	---	---	---	---	---	---	---
Shidler---------	0-7	Silt loam	CL	A-4, A-6	0	0-25	75-100	75-100	70-100	60-97	30-37	8-13
	7-20	Bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Bedrock	---	---	---	---	---	---	---	---	---	---
7:												
Choska----------	0-14	Very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	15-31	NP-10
	14-35	Very fine sandy loam, silt loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	15-31	NP-9
	35-48	Silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	15-31	NP-9
	48-80	Stratified loamy fine sand to silt loam	SM	A-2	0	0	100	98-100	90-100	15-97	0-31	NP-9

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
8:												
Choska----------	0-14	Very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	15-31	NP-10
	14-25	Very fine sandy loam, silt loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	15-31	NP-9
	25-35	Silt loam, very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	51-97	15-31	NP-9
	35-80	Stratified loamy fine sand to silt loam	SM	A-2	0	0	100	98-100	90-100	15-97	0-31	NP-9
Severn----------	0-8	Very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-31	NP-10
	8-28	Stratified loamy very fine sand to silty clay loam	CL, CL-ML, ML, SM	A-4, A-6, A-7	0	0	100	100	94-100	36-97	0-42	NP-19
	28-48	Very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-31	NP-10
	48-80	Stratified loamy very fine sand to silty clay loam	CL, CL-ML, ML, SM	A-4, A-6, A-7	0	0	100	100	94-100	36-97	0-42	NP-19
Urban land------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
9:												
Cleora----------	0-11	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	15-26	NP-7
	11-31	Loam, fine sandy loam	CL, ML, SC, SM	A-4	0	0	100	98-100	94-100	36-85	15-31	NP-10
	31-62	Stratified loamy fine sand to loam	CL, ML, SC, SM	A-2, A-4	0	0	100	98-100	90-100	15-85	15-31	NP-10
10:												
Coweta----------	0-6	Loam	CL, CL-ML, ML	A-4	0	0-15	90-100	85-100	80-90	55-85	15-31	NP-10
	6-17	Gravelly clay loam, gravelly fine sandy loam, gravelly loam	CL, ML, SC, SM	A-2, A-4, A-6	0	0-25	60-95	55-90	50-90	20-80	15-35	2-15
	17-31	Bedrock	---	---	---	---	---	---	---	---	---	---
Bates-----------	0-9	Loam	CL, CL-ML, ML	A-4, A-6	0	0	90-100	85-100	75-95	55-75	20-40	3-15
	9-12	Loam, clay loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6, A-7	0	0	85-100	85-100	70-95	35-80	25-45	3-20
	12-25	Clay loam, loam, sandy clay loam, gravelly clay loam, gravelly loam, gravelly sandy clay loam	CL, SC, SC-SM	A-2, A-4, A-6	0	0-15	55-80	45-80	35-75	15-65	20-35	5-15
	25-32	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
11:												
Coweta----------	0-6	Loam	CL, CL-ML, ML	A-4	0	0-15	90-100	85-100	80-90	55-85	15-31	NP-10
	6-17	Gravelly loam, gravelly clay loam, gravelly fine sandy loam	CL, ML, SC, SM	A-2, A-4, A-6	0	0-25	60-95	55-90	50-90	20-80	15-35	2-15
	17-31	Bedrock	---	---	---	---	---	---	---	---	---	---
Urban land------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
Eram------------	0-14	Silty clay loam	CL	A-6, A-7	0	0	75-100	75-100	75-100	70-98	33-50	12-26
	14-25	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-6, A-7	0	0	95-100	95-100	95-100	80-99	37-60	16-34
	25-34	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-6, A-7	0	0	95-100	95-100	95-100	80-99	37-60	16-34
	34-40	Bedrock	---	---	---	---	---	---	---	---	---	---
12:												
Dennis----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-37	2-14
	8-15	Silt loam, loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	75-97	22-37	2-14
	15-25	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-42	12-19
	25-35	Silty clay, clay, silty clay loam	CH, CL, MH, ML	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	35-47	Silty clay, clay, silty clay loam	CH, CL, MH, ML	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	47-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
13:												
Dennis----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-37	2-14
	8-12	Silt loam, loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	75-97	22-37	2-14
	12-16	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-42	12-19
	16-24	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-42	12-19
	24-46	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	46-80	Clay loam, silty clay, silty clay loam, clay	CL, CH	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
14:												
Dennis	0-6	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-37	2-14
	6-10	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-42	12-19
	10-44	Clay loam, silty clay, silty clay loam, clay	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	44-80	Clay loam, silty clay, silty clay loam, clay	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
15:												
Dennis	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-37	2-14
	8-14	Silt loam, loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	75-97	22-37	2-14
	14-18	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-42	12-19
	18-34	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	34-54	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	54-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
Pharoah	0-9	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	9-12	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	12-26	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	26-47	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-70	26-45
	47-80	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-70	26-45
16:												
Dennis	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-37	2-14
	8-14	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-42	12-19
	14-24	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	24-38	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	38-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
Radley	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	96-100	80-97	25-35	7-15
	10-20	Silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	28-43	8-21
	20-80	Silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	28-43	8-21

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
17:												
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---	---
Dennis	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	65-97	22-37	2-14
	8-14	Silty clay loam, clay loam	CL	A-7, A-6	0	0	100	100	96-100	80-98	33-42	12-19
	14-24	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	24-38	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	38-78	Clay, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
18:												
Endsaw	0-8	Stony loam	CL-ML, GC, ML, SC	A-4, A-6	0-5	15-35	65-95	60-90	50-85	40-75	22-35	2-13
	8-38	Clay, silty clay, gravelly clay, gravelly silty clay	CH, CL	A-7	0	0-15	75-100	70-98	68-96	65-95	41-60	18-32
	38-42	Clay, silty clay, gravelly clay, gravelly silty clay	CH, CL	A-7	0	0-15	75-100	70-98	68-96	65-95	41-60	18-32
	42-60	Bedrock	---	---	---	---	---	---	---	---	---	---
Hector	0-4	Stony loam	GC-GM, GM, SC-SM, SM	A-2, A-4	20-40	0-30	50-95	50-95	40-65	30-50	0-25	NP-7
	4-7	Stony loam	GC-GM, GM, SC-SM, SM	A-2, A-4	20-40	0-30	50-95	50-95	40-65	30-50	0-25	NP-7
	7-18	Fine sandy loam, gravelly fine sandy loam, gravelly loam	GC-GM, GM, SC-SM, SM	A-2, A-4	0-5	0-10	55-100	55-95	50-70	30-50	0-25	NP-7
	18-20	Bedrock	---	---	---	---	---	---	---	---	---	---
19:												
Eram	0-14	Silty clay loam	CL	A-6, A-7	0	0	75-100	75-100	75-100	70-98	33-50	12-26
	14-25	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-6, A-7	0	0	95-100	95-100	95-100	80-99	37-60	16-34
	25-36	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-6, A-7	0	0	95-100	95-100	95-100	80-99	37-60	16-34
	36-40	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
20:												
Eram	0-12	Silty clay loam	CL	A-6, A-7	0	0	75-100	75-100	75-100	70-98	33-50	12-26
	12-18	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-6, A-7	0	0	95-100	95-100	95-100	80-99	37-60	16-34
	18-26	Silty clay loam, silty clay, clay loam, clay	CH, CL	A-6, A-7	0	0	95-100	95-100	95-100	80-99	37-60	16-34
	26-30	Bedrock	---	---	---	---	---	---	---	---	---	---
Coweta	0-11	Loam	CL, CL-ML, ML	A-4	0	0-15	90-100	85-100	80-90	55-85	15-31	NP-10
	11-17	Gravelly fine sandy loam, gravelly clay loam, gravelly loam	CL, ML, SC, SM	A-2, A-4, A-6	0	0-25	60-95	55-90	50-90	20-80	15-35	2-15
	17-28	Bedrock	---	---	---	---	---	---	---	---	---	---
21:												
Glenpool	0-4	Loamy fine sand	SM	A-2	0	0	100	100	90-100	15-35	0-14	NP
	4-41	Fine sand, loamy fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-98	3-35	0-14	NP
	41-48	Loamy fine sand	SM	A-2, A-4	0	0	100	98-100	90-100	15-45	0-14	NP
	48-55	Fine sandy loam, loamy fine sand, fine sand	SM	A-2, A-4	0	0	100	98-100	90-100	15-45	0-14	NP
	55-80	Loamy fine sand, fine sandy loam	SM	A-2, A-4	0	0	100	98-100	90-100	15-45	0-14	NP
22:												
Hector	0-2	Gravelly loam	GC-GM, GM, SC-SM, SM	A-2, A-4	0-5	0-10	50-75	50-75	40-70	25-50	15-25	NP-7
	2-9	Gravelly loam	GC-GM, GM, SC-SM, SM	A-2, A-4	0-5	0-10	50-75	50-75	40-70	25-50	15-25	NP-7
	9-15	Fine sandy loam, gravelly fine sandy loam, gravelly loam	GC-GM, GM, ML, SM	A-1-b, A-2, A-4	0-5	0-15	55-100	55-100	35-95	20-65	15-25	NP-7
	15-20	Bedrock	---	---	---	---	---	---	---	---	---	---
Linker	0-5	Loam	CL, CL-ML	A-4, A-6	0	0	75-100	75-100	65-95	50-75	20-35	4-15
	5-12	Gravelly fine sandy loam, gravelly loam, fine sandy loam	CL, CL-ML, SC, SC-SM	A-1, A-2, A-4, A-6	0	0-5	55-100	50-100	40-95	20-75	20-40	4-20
	12-26	Sandy clay loam, loam, gravelly clay loam	CL, GC, SC	A-2, A-6	0	0-10	55-100	55-100	40-95	20-80	30-40	10-20
	26-31	Gravelly sandy clay loam, gravelly fine sandy loam, sandy clay loam	SC, CL, GC	A-2, A-4, A-6	0	0-10	50-100	40-100	25-95	15-80	25-40	8-20
	31-33	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
23:												
Kamie-----------	0-6	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	6-18	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	18-54	Sandy clay loam, clay loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	54-64	Fine sandy loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
24:												
Kamie-----------	0-8	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	8-16	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	98-100	94-100	36-60	14-26	NP-7
	16-54	Sandy clay loam, clay loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	54-66	Fine sandy loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
25:												
Kamie-----------	0-8	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	8-18	Loamy fine sand	SM	A-2	0	0	100	98-100	90-100	15-35	0-14	NP
	18-54	Sandy clay loam, clay loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	54-64	Sandy clay loam, fine sandy loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-65	14-37	NP-16
Urban land------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
26:												
Kanima----------	0-3	Gravelly silty clay loam	CL, GC, SC	A-6	0	0-10	50-75	50-75	50-75	40-75	33-40	12-18
	3-80	Very gravelly clay loam, very gravelly silty clay loam, very gravelly loam	GC, GP-GC	A-2, A-4, A-6	0	0-10	5-50	5-50	5-50	5-49	30-40	8-18
27:												
Kiomatia--------	0-10	Loamy fine sand	SC-SM, SM	A-2-4, A-4	0	0	100	95-100	80-100	30-45	16-26	NP-7
	10-61	Stratified fine sand to loam	SC-SM, SM	A-2-4	0	0	100	95-100	80-100	13-30	16-22	NP-5
28:												
Larton----------	0-11	Loamy fine sand	SM	A-2	0	0	100	100	90-100	15-35	0-14	NP
	11-30	Loamy fine sand	SM	A-2	0	0	100	100	90-100	15-35	0-14	NP
	30-36	Fine sandy loam, loam, sandy clay loam	CL-ML, ML, SC, SM	A-4, A-6	0	0	100	100	90-100	36-90	14-37	NP-16
	36-54	Fine sandy loam, loam, sandy clay loam	CL-ML, ML, SC, SM	A-4, A-6	0	0	100	100	90-100	36-90	14-37	NP-16
	54-66	Sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-65	25-37	7-16

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
28:												
Glenpool	0-4	Loamy fine sand	SM	A-2	0	0	100	100	90-100	15-35	0-14	NP
	4-41	Fine sand, loamy fine sand	SM, SP-SM	A-2, A-3	0	0	100	98-100	82-98	3-35	0-14	NP
	41-80	Loamy fine sand	SM	A-2, A-4	0	0	100	98-100	90-100	15-45	0-14	NP
29:												
Latanier	0-11	Clay	CH	A-7-6	0	0	100	100	100	95-100	51-75	26-45
	11-32	Clay, silty clay	CH	A-7-6	0	0	100	100	100	95-100	51-75	26-45
	32-42	Silty clay loam, silt loam, very fine sandy loam	CL-ML, ML, CL	A-4, A-6	0	0	100	100	94-100	65-100	0-40	NP-17
	42-66	Very fine sandy loam, silty clay loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	94-100	65-100	0-40	NP-17
30:												
Lula	0-14	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	80-97	21-37	1-15
	14-19	Silty clay loam, clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	30-43	9-20
	19-54	Silty clay loam, clay loam	CL	A-6, A-7	---	0	85-100	85-100	80-100	70-98	33-43	12-20
	54-60	Bedrock	---	---	---	---	---	---	---	---	---	---
31:												
Mason	0-13	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	70-97	22-37	2-14
	13-37	Silty clay loam, clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	37-56	Silty clay loam, clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
	56-80	Silty clay loam, clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	75-98	30-43	8-20
32:												
Newtonia	0-11	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	65-97	30-37	9-14
	11-18	Silt loam, silty clay loam	CL	A-4, A-6	0	0	100	100	96-100	80-98	30-40	9-16
	18-26	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	26-46	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	96-100	90-98	37-60	15-34
	46-80	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	75-100	75-100	70-98	70-98	37-60	15-34

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
33:												
Newtonia--------	0-12	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	65-97	30-37	9-14
	12-17	Silt loam, silty clay loam	CL	A-4, A-6	0	0	100	100	96-100	80-98	30-40	9-16
	17-30	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	30-46	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	96-100	90-98	37-60	15-34
	46-80	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	75-100	75-100	70-98	70-98	37-60	15-34
34:												
Niotaze---------	0-5	Cobbly fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2-4, A-4	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	5-11	Cobbly fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2-4, A-4	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	11-34	Silty clay, silty clay loam, clay	CH, CL	A-6, A-7-6	0	0	95-100	95-100	90-100	90-100	37-60	15-34
	34-48	Bedrock	---	---	---	---	---	---	---	---	---	---
Darnell---------	0-4	Cobbly fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	4-17	Fine sandy loam, loam, gravelly fine sandy loam	CL, ML, SC, SM	A-2, A-4	0	0-10	70-100	70-100	60-100	25-60	15-30	NP-10
	17-20	Bedrock	---	---	---	---	---	---	---	---	---	---
35:												
Niotaze---------	0-5	Cobbly fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2-4, A-4	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	5-12	Cobbly fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2-4, A-4	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	12-35	Silty clay, silty clay loam, clay	CH, CL	A-6, A-7-6	0	0	95-100	95-100	90-100	90-100	37-60	15-34
	35-64	Bedrock	---	---	---	---	---	---	---	---	---	---
Darnell---------	0-4	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0-15	90-100	88-100	83-100	30-60	0-26	NP-7
	4-15	Fine sandy loam, loam, gravelly fine sandy loam	CL, ML, SC, SM	A-2, A-4	0	0-10	70-100	70-100	60-100	25-60	15-30	NP-10
	15-26	Bedrock	---	---	---	---	---	---	---	---	---	---
36:												
Niotaze---------	0-4	Stony fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2-4, A-4	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	4-13	Stony fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2-4, A-4	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	13-32	Silty clay, silty clay loam, clay	CH, CL	A-6, A-7-6	0	0	95-100	95-100	90-100	90-100	37-60	15-34
	32-40	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
36:												
Darnell	0-3	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0-15	90-100	88-100	83-100	30-60	0-26	NP-7
	3-12	Gravelly fine sandy loam, loam, fine sandy loam	CL, ML, SC, SM	A-2, A-4	0	0-10	70-100	70-100	60-100	25-60	15-30	NP-10
	12-22	Bedrock	---	---	---	---	---	---	---	---	---	---
37:												
Niotaze	0-4	Cobbly fine sandy loam	GC-GM, GM, SC-SM, SM	A-2-4, A-4, A-1	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	4-13	Cobbly fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2-4, A-4	0	25-50	50-75	50-75	35-60	15-45	0-26	NP-7
	13-32	Clay, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	95-100	95-100	90-100	90-100	37-60	15-34
	32-40	Bedrock	---	---	---	---	---	---	---	---	---	---
Darnell	0-3	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0-15	90-100	88-100	83-100	30-60	0-26	NP-7
	3-12	Gravelly fine sandy loam, loam, fine sandy loam	CL, ML, SC, SM	A-2, A-4	0	0-10	70-100	70-100	60-100	25-60	15-30	NP-10
	12-22	Bedrock	---	---	---	---	---	---	---	---	---	---
Urban land	0-60	Variable	---	---	---	---	---	---	---	---	---	---
38:												
Oil waste land	0-60	Variable	---	---	---	---	---	---	---	---	---	---
39:												
Okay	0-15	Loam	CL	A-4, A-6	0	0	100	100	94-100	65-85	30-35	9-13
	15-20	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	20-42	Clay loam, loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	42-64	Loam, sandy clay loam, fine sandy loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-90	15-34	NP-13
40:												
Okay	0-12	Loam	CL	A-4, A-6	0	0	100	100	94-100	65-85	30-35	9-13
	12-18	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	18-46	Clay loam, loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	46-70	Loam, sandy clay loam, fine sandy loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-90	15-34	NP-13

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
41:												
Okay	0-11	Loam	CL	A-4, A-6	0	0	100	100	94-100	65-85	30-35	9-13
	11-19	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	19-29	Clay loam, loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	29-44	Clay loam, loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	44-74	Loam, sandy clay loam, fine sandy loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-90	15-34	NP-13
42:												
Okay	0-8	Loam	CL	A-4, A-6	0	0	100	100	94-100	65-85	30-35	9-13
	8-12	Loam, clay loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	12-53	Sandy clay loam, loam, clay loam	CL, SC	A-4, A-6	0	0	100	100	90-100	36-90	25-40	7-18
	53-80	Fine sandy loam, sandy clay loam, loam	CL, ML, SC, SM	A-4, A-6	0	0	100	98-100	90-100	36-90	15-34	NP-13
43:												
Okemah	0-9	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	9-20	Silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	98-100	80-98	30-50	8-25
	20-28	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	90-99	37-60	15-34
	28-48	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	90-99	37-60	15-34
	48-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	90-99	37-60	15-34
44:												
Okemah	0-14	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	14-17	Silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	98-100	80-98	30-50	8-25
	17-54	Silty clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0	100	100	96-100	90-99	37-60	15-34
	54-80	Silty clay, clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	90-99	37-60	15-34

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
44:												
Parsons---------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	96-100	96-100	80-97	22-37	2-13
	8-14	Silt loam, loam	ML, CL, CL-ML	A-4, A-6	0	0	100	96-100	96-100	80-97	22-37	2-14
	14-25	Clay, silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	96-100	96-100	80-99	37-60	15-34
	25-54	Clay, silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	96-100	96-100	80-99	37-60	15-34
	54-80	Clay, silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	96-100	96-100	80-99	37-60	15-34
Pharoah---------	0-7	Silt loam	CL	A-4, A-6	0	0	100	100	96-100	80-97	30-37	8-13
	7-14	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	14-23	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	37-60	15-34
	23-51	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-70	26-45
	51-80	Silty clay, clay	CH, CL	A-7	0	0	100	100	96-100	90-99	41-70	26-45
45:												
Osage-----------	0-8	Silty clay	CH	A-7	0	0	100	100	100	95-100	50-75	30-55
	8-18	Silty clay	CH	A-7	0	0	100	100	100	95-100	50-75	30-55
	18-38	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	40-80	20-50
	38-80	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	40-80	20-50
46:												
Pits------------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
47:												
Radley----------	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	96-100	80-97	25-35	7-15
	10-18	Silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	28-43	8-21
	18-36	Silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	28-43	8-21
	36-80	Silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	28-43	8-21
48:												
Radley----------	0-14	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	96-100	80-97	25-35	7-15
	14-34	Silty clay loam, silt loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	28-43	8-21
	34-80	Silt loam, silty clay loam	CL	A-4, A-6, A-7	0	0	100	100	96-100	80-98	28-43	8-21

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
49:												
Severn----------	0-8	Very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-31	NP-10
	8-28	Stratified loamy very fine sand to silty clay loam	CL, CL-ML, ML, SM	A-4, A-6, A-7	0	0	100	100	94-100	36-97	0-42	NP-19
	28-48	Very fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	94-100	65-90	14-31	NP-10
	48-80	Stratified loamy very fine sand to silty clay loam	CL, CL-ML, ML, SM	A-4, A-6, A-7	0	0	100	100	94-100	36-97	0-42	NP-19
50:												
Shidler---------	0-9	Silty clay loam	CH, CL	A-6, A-7	0	0-25	75-100	75-100	70-100	65-98	33-55	12-27
	9-16	Silty clay loam	CH, CL	A-6, A-7	0	0-25	75-100	75-100	70-100	65-98	33-55	12-27
	16-20	Bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Bedrock	---	---	---	---	---	---	---	---	---	---
51:												
Tullahassee-----	0-8	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	100	94-100	36-85	14-26	NP-7
	8-21	Fine sandy loam, loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	100	94-100	36-85	14-29	NP-7
	21-45	Fine sandy loam, loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	100	94-100	36-85	14-29	NP-7
	45-80	Fine sandy loam, loam	CL-ML, ML, SC-SM, SM	A-4	0	0	100	100	94-100	36-85	14-29	NP-7
52:												
Urban land------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
53:												
Wynona----------	0-10	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	10-23	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	23-42	Silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	33-60	12-34
	42-80	Silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	33-60	12-34
54:												
Wynona----------	0-10	Silty clay loam	CL	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-20
	10-23	Silty clay loam	CL	A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-19
	23-33	Silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	33-60	12-34
	33-80	Silty clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	100	98-100	90-99	33-60	12-34
Urban land------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
DAM:												
Dam-------------	0-80	Variable	---	---	---	---	---	---	---	---	---	---
DUM:												
Dumps-----------	0-80	Variable	---	---	---	---	---	---	---	---	---	---

Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
M-W:												
Miscellaneous water----------	0-80	Water	---	---	---	---	---	---	---	---	---	---
W:												
Water-----------	0-80	Water	---	---	---	---	---	---	---	---	---	---

Physical Properties

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

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions section of this survey.

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

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In the table “Physical Properties of the Soils,” the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

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

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

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

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

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Erosion factors.—Soil erodibility (K) and soil-loss tolerance (T) factors are used in an equation that predicts the amount of soil lost through water erosion in areas of cropland. The procedure for predicting soil loss is useful in guiding the selection of soil and water conservation practices.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The soil properties that influence erodibility are those that affect the infiltration rate, the movement of water through the soil, and the water storage capacity of the soil and those that allow the soil to resist dispersion, splashing, abrasion, and the transporting forces of rainfall and runoff. The most important soil properties are the content of silt plus very fine sand, the content of sand coarser than very fine sand, the content of organic matter, soil structure, and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.64. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size. This is one of the factors used in the revised Universal Soil Loss Equation.

Erosion factor T is an estimate of the maximum annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons of soil loss per acre per year. Ratings of 1 to 5 are used, depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gullying, and the value of nutrients lost through erosion.

Wind erodibility groups.—Wind erodibility is directly related to the percentage of dry, nonerodible surface soil aggregates larger than 0.84 millimeter in diameter. From this percentage, the wind erodibility index factor (I) is determined. This factor is an expression of the stability of the soil aggregates, or the extent to which they are broken down by tillage and the abrasion caused by windblown soil particles. Soils are assigned to wind erodibility groups (WEG) having similar percentages of dry soil aggregates larger than 0.84 millimeter.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

WEG 1. Very fine sand, fine sand, sand, and coarse sand.

WEG 2. Loamy very fine sand, loamy fine sand, loamy sand, loamy coarse sand, ash, and sapric organic soil material.

WEG 3. Very fine sandy loam, fine sandy loam, sandy loam, and coarse sandy loam.

WEG 4. Clay, silty clay, and noncalcareous clay loam and silty clay loam with more than 35 percent clay.

WEG 4L. Calcareous loam, silt loam, clay loam, and silty clay loam characterized by a strongly or violently effervescent reaction to cold dilute (1N) HCl.

WEG 5. Noncalcareous loam and silt loam with less than 20 percent clay and sandy clay loam, sandy clay, and hemic organic soil material.

WEG 6. Noncalcareous loam and silt loam with more than 20 percent clay and noncalcareous clay loam with less than 35 percent clay.

WEG 7. Silt, noncalcareous silty clay loam with less than 35 percent clay, and fibric organic soil material.

WEG 8. Soils that are not susceptible to soil blowing because of rock fragments on the surface or because of surface wetness.

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

Additional information about wind erodibility groups and K, Kf, T, and I factors can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Physical Properties of the Soils

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

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
1:														
Apperson-------	0-8	0-20	40-73	27-35	1.30-1.60	0.2-0.6	0.16-0.20	3.0-5.9	1.0-3.0	.37	.37	3	7	38
	8-16	0-20	40-65	35-45	1.30-1.60	0.2-0.6	0.14-0.22	6.0-8.9	0.5-1.0	.37	.37			
	16-28	0-20	40-60	40-60	1.30-1.60	0.0015-0.06	0.14-0.18	9.0-25.0	0.5-1.0	.32	.32			
	28-42	0-20	40-60	40-60	1.30-1.60	0.0015-0.06	0.14-0.18	9.0-25.0	0.5-1.0	.32	.32			
	42-52	0-20	40-60	40-60	1.30-1.60	0.0015-0.06	0.14-0.18	9.0-25.0	0.0-1.0	.32	.32			
	52-60	---	---	---	1.85-2.35	0.0000-0.0015	---	---	---	---	---			
2:														
Apperson-------	0-12	0-20	40-73	27-35	1.30-1.60	0.2-0.6	0.16-0.20	3.0-5.9	1.0-3.0	.37	.37	3	7	38
	12-18	0-20	40-65	35-45	1.30-1.60	0.2-0.6	0.14-0.22	6.0-8.9	0.5-1.0	.37	.37			
	18-28	0-20	40-60	40-60	1.30-1.60	0.0015-0.06	0.14-0.18	9.0-25.0	0.5-1.0	.32	.32			
	28-48	0-20	40-60	40-60	1.30-1.60	0.0015-0.06	0.14-0.18	9.0-25.0	0.5-1.0	.32	.32			
	48-52	0-20	40-60	40-60	1.30-1.60	0.0015-0.06	0.14-0.18	9.0-25.0	0.0-1.0	.32	.32			
	52-60	---	---	---	1.85-2.35	0.0000-0.0015	---	---	---	---	---			
3:														
Bates----------	0-10	23-53	27-50	15-27	1.40-1.50	0.6-2	0.20-0.22	0.0-2.9	1.0-4.0	.28	.28	3	5	56
	10-14	20-80	0-53	18-35	1.30-1.45	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.32			
	14-24	20-80	0-53	18-35	1.30-1.45	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.32			
	24-34	20-80	0-53	18-30	1.35-1.45	0.6-2	0.14-0.19	0.0-2.9	0.5-1.0	.20	.43			
	34-40	---	---	---	1.85-2.35	0.2-0.6	---	---	---	---	---			
4:														
Bates----------	0-9	23-53	27-50	15-27	1.40-1.50	0.6-2	0.20-0.22	0.0-2.9	1.0-4.0	.28	.28	3	5	56
	9-12	20-80	0-53	18-35	1.30-1.45	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.32			
	12-21	20-80	0-53	18-35	1.30-1.45	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.32			
	21-32	20-80	0-53	18-30	1.35-1.45	0.6-2	0.14-0.19	0.0-2.9	0.5-1.0	.20	.43			
	32-36	---	---	---	1.85-2.35	0.2-0.6	---	---	---	---	---			
Coweta---------	0-7	23-53	27-50	15-26	1.30-1.55	2-6	0.13-0.20	0.0-2.9	1.0-3.0	.32	.37	2	6	48
	7-16	20-85	0-53	10-30	1.45-1.70	0.6-2	0.09-0.18	0.0-2.9	0.0-1.0	.28	.37			
	16-28	---	---	---	1.85-2.35	0.2-0.6	---	---	---	---	---			
5:														
Catoosa--------	0-10	0-50	50-88	15-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	2	6	48
	10-15	0-53	15-82	18-30	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	15-28	0-45	15-73	27-39	1.45-1.70	0.6-2	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32			
	28-40	---	---	---	1.85-2.35	0.0000-0.0015	---	---	---	---	---			
6:														
Catoosa--------	0-7	0-50	50-88	15-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	2	6	48
	7-12	0-53	15-82	18-30	1.40-1.70	0.6-2	0.15-0.24	3.0-5.9	0.5-1.0	.37	.37			
	12-20	0-45	15-73	27-39	1.45-1.70	0.6-2	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32			
	20-28	0-45	15-73	27-39	1.45-1.70	0.6-2	0.15-0.22	3.0-5.9	0.0-0.5	.32	.32			
	28-30	---	---	---	1.85-2.35	0.0000-0.0015	---	---	---	---	---			
Shidler--------	0-7	0-32	50-82	18-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-5.0	.24	.37	1	6	48
	7-20	---	---	---	1.85-2.35	0.0000-0.0015	---	---	---	---	---			
Rock outcrop---	0-60	---	---	---	1.85-2.35	0.0015-0.06	0.00-0.00	---	---	---	---	--	8	0
7:														
Choska---------	0-14	43-85	0-50	5-20	1.30-1.55	0.6-2	0.13-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	14-35	0-85	0-88	5-18	1.40-1.65	0.6-2	0.13-0.24	0.0-2.9	0.0-0.5	.37	.37			
	35-48	0-85	0-88	5-18	1.40-1.65	0.6-2	0.13-0.24	0.0-2.9	0.0-0.5	.37	.37			
	48-80	0-90	0-88	5-18	1.60-1.70	0.6-6	0.07-0.24	0.0-2.9	0.0-0.5	.17	.17			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
8:														
Choska---------	0-14	43-85	0-50	5-20	1.30-1.55	0.6-2	0.13-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	14-25	0-85	0-88	5-18	1.40-1.65	0.6-2	0.13-0.24	0.0-2.9	0.0-0.5	.37	.37			
	25-35	0-85	0-88	5-18	1.40-1.65	0.6-2	0.13-0.24	0.0-2.9	0.0-0.5	.37	.37			
	35-80	0-90	0-88	5-18	1.60-1.70	0.6-6	0.07-0.24	0.0-2.9	0.0-0.5	.17	.17			
Severn---------	0-8	43-85	0-50	8-17	1.25-1.55	2-6	0.13-0.24	0.0-2.9	0.5-1.0	.32	.32	5	4L	86
	8-28	0-90	0-73	8-35	1.35-1.70	2-6	0.07-0.24	0.0-2.9	0.5-1.0	.32	.32			
	28-48	43-85	0-50	8-17	1.25-1.55	2-6	0.13-0.24	0.0-2.9	0.5-1.0	.32	.32			
	48-80	0-90	0-73	8-35	1.35-1.70	2-6	0.07-0.24	0.0-2.9	0.5-1.0	.32	.32			
Urban land-----	0-60	---	---	---	---	0.06-2	0.00-0.00	---	---	---	---	--	---	---
9:														
Cleora---------	0-11	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	11-31	32-85	0-50	10-18	1.40-1.70	2-6	0.11-0.20	0.0-2.9	0.5-1.0	.32	.32			
	31-62	32-90	0-50	5-18	1.40-1.70	2-6	0.07-0.20	0.0-2.9	0.0-1.0	.32	.32			
10:														
Coweta---------	0-6	23-53	27-50	15-26	1.30-1.55	2-6	0.13-0.20	0.0-2.9	1.0-3.0	.32	.37	2	6	48
	6-17	20-85	0-53	10-30	1.45-1.70	0.6-2	0.09-0.18	0.0-2.9	0.0-1.0	.28	.37			
	17-31	---	---	---	1.85-2.35	0.2-0.6	---	---	---	---	---			
Bates----------	0-9	23-53	27-50	15-27	1.40-1.50	0.6-2	0.20-0.22	0.0-2.9	1.0-4.0	.28	.28	3	5	56
	9-12	20-80	0-53	18-35	1.30-1.45	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.32			
	12-25	20-80	0-53	18-30	1.35-1.45	0.6-2	0.14-0.19	0.0-2.9	0.5-1.0	.20	.43			
	25-32	---	---	---	1.85-2.35	0.2-0.6	---	---	---	---	---			
11:														
Coweta---------	0-6	23-53	27-50	15-26	1.30-1.55	2-6	0.13-0.20	0.0-2.9	1.0-3.0	.32	.37	2	6	48
	6-17	20-85	0-53	10-30	1.45-1.70	0.6-2	0.09-0.18	0.0-2.9	0.0-1.0	.28	.37			
	17-31	---	---	---	1.85-2.35	0.2-0.6	---	---	---	---	---			
Urban land-----	0-60	---	---	---	---	0.06-2	0.00-0.00	---	---	---	---	--	---	---
Eram-----------	0-14	0-20	40-73	27-40	1.25-1.55	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.32	.37	3	7	38
	14-25	0-45	0-65	35-55	1.30-1.70	0.06-0.2	0.12-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-34	0-45	0-65	35-55	1.30-1.70	0.06-0.2	0.12-0.20	6.0-8.9	1.0-2.0	.37	.37			
	34-40	---	---	---	1.85-2.35	0.0000-0.2	---	---	---	---	---			
12:														
Dennis---------	0-8	0-50	50-88	10-27	1.25-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	8-15	0-53	27-88	10-27	1.30-1.65	0.6-2	0.15-0.20	0.0-2.9	1.0-2.0	.43	.43			
	15-25	0-45	15-73	27-35	1.30-1.75	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37			
	25-35	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	35-47	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	47-80	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
13:														
Dennis---------	0-8	0-50	50-88	10-27	1.25-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	8-12	0-53	27-88	10-27	1.30-1.65	0.6-2	0.15-0.20	0.0-2.9	1.0-2.0	.43	.43			
	12-16	0-45	15-73	27-35	1.30-1.75	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37			
	16-24	0-45	0-65	27-35	1.30-1.75	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37			
	24-46	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	46-80	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
14:														
Dennis---------	0-6	0-50	50-88	10-27	1.25-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	6-10	0-45	15-73	27-35	1.30-1.75	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37			
	10-44	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	44-80	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
15:														
Dennis---------	0-8	0-50	50-88	10-27	1.25-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	8-14	0-53	27-88	10-27	1.30-1.65	0.6-2	0.15-0.20	0.0-2.9	1.0-2.0	.43	.43			
	14-18	0-45	15-73	27-35	1.30-1.75	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37			
	18-34	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	34-54	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	54-80	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
Pharoah--------	0-9	0-32	50-82	18-27	1.20-1.40	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	5	6	48
	9-12	0-32	50-82	18-27	1.20-1.40	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49			
	12-26	0-20	40-73	30-55	1.45-1.65	0.0015-0.06	0.14-0.22	6.0-8.9	1.0-2.0	.49	.49			
	26-47	0-45	0-60	40-60	1.40-1.60	0.0015-0.06	0.12-0.18	9.0-25.0	0.0-0.5	.49	.49			
	47-80	0-45	0-60	40-60	1.40-1.60	0.0015-0.06	0.12-0.18	9.0-25.0	0.0-0.5	.49	.49			
16:														
Dennis---------	0-8	0-50	50-88	10-27	1.25-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	8-14	0-45	15-73	27-35	1.30-1.75	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37			
	14-24	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	24-38	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	38-80	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
Radley---------	0-10	0-50	50-88	15-27	1.25-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.32	.32	5	6	48
	10-20	0-32	40-82	18-35	1.30-1.75	0.6-2	0.16-0.24	3.0-5.9	0.0-1.0	.32	.32			
	20-80	0-32	40-82	18-35	1.30-1.75	0.6-2	0.16-0.24	3.0-5.9	0.0-1.0	.32	.32			
17:														
Urban land-----	0-60	---	---	---	---	0.06-2	0.00-0.00	---	---	---	---	--	---	---
Dennis---------	0-8	0-50	50-88	10-27	1.25-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	8-14	0-45	15-73	27-35	1.30-1.75	0.2-0.6	0.15-0.22	3.0-5.9	0.5-1.0	.37	.37			
	14-24	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	24-38	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
	38-78	0-45	0-65	35-55	1.30-1.75	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.37	.37			
18:														
Endsaw---------	0-8	23-53	27-50	10-25	1.30-1.55	0.6-2	0.08-0.20	0.0-2.9	0.5-1.0	.24	.43	4	8	0
	8-38	0-45	0-60	40-60	1.35-1.60	0.06-0.2	0.08-0.18	6.0-8.9	0.5-1.0	.28	.32			
	38-42	0-45	0-60	40-60	1.35-1.60	0.06-0.2	0.08-0.18	6.0-8.9	0.5-1.0	.28	.32			
	42-60	---	---	---	1.85-2.00	0.0015-0.06	---	---	---	---	---			
Hector---------	0-4	23-53	27-50	7-20	1.30-1.60	2-6	0.08-0.12	0.0-2.9	0.5-2.0	.17	.28	1	8	0
	4-7	23-53	27-50	5-20	1.30-1.60	2-6	0.08-0.12	0.0-2.9	0.5-2.0	.17	.28			
	7-18	23-85	0-50	10-25	1.30-1.60	2-6	0.08-0.15	0.0-2.9	0.0-0.5	.17	.32			
	18-20	---	---	---	1.85-2.35	0.0000-0.2	0.00-0.00	---	---	---	---			
19:														
Eram-----------	0-14	0-20	40-73	27-40	1.25-1.55	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.32	.37	3	7	38
	14-25	0-45	0-65	35-55	1.30-1.70	0.06-0.2	0.12-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-36	0-45	0-65	35-55	1.30-1.70	0.06-0.2	0.12-0.20	6.0-8.9	1.0-2.0	.37	.37			
	36-40	---	---	---	1.85-2.35	0.0000-0.2	---	---	---	---	---			
20:														
Eram-----------	0-12	0-20	40-73	27-40	1.25-1.55	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.32	.37	3	7	38
	12-18	0-45	0-65	35-55	1.30-1.70	0.06-0.2	0.12-0.20	6.0-8.9	1.0-2.0	.37	.37			
	18-26	0-45	0-65	35-55	1.30-1.70	0.06-0.2	0.12-0.20	6.0-8.9	1.0-2.0	.37	.37			
	26-30	---	---	---	1.85-2.35	0.0000-0.2	---	---	---	---	---			
Coweta---------	0-11	23-53	27-50	15-26	1.30-1.55	2-6	0.13-0.20	0.0-2.9	1.0-3.0	.32	.37	2	6	48
	11-17	20-85	0-53	10-30	1.45-1.70	0.6-2	0.09-0.18	0.0-2.9	0.0-1.0	.28	.37			
	17-28	---	---	---	1.85-2.35	0.2-0.6	---	---	---	---	---			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
21:														
Glenpool-------	0-4	70-90	0-30	5-12	1.35-1.50	6-20	0.05-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	4-41	70-100	0-30	3-12	1.50-1.65	6-20	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	41-48	70-90	0-30	5-12	1.35-1.50	6-20	0.07-0.14	0.0-2.9	0.0-0.5	.20	.20			
	48-55	43-100	0-50	5-12	1.35-1.50	6-20	0.07-0.14	0.0-2.9	0.0-0.5	.20	.20			
	55-80	43-90	0-50	5-12	1.35-1.50	6-20	0.07-0.14	0.0-2.9	0.0-0.5	.20	.20			
22:														
Hector---------	0-2	23-53	27-50	10-20	1.30-1.60	2-6	0.08-0.15	0.0-2.9	0.5-2.0	.20	.28	1	5	56
	2-9	23-53	27-50	5-20	1.30-1.60	2-6	0.08-0.15	0.0-2.9	0.5-2.0	.20	.28			
	9-15	23-85	0-50	10-25	1.30-1.60	2-6	0.08-0.15	0.0-2.9	0.0-0.5	.17	.28			
	15-20	---	---	---	1.85-2.35	0.0000-0.6	0.00-0.00	---	---	---	---			
Linker---------	0-5	23-53	27-50	10-25	1.30-1.60	0.6-2	0.14-0.17	0.0-2.9	0.5-3.0	.32	.32	2	5	56
	5-12	23-85	0-50	10-35	1.30-1.60	0.6-2	0.08-0.18	0.0-2.9	0.5-2.0	.28	.32			
	12-26	20-80	0-53	18-35	1.30-1.60	0.6-2	0.10-0.18	0.0-2.9	0.5-1.0	.32	.32			
	26-31	43-85	0-50	15-35	1.30-1.60	0.6-2	0.10-0.18	0.0-2.9	0.5-1.0	.28	.32			
	31-33	---	---	---	1.85-2.35	0.0000-0.2	0.00-0.00	---	---	---	---			
23:														
Kamie----------	0-6	70-90	0-30	5-10	1.35-1.50	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	6-18	70-90	0-30	5-10	1.35-1.50	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20			
	18-54	20-80	0-53	20-35	1.35-1.65	0.6-2	0.12-0.20	0.0-2.9	0.0-0.5	.32	.32			
	54-64	45-80	0-27	18-32	1.35-1.65	0.6-2	0.11-0.17	0.0-2.9	0.0-0.5	.32	.32			
24:														
Kamie----------	0-8	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.24	.24	5	3	86
	8-16	43-85	0-50	10-18	1.30-1.60	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.24	.24			
	16-54	20-80	0-53	20-35	1.35-1.65	0.6-2	0.12-0.20	0.0-2.9	0.0-0.5	.32	.32			
	54-66	45-80	0-27	18-32	1.35-1.65	0.6-2	0.11-0.17	0.0-2.9	0.0-0.5	.32	.32			
25:														
Kamie----------	0-8	70-90	0-30	5-10	1.35-1.50	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	8-18	70-90	0-30	5-10	1.35-1.50	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20			
	18-54	20-80	0-53	20-35	1.35-1.65	0.6-2	0.12-0.20	0.0-2.9	0.0-0.5	.32	.32			
	54-64	45-80	0-27	18-32	1.35-1.65	0.6-2	0.11-0.17	0.0-2.9	0.0-0.5	.32	.32			
Urban land-----	0-60	---	---	---	---	0.06-2	0.00-0.00	---	---	---	---	--	---	---
26:														
Kanima---------	0-3	0-20	40-73	27-35	1.30-1.60	0.6-2	0.08-0.17	0.0-2.9	0.5-2.0	.17	.32	2	7	38
	3-80	0-53	15-73	18-35	1.40-1.70	0.6-2	0.02-0.12	0.0-2.9	0.0-1.0	.15	.32			
27:														
Kiomatia-------	0-10	72-90	0-30	5-15	1.30-1.60	0.6-2	0.10-0.15	0.0-2.9	0.3-1.0	.17	.17	5	3	86
	10-61	32-100	0-50	2-15	1.40-1.65	6-20	0.05-0.10	0.0-2.9	0.1-0.3	.17	.17			
28:														
Larton---------	0-11	70-90	0-30	5-10	1.45-1.65	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20	5	2	134
	11-30	70-90	0-30	5-10	1.45-1.65	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.20	.20			
	30-36	23-85	0-50	15-25	1.40-1.70	0.6-6	0.10-0.19	0.0-2.9	0.0-0.5	.24	.24			
	36-54	23-85	0-50	15-25	1.40-1.70	0.6-6	0.10-0.19	0.0-2.9	0.0-0.5	.24	.24			
	54-66	45-80	0-27	15-25	1.45-1.70	0.6-2	0.14-0.19	0.0-2.9	0.0-0.5	.32	.32			
Glenpool-------	0-4	70-90	0-30	5-12	1.35-1.50	6-20	0.05-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	4-41	70-100	0-30	3-12	1.50-1.65	6-20	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	41-80	70-90	0-30	5-12	1.35-1.50	6-20	0.07-0.14	0.0-2.9	0.0-0.5	.20	.20			
29:														
Latanier-------	0-11	0-45	0-40	40-55	1.20-1.45	0.0015-0.06	0.15-0.19	9.0-25.0	1.0-4.0	.32	.32	5	4	86
	11-32	0-45	0-60	40-55	1.20-1.45	0.0015-0.06	0.15-0.19	9.0-25.0	0.5-1.0	.32	.32			
	32-42	0-85	0-88	10-27	1.30-1.65	0.06-2	0.18-0.22	0.0-2.9	0.5-1.0	.37	.37			
	42-66	0-85	0-88	10-27	1.30-1.65	0.06-2	0.18-0.22	0.0-2.9	0.5-1.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
30:														
Lula-----------	0-14	0-50	50-88	15-27	1.30-1.55	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	3	6	48
	14-19	0-45	15-82	18-35	1.45-1.70	0.6-2	0.16-0.20	3.0-5.9	1.0-2.0	.37	.37			
	19-54	0-45	15-73	27-35	1.45-1.70	0.6-2	0.16-0.20	3.0-5.9	0.5-1.0	.32	.32			
	54-60	---	---	---	1.85-2.35	0.0000-0.0015	---	---	---	---	---			
31:														
Mason----------	0-13	0-50	50-88	12-27	1.30-1.65	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	13-37	0-45	15-82	20-35	1.30-1.75	0.2-0.6	0.15-0.20	3.0-5.9	0.5-1.0	.37	.37			
	37-56	0-45	15-82	20-35	1.30-1.75	0.2-0.6	0.15-0.20	3.0-5.9	0.5-1.0	.37	.37			
	56-80	0-45	15-82	20-35	1.30-1.75	0.2-0.6	0.15-0.20	3.0-5.9	0.5-1.0	.37	.37			
32:														
Newtonia-------	0-11	0-50	50-88	10-24	1.30-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	11-18	0-32	40-82	20-35	1.40-1.70	0.6-2	0.16-0.22	3.0-5.9	1.0-2.0	.37	.37			
	18-26	0-20	40-73	27-35	1.45-1.70	0.6-2	0.18-0.22	3.0-5.9	0.0-0.5	.32	.32			
	26-46	0-45	0-73	32-45	1.35-1.65	0.6-2	0.12-0.20	3.0-5.9	0.0-0.5	.32	.32			
	46-80	0-45	0-73	32-45	1.35-1.65	0.6-2	0.12-0.20	3.0-5.9	0.0-0.5	.32	.32			
33:														
Newtonia-------	0-12	0-50	50-88	10-24	1.30-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	12-17	0-32	40-82	20-35	1.40-1.70	0.6-2	0.16-0.22	3.0-5.9	1.0-2.0	.37	.37			
	17-30	0-20	40-73	27-35	1.45-1.70	0.6-2	0.18-0.22	3.0-5.9	0.0-0.5	.32	.32			
	30-46	0-45	0-73	32-45	1.35-1.65	0.6-2	0.12-0.20	3.0-5.9	0.0-0.5	.32	.32			
	46-80	0-45	0-73	32-45	1.35-1.65	0.6-2	0.12-0.20	3.0-5.9	0.0-0.5	.32	.32			
34:														
Niotaze--------	0-5	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.64	3	8	0
	5-11	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.64			
	11-34	0-45	0-65	35-55	1.35-1.45	0.06-0.2	0.10-0.20	6.0-8.9	0.0-0.5	.28	.28			
	34-48	---	---	---	1.85-2.35	0.0000-0.6	0.00-0.00	---	---	---	---			
Darnell--------	0-4	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.24	2	3	86
	4-17	23-85	0-50	10-25	1.40-1.70	2-6	0.12-0.16	0.0-2.9	0.0-0.5	.24	.32			
	17-20	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
35:														
Niotaze--------	0-5	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.64	3	8	0
	5-12	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.64			
	12-35	0-45	0-65	35-55	1.35-1.45	0.06-0.2	0.10-0.20	6.0-8.9	0.0-0.5	.28	.28			
	35-64	---	---	---	1.85-2.35	0.0000-0.6	0.00-0.00	---	---	---	---			
Darnell--------	0-4	43-85	0-50	10-20	1.30-1.65	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.24	2	3	86
	4-15	23-85	0-50	10-25	1.40-1.70	2-6	0.12-0.16	0.0-2.9	0.0-0.5	.24	.32			
	15-26	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
36:														
Niotaze--------	0-4	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.64	3	8	0
	4-13	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.64			
	13-32	0-45	0-65	35-55	1.35-1.45	0.06-0.2	0.10-0.20	6.0-8.9	0.0-0.5	.28	.28			
	32-40	---	---	---	1.85-2.35	0.0000-0.6	0.00-0.00	---	---	---	---			
Darnell--------	0-3	43-85	0-50	10-20	1.30-1.65	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.24	2	3	86
	3-12	43-85	0-50	10-25	1.40-1.70	2-6	0.12-0.16	0.0-2.9	0.0-0.5	.24	.32			
	12-22	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
37:														
Niotaze--------	0-4	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.64	3	8	0
	4-13	43-85	0-50	5-20	1.35-1.45	0.6-6	0.06-0.11	0.0-2.9	0.5-1.0	.20	.64			
	13-32	0-45	0-65	35-55	1.35-1.45	0.06-0.2	0.10-0.20	6.0-8.9	0.0-0.5	.28	.28			
	32-40	---	---	---	1.85-2.35	0.0000-0.6	0.00-0.00	---	---	---	---			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
37:														
Darnell--------	0-3	43-85	0-50	10-20	1.30-1.65	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.24	2	3	86
	3-12	23-85	0-50	10-25	1.40-1.70	2-6	0.12-0.16	0.0-2.9	0.0-0.5	.24	.32			
	12-22	---	---	---	1.85-2.00	0.0000-0.2	---	---	---	---	---			
Urban land-----	0-60	---	---	---	---	0.06-2	0.00-0.00	---	---	---	---	--	---	---
38:														
Oil waste land-	0-60	---	---	---	---	0.0000-0.2	---	---	---	---	---	--	8	0
39:														
Okay-----------	0-15	23-53	27-50	18-25	1.30-1.55	2-6	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	15-20	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	20-42	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	42-64	20-85	0-53	15-27	1.40-1.65	0.6-6	0.11-0.17	0.0-2.9	0.0-1.0	.37	.37			
40:														
Okay-----------	0-12	23-53	27-50	18-25	1.30-1.55	2-6	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	12-18	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	18-46	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	46-70	20-85	0-53	15-27	1.40-1.65	0.6-6	0.11-0.17	0.0-2.9	0.0-1.0	.37	.37			
41:														
Okay-----------	0-11	23-53	27-50	18-25	1.30-1.55	2-6	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	11-19	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	19-29	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	29-44	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	44-74	20-85	0.53	15-27	1.40-1.65	0.6-6	0.11-0.17	0.0-2.9	0.0-1.0	.37	.37			
42:														
Okay-----------	0-8	23-53	27-50	18-25	1.30-1.55	2-6	0.15-0.20	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	8-12	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	12-53	20-80	0-53	20-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9	0.5-2.0	.37	.37			
	53-80	20-85	0-53	15-27	1.40-1.65	0.6-6	0.11-0.17	0.0-2.9	0.0-1.0	.37	.37			
43:														
Okemah---------	0-9	0-32	50-82	20-27	1.40-1.65	0.2-2	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43	5	6	48
	9-20	0-32	40-82	20-35	1.40-1.70	0.2-0.6	0.16-0.24	3.0-5.9	1.0-3.0	.43	.43			
	20-28	0-45	0-65	35-55	1.35-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	28-48	0-45	0-65	35-55	1.35-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	48-80	0-45	0-65	35-55	1.35-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
44:														
Okemah---------	0-14	0-32	50-82	20-27	1.40-1.65	0.2-2	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43	5	6	48
	14-17	0-32	40-82	20-35	1.40-1.70	0.2-0.6	0.16-0.24	3.0-5.9	1.0-3.0	.43	.43			
	17-54	0-45	0-65	35-55	1.35-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	54-80	0-45	0-65	35-55	1.35-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
Parsons--------	0-8	0-50	50-88	15-25	1.25-1.50	0.6-2	0.16-0.24	0.0-2.9	0.5-4.0	.49	.49	3	6	48
	8-14	0-53	27-88	15-25	1.30-1.65	0.6-2	0.16-0.24	0.0-2.9	0.5-1.0	.49	.49			
	14-25	0-45	0-65	35-60	1.30-1.75	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	25-54	0-45	0-65	35-60	1.30-1.75	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	54-80	0-45	0-65	35-60	1.30-1.75	0.0015-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
Pharoah--------	0-7	0-32	50-82	18-27	1.20-1.40	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.49	.49	5	6	48
	7-14	0-20	40-73	30-55	1.45-1.65	0.0015-0.06	0.14-0.22	6.0-8.9	1.0-2.0	.49	.49			
	14-23	0-20	40-73	30-55	1.45-1.65	0.0015-0.06	0.14-0.22	6.0-8.9	1.0-2.0	.49	.49			
	23-51	0-45	0-60	40-60	1.40-1.60	0.0015-0.06	0.12-0.18	9.0-25.0	0.0-0.5	.49	.49			
	51-80	0-45	0-60	40-60	1.40-1.60	0.0015-0.06	0.12-0.18	9.0-25.0	0.0-0.5	.49	.49			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
45:														
Osage----------	0-8	0-20	40-60	40-50	1.40-1.60	0.0015-0.06	0.12-0.18	9.0-25.0	1.0-4.0	.28	.28	5	4	86
	8-18	0-20	40-60	40-50	1.40-1.60	0.0015-0.06	0.12-0.18	9.0-25.0	1.0-4.0	.28	.28			
	18-38	0-45	0-65	35-60	1.50-1.70	0.0015-0.06	0.13-0.18	9.0-25.0	0.5-1.0	.28	.28			
	38-80	0-45	0-65	35-60	1.50-1.70	0.0015-0.06	0.13-0.18	9.0-25.0	0.5-1.0	.28	.28			
46:														
Pits-----------	0-60	---	---	---	1.35-1.70	0.06-6	---	---	---	---	---	--	8	0
47:														
Radley---------	0-10	0-50	50-88	15-27	1.25-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.32	.32	5	6	48
	10-18	0-32	40-82	18-35	1.30-1.75	0.6-2	0.16-0.24	3.0-5.9	0.0-1.0	.32	.32			
	18-36	0-32	40-82	18-35	1.30-1.75	0.6-2	0.16-0.24	3.0-5.9	0.0-1.0	.32	.32			
	36-80	0-32	40-82	18-35	1.30-1.75	0.6-2	0.16-0.24	3.0-5.9	0.0-1.0	.32	.32			
48:														
Radley---------	0-14	0-50	50-88	15-27	1.25-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.32	.32	5	6	48
	14-34	0-32	40-82	18-35	1.30-1.75	0.6-2	0.16-0.24	3.0-5.9	0.0-1.0	.32	.32			
	34-80	0-32	40-82	18-35	1.30-1.75	0.6-2	0.16-0.24	3.0-5.9	0.0-1.0	.32	.32			
49:														
Severn---------	0-8	43-85	0-90	8-17	1.25-1.55	2-6	0.13-0.24	0.0-2.9	0.5-1.0	.32	.32	5	4L	86
	8-28	0-90	0-73	8-35	1.35-1.70	2-6	0.07-0.24	0.0-2.9	0.5-1.0	.32	.32			
	28-48	43-85	0-50	8-17	1.25-1.55	2-6	0.13-0.24	0.0-2.9	0.5-1.0	.32	.32			
	48-80	0-90	0-73	8-35	1.35-1.70	2-6	0.07-0.24	0.0-2.9	0.5-1.0	.32	.32			
50:														
Shidler--------	0-9	0-20	40-73	27-35	1.30-1.60	0.6-2	0.18-0.22	3.0-5.9	1.0-5.0	.20	.32	1	7	38
	9-16	0-20	40-73	27-35	1.30-1.60	0.6-2	0.18-0.22	3.0-5.9	1.0-5.0	.20	.32			
	16-20	---	---	---	1.85-2.35	0.0000-0.0015	---	---	---	---	---			
Rock outcrop---	0-60	---	---	---	1.85-2.35	0.0015-0.06	0.00-0.00	---	---	---	---	--	8	0
51:														
Tullahassee----	0-8	43-85	0-50	10-18	1.30-1.65	2-6	0.13-0.19	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	8-21	32-85	0-50	5-18	1.35-1.70	2-6	0.13-0.19	0.0-2.9	0.0-1.0	.20	.20			
	21-45	32-85	0-50	5-18	1.35-1.70	2-6	0.13-0.19	0.0-2.9	0.0-1.0	.20	.20			
	45-80	32-85	0-50	5-18	1.35-1.70	2-6	0.13-0.19	0.0-2.9	0.0-1.0	.20	.20			
52:														
Urban land-----	0-60	---	---	---	---	0.06-2	0.00-0.00	---	---	---	---	--	---	---
53:														
Wynona---------	0-10	0-20	40-73	27-35	1.30-1.55	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.37	.37	5	7	38
	10-23	0-20	40-73	27-35	1.35-1.75	0.2-0.6	0.18-0.22	3.0-5.9	0.5-1.0	.37	.37			
	23-42	0-20	40-73	30-45	1.30-1.75	0.06-0.2	0.14-0.22	6.0-8.9	0.5-1.0	.37	.37			
	42-80	0-20	40-73	30-45	1.30-1.75	0.06-0.2	0.14-0.22	6.0-8.9	0.5-1.0	.37	.37			
54:														
Wynona---------	0-10	0-20	40-73	27-35	1.30-1.55	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.37	.37	5	7	38
	10-23	0-20	40-73	27-35	1.35-1.75	0.2-0.6	0.18-0.22	3.0-5.9	0.5-1.0	.37	.37			
	23-33	0-20	40-73	30-45	1.30-1.75	0.06-0.2	0.14-0.22	6.0-8.9	0.5-1.0	.37	.37			
	33-80	0-20	40-73	30-45	1.30-1.75	0.06-0.2	0.14-0.22	6.0-8.9	0.5-1.0	.37	.37			
Urban land-----	0-60	---	---	---	---	0.06-2	0.00-0.00	---	---	---	---	--	---	---
DAM:														
Dam------------	0-80	---	---	---	---	0.06-2	0.00-0.00	---	---	---	---	--	---	---
DUM:														
Dumps----------	0-80	---	---	---	---	0.0000-6	0.00-0.00	---	---	---	---	--	8	0

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
M-W:														
Miscellaneous water	0-80	---	---	---	---	---	---	---	---	---	---	--	---	---
W:														
Water	0-80	---	---	---	---	---	---	---	---	---	---	--	---	---

Chemical Properties

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

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions section of this survey.

Cation-exchange capacity is 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. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

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

Calcium carbonate equivalent is the percent of carbonates, by weight, in the soil. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is given as the percent, by weight, of hydrated calcium sulfates in the soil. Gypsum is partially soluble in water and can be dissolved and removed by water. Soils that have a high content of gypsum (more than 10 percent) may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter (decisiemens per meter) at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio is the measure of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils having a sodium adsorption ratio of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
1:								
Apperson	0-8	17-21	---	5.6-6.5	0	0	0	0
	8-16	21-27	---	5.6-7.8	0	0	0	0
	16-28	24-36	---	6.1-8.4	0-2	0	0	0
	28-42	24-36	---	6.1-8.4	0-2	0	0	0
	42-52	24-36	---	6.1-8.4	0-2	0	0	0
	52-60	---	---	---	---	---	---	---
2:								
Apperson	0-12	17-21	---	5.6-6.5	0	0	0	0
	12-18	21-27	---	5.6-7.8	0	0	0	0
	18-28	24-36	---	6.1-8.4	0-2	0	0	0
	28-48	24-36	---	6.1-8.4	0-2	0	0	0
	48-52	24-36	---	6.1-8.4	0-2	0	0	0
	52-60	---	---	---	---	---	---	---
3:								
Bates	0-10	10-25	---	5.1-6.5	0	0	0	0
	10-14	10-20	---	5.1-6.5	0	0	0	0
	14-24	10-20	---	5.1-6.5	0	0	0	0
	24-34	10-25	---	5.1-6.5	0	0	0	0
	34-40	---	---	---	---	---	---	---
4:								
Bates	0-9	10-25	---	5.1-6.5	0	0	0	0
	9-12	10-20	---	5.1-6.5	0	0	0	0
	12-21	10-20	---	5.1-6.5	0	0	0	0
	21-32	10-25	---	5.1-6.5	0	0	0	0
	32-36	---	---	---	---	---	---	---
Coweta	0-7	10-16	---	5.1-6.5	0	0	0	0
	7-16	7.0-18	---	5.1-6.5	0	0	0	0
	16-28	---	---	---	---	---	---	---
5:								
Catoosa	0-10	9.0-15	---	5.6-6.5	0	0	0	0
	10-15	11-18	---	5.6-6.5	0	0	0	0
	15-28	16-23	---	5.1-7.3	0	0	0	0
	28-40	---	---	---	---	---	---	---
6:								
Catoosa	0-7	9.0-15	---	5.6-6.5	0	0	0	0
	7-12	11-18	---	5.6-6.5	0	0	0	0
	12-20	16-23	---	5.1-7.3	0	0	0	0
	20-28	16-23	---	5.1-7.3	0	0	0	0
	28-30	---	---	---	---	---	---	---
Shidler	0-7	11-16	---	6.1-8.4	0	0	0	0
	7-20	---	---	---	---	---	---	---
Rock outcrop	0-60	---	---	---	---	---	---	---
7:								
Choska	0-14	9.0-16	---	6.1-7.8	0	0	0	0
	14-35	7.0-11	---	6.6-8.4	0	0	0	0
	35-48	7.0-11	---	6.6-8.4	0	0	0	0
	48-80	3.0-11	---	6.6-8.4	0	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
8:								
Choska---------------	0-14	9.0-16	---	6.1-7.8	0	0	0	0
	14-25	7.0-11	---	6.6-8.4	0	0	0	0
	25-35	7.0-11	---	6.6-8.4	0	0	0	0
	35-80	3.0-11	---	6.6-8.4	0	0	0	0
Severn---------------	0-8	6.0-11	---	7.4-8.4	0-2	0	0	0
	8-28	6.0-21	---	7.9-8.4	0-2	0	0	0
	28-48	6.0-11	---	7.4-8.4	0-2	0	0	0
	48-80	6.0-21	---	7.9-8.4	0-2	0	0	0
Urban land-----------	0-60	---	---	---	---	---	---	---
9:								
Cleora---------------	0-11	7.0-11	---	5.6-7.3	0	0	0	0
	11-31	7.0-11	---	5.6-7.3	0	0	0	0
	31-62	4.0-11	---	5.6-7.3	0	0	0	0
10:								
Coweta---------------	0-6	10-16	---	5.1-6.5	0	0	0	0
	6-17	7.0-18	---	5.1-6.5	0	0	0	0
	17-31	---	---	---	---	---	---	---
Bates----------------	0-9	10-25	---	5.1-6.5	0	0	0	0
	9-12	10-20	---	5.1-6.5	0	0	0	0
	12-25	10-25	---	5.1-6.5	0	0	0	0
	25-32	---	---	---	---	---	---	---
11:								
Coweta---------------	0-6	10-16	---	5.1-6.5	0	0	0	0
	6-17	7.0-18	---	5.1-6.5	0	0	0	0
	17-31	---	---	---	---	---	---	---
Urban land-----------	0-60	---	---	---	---	---	---	---
Eram-----------------	0-14	17-24	---	5.6-6.5	0	0	0	0
	14-25	21-33	---	5.1-8.4	0	0	0	0
	25-34	21-33	---	5.1-8.4	0	0	0	0
	34-40	---	---	---	---	---	---	---
12:								
Dennis---------------	0-8	7.0-17	---	5.1-6.0	0	0	0	0
	8-15	7.0-17	---	5.1-6.0	0	0	0	0
	15-25	17-21	17-21	4.5-6.0	0	0	0	0
	25-35	21-33	---	5.1-8.4	0	0	0	0
	35-47	21-33	---	5.1-8.4	0	0	0	0
	47-80	21-33	---	5.1-8.4	0	0	0	0
13:								
Dennis---------------	0-8	7.0-17	---	5.1-6.0	0	0	0	0
	8-12	7.0-17	---	5.1-6.0	0	0	0	0
	12-16	17-21	17-21	4.5-6.0	0	0	0	0
	16-24	17-21	17-21	4.5-6.0	0	0	0	0
	24-46	21-33	---	5.1-8.4	0	0	0	0
	46-80	21-33	---	5.1-8.4	0	0	0	0
14:								
Dennis---------------	0-6	7.0-17	---	5.1-6.0	0	0	0	0
	6-10	17-21	17-21	4.5-6.0	0	0	0	0
	10-44	21-33	---	5.1-8.4	0	0	0	0
	44-80	21-33	---	5.1-8.4	0	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
15:								
Dennis---------------	0-8	7.0-17	---	5.1-6.0	0	0	0	0
	8-14	7.0-17	---	5.1-6.0	0	0	0	0
	14-18	17-21	17-21	4.5-6.0	0	0	0	0
	18-34	21-33	---	5.1-8.4	0	0	0	0
	34-54	21-33	---	5.1-8.4	0	0	0	0
	54-80	21-33	---	5.1-8.4	0	0	0	0
Pharoah--------------	0-9	11-17	---	5.1-7.8	0	0	0.0-4.0	2-4
	9-12	11-17	---	5.1-7.8	0	0	0.0-4.0	2-4
	12-26	18-33	---	5.6-8.4	0	0	2.0-8.0	4-8
	26-47	24-36	---	6.6-8.4	0	0-2	4.0-8.0	4-13
	47-80	24-36	---	6.6-8.4	0	0-2	4.0-8.0	4-13
16:								
Dennis---------------	0-8	7.0-17	---	5.1-6.0	0	0	0	0
	8-14	17-21	17-21	4.5-6.0	0	0	0	0
	14-24	21-33	---	5.1-8.4	0	0	0	0
	24-38	21-33	---	5.1-8.4	0	0	0	0
	38-80	21-33	---	5.1-8.4	0	0	0	0
Radley---------------	0-10	10-17	---	5.6-7.3	0	0	0	0
	10-20	11-21	---	5.6-7.3	0	0	0	0
	20-80	11-21	---	5.6-7.3	0	0	0	0
17:								
Urban land-----------	0-60	---	---	---	---	---	---	---
Dennis---------------	0-8	7.0-17	---	5.1-6.0	0	0	0	0
	8-14	17-21	17-21	4.5-6.0	0	0	0	0
	14-24	21-33	---	5.1-8.4	0	0	0	0
	24-38	21-33	---	5.1-8.4	0	0	0	0
	38-78	21-33	---	5.1-8.4	0	0	0	0
18:								
Endsaw---------------	0-8	7.0-15	---	5.1-6.0	0	0	0	0
	8-38	24-36	24-36	4.5-5.5	0	0	0	0
	38-42	24-36	24-36	4.5-5.5	0	0	0	0
	42-60	---	---	---	---	---	---	---
Hector---------------	0-4	5.0-15	---	5.1-6.5	0	0	0	0
	4-7	5.0-15	---	5.1-6.5	0	0	0	0
	7-18	5.0-15	5.0-15	4.5-5.5	0	0	0	0
	18-20	---	---	---	---	---	---	---
19:								
Eram-----------------	0-14	17-24	---	5.6-6.5	0	0	0	0
	14-25	21-33	---	5.1-8.4	0	0	0	0
	25-36	21-33	---	5.1-8.4	0	0	0	0
	36-40	---	---	---	---	---	---	---
20:								
Eram-----------------	0-12	17-24	---	5.6-6.5	0	0	0	0
	12-18	21-33	---	5.1-8.4	0	0	0	0
	18-26	21-33	---	5.1-8.4	0	0	0	0
	26-30	---	---	---	---	---	---	---
Coweta---------------	0-11	10-16	---	5.1-6.5	0	0	0	0
	11-17	7.0-18	---	5.1-6.5	0	0	0	0
	17-28	---	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
21:								
Glenpool-------------	0-4	3.0-7.0	---	5.6-6.5	0	0	0	0
	4-41	2.0-7.0	---	5.6-6.5	0	0	0	0
	41-48	3.0-7.0	3.0-7.0	4.5-5.5	0	0	0	0
	48-55	3.0-7.0	3.0-7.0	4.5-5.5	0	0	0	0
	55-80	3.0-7.0	3.0-7.0	4.5-5.5	0	0	0	0
22:								
Hector---------------	0-2	5.0-15	---	5.1-6.5	0	0	0	0
	2-9	5.0-15	---	5.1-6.5	0	0	0	0
	9-15	5.0-15	5.0-15	4.5-5.5	0	0	0	0
	15-20	---	---	---	---	---	---	---
Linker---------------	0-5	5.0-15	5.0-15	3.6-5.5	0	0	0	0
	5-12	5.0-15	5.0-15	3.6-5.5	0	0	0	0
	12-26	5.0-20	5.0-20	3.6-5.5	0	0	0	0
	26-31	5.0-20	5.0-20	3.6-5.5	0	0	0	0
	31-33	---	---	---	---	---	---	---
23:								
Kamie----------------	0-6	3.0-6.0	---	5.6-7.3	0	0	0	0
	6-18	3.0-6.0	---	5.6-7.3	0	0	0	0
	18-54	12-21	12-21	4.5-6.0	0	0	0	0
	54-64	11-19	11-19	4.5-6.0	0	0	0	0
24:								
Kamie----------------	0-8	6.0-11	---	5.6-7.3	0	0	0	0
	8-16	6.0-11	---	5.6-7.3	0	0	0	0
	16-54	12-21	12-21	4.5-6.0	0	0	0	0
	54-66	11-19	11-19	4.5-6.0	0	0	0	0
25:								
Kamie----------------	0-8	3.0-6.0	---	5.6-7.3	0	0	0	0
	8-18	3.0-6.0	---	5.6-7.3	0	0	0	0
	18-54	12-21	12-21	4.5-6.0	0	0	0	0
	54-64	11-19	11-19	4.5-6.0	0	0	0	0
Urban land-----------	0-60	---	---	---	---	---	---	---
26:								
Kanima---------------	0-3	16-21	---	5.6-8.4	0	0	0	0
	3-80	11-21	---	5.6-8.4	0	0	0	0
27:								
Kiomatia-------------	0-10	2.0-7.0	---	6.1-8.4	0-5	0	0	0
	10-61	1.0-7.0	---	6.1-8.4	0-5	0	0	0
28:								
Larton---------------	0-11	4.0-7.0	---	5.1-6.5	0	0	0	0
	11-30	4.0-7.0	---	5.1-6.5	0	0	0	0
	30-36	10-15	10-15	4.5-6.0	0	0	0	0
	36-54	10-15	10-15	4.5-6.0	0	0	0	0
	54-66	10-15	---	5.1-6.5	0	0	0	0
Glenpool-------------	0-4	3.0-7.0	---	5.6-6.5	0	0	0	0
	4-41	2.0-7.0	---	5.6-6.5	0	0	0	0
	41-80	3.0-7.0	3.0-7.0	4.5-5.5	0	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
29:								
Latanier	0-11	20-40	---	6.6-8.4	0	0	0	0
	11-32	20-40	---	6.6-8.4	0-5	0-5	0	0
	32-42	5.0-30	---	6.6-8.4	0-5	0-5	0	0
	42-66	5.0-30	---	6.6-8.4	0-5	0-5	0	0
30:								
Lula	0-14	9.0-16	---	5.6-6.5	0	0	0	0
	14-19	11-21	---	5.6-6.5	0	0	0	0
	19-54	16-21	---	5.1-7.3	0	0	0	0
	54-60	---	---	---	---	---	---	---
31:								
Mason	0-13	8.0-17	---	5.1-7.3	0	0	0	0
	13-37	12-21	---	4.5-7.8	0	0	0	0
	37-56	12-21	---	4.5-7.8	0	0	0	0
	56-80	12-21	---	4.5-7.8	0	0	0	0
32:								
Newtonia	0-11	6.0-14	---	5.6-6.5	0	0	0	0
	11-18	12-21	---	5.1-6.5	0	0	0	0
	18-26	16-21	---	5.1-6.0	0	0	0	0
	26-46	19-27	---	5.1-6.0	0	0	0	0
	46-80	19-27	---	5.1-7.3	0	0	0	0
33:								
Newtonia	0-12	6.0-14	---	5.6-6.5	0	0	0	0
	12-17	12-21	---	5.1-6.5	0	0	0	0
	17-30	16-21	---	5.1-6.0	0	0	0	0
	30-46	19-27	---	5.1-6.0	0	0	0	0
	46-80	19-27	---	5.1-7.3	0	0	0	0
34:								
Niotaze	0-5	4.0-12	---	5.1-6.0	0	0	0	0
	5-11	4.0-12	---	5.1-6.0	0	0	0	0
	11-34	21-33	---	4.5-7.3	0	0	0	0
	34-48	---	---	---	0	0	0	0
Darnell	0-4	4.0-12	---	5.1-7.3	0	0	0	0
	4-17	7.0-16	---	5.1-7.3	0	0	0	0
	17-20	---	---	---	---	---	---	---
35:								
Niotaze	0-5	4.0-12	---	5.1-6.0	0	0	0	0
	5-12	4.0-12	---	5.1-6.0	0	0	0	0
	12-35	21-33	---	4.5-7.3	0	0	0	0
	35-64	---	---	---	0	0	0	0
Darnell	0-4	7.0-13	---	5.1-7.3	0	0	0	0
	4-15	7.0-16	---	5.1-7.3	0	0	0	0
	15-26	---	---	---	---	---	---	---
36:								
Niotaze	0-4	4.0-12	---	5.1-6.0	0	0	0	0
	4-13	4.0-12	---	5.1-6.0	0	0	0	0
	13-32	21-33	---	4.5-7.3	0	0	0	0
	32-40	---	---	---	0	0	0	0
Darnell	0-3	7.0-13	---	5.1-7.3	0	0	0	0
	3-12	7.0-16	---	5.1-7.3	0	0	0	0
	12-22	---	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
37:								
Niotaze-------------	0-4	4.0-12	---	5.1-6.0	0	0	0	0
	4-13	4.0-12	---	5.1-6.0	0	0	0	0
	13-32	21-33	---	4.5-7.3	0	0	0	0
	32-40	---	---	---	0	0	0	0
Darnell-------------	0-3	7.0-13	---	5.1-7.3	0	0	0	0
	3-12	7.0-16	---	5.1-7.3	0	0	0	0
	12-22	---	---	---	---	---	---	---
Urban land-----------	0-60	---	---	---	---	---	---	---
38:								
Oil waste land-------	0-60	---	---	---	---	---	16.0-30.0	13-20
39:								
Okay-----------------	0-15	9.0-15	---	5.6-6.5	0	0	0	0
	15-20	12-21	---	5.1-6.5	0	0	0	0
	20-42	12-21	---	5.1-6.5	0	0	0	0
	42-64	9.0-16	---	5.1-7.3	0	0	0	0
40:								
Okay-----------------	0-12	9.0-15	---	5.6-6.5	0	0	0	0
	12-18	12-21	---	5.1-6.5	0	0	0	0
	18-46	12-21	---	5.1-6.5	0	0	0	0
	46-70	9.0-16	---	5.1-7.3	0	0	0	0
41:								
Okay-----------------	0-11	9.0-15	---	5.6-6.5	0	0	0	0
	11-19	12-21	---	5.1-6.5	0	0	0	0
	19-29	12-21	---	5.1-6.5	0	0	0	0
	29-44	12-21	---	5.1-6.5	0	0	0	0
	44-74	9.0-16	---	5.1-7.3	0	0	0	0
42:								
Okay-----------------	0-8	9.0-15	---	5.6-6.5	0	0	0	0
	8-12	12-21	---	5.1-6.5	0	0	0	0
	12-53	12-21	---	5.1-6.5	0	0	0	0
	53-80	9.0-16	---	5.1-7.3	0	0	0	0
43:								
Okemah---------------	0-9	12-17	---	5.6-7.3	0	0	0	0
	9-20	12-21	---	5.6-7.3	0	0	0	0
	20-28	21-33	---	5.6-7.8	0	0	0	0
	28-48	21-33	---	6.6-8.4	0-2	0-2	0	0
	48-80	21-33	---	6.6-8.4	0-2	0-2	0	0
44:								
Okemah---------------	0-14	12-17	---	5.6-7.3	0	0	0	0
	14-17	12-21	---	5.6-7.3	0	0	0	0
	17-54	21-33	---	5.6-7.8	0	0	0	0
	54-80	21-33	---	6.6-8.4	0-2	0-2	0	0
Parsons--------------	0-8	10-15	---	5.1-6.5	0	0	0	0
	8-14	10-15	---	5.1-6.5	0	0	0	0
	14-25	21-36	---	5.1-7.8	0	0	0	0
	25-54	21-36	---	5.1-7.8	0	0	0	0
	54-80	21-36	---	5.1-7.8	0	0	0	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
44:								
Pharoah----------------	0-7	11-17	---	5.1-7.8	0	0	0.0-4.0	2-4
	7-14	18-33	---	5.6-8.4	0	0	2.0-8.0	4-8
	14-23	18-33	---	5.6-8.4	0	0	2.0-8.0	4-8
	23-51	24-36	---	6.6-8.4	0	0-2	4.0-8.0	4-13
	51-80	24-36	---	6.6-8.4	0	0-2	4.0-8.0	4-13
45:								
Osage------------------	0-8	18-35	---	5.1-7.8	0	0	0	0
	8-18	18-35	---	5.1-7.8	0	0	0	0
	18-38	16-25	---	5.6-7.8	0	0	0	0
	38-80	16-25	---	5.6-7.8	0	0	0	0
46:								
Pits-------------------	0-60	---	---	---	---	---	---	---
47:								
Radley-----------------	0-10	10-17	---	5.6-7.3	0	0	0	0
	10-18	11-21	---	5.6-7.3	0	0	0	0
	18-36	11-21	---	5.6-7.3	0	0	0	0
	36-80	11-21	---	5.6-7.3	0	0	0	0
48:								
Radley-----------------	0-14	10-17	---	5.6-7.3	0	0	0	0
	14-34	11-21	---	5.6-7.3	0	0	0	0
	34-80	11-21	---	5.6-7.3	0	0	0	0
49:								
Severn-----------------	0-8	6.0-11	---	7.4-8.4	0-2	0	0	0
	8-28	6.0-21	---	7.9-8.4	0-2	0	0	0
	28-48	6.0-11	---	7.4-8.4	0-2	0	0	0
	48-80	6.0-21	---	7.9-8.4	0-2	0	0	0
50:								
Shidler----------------	0-9	16-21	---	6.1-8.4	0	0	0	0
	9-16	16-21	---	6.1-8.4	0	0	0	0
	16-20	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
51:								
Tullahassee------------	0-8	7.0-11	---	5.6-6.5	0	0	0	0
	8-21	4.0-11	---	5.6-6.5	0	0	0	0
	21-45	4.0-11	---	5.6-6.5	0	0	0	0
	45-80	4.0-11	---	5.6-6.5	0	0	0	0
52:								
Urban land-------------	0-60	---	---	---	---	---	---	---
53:								
Wynona-----------------	0-10	17-21	---	5.1-6.5	0	0	0	0
	10-23	17-21	---	5.1-6.5	0	0	0	0
	23-42	18-27	---	5.1-6.0	0	0	0	0
	42-80	18-27	---	5.1-6.0	0	0	0	0
54:								
Wynona-----------------	0-10	17-21	---	5.1-6.5	0	0	0	0
	10-23	17-21	---	5.1-6.5	0	0	0	0
	23-33	18-27	---	5.1-6.0	0	0	0	0
	33-80	18-27	---	5.1-6.0	0	0	0	0
Urban land-------------	0-60	---	---	---	---	---	---	---

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
DAM:								
Dam	0-80	---	---	---	---	---	---	---
DUM:								
Dumps	0-80	---	---	---	---	---	0	---
M-W:								
Miscellaneous water	---	---	---	---	---	---	---	---
W:								
Water	---	---	---	---	---	---	---	---

Water Features

The table “Water Features” gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

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

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

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table “Water Features” indicates, by month, depth to the top *(upper limit)* and base *(lower limit)* of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table “Water Features” indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

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

Duration and frequency are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

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

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

Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro-logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
1:									
Apperson------------------	C								
		January	1.5-2.0	3.2-5.0	---	---	None	---	None
		February	1.5-2.0	3.2-5.0	---	---	None	---	None
		March	1.5-2.0	3.2-5.0	---	---	None	---	None
		April	1.5-2.0	3.2-5.0	---	---	None	---	None
		December	1.5-2.0	3.2-5.0	---	---	None	---	None
2:									
Apperson------------------	C								
		January	1.5-2.0	3.2-5.0	---	---	None	---	None
		February	1.5-2.0	3.2-5.0	---	---	None	---	None
		March	1.5-2.0	3.2-5.0	---	---	None	---	None
		April	1.5-2.0	3.2-5.0	---	---	None	---	None
		December	1.5-2.0	3.2-5.0	---	---	None	---	None
3:									
Bates---------------------	B								
		Jan-Dec	---	---	---	---	None	---	None
4:									
Bates---------------------	B								
		Jan-Dec	---	---	---	---	None	---	None
Coweta--------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
5:									
Catoosa-------------------	B								
		Jan-Dec	---	---	---	---	None	---	None
6:									
Catoosa-------------------	B								
		Jan-Dec	---	---	---	---	None	---	None
Shidler-------------------	D								
		Jan-Dec	---	---	---	---	None	---	None
Rock outcrop--------------	D								
		Jan-Dec	---	---	---	---	None	---	None
7:									
Choska--------------------	B								
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
		October	---	---	---	---	None	Very brief	Rare
		November	---	---	---	---	None	Very brief	Rare

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
8:									
Choska	B								
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
		October	---	---	---	---	None	Very brief	Rare
		November	---	---	---	---	None	Very brief	Rare
Severn	B								
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
		October	---	---	---	---	None	Very brief	Rare
		November	---	---	---	---	None	Very brief	Rare
Urban land	D								
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
		October	---	---	---	---	None	Very brief	Rare
		November	---	---	---	---	None	Very brief	Rare
9:									
Cleora	B								
		January	---	---	---	---	None	Very brief	Occasional
		February	---	---	---	---	None	Very brief	Occasional
		March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
10:									
Coweta	C								
		Jan-Dec	---	---	---	---	None	---	None
Bates	B								
		Jan-Dec	---	---	---	---	None	---	None
11:									
Coweta	C								
		Jan-Dec	---	---	---	---	None	---	None
Urban land	D								
		Jan-Dec	---	---	---	---	None	---	None
Eram	C								
		January	1.0-2.0	1.6-3.5	---	---	None	---	None
		February	1.0-2.0	1.6-3.5	---	---	None	---	None
		March	1.0-2.0	1.6-3.5	---	---	None	---	None
		April	1.0-2.0	1.6-3.5	---	---	None	---	None
		November	1.0-2.0	1.6-3.5	---	---	None	---	None
		December	1.0-2.0	1.6-3.5	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
12:									
Dennis	C								
		January	1.0-2.5	1.1-2.5	---	---	None	---	None
		February	1.0-2.5	1.1-2.5	---	---	None	---	None
		March	1.0-2.5	1.1-2.5	---	---	None	---	None
		April	1.0-2.5	1.1-2.5	---	---	None	---	None
		December	1.0-2.5	1.1-2.5	---	---	None	---	None
13:									
Dennis	C								
		January	1.0-2.5	1.1-2.5	---	---	None	---	None
		February	1.0-2.5	1.1-2.5	---	---	None	---	None
		March	1.0-2.5	1.1-2.5	---	---	None	---	None
		April	1.0-2.5	1.1-2.5	---	---	None	---	None
		December	1.0-2.5	1.1-2.5	---	---	None	---	None
14:									
Dennis	C								
		January	1.0-2.5	1.1-2.5	---	---	None	---	None
		February	1.0-2.5	1.1-2.5	---	---	None	---	None
		March	1.0-2.5	1.1-2.5	---	---	None	---	None
		April	1.0-2.5	1.1-2.5	---	---	None	---	None
		December	1.0-2.5	1.1-2.5	---	---	None	---	None
15:									
Dennis	C								
		January	1.0-2.5	1.1-2.5	---	---	None	---	None
		February	1.0-2.5	1.1-2.5	---	---	None	---	None
		March	1.0-2.5	1.1-2.5	---	---	None	---	None
		April	1.0-2.5	1.1-2.5	---	---	None	---	None
		December	1.0-2.5	1.1-2.5	---	---	None	---	None
Pharoah	D								
		January	0.5-1.5	0.5-2.0	---	---	None	---	None
		February	0.5-1.5	0.5-2.0	---	---	None	---	None
		March	0.5-1.5	0.5-2.0	---	---	None	---	None
		April	0.5-1.5	0.5-2.0	---	---	None	---	None
		May	0.5-1.5	0.5-2.0	---	---	None	---	None
		December	0.5-1.5	0.5-2.0	---	---	None	---	None
16:									
Dennis	C								
		January	1.0-2.5	1.1-2.5	---	---	None	---	None
		February	1.0-2.5	1.1-2.5	---	---	None	---	None
		March	1.0-2.5	1.1-2.5	---	---	None	---	None
		April	1.0-2.5	1.1-2.5	---	---	None	---	None
		December	1.0-2.5	1.1-2.5	---	---	None	---	None
Radley	B								
		January	---	---	---	---	None	Very brief	Frequent
		February	---	---	---	---	None	Very brief	Frequent
		March	---	---	---	---	None	Very brief	Frequent
		April	---	---	---	---	None	Very brief	Frequent
		May	---	---	---	---	None	Very brief	Frequent
		June	---	---	---	---	None	Very brief	Frequent
		July	---	---	---	---	None	Very brief	Frequent
		December	---	---	---	---	None	Very brief	Frequent

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
17:									
Urban land	D								
		Jan-Dec	---	---	---	---	None	---	None
Dennis	C								
		January	1.0-2.5	1.1-2.5	---	---	None	---	None
		February	1.0-2.5	1.1-2.5	---	---	None	---	None
		March	1.0-2.5	1.1-2.5	---	---	None	---	None
		April	1.0-2.5	1.1-2.5	---	---	None	---	None
		December	1.0-2.5	1.1-2.5	---	---	None	---	None
18:									
Endsaw	C								
		January	2.0-3.0	3.5-5.0	---	---	None	---	None
		February	2.0-3.0	3.5-5.0	---	---	None	---	None
		December	2.0-3.0	3.5-5.0	---	---	None	---	None
Hector	D								
		Jan-Dec	---	---	---	---	None	---	None
19:									
Eram	C								
		January	1.0-2.0	1.6-3.5	---	---	None	---	None
		February	1.0-2.0	1.6-3.5	---	---	None	---	None
		March	1.0-2.0	1.6-3.5	---	---	None	---	None
		April	1.0-2.0	1.6-3.5	---	---	None	---	None
		November	1.0-2.0	1.6-3.5	---	---	None	---	None
		December	1.0-2.0	1.6-3.5	---	---	None	---	None
20:									
Eram	C								
		January	1.0-2.0	1.6-3.5	---	---	None	---	None
		February	1.0-2.0	1.6-3.5	---	---	None	---	None
		March	1.0-2.0	1.6-3.5	---	---	None	---	None
		April	1.0-2.0	1.6-3.5	---	---	None	---	None
		November	1.0-2.0	1.6-3.5	---	---	None	---	None
		December	1.0-2.0	1.6-3.5	---	---	None	---	None
Coweta	C								
		Jan-Dec	---	---	---	---	None	---	None
21:									
Glenpool	A								
		Jan-Dec	---	---	---	---	None	---	None
22:									
Hector	D								
		Jan-Dec	---	---	---	---	None	---	None
Linker	B								
		Jan-Dec	---	---	---	---	None	---	None
23:									
Kamie	B								
		Jan-Dec	---	---	---	---	None	---	None
24:									
Kamie	B								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table Upper limit	Water table Lower limit	Ponding Surface water depth	Ponding Duration	Ponding Frequency	Flooding Duration	Flooding Frequency
			Ft	Ft	Ft				
25:									
Kamie	B								
		Jan-Dec	---	---	---	---	None	---	None
Urban land	D								
		Jan-Dec	---	---	---	---	None	---	None
26:									
Kanima	C								
		Jan-Dec	---	---	---	---	None	---	None
27:									
Kiomatia	A								
		January	3.5-5.0	>6.0	---	---	None	---	None
		February	3.5-5.0	>6.0	---	---	None	Brief	Frequent
		March	3.5-5.0	>6.0	---	---	None	Brief	Frequent
		April	3.5-5.0	>6.0	---	---	None	Brief	Frequent
		May	3.5-5.0	>6.0	---	---	None	Brief	Frequent
		June	3.5-5.0	>6.0	---	---	None	Brief	Frequent
		July	3.5-5.0	>6.0	---	---	None	---	None
28:									
Larton	A								
		Jan-Dec	---	---	---	---	None	---	None
Glenpool	A								
		Jan-Dec	---	---	---	---	None	---	None
29:									
Latanier	D								
		January	1.0-3.0	>6.0	---	---	None	Long	Occasional
		February	1.0-3.0	>6.0	---	---	None	Long	Occasional
		March	1.0-3.0	>6.0	---	---	None	Long	Occasional
		April	1.0-3.0	>6.0	---	---	None	Long	Occasional
		May	---	---	---	---	None	Long	Occasional
		June	---	---	---	---	None	Long	Occasional
		July	---	---	---	---	None	Long	Occasional
		November	---	---	---	---	None	Long	Occasional
		December	1.0-3.0	>6.0	---	---	None	Long	Occasional
30:									
Lula	B								
		Jan-Dec	---	---	---	---	None	---	None
31:									
Mason	B								
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
		October	---	---	---	---	None	Very brief	Rare
		November	---	---	---	---	None	Very brief	Rare
32:									
Newtonia	B								
		Jan-Dec	---	---	---	---	None	---	None
33:									
Newtonia	B								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
34:									
Niotaze-------------------	C								
		January	1.0-2.0	1.5-3.3	---	---	None	---	None
		February	1.0-2.0	1.5-3.3	---	---	None	---	None
		March	1.0-2.0	1.5-3.3	---	---	None	---	None
		April	1.0-2.0	1.5-3.3	---	---	None	---	None
		May	1.0-2.0	1.5-3.3	---	---	None	---	None
		June	1.0-2.0	1.5-3.3	---	---	None	---	None
		November	1.0-2.0	1.5-3.3	---	---	None	---	None
		December	1.0-2.0	1.5-3.3	---	---	None	---	None
Darnell-------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
35:									
Niotaze-------------------	C								
		January	1.0-2.0	1.5-3.3	---	---	None	---	None
		February	1.0-2.0	1.5-3.3	---	---	None	---	None
		March	1.0-2.0	1.5-3.3	---	---	None	---	None
		April	1.0-2.0	1.5-3.3	---	---	None	---	None
		May	1.0-2.0	1.5-3.3	---	---	None	---	None
		June	1.0-2.0	1.5-3.3	---	---	None	---	None
		November	1.0-2.0	1.5-3.3	---	---	None	---	None
		December	1.0-2.0	1.5-3.3	---	---	None	---	None
Darnell-------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
36:									
Niotaze-------------------	C								
		January	1.0-2.0	1.5-3.3	---	---	None	---	None
		February	1.0-2.0	1.5-3.3	---	---	None	---	None
		March	1.0-2.0	1.5-3.3	---	---	None	---	None
		April	1.0-2.0	1.5-3.3	---	---	None	---	None
		May	1.0-2.0	1.5-3.3	---	---	None	---	None
		June	1.0-2.0	1.5-3.3	---	---	None	---	None
		November	1.0-2.0	1.5-3.3	---	---	None	---	None
		December	1.0-2.0	1.5-3.3	---	---	None	---	None
Darnell-------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
37:									
Niotaze-------------------	C								
		January	1.0-2.0	1.5-3.3	---	---	None	---	None
		February	1.0-2.0	1.5-3.3	---	---	None	---	None
		March	1.0-2.0	1.5-3.3	---	---	None	---	None
		April	1.0-2.0	1.5-3.3	---	---	None	---	None
		May	1.0-2.0	1.5-3.3	---	---	None	---	None
		June	1.0-2.0	1.5-3.3	---	---	None	---	None
		November	1.0-2.0	1.5-3.3	---	---	None	---	None
		December	1.0-2.0	1.5-3.3	---	---	None	---	None
Darnell-------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
Urban land----------------	D								
		Jan-Dec	---	---	---	---	None	---	None
38:									
Oil waste land------------	D								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
39:									
Okay	B								
		Jan-Dec	---	---	---	---	None	---	None
Okay	B								
		Jan-Dec	---	---	---	---	None	---	None
41:									
Okay	B								
		Jan-Dec	---	---	---	---	None	---	None
42:									
Okay	B								
		Jan-Dec	---	---	---	---	None	---	None
43:									
Okemah	C								
		January	1.0-2.5	1.5-2.5	---	---	None	---	None
		February	1.0-2.5	1.5-2.5	---	---	None	---	None
		March	1.0-2.5	1.5-2.5	---	---	None	---	None
		April	1.0-2.5	1.5-2.5	---	---	None	---	None
		November	1.0-2.5	1.5-2.5	---	---	None	---	None
		December	1.0-2.5	1.5-2.5	---	---	None	---	None
44:									
Okemah	C								
		January	1.0-2.5	1.5-2.5	---	---	None	---	None
		February	1.0-2.5	1.5-2.5	---	---	None	---	None
		March	1.0-2.5	1.5-2.5	---	---	None	---	None
		April	1.0-2.5	1.5-2.5	---	---	None	---	None
		November	1.0-2.5	1.5-2.5	---	---	None	---	None
		December	1.0-2.5	1.5-2.5	---	---	None	---	None
Parsons	D								
		January	0.5-1.5	1.0-2.5	---	---	None	---	None
		February	0.5-1.5	1.0-2.5	---	---	None	---	None
		March	0.5-1.5	1.0-2.5	---	---	None	---	None
		April	0.5-1.5	1.0-2.5	---	---	None	---	None
		December	0.5-1.5	1.0-2.5	---	---	None	---	None
Pharoah	D								
		January	0.5-1.5	0.5-2.0	---	---	None	---	None
		February	0.5-1.5	0.5-2.0	---	---	None	---	None
		March	0.5-1.5	0.5-2.0	---	---	None	---	None
		April	0.5-1.5	0.5-2.0	---	---	None	---	None
		May	0.5-1.5	0.5-2.0	---	---	None	---	None
		December	0.5-1.5	0.5-2.0	---	---	None	---	None
45:									
Osage	D								
		January	0.0-1.0	>6.0	---	---	None	Long	Occasional
		February	0.0-1.0	>6.0	---	---	None	Long	Occasional
		March	0.0-1.0	>6.0	---	---	None	Long	Occasional
		April	0.0-1.0	>6.0	---	---	None	Long	Occasional
		May	0.0-1.0	>6.0	---	---	None	Long	Occasional
		November	0.0-1.0	>6.0	---	---	None	Long	Occasional
		December	0.0-1.0	>6.0	---	---	None	Long	Occasional
46:									
Pits	--	---	---	---	---	---	---	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
47:									
Radley	B								
		January	---	---	---	---	None	Very brief	Occasional
		February	---	---	---	---	None	Very brief	Occasional
		March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		December	---	---	---	---	None	Very brief	Occasional
48:									
Radley	B								
		January	---	---	---	---	None	Very brief	Frequent
		February	---	---	---	---	None	Very brief	Frequent
		March	---	---	---	---	None	Very brief	Frequent
		April	---	---	---	---	None	Very brief	Frequent
		May	---	---	---	---	None	Very brief	Frequent
		June	---	---	---	---	None	Very brief	Frequent
		July	---	---	---	---	None	Very brief	Frequent
		December	---	---	---	---	None	Very brief	Frequent
49:									
Severn	B								
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
		October	---	---	---	---	None	Very brief	Rare
		November	---	---	---	---	None	Very brief	Rare
50:									
Shidler	D								
		Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D								
		Jan-Dec	---	---	---	---	None	---	None
51:									
Tullahassee	C								
		January	0.5-3.0	>6.0	---	---	None	---	None
		February	0.5-3.0	>6.0	---	---	None	---	None
		March	0.5-3.0	>6.0	---	---	None	Long	Frequent
		April	0.5-3.0	>6.0	---	---	None	Long	Frequent
		May	0.5-3.0	>6.0	---	---	None	Long	Frequent
		June	---	---	---	---	None	Long	Frequent
		July	---	---	---	---	None	Long	Frequent
		August	---	---	---	---	None	Long	Frequent
		November	0.5-3.0	>6.0	---	---	None	---	None
		December	0.5-3.0	>6.0	---	---	None	---	None
52:									
Urban land	D								
		Jan-Dec	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
53:									
Wynona	C								
		January	0.0-2.0	>6.0	---	---	None	Very brief	Occasional
		February	0.0-2.0	>6.0	---	---	None	Very brief	Occasional
		March	0.0-2.0	>6.0	---	---	None	Very brief	Occasional
		April	0.0-2.0	>6.0	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		November	0.0-2.0	>6.0	---	---	None	---	None
		December	0.0-2.0	>6.0	---	---	None	---	None
54:									
Wynona	C								
		January	0.0-2.0	>6.0	---	---	None	Very brief	Occasional
		February	0.0-2.0	>6.0	---	---	None	Very brief	Occasional
		March	0.0-2.0	>6.0	---	---	None	Very brief	Occasional
		April	0.0-2.0	>6.0	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		November	0.0-2.0	>6.0	---	---	None	---	None
		December	0.0-2.0	>6.0	---	---	None	---	None
Urban land	D								
		Jan-Dec	---	---	---	---	None	---	None
DAM:									
Dam	D								
		Jan-Dec	---	---	---	---	None	---	None
DUM:									
Dumps	--	---	---	---	---	---	---	---	---
M-W:									
Miscellaneous water	--	---	---	---	---	---	---	---	---
W:									
Water	--	---	---	---	---	---	---	---	---

Soil Features

The table “Soil Features” gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. Depth to top is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

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

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

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

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

Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top		Uncoated steel	Concrete
		In			
1:					
Apperson	Bedrock (lithic)	40-60	None	High	Low
2:					
Apperson	Bedrock (lithic)	40-60	None	High	Low
3:					
Bates	Bedrock (paralithic)	20-40	None	Low	Moderate
4:					
Bates	Bedrock (paralithic)	20-40	None	Low	Moderate
Coweta	Bedrock (paralithic)	10-20	None	Low	Moderate
5:					
Catoosa	Bedrock (lithic)	20-40	None	Moderate	Moderate
6:					
Catoosa	Bedrock (lithic)	20-40	None	Moderate	Moderate
Shidler	Bedrock (lithic)	4-20	None	Moderate	Low
Rock outcrop	Bedrock (lithic)	0-0	None	---	---
7:					
Choska	---	---	None	Low	Low
8:					
Choska	---	---	None	Low	Low
Severn	---	---	None	Low	Low
Urban land	---	---	None	---	---
9:					
Cleora	---	---	None	Low	Moderate
10:					
Coweta	Bedrock (paralithic)	10-20	None	Low	Moderate
Bates	Bedrock (paralithic)	20-40	None	Low	Moderate
11:					
Coweta	Bedrock (paralithic)	10-20	None	Low	Moderate
Urban land	---	---	None	---	---
Eram	Bedrock (paralithic)	20-40	None	High	Moderate
12:					
Dennis	---	---	None	High	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In			
13:					
Dennis	---	---	None	High	Moderate
14:					
Dennis	---	---	None	High	Moderate
15:					
Dennis	---	---	None	High	Moderate
Pharoah	---	---	None	High	High
16:					
Dennis	---	---	None	High	Moderate
Radley	---	---	Low	Low	Low
17:					
Urban land	---	---	None	---	---
Dennis	---	---	None	High	Moderate
18:					
Endsaw	Bedrock (paralithic)	40-60	None	High	High
Hector	Bedrock (lithic)	10-20	None	Low	Moderate
19:					
Eram	Bedrock (paralithic)	20-40	None	High	Moderate
20:					
Eram	Bedrock (paralithic)	20-40	None	High	Moderate
Coweta	Bedrock (paralithic)	10-20	None	Low	Moderate
21:					
Glenpool	---	---	None	Low	High
22:					
Hector	Bedrock (lithic)	10-20	None	Low	Moderate
Linker	Bedrock (lithic)	20-40	None	Low	High
23:					
Kamie	---	---	None	Moderate	Moderate
24:					
Kamie	---	---	None	Moderate	Moderate
25:					
Kamie	---	---	None	Moderate	Moderate
Urban land	---	---	None	---	---
26:					
Kanima	---	---	None	Moderate	Low
27:					
Kiomatia	---	---	None	Low	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top		Uncoated steel	Concrete
		In			
28:					
Larton	---	---	None	Low	Moderate
Glenpool	---	---	None	Low	High
29:					
Latanier	---	---	None	High	Low
30:					
Lula	Bedrock (lithic)	40-60	None	Moderate	Moderate
31:					
Mason	---	---	None	Moderate	Moderate
32:					
Newtonia	---	---	None	Moderate	Moderate
33:					
Newtonia	---	---	None	Moderate	Moderate
34:					
Niotaze	Bedrock (paralithic)	20-40	None	High	Moderate
Darnell	Bedrock (paralithic)	10-20	None	Low	Moderate
35:					
Niotaze	Bedrock (paralithic)	20-40	None	High	Moderate
Darnell	Bedrock (paralithic)	10-20	None	Low	Moderate
36:					
Niotaze	Bedrock (paralithic)	20-40	None	High	Moderate
Darnell	Bedrock (paralithic)	10-20	None	Low	Moderate
37:					
Niotaze	Bedrock (paralithic)	20-40	None	High	Moderate
Darnell	Bedrock (paralithic)	10-20	None	Low	Moderate
Urban land	---	---	None	---	---
38:					
Oil waste land	---	---	None	High	High
39:					
Okay	---	---	None	Moderate	Moderate
40:					
Okay	---	---	None	Moderate	Moderate
41:					
Okay	---	---	None	Moderate	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top		Uncoated steel	Concrete
		In			
42:					
Okay	---	---	None	Moderate	Moderate
43:					
Okemah	---	---	None	High	Moderate
44:					
Okemah	---	---	None	High	Moderate
Parsons	---	---	None	High	Moderate
Pharoah	---	---	None	High	High
45:					
Osage	---	---	None	High	Moderate
46:					
Pits	---	---	None	---	---
47:					
Radley	---	---	None	Low	Low
48:					
Radley	---	---	None	Low	Low
49:					
Severn	---	---	None	Low	Low
50:					
Shidler	Bedrock (lithic)	4-20	None	Moderate	Low
Rock outcrop	Bedrock (lithic)	0-0	None	---	---
51:					
Tullahassee	---	---	None	Moderate	Moderate
52:					
Urban land	---	---	None	---	---
53:					
Wynona	---	---	None	High	Moderate
54:					
Wynona	---	---	None	High	Moderate
Urban land	---	---	None	---	---
DAM:					
Dam	---	---	None	---	---
DUM:					
Dumps	---	---	None	---	---
M-W:					
Miscellaneous water	---	---	---	---	---
W:					
Water	---	---	---	---	---

Agronomy

General management concerns affecting crops, hay and pasture are identified in this section. The system of land capability classification used by the Natural Resources Conservation Service is explained, the estimated yields of the main crops and hay and pasture plants are listed for each soil, and the soils that meet the requirements for prime farmland are identified.

Planners of management systems for individual fields or farms should consider obtaining specific information from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Land Capability Classification

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

In the capability system, as described in “Land Capability Classification” (USDA, 1961), soils generally are grouped at three levels: capability class, subclass, and unit. These levels indicate the degree and kinds of limitations affecting mechanized farming systems that produce the more commonly grown field crops, such as corn, small grain, cotton, hay, and field-grown vegetables. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Arabic numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use.

If properly managed, soils in classes 1, 2, 3, and 4 are suitable for the mechanized production of commonly grown field crops and for pasture and woodland. The degree of the soil limitations affecting the production of cultivated crops increases progressively from class 1 to class 4. The limitations can affect levels of production and the risk of permanent soil deterioration caused by erosion and other factors.

Soils in classes 5, 6, and 7 are generally not suited to the mechanized production of commonly grown field crops without special management, but they are suitable for plants that provide a permanent cover, such as grasses and trees. The severity of the soil limitations affecting crops increases progressively from class 5 to class 7. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide guidance on the use of these soils as cropland.

Areas in class 8 are generally not suitable for crops, pasture, rangeland, or woodland. These areas may have potential for other uses, such as recreational facilities and wildlife habitat.

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

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

The capability classification of each map unit is given in the table “Land Capability and Yields per Acre of Crops,” which is in this section.

Estimated Yields of Crops, Hay, and Pasture

The average yields per acre that can be expected of the principal crops and pasture under a high level of management are shown in the tables “Land Capability and Yields per Acre of Crops” and “Land Capability and Yields per Acre of Pasture.” In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

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

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

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small.

Under good pasture management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

A pasture program is needed to provide the desired amount of forage during each month of the year. A study of the growth habits of the different plants is necessary to ensure adequate forage during each month. The months that various kinds of forage plants grow are indicated in Figure 2 in the “Range” section of this survey (page 173). The percent growth that can be safely grazed each month without substantially reducing the total yield for each kind of plant is illustrated.

Yield estimates are often indicated in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about forage yields other than those shown in the table “Land Capability and Yields per Acre of Pasture.”

Land Capability and Yields per Acre of Crops

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

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Wheat
		Bu	Bu	Bu	Bu
1:					
Apperson-----------	3w	---	65	30	35
2:					
Apperson-----------	3e	---	60	25	30
3:					
Bates--------------	2e	50	55	25	35
4:					
Bates--------------	3e	45	40	20	30
Coweta-------------	4e	---	---	---	---
5:					
Catoosa------------	2e	---	55	25	35
6:					
Catoosa------------	3e	---	40	20	25
Shidler------------	7s	---	---	---	---
Rock outcrop-------	8s	---	---	---	---
7:					
Choska-------------	1	65	75	40	40
8:					
Choska-------------	1	65	75	40	40
Severn-------------	1	---	75	40	40
Urban land---------	8s	---	---	---	---
9:					
Cleora-------------	2w	---	75	30	35
10:					
Coweta-------------	4e	---	---	---	---
Bates--------------	3e	45	55	20	30
11:					
Coweta-------------	4e	---	---	---	---
Urban land---------	8s	---	---	---	---
Eram---------------	6e	---	---	---	---
12:					
Dennis-------------	2e	---	70	30	40
13:					
Dennis-------------	3e	---	65	25	30
14:					
Dennis-------------	3e	---	50	20	30

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Wheat
		Bu	Bu	Bu	Bu
15:					
Dennis	2e	---	50	20	30
Pharoah	3w	65	60	20	30
16:					
Dennis	3e	---	60	20	30
Radley	5w	---	---	---	---
17:					
Urban land	8s	---	---	---	---
Dennis	2e	---	---	---	---
18:					
Endsaw	7s	---	---	---	---
Hector	6s	---	---	---	---
19:					
Eram	3e	---	45	20	25
20:					
Eram	6e	---	---	---	---
Coweta	4e	---	---	---	---
21:					
Glenpool	6e	---	---	---	---
22:					
Hector	4e	---	---	---	20
Linker	2e	---	---	---	20
23:					
Kamie	4e	---	---	---	25
24:					
Kamie	2e	---	45	---	30
25:					
Kamie	3e	---	35	---	25
Urban land	8s	---	---	---	---
26:					
Kanima	7s	---	---	---	---
27:					
Kiomatia	5w	---	---	---	---
28:					
Larton	3e	---	35	20	25
Glenpool	4s	---	50	15	20
29:					
Latanier	4w	---	---	35	---
30:					
Lula	2e	60	65	30	40

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Wheat
		Bu	Bu	Bu	Bu
31:					
Mason	1	75	75	35	40
32:					
Newtonia	2e	70	75	30	40
33:					
Newtonia	3e	65	70	25	35
34:					
Niotaze	7s	---	---	---	---
Darnell	6e	---	---	---	---
35:					
Niotaze	7e	---	---	---	---
Darnell	7e	---	---	---	---
36:					
Niotaze	7e	---	---	---	---
Darnell	7e	---	---	---	---
37:					
Niotaze	7s	---	---	---	---
Darnell	3s	---	---	---	---
Urban land	8s	---	---	---	---
38:					
Oil waste land	8s	---	---	---	---
39:					
Okay	1	---	60	30	40
40:					
Okay	2e	---	65	30	40
41:					
Okay	3e	---	55	25	30
42:					
Okay	3e	---	40	20	25
43:					
Okemah	1	60	70	35	40
44:					
Okemah	1	60	70	30	35
Parsons	2w	55	45	25	35
Pharoah	3w	65	60	25	30
45:					
Osage	3w	80	60	25	30
46:					
Pits	8s	---	---	---	---
47:					
Radley	2w	70	65	30	40

Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Wheat
		Bu	Bu	Bu	Bu
48:					
Radley	5w	---	---	---	---
49:					
Severn	1	---	75	40	40
50:					
Shidler	7s	---	---	---	---
Rock outcrop	8s	---	---	---	---
51:					
Tullahassee	5w	---	---	---	---
52:					
Urban land	8s	---	---	---	---
53:					
Wynona	2w	---	70	30	35
54:					
Wynona	2w	---	70	30	35
Urban land	8s	---	---	---	---
DAM:					
Dam	8s	---	---	---	---
DUM:					
Dumps	8s	---	---	---	---
M-W:					
Miscellaneous water	---	---	---	---	---
W:					
Water	---	---	---	---	---

Land Capability and Yields per Acre of Pasture

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

Map symbol and soil name	Land capability	Alfalfa hay	Common bermudagrass	Grass-legume hay	Improved bermudagrass	Tall fescue
		Tons	AUM*	Tons	AUM*	AUM*
1:						
Apperson-----------	3w	4.0	---	---	6.0	6.0
2:						
Apperson-----------	3e	---	---	---	5.5	5.5
3:						
Bates--------------	2e	3.5	---	---	---	5.0
4:						
Bates--------------	3e	3.0	---	---	---	5.0
Coweta-------------	4e	---	---	---	5.0	---
5:						
Catoosa------------	2e	---	---	---	5.0	5.0
6:						
Catoosa------------	3e	---	---	---	6.0	5.0
Shidler------------	7s	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
7:						
Choska-------------	1	4.0	---	---	8.5	---
8:						
Choska-------------	1	4.0	---	---	8.5	---
Severn-------------	1	4.0	8.5	---	8.5	---
Urban land---------	8s	---	---	---	---	---
9:						
Cleora-------------	2w	4.0	---	---	8.0	6.0
10:						
Coweta-------------	4e	---	---	---	4.5	---
Bates--------------	3e	3.0	---	---	---	5.0
11:						
Coweta-------------	4e	---	---	---	4.0	---
Urban land---------	8s	---	---	---	---	---
Eram---------------	6e	---	---	---	5.5	4.5
12:						
Dennis-------------	2e	4.0	---	---	7.0	6.0
13:						
Dennis-------------	3e	4.0	---	---	6.5	5.5
14:						
Dennis-------------	3e	3.5	---	---	6.0	5.0

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Common bermudagrass	Grass-legume hay	Improved bermudagrass	Tall fescue
		Tons	AUM*	Tons	AUM*	AUM*
15:						
Dennis-------------	2e	4.0	---	---	5.5	5.0
Pharoah------------	3w	---	---	---	---	5.0
16:						
Dennis-------------	3e	4.0	---	---	7.0	6.0
Radley-------------	5w	---	---	---	---	---
17:						
Urban land---------	8s	---	---	---	---	---
Dennis-------------	2e	---	---	---	---	---
18:						
Endsaw-------------	7s	---	---	---	---	---
Hector-------------	6s	---	4.0	---	---	3.0
19:						
Eram---------------	3e	3.5	---	---	6.0	5.0
20:						
Eram---------------	6e	---	---	---	4.5	4.5
Coweta-------------	4e	---	---	---	4.5	---
21:						
Glenpool-----------	6e	---	---	---	6.0	---
22:						
Hector-------------	4e	---	4.0	---	---	5.0
Linker-------------	2e	---	4.0	---	---	5.0
23:						
Kamie--------------	4e	---	---	---	6.0	---
24:						
Kamie--------------	2e	---	---	---	6.5	---
25:						
Kamie--------------	3e	---	---	---	6.5	---
Urban land---------	8s	---	---	---	---	---
26:						
Kanima-------------	7s	---	---	---	---	---
27:						
Kiomatia-----------	5w	---	4.0	---	5.5	---
28:						
Larton-------------	3e	---	---	---	6.0	---
Glenpool-----------	4s	---	---	---	6.0	---
29:						
Latanier-----------	4w	---	4.0	---	---	7.0
30:						
Lula---------------	2e	---	---	---	6.5	5.5

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Common bermudagrass	Grass-legume hay	Improved bermudagrass	Tall fescue
		Tons	AUM*	Tons	AUM*	AUM*
31:						
Mason	1	4.5	---	---	8.0	7.0
32:						
Newtonia	2e	3.5	---	---	7.5	6.0
33:						
Newtonia	3e	3.0	---	---	7.0	6.0
34:						
Niotaze	7s	---	---	---	---	---
Darnell	6e	---	---	---	4.50	---
35:						
Niotaze	7e	---	---	---	---	---
Darnell	7e	---	---	---	---	---
36:						
Niotaze	7e	---	---	---	---	---
Darnell	7e	---	---	---	---	---
37:						
Niotaze	7s	---	---	---	---	---
Darnell	3s	---	---	---	3.5	---
Urban land	8s	---	---	---	---	---
38:						
Oil waste land	8s	---	---	---	---	---
39:						
Okay	1	3.5	---	---	8.0	---
40:						
Okay	2e	3.0	---	---	7.0	6.5
41:						
Okay	3e	---	---	---	6.0	6.0
42:						
Okay	3e	---	---	---	8.0	5.0
43:						
Okemah	1	4.5	---	---	8.0	7.5
44:						
Okemah	1	4.5	---	---	6.0	6.5
Parsons	2w	---	---	---	6.0	6.0
Pharoah	3w	---	---	---	---	4.0
45:						
Osage	3w	---	---	3.0	---	7.0
46:						
Pits	8s	---	---	---	---	---
47:						
Radley	2w	4.0	---	---	---	6.5

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Common bermudagrass	Grass-legume hay	Improved bermudagrass	Tall fescue
		Tons	AUM*	Tons	AUM*	AUM*
48:						
Radley	5w	---	---	---	---	7.0
49:						
Severn	1	4.5	6.0	---	8.5	6.5
50:						
Shidler	7s	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
51:						
Tullahassee	5w	---	---	---	8.0	7.0
52:						
Urban land	8s	---	---	---	---	---
53:						
Wynona	2w	4.5	---	---	7.5	8.5
54:						
Wynona	2w	4.5	---	---	7.5	8.0
Urban land	8s	---	---	---	---	---
DAM:						
Dam	8s	---	---	---	---	---
DUM:						
Dumps	8s	---	---	---	---	---
M-W:						
Miscellaneous water	---	---	---	---	---	---
W:						
Water	---	---	---	---	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed map units in the survey area for crops are shown in the table “Cropland Limitations and Hazards.” The main concerns in managing nonirrigated cropland are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility and tilth.

Conserving moisture primarily involves reducing the evaporation and runoff rates and increasing the rate of water infiltration. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *soil blowing* and *water erosion.* Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining *soil fertility* include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

On irrigated soils the main management concerns are *efficient water use, nutrient management, control of erosion, soil tilth, pest and weed control,* and *timely planting and harvesting* for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can create drainage problems, raise the water table, and increase soil salinity.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *channels, flooding, depth to rock, ponding, gullies,* and *lack of timely precipitation.*

Additional limitations and hazards are as follows:

Areas of rock outcrop and oil waste land.—Farming around these areas may be feasible. Subsoiling or deep ripping soft sedimentary beds increases the effective rooting depth and the rate of water infiltration.

Excessive permeability.—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor.

Potential for ground-water pollution.—This is a hazard in soils with excessive permeability, hard bedrock, or a water table within the profile.

Lime content, limited available water capacity, poor tilth, restricted permeability, and *surface crusting.*—The adverse effects of these limitations can be reduced by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer to soils that have a high content of lime.

Surface rock fragments.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Slope.—Where the slope is more than 8 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied.

Surface stones.—Stones or boulders on the surface can hinder normal tillage unless they are removed.

Salt and sodium content.—In areas where this is a limitation, only salt- and sodium-tolerant crops should be grown.

Criiteria for Limitations and Hazards

Following is an explanation of the criteria used to determine the limitations or hazards.

Areas of rock outcrop.—Rock outcrop is a named component of the map unit.

Areas of rubble land.—Rubble land is a named component of the map unit.

Areas of oil waste land.—Oil waste land is a named component of the map unit.

Channeled.—The word “channeled” is included in the name of the map unit.

Depth to rock.—Bedrock is within a depth of 40 inches.

Water erosion.—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

Excessive permeability.—The upper limit of the permeability range is 6 inches or more within the soil profile.

Flooding.—The component of the map unit is occasionally flooded or frequently flooded.

Gullied.—The word “gullied” is included in the name of the map unit.

Lime content.—The surface layer has more than 15 percent calcium carbonate equivalent or has a wind erosion equation of 4L.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

Ponding.—A ponding duration is assigned to the component of the map unit.

Potential for ground-water pollution.—The soil has a water table within a depth of 4 feet or bedrock within 40 inches of the surface, or permeability is more than 2 inches per hour within the soil profile.

Poor tilth.—The component of the map unit has more than 35 percent clay in the surface layer.

Restricted permeability.—Permeability is 0.06 inch per hour or less within the soil profile.

Salt content.—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

Slope.—The upper slope limit of the component of the map unit is more than 8 percent.

Sodium content.—The sodium adsorption ratio of the component of the map unit is more than 13 within a depth of 30 inches.

Soil blowing.—The wind erodibility index is equal to or greater than 8.

Surface rock fragments.—The terms describing the texture of the surface layer include any rock fragment modifier except for gravelly or channery.

Surface crusting.—The organic matter content is less than 2 percent in the surface layer.

Surface stones.—The terms describing the texture of the surface layer include any stony or bouldery modifier, or the map unit is a stony or bouldery phase.

Water table.—The component of the map unit has a water table within a depth of 3 feet.

Cropland Limitations and Hazards

(See text for a description and criteria of the limitations and hazards listed in this table.)

Map symbol and component name	Cropland limitations and hazards
1:	
Apperson	Restricted permeability Ground-water pollution potential Water table
2:	
Apperson	Restricted permeability Ground-water pollution potential Water table
3:	
Bates	Depth to bedrock
4:	
Bates	Depth to bedrock
Coweta	Depth to bedrock Ground-water pollution potential Limited available water capacity
5:	
Catoosa	Depth to bedrock Restricted permeability Ground-water pollution potential
6:	
Catoosa	Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential
Shidler	Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity
Rock outcrop	Nonsoil material
7:	
Choska	Ground-water pollution potential
8:	
Choska	Ground-water pollution potential
Severn	Ground-water pollution potential Lime content
Urban land	Nonsoil material
9:	
Cleora	Flooding Ground-water pollution potential
10:	
Coweta	Depth to bedrock Ground-water pollution potential Limited available water capacity
Bates	Depth to bedrock Limited available water capacity

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
11:	
Coweta	Depth to bedrock Ground-water pollution potential Limited available water capacity
Urban land	Nonsoil material
Eram	Water erosion Depth to bedrock Restricted permeability Slope Water table Poor tilth
12:	
Dennis	Ground-water pollution potential Water table
13:	
Dennis	Water erosion Ground-water pollution potential Water table
14:	
Dennis	Water erosion Ground-water pollution potential Water table
15:	
Dennis	Ground-water pollution potential Water table
Pharoah	Restricted permeability Ground-water pollution potential Water table
16:	
Dennis	Water erosion Ground-water pollution potential Water table
Radley	Flooding Ground-water pollution potential Water table
18:	
Endsaw	Water erosion Restricted permeability Slope Water table Surface stones or boulders
Hector	Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Surface stones or boulders
19:	
Eram	Depth to bedrock Restricted permeability Water table Poor tilth

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
20:	
Eram	Water erosion Depth to bedrock Restricted permeability Limited available water capacity Slope Water table Poor tilth
Coweta	Water erosion Depth to bedrock Ground-water pollution potential Limited available water capacity
21:	
Glenpool	Water erosion Excessive permeability Ground-water pollution potential Slope
22:	
Hector	Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity
Linker	Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity
23:	
Kamie	Ground-water pollution potential
24:	
Kamie	Ground-water pollution potential
25:	
Kamie	Ground-water pollution potential
Urban land	Nonsoil material
26:	
Kanima	Water erosion Slope
27:	
Kiomatia	Flooding Excessive permeability Ground-water pollution potential
28:	
Larton	Ground-water pollution potential
Glenpool	Excessive permeability Ground-water pollution potential
29:	
Latanier	Flooding Restricted permeability Ground-water pollution potential Water table Poor tilth

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
30:	
Lula	Restricted permeability Ground-water pollution potential
31:	
Mason	None
32:	
Newtonia	None
33:	
Newtonia	None
34:	
Niotaze	Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope Water table Surface rock fragments
Darnell	Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope Surface rock fragments
35:	
Niotaze	Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope Water table Surface rock fragments
Darnell	Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope
36:	
Niotaze	Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope Water table Surface stones or boulders
Darnell	Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
37:	
Niotaze	Water erosion Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity Slope Water table Surface rock fragments
Darnell	Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity
Urban land	Nonsoil material
38:	
Oil waste land	Nonsoil material
39:	
Okay	Ground-water pollution potential
40:	
Okay	Ground-water pollution potential
41:	
Okay	Ground-water pollution potential
42:	
Okay	Ground-water pollution potential
43:	
Okemah	Ground-water pollution potential Water table
44:	
Okemah	Ground-water pollution potential Water table
Parsons	Restricted permeability Ground-water pollution potential Water table
Pharoah	Restricted permeability Ground-water pollution potential Water table
45:	
Osage	Flooding Restricted permeability Ground-water pollution potential Water table Poor tilth
46:	
Pits	Nonsoil material
47:	
Radley	Flooding
48:	
Radley	Flooding

Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
49:	
Severn	Ground-water pollution potential Lime content
50:	
Shidler	Depth to bedrock Restricted permeability Ground-water pollution potential Limited available water capacity
Rock outcrop	Nonsoil material
51:	
Tullahassee	Flooding Ground-water pollution potential Water table
52:	
Urban land	Nonsoil material
53:	
Wynona	Flooding Ground-water pollution potential Water table
54:	
Wynona	Flooding Ground-water pollution potential Water table
Urban land	Nonsoil material
DAM:	
Dam	Nonsoil material
DUM:	
Dumps	Nonsoil material
M-W:	
Miscellaneous water	Nonsoil material
W:	
Water	Nonsoil material

Prime Farmland

Prime farmland is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment (USDA, 2002).

Prime farmland soils may presently be used as cropland, pasture, rangeland, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable, and the level of acidity or alkalinity and the content of salts and sodium are acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods, and they are not frequently flooded during the growing season or are protected from flooding. Slopes range from 0 to 8 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland where these limitations are overcome by drainage measures, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 126,000 acres, or nearly 34 percent of the survey area, meets the requirements for prime farmland. The map units in the survey area that meet the requirements for prime farmland are listed in the table “Prime Farmland.” The location of each map unit is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described in the section “Soil Series and Detailed Soil Map Units.” This list does not constitute a recommendation for a particular land use.

Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland.)

Map symbol	Soil name
1	Apperson silty clay loam, 1 to 3 percent slopes
2	Apperson silty clay loam, 3 to 5 percent slopes
3	Bates loam, 1 to 3 percent slopes
5	Catoosa silt loam, 1 to 3 percent slopes
7	Choska very fine sandy loam, 0 to 1 percent slopes, rarely flooded
9	Cleora fine sandy loam, 0 to 1 percent slopes, occasionally flooded
12	Dennis silt loam, 1 to 3 percent slopes
13	Dennis silt loam, 3 to 5 percent slopes
19	Eram silty clay loam, 3 to 5 percent slopes
24	Kamie fine sandy loam, 1 to 3 percent slopes
29	Latanier clay, 0 to 1 percent slopes, occasionally flooded
30	Lula silt loam, 1 to 3 percent slopes
31	Mason silt loam, 0 to 1 percent slopes, rarely flooded
32	Newtonia silt loam, 1 to 3 percent slopes
33	Newtonia silt loam, 3 to 5 percent slopes
39	Okay loam, 0 to 1 percent slopes
40	Okay loam, 1 to 3 percent slopes
41	Okay loam, 3 to 5 percent slopes
43	Okemah silt loam, 0 to 1 percent slopes
45	Osage silty clay, 0 to 1 percent slopes, occasionally flooded
47	Radley silt loam, 0 to 1 percent slopes, occasionally flooded
49	Severn very fine sandy loam, 0 to 3 percent slopes, rarely flooded
53	Wynona silty clay loam, 0 to 1 percent slopes, occasionally flooded

Range

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

Range, grazed forest land, 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, grasslike plants, forbs, and shrubs suitable for grazing and browsing. Range includes natural grasslands, savannas, many wetlands, some deserts, tundra, and certain shrub and forb communities. Range 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 forest land 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.

The table “Rangeland Productivity and Characteristic Plant Communities” in this section 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. Explanation of the column headings in this table follows.

About 11 percent of the soils in Tulsa County are in native range on which domestic animals graze. The range is generally grazed throughout the year, but the forage is supplemented by protein and hay or tame pasture.

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 in varying lengths and short-term summer droughts are 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.

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 tall and mid 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 due to the lack of prairie fires.

However, remnants of the original plant species are still found on most rangeland and progressive grazing management will allow these high quality plants to reestablish without reseeding.

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.

There are many different ecological sites in Tulsa County. 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 "Field Office Technical Guide," which is available at local offices of the Natural Resources Conservation Service, can provide specific information about ecological sites.

Total dry-weight 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 2 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 indicates, by percentages ranging from 1 to 100, the extent to which the present plant community resembles one of two other plant communities 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 places between current vegetation and historic vegetation.

A similarity index of 70 would suggest that the present plant community contain 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. 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.

Range Management

Range management requires a 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 wildlife, enhances recreational opportunities, and protects the soil. The main management concern is recognizing important changes in the plant cover or rhe range trend. These changes take place gradually and can be overlooked.

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

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
IMPROVED BERMUDAGRASS				5	25	35	20	10	5			
WEEPING LOVEGRASS			3	20	25	20	15	6	11			
INTRODUCED BLUESTEM				3	15	26	22	18	10	1		
SMALL GRAIN GRAZEOUT	3	9	29	27	18				1	4	6	3
FORAGE SORGHUM						14	33	33	20			
NATIVE GRASS	1	1	2	10	20	27	16	8	5	2	2	1

Figure 2.—Forage calendar showing the estimated monthly percentage of growth on an annual basis for forage production.

The primary range management practices used in Tulsa 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. *Proper grazing distribution,* which is achieved by managing livestock to graze all parts of the grazing unit equally.
2. *Selective grazing,* which 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,* which is achieved by balancing animal numbers with forage production.
4. *Rest periods* during which grazed plants are given enough rest to recover and to maintain their 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 9490 pounds). Dividing the 875 pounds of usable forage per acre into the 9490 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 Sites

Twelve ecological sites are recognized in Tulsa County. The ecological site identifier has ten characters. The first four characters identify the major land resource area, the fifth 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.

112XY059OK, Loamy Prairie (northeast).—This site is in areas where climax plant cover is primarily true prairie grasses such as big bluestem, little bluestem, Indiangrass, and switchgrass. These plants make up about 80 percent of the vegetation. Plants such as jointtail, purpletop, and dropseeds make up to 30 percent of the vegetation. Those plants that invade when pastures decline include broomsedge, splitbeard, windmillgrass, silver bluestem, and buffalograss. Weedy invaders are western and lanceleaf ragweed, narrowleaf sumpweed, broomweed, and ironweed.

084AY075OK, Sandy Savannah (west).—This site is in areas of deep, gently sloping to steep, moderately productive, loamy, upland soil. Under good management the important plants are a scattered stand of post oak and blackjack oak with little bluestem, big bluestem, Indiangrass, perennial sunflowers, and perennial lespedezas. Continued abuse will result in an increase of poison ivy, tall dropseed, sideoats grama, Scribner panicum, purpletop, and heathaster. Woody vegetation is approximately 10 to 15 percent of the total.

112XY077OK, Sandy Savannah.—This site is in areas where the principal plants are little bluestem, Indiangrass, big bluestem, and switchgrass. These plants represent about 40 percent of the climax cover. Other warm-season grasses include purpletop, sideoats grama, bearded skeletongrass, and tall dropseed. Cool-season plants include Canada wildrye, Virginia wildrye, Texas bluegrass, and flatsedge species. Virginia tephrosia, slender lespedeza, roundhead lespedeza, trailing lespedeza, and tickclover are important legumes. Woody species compose about 25 percent of the cover such as post oak, blackjack oak, hickory, ash, elm, bumelia, coralberry, greenbrier, poison-ivy, Virginia creeper, and grape. Plants such as broomsedge bluestem, splitbeard bluestem, fringeleaf paspalum, Japanese brome threeawns, partridgepea, ragweeds, croton, bitter sneezeweed, persimmon, and hawthorn dominate when the site is abused.

118XY075OK, Sandy Savannah.—This site is in areas of mixed tall grasses and low grade hardwoods with some scrub pine. Principal grasses are big bluestem, Indiangrass, little bluestem, and switchgrass in approximately that order of dominance. These grasses represent about half of the total original cover. Principal cool-season plants are Canada and Virginia wildrye, low panicums, and sedges. Woody species comprise about 30 percent of the vegetation. The main species are post oak, blackjack oak, southern red oak, hickory, persimmon, and sassafras, grading into pine and hardwood forest at about 45 inches of precipitation.

084AY079OK, Savannah Breaks.—This site is in areas of mid-tall grasses and oak-hickory climax. Big bluestem, little bluestem, and Indiangrass compose about 40 to 50 percent of the total vegetation. The canopy of woody species will generally constitute 15 to 20 percent. Abuse caused by overgrazing results in a gradual thickening of the woody species and a corresponding reduction in grass. The taller grasses are restricted to the deeper soils while low growing perennials and annual grasses will occupy the very shallow soils. Hairy grama, Scribner panicum, and several muhly grasses, including rock, threeawn, and nimblewill are typical of the low growing type vegetation.

112XY010OK, Claypan Prairie.—The potential plant community for this site is a tall grass aspect. Species composition, by weight, is 80 percent grasses, 15 percent forbs, and 5 percent woody plants. Big bluestem, Indiangrass, switchgrass, little bluestem, prairie scurfpea, Illinois bundleflower, leadplant, blacksampson, gay feathers, and poison-ivy are plants that make up 70 percent of production in high ecological condition. Under continuous heavy grazing, These plants are replaced by meadow dropseed, sideoats grama, Scribner panicum, fringeleaf paspalum, buffalograss, wild indigo, ashy sunflower, milkweeds, sagewort, goldenrods, wingedelm, and sumacs. As the site deteriorates, plants such as broomsedge bluestem, splitbeard bluestem, silver bluestem, windmillgrass, threeawns, Japanese brome, showy partridgepea, ragweeds, croton, bitter sneezeweed, persimmon, and hawthorn dominate the site.

112XY086OK, Shallow Prairie (eastern).—Little bluestem, big bluestem, Indiangrass, and switchgrass comprise 50 to 60 percent of the vegetation on this site. Meadow dropseed, sideoats grama, and Scribner panicum increase on the deeper soils under continuous grazing. Important legumes are catclaw sensitive brier, Illinois bundleflower, Virginia tephrosia, leadplant, and priairieclover. Woody species occur in minor amounts including coralberry, hackberry, wingedelm, and persimmon. These species increase when the site is abused.

084AY088OK, Shallow savannah.—This site is in areas of mid-tall grass savannahs. Little bluestem, sand bluestem, and sideoats grama are the more important grasses. Sideoats grama is important on the very shallow spots. Decreaser grasses and legumes make up about 50 percent of the climax vegetation. Principal legumes are Stueve’s lespedeza, roundhead lespedeza, Virginia tephrosia, and prairieclover. Post oak, blackjack oak, and associated woody species represent about 10 percent of climax. Buckeye, a common woody shrub that is sometimes poisonous to livestock, occurs on this site.

118XY088OK, Shallow Savannah.—This site produces an open stand of post oak, blackjack oak, and associated hardwoods, with an understory of tall grasses. Oak species average 15 to 20 percent of the composition. Big bluestem, little bluestem, and Indiangrass compose about 70 percent of the production, with other grasses and brush making up about 10 to 15 percent. When the site condition declines, grasses thin out and are replaced by oak sprouts. The site may develop the appearance of a forest; however, the brush will not reach commercial woodland size. Shortleaf pine is found on the dry edge of the humid zone but is sub-marginal for woodland products, since it occurs in a rangeland area (not a forest site).

112XY098OK, Very Shallow.—On this site, moisture and root penetration are very limited and result in a varied plant community. Drought-tolerant grasses such as blue, sideoats, and hairy grama predominate. Bands of deeper soils support tall grasses such as big bluestem, Indiangrass, little bluestem, and switchgrass. Annual grasses, along with perennial forbs such as cobea penstemon, willowleaf sunflower, and dotted gay feather are abundant during years of normal rainfall.

118XY020OK, Deep Sand Savannah.—This site supports a vegetative cover composed of 75 percent grasses and forbs, along with a 25 percent crown canopy of woody species. Forage species are 80 percent climax species with the principal ones being big bluestem, sand bluestem, Indiangrass, little bluestem, switchgrass, broadleaf uniola, beaked panicum, and sand lovegrass. Other plants that increase with prolonged mismanagement are broomsedge bluestem, splitbeard bluestem, showy partridgepea, bitter sneezeweed, ragweeds, and white snakeroot. Principal woody species are post oak, blackjack oak, winged elm, and persimmon.

112XY856OK, Reseeded Loamy Prairie.—This site is in areas where seeded species include tall grasses such as little bluestem, big bluestem, Indiangrass, switchgrass, sideoats grama, Illinois bundleflower, and a few others. Under continuous heavy grazing, they are replaced by plants such as dropseed, Scribner panicum, wildindigo, heath aster, goldenrod, sagewort, sumacs, and blackberry. If the site continues to deteriorate, plants such as broomsedge, splitbeard bluestem, silver bluestem, Japanese brome, threeawn, showy partridgepea, broomweed, ragweed, croton, and persimmon dominate the site. Because of cultivation, this site is not as productive as the original plant community.

Rangeland Productivity and Characteristic Plant Communities

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
1:						
Apperson	Claypan Prairie, 112XY010OK	4,500	3,000	2,000	Big bluestem	20
					Little bluestem	15
					Switchgrass	15
					Yellow Indiangrass	10
					Miscellaneous perennial grasses	7
					Blue grama	5
					Buffalograss	5
					Coralberry	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
					Leadplant	3
2:						
Apperson	Claypan Prairie, 112XY010OK	4,500	3,000	2,000	Big bluestem	20
					Little bluestem	15
					Switchgrass	15
					Yellow Indiangrass	10
					Miscellaneous perennial grasses	7
					Blue grama	5
					Buffalograss	5
					Coralberry	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
					Leadplant	3
3:						
Bates	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
4:						
Bates	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
Coweta	Shallow Prairie (eastern), 112XY086OK	3,500	2,300	1,500	Little bluestem	25
					Big bluestem	15
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Miscellaneous trees	5
					Sideoats grama	5
					Switchgrass	5
					Tall dropseed	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Composition
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		Pct
5:						
Catoosa	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
6:						
Catoosa	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	little bluestem	25
					big bluestem	20
					miscellaneous perennial forbs	10
					miscellaneous perennial grasses	10
					switchgrass	10
					yellow Indiangrass	10
					miscellaneous shrubs	5
					purpletop tridens	5
					Scribner panicum	5
Shidler	Very Shallow, 112XY098OK	2,500	1,300	500	Little bluestem	25
					Sideoats grama	20
					Big bluestem	15
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Blue grama	5
					Tall dropseed	5
					THREEAWN	5
					Miscellaneous shrubs	2
Rock outcrop	---	---	---	---	---	---
7:						
Choska	Loamy Bottomland, 112XY050OK	10,000	8,500	6,000	Eastern gamagrass	15
					Switchgrass	15
					Big bluestem	10
					Cane	10
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Miscellaneous trees	10
					Beaked panicum	5
					Florida paspalum	5
					Indian woodoats	5
					Sedge	5
8:						
Choska	---	---	---	---	---	---
Severn	---	---	---	---	---	---
Urban land	---	---	---	---	---	---

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Total dry-weight production: Normal year	Total dry-weight production: Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
9:						
Cleora	Loamy Bottomland, 112XY050OK	10,000	8,500	6,000	Eastern gamagrass	15
					Switchgrass	15
					Big bluestem	10
					Cane	10
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Miscellaneous trees	10
					Beaked panicum	5
					Florida paspalum	5
					Indian woodoats	5
					Sedge	5
10:						
Coweta	Shallow Prairie (eastern), 112XY086OK	3,500	2,300	1,500	Little bluestem	25
					Big bluestem	15
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Miscellaneous trees	5
					Sideoats grama	5
					Switchgrass	5
					Tall dropseed	5
Bates	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
11:						
Coweta	---	---	---	---	---	---
Urban land	---	---	---	---	---	---
Eram	---	---	---	---	---	---
12:						
Dennis	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					SWITCHGRASS	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
13:						
Dennis	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	little bluestem	25
					big bluestem	20
					miscellaneous perennial forbs	10
					miscellaneous perennial grasses	10
					switchgrass	10
					yellow Indiangrass	10
					miscellaneous shrubs	5
					purpletop tridens	5
					Scribner panicum	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
14:						
Dennis	Reseeded Loamy Prairie, 112XY856OK	4,400	3,200	2,400	---	---
15:						
Dennis	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
Pharoah	Claypan Prairie, 112XY010OK	4,500	3,000	2,000	Big bluestem	20
					Little bluestem	15
					Switchgrass	15
					Yellow Indiangrass	10
					Miscellaneous perennial grasses	7
					Blue grama	5
					Buffalograss	5
					Coralberry	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
					Leadplant	3
16:						
Dennis	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
Radley	---	---	---	---	---	---
17:						
Urban land	---	---	---	---	---	---
Dennis	---	---	---	---	---	---
18:						
Endsaw	Sandy Savannah, 118XY075OK	5,500	3,800	2,600	Big bluestem	25
					Miscellaneous trees	20
					Yellow Indiangrass	15
					Little bluestem	10
					Miscellaneous perennial forbs	5
					Miscellaneous perennial grasses	5
					Miscellaneous shrubs	5
					Post oak	5
					Switchgrass	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
18:						
Hector----------	Shallow Savannah, 118XY088OK	3,500	2,800	1,750	Little bluestem----------------	45
					Miscellaneous trees------------	15
					Yellow Indiangrass-------------	15
					Big bluestem-------------------	8
					Miscellaneous perennial grasses	5
					Panicum------------------------	3
					Lespedeza----------------------	2
					Switchgrass--------------------	2
					Gayfeather---------------------	1
					Prairie bundleflower-----------	1
					Ticktrefoil--------------------	1
19:						
Eram------------	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem----------------	25
					Big bluestem-------------------	20
					Miscellaneous perennial forbs--	10
					Miscellaneous perennial grasses	10
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Miscellaneous shrubs-----------	5
					Purpletop tridens--------------	5
					Scribner panicum---------------	5
20:						
Eram------------	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem----------------	25
					Big bluestem-------------------	20
					Miscellaneous perennial forbs--	10
					Miscellaneous perennial grasses	10
					Switchgrass--------------------	10
					Yellow Indiangrass-------------	10
					Miscellaneous shrubs-----------	5
					Purpletop tridens--------------	5
					Scribner panicum---------------	5
Coweta----------	Shallow Prairie (eastern), 112XY086OK	3,500	2,300	1,500	Little bluestem----------------	25
					Big bluestem-------------------	15
					Miscellaneous perennial forbs--	10
					Miscellaneous perennial grasses	10
					Yellow Indiangrass-------------	10
					Miscellaneous shrubs-----------	5
					Miscellaneous trees------------	5
					Sideoats grama-----------------	5
					Switchgrass--------------------	5
					Tall dropseed------------------	5
21:						
Glenpool--------	Deep Sand Savannah, 118XY020OK	4,000	2,800	2,000	Big bluestem-------------------	20
					Miscellaneous perennial grasses	15
					Little bluestem----------------	15
					Miscellaneous trees------------	15
					Miscellaneous shrubs-----------	10
					Yellow Indiangrass-------------	10
					Miscellaneous perennial forbs--	5
					Blackjack oak------------------	5
					Post oak-----------------------	5
					Switchgrass--------------------	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
22:						
Hector	Shallow Savannah, 118XY088OK	3,500	2,800	1,750	Little bluestem	45
					Miscellaneous trees	15
					Yellow Indiangrass	15
					Big bluestem	8
					Miscellaneous perennial grasses	5
					Panicum	3
					Lespedeza	2
					Switchgrass	2
					Gayfeather	1
					Prairie bundleflower	1
					Ticktrefoil	1
Linker	Sandy Savannah, 118XY075OK	5,500	3,800	2,600	Big bluestem	25
					Miscellaneous trees	20
					Yellow Indiangrass	15
					Little bluestem	10
					Miscellaneous perennial forbs	5
					Miscellaneous perennial grasses	5
					Miscellaneous shrubs	5
					Post oak	5
					Switchgrass	5
23:						
Kamie	Sandy Savannah, 118XY075OK	5,500	3,800	2,600	Big bluestem	25
					Miscellaneous trees	20
					Yellow Indiangrass	15
					Little bluestem	10
					Miscellaneous perennial forbs	5
					Miscellaneous perennial grasses	5
					Miscellaneous shrubs	5
					Post oak	5
					Switchgrass	5
24:						
Kamie	Sandy Savannah, 118XY075OK	5,500	3,800	2,600	Big bluestem	25
					Miscellaneous trees	20
					Yellow Indiangrass	15
					Little bluestem	10
					Miscellaneous perennial forbs	5
					Miscellaneous perennial grasses	5
					Miscellaneous shrubs	5
					Post oak	5
					Switchgrass	5
25:						
Kamie	---	---	---	---	---	---
Urban land	---	---	---	---	---	---
26:						
Kanima	Reseeded Disturbed Land, 119XY899OK	1,800	1,200	800	---	---
27:						
Kiomatia	---	---	---	---	---	---

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
28:						
Larton	Deep Sand Savannah 118XY020OK	4,000	2,800	2,000	Big bluestem	20
					Miscellaneous perennial grasses	15
					Little bluestem	15
					Miscellaneous trees	15
					Miscellaneous shrubs	10
					Yellow Indiangrass	10
					Miscellaneous perennial forbs	5
					Blackjack oak	5
					Post oak	5
					Switchgrass	5
Glenpool	Deep Sand Savannah, 118XY020OK	4,000	2,800	2,000	Big bluestem	20
					Miscellaneous perennial grasses	15
					Little bluestem	15
					Miscellaneous trees	15
					Miscellaneous shrubs	10
					Yellow Indiangrass	10
					Miscellaneous perennial forbs	5
					Blackjack oak	5
					Post oak	5
					Switchgrass	5
29:						
Latanier	---	---	---	---	---	---
30:						
Lula	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
31:						
Mason	Loamy Bottomland, 112XY050OK	10,000	8,500	6,000	Eastern gamagrass	15
					Switchgrass	15
					Big bluestem	10
					Cane	10
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Miscellaneous trees	10
					Beaked panicum	5
					Florida paspalum	5
					Indian woodoats	5
					Sedge	5
32:						
Newtonia	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
33:						
Newtonia	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
34:						
Niotaze	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem	25
					Big bluestem	20
					Blackjack oak	10
					Post oak	10
					Miscellaneous perennial forbs	5
					Miscellaneous trees	5
					Purple lovegrass	5
					Purpletop tridens	5
					Sand lovegrass	5
					Scribner panicum	5
					Switchgrass	5
Darnell	Shallow Savannah, 084AY088OK	3,200	2,100	1,400	Little bluestem	30
					Big bluestem	20
					Blackjack oak	10
					Miscellaneous perennial forbs	5
					Miscellaneous shrubs	5
					Post oak	5
					Purpletop tridens	5
					Scribner panicum	5
					Sideoats grama	5
					Tall dropseed	5
					Yellow Indiangrass	5
35:						
Niotaze	Sandy Savannah (central), 084AY076OK	5,000	3,500	2,500	Little bluestem	25
					Big bluestem	20
					Blackjack oak	10
					Post oak	10
					Miscellaneous perennial forbs	5
					Miscellaneous trees	5
					Purple lovegrass	5
					Purpletop tridens	5
					Sand lovegrass	5
					Scribner panicum	5
					Switchgrass	5
Darnell	Shallow Savannah, 084AY088OK	3,200	2,100	1,400	Little bluestem	30
					Big bluestem	20
					Blackjack oak	10
					Miscellaneous perennial forbs	5
					Miscellaneous shrubs	5
					Post oak	5
					Purpletop tridens	5
					Scribner panicum	5
					Sideoats grama	5
					Tall dropseed	5
					Yellow Indiangrass	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
36:						
Niotaze	Savannah Breaks, 084AY079OK	3,200	2,100	1,400	Little bluestem	30
					Big bluestem	20
					Blackjack oak	15
					Miscellaneous perennial grasses	10
					Post oak	10
					Miscellaneous perennial forbs	5
					Purpletop tridens	5
					Yellow Indiangrass	5
Darnell	Savannah Breaks, 084AY079OK	3,200	2,100	1,400	Little bluestem	30
					Big bluestem	20
					Blackjack oak	15
					Miscellaneous perennial grasses	10
					Post oak	10
					Miscellaneous perennial forbs	5
					Purpletop tridens	5
					Yellow Indiangrass	5
37:						
Niotaze	---	---	---	---	---	---
Darnell	---	---	---	---	---	---
Urban land	---	---	---	---	---	---
38:						
Oil waste land	---	---	---	---	---	---
39:						
Okay	Loamy Prairie (northeast),112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
40:						
Okay	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
41:						
Okay	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
42:						
Okay	Reseeded Loamy Prairie, 112XY856OK	4,400	3,200	2,400	---	---
43:						
Okemah	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
44:						
Okemah	Loamy Prairie (northeast), 112XY059OK	7,000	5,500	4,500	Little bluestem	25
					Big bluestem	20
					Miscellaneous perennial forbs	10
					Miscellaneous perennial grasses	10
					Switchgrass	10
					Yellow Indiangrass	10
					Miscellaneous shrubs	5
					Purpletop tridens	5
					Scribner panicum	5
Parsons	Claypan Prairie, 112XY010OK	4,500	3,000	2,000	Big bluestem	20
					Little bluestem	15
					Switchgrass	15
					Yellow Indiangrass	10
					Miscellaneous perennial grasses	7
					Blue grama	5
					Buffalograss	5
					Coralberry	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
					Leadplant	3
Pharoah	Claypan Prairie, 112XY010OK	4,500	3,000	2,000	Big bluestem	20
					Little bluestem	15
					Switchgrass	15
					Yellow Indiangrass	10
					Miscellaneous perennial grasses	7
					Blue grama	5
					Buffalograss	5
					Coralberry	5
					Miscellaneous perennial forbs	5
					Sideoats grama	5
					Tall dropseed	5
					Leadplant	3
45:						
Osage	---	---	---	---	---	---
46:						
Pits	---	---	---	---	---	---
47:						
Radley	---	---	---	---	---	---
48:						
Radley	---	---	---	---	---	---

Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Composition
		Lb/acre	Lb/acre	Lb/acre		Pct
49:						
Severn----------	---	---	---	---	---	---
50:						
Shidler---------	Very Shallow, 112XY098OK	2,500	1,300	500	Little bluestem----------------	25
					Sideoats grama-----------------	20
					Big bluestem-------------------	15
					Miscellaneous perennial forbs--	10
					Miscellaneous perennial grasses	10
					Blue grama---------------------	5
					Tall dropseed------------------	5
					Threeawn-----------------------	5
					Miscellaneous shrubs-----------	2
Rock outcrop----	---	---	---	---	---	---
51:						
Tullahassee-----	Subirrigated, 112XY095OK	10,000	7,600	6,000	Giant cane---------------------	15
					Eastern gamagrass--------------	10
					Miscellaneous perennial forbs--	10
					Miscellaneous perennial grasses	10
					Panicum------------------------	10
					Switchgrass--------------------	10
					Wildrye------------------------	10
					Yellow Indiangrass-------------	10
					Big bluestem-------------------	5
					Miscellaneous shrubs-----------	5
					Sedge--------------------------	3
					Bulrush------------------------	2
52:						
Urban land------	---	---	---	---	---	---
53:						
Wynona----------	---	---	---	---	---	---
54:						
Wynona----------	---	---	---	---	---	---
Urban land------	---	---	---	---	---	---
DAM:						
Dam-------------	---	---	---	---	---	---
DUM:						
Dumps-----------	---	---	---	---	---	---
M-W:						
Miscellaneous water----------	---	---	---	---	---	---
W:						
Water-----------	---	---	---	---	---	---

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

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

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

Windbreaks are often planted on land that did not originally support trees. Knowledge of how trees perform on such land can be gained only by observing and recording the performance of trees that have been planted and have survived. Many popular windbreak species are not indigenous to the areas in which they are planted.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under given climatic conditions. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

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

Windbreaks and Environmental Plantings

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

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
1:					
Apperson	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bur oak, bois d'arc, black locust, mulberry	Chinese elm, common hackberry, loblolly pine	---
2:					
Apperson	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bur oak, bois d'arc, black locust, mulberry	Chinese elm, common hackberry, loblolly pine	---
3:					
Bates	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
4:					
Bates	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
Coweta	---	---	---	---	---
5:					
Catoosa	---	---	---	---	---
6:					
Catoosa	---	---	---	---	---
Shidler	---	---	---	---	---
Rock outcrop	---	---	---	---	---
7:					
Choska	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
8:					
Choska	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
Severn	---	Ahrub lespedeza, Amur honeysuckle, common lilac, American plum	Wastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
8:					
Urban land	---	---	---	---	---
9:					
Cleora	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
10:					
Coweta	---	---	---	---	---
Bates	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
11:					
Coweta	---	---	---	---	---
Urban land	---	---	---	---	---
Eram	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
12:					
Dennis	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bois d'arc, Shumard's oak, mulberry	Chinese elm, common hackberry, loblolly pine	---
13:					
Dennis	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bois d'arc, Shumard's oak, mulberry	Chinese elm, common hackberry, loblolly pine	---
14:					
Dennis	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bois d'arc, Shumard's oak, mulberry	Chinese elm, common hackberry, loblolly pine	---
15:					
Dennis	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bois d'arc, Shumard's oak, mulberry	Chinese elm, common hackberry, loblolly pine	---
Pharoah	---	---	---	---	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
16:					
Dennis	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bois d'arc, Shumard's oak, mulberry	Chinese elm, common hackberry, loblolly pine	---
Radley	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
17:					
Urban land	---	---	---	---	---
Dennis	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bois d'arc, Shumard's oak, mulberry	Chinese elm, common hackberry, loblolly pine	---
18:					
Endsaw	---	---	---	---	---
Hector	---	---	---	---	---
19:					
Eram	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
20:					
Eram	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
Coweta	---	---	---	---	---
21:					
Glenpool	---	---	---	---	---
22:					
Hector	---	---	---	---	---
Linker	---	---	---	---	---
23:					
Kamie	---	---	---	---	---
24:					
Kamie	---	---	---	---	---
25:					
Kamie	---	---	---	---	---
Urban land	---	---	---	---	---
26:					
Kanima	---	---	---	---	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
27:					
Kiomatia	---	---	---	---	---
28:					
Larton	---	---	---	---	---
Glenpool	---	---	---	---	---
29:					
Latanier	---	---	---	---	---
30:					
Lula	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
31:					
Mason	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
32:					
Newtonia	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
33:					
Newtonia	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
34:					
Niotaze	---	---	---	---	---
Darnell	---	---	---	---	---
35:					
Niotaze	---	---	---	---	---
Darnell	---	---	---	---	---
36:					
Niotaze	---	---	---	---	---
Darnell	---	---	---	---	---
37:					
Niotaze	---	---	---	---	---
Darnell	---	---	---	---	---
Urban land	---	---	---	---	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
38: Oil waste land	---	---	---	---	---
39: Okay	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
40: Okay	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
41: Okay	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
42: Okay	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
43: Okemah	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
44: Okemah	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
Parsons	---	American plum, Amur honeysuckle, common lilac, eastern redbud, oriental arborvitae	Ponderosa pine, Russian olive, bur oak, bois d'arc, black locust, mulberry	Chinese elm, common hackberry, loblolly pine	---
Pharoah	---	---	---	---	---
45: Osage	---	---	---	---	---
46: Pits	---	---	---	---	---

Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
47:					
Radley	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
48:					
Radley	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
49:					
Severn	---	Shrub lespedeza, Amur honeysuckle, common lilac, American plum	Eastern redbud, ponderosa pine, Russian olive, oriental arborvitae, Scotch pine	Austrian pine, bois d'arc, bur oak, mulberry, Chinese elm, common hackberry, green ash	Black locust
50:					
Shidler	---	---	---	---	---
Rock outcrop	---	---	---	---	---
51:					
Tullahassee	---	---	---	---	---
52:					
Urban land	---	---	---	---	---
53:					
Wynona	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
54:					
Wynona	---	American plum, Amur honeysuckle, common lilac, oriental arborvitae	Eastern redbud, ponderosa pine, Russian olive, bur oak, bois d'arc, mulberry	Black locust, Chinese elm, common hackberry, loblolly pine	---
Urban land	---	---	---	---	---
DAM:					
Dam	---	---	---	---	---
DUM:					
Dumps	---	---	---	---	---
M-W:					
Miscellaneous water	---	---	---	---	---
W:					
Water	---	---	---	---	---

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. If food, cover, or water is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit the area.

The table “Wildlife Habitat” in this section shows the soils that have potential for habitat development. Wildlife habitat can be created or improved by planting appropriate vegetation, properly managing the existing plant cover, and fostering the natural establishment of desirable plants.

Elements of Wildlife Habitat

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants used by wildlife. Examples are wheat, rye, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes planted for wildlife food and cover. Examples are fescue, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, reed canarygrass, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, Indiangrass, blueberry, goldenrod, lambsquarters, dandelions, blackberry, ragweed, wheatgrass, fescue, and nightshade.

The major soil properties affecting the growth of grain and forage crops and wild herbaceous plants are depth of the root zone, texture of the surface layer, the amount of water available to plants, wetness, salinity or sodicity, and flooding. The length of the growing season also is important.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage that wildlife eat. Examples are oak, poplar, boxelder, birch, maple, green ash, willow, and American elm. Examples of fruit-producing shrubs that are suitable for planting on soils that have good potential for these plants are hawthorn, honeysuckle, American plum, Redosier dogwood, chokecherry, serviceberry, silver buffaloberry, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that provides habitat or supplies food in the form of browse, seed, or fruitlike cones. Examples are pine, spruce, hemlock, fir, yew, cedar, larch, and juniper.

The major soil properties affecting the growth of hardwood and coniferous trees and shrubs are depth of the root zone, the amount of water available to plants, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Wetland plants produce food or cover for wetland wildlife. Examples of these plants are smartweed, wild millet, rushes, sedges, bulrushes, wild rice, arrowhead, waterplantain, pickerelweed, and cattail.

The major soil properties affecting wetland plants are texture of the surface layer, wetness, acidity or alkalinity, and slope.

Shallow water areas have an average depth of less than 5 feet. They are useful as habitat for some wildlife species. They are naturally wet areas or are created by dams, levees, or water-control measures in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability.

Kinds of Wildlife Habitat

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, and shrubs. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include Hungarian partridge, pheasant, sharp-tailed grouse, sage grouse, meadowlark, field sparrow, killdeer, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of hardwoods or conifers or a mixture of these and associated grasses, legumes, and wild herbaceous plants. The wildlife attracted to this habitat include wild turkey, ruffed grouse, thrushes, woodpeckers, owls, tree squirrels, porcupine, raccoon, deer, elk, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas that support water-tolerant plants. The wildlife attracted to this habitat include ducks, geese, herons, bitterns, rails, kingfishers, muskrat, otter, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. The wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1:												
Apperson	Good	Good	Fair	Good	Good	---	Poor	Poor	Good	Good	Poor	---
2:												
Apperson	Good	Good	Fair	Good	Good	---	Poor	Poor	Good	Good	Poor	---
3:												
Bates	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
4:												
Bates	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
Coweta	Very poor	Poor	Poor	Very poor	Very poor	---	Very poor	Very poor	Poor	Very poor	Very poor	---
5:												
Catoosa	Fair	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
6:												
Catoosa	Fair	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
Shidler	Very poor	Very poor	Poor	---	---	Poor	Very poor	Very poor	Very poor	---	Very poor	Poor
Rock outcrop	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
7:												
Choska	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
8:												
Choska	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
Severn	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
Urban land	---	---	---	---	---	---	---	---	---	---	---	---
9:												
Cleora	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
10:												
Coweta	Very poor	Poor	Poor	Very poor	Very poor	---	Very poor	Very poor	Poor	Very poor	Very poor	---
Bates	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
11:												
Coweta	Very poor	Poor	Poor	Very poor	Very poor	---	Very poor	Very poor	Poor	Very poor	Very poor	---
Urban land	---	---	---	---	---	---	---	---	---	---	---	---

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
11:												
Eram	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
12:												
Dennis	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
13:												
Dennis	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
14:												
Dennis	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
15:												
Dennis	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
Pharoah	Poor	Fair	Fair	---	---	---	Good	Good	Fair	Poor	Good	Fair
16:												
Dennis	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
Radley	Good	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor	Good
17:												
Urban land	---	---	---	---	---	---	---	---	---	---	---	---
Dennis	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
18:												
Endsaw	Very poor	Poor	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor	---
Hector	Very poor	Very poor	Poor	Poor	Very poor	---	Very poor	Very poor	Very poor	Poor	Very poor	---
19:												
Eram	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
20:												
Eram	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
Coweta	Very poor	Poor	Poor	Very poor	Very poor	---	Very poor	Very poor	Poor	Very poor	Very poor	---
21:												
Glenpool	Fair	Fair	Good	Fair	Fair	---	Very poor	Very poor	Fair	Fair	Very poor	---
22:												
Hector	Very poor	Poor	Poor	Poor	Very poor	---	Very poor	Very poor	Poor	Poor	Very poor	---
Linker	Fair	Good	Good	Fair	Fair	---	Poor	Very poor	Good	Fair	Very poor	---
23:												
Kamie	Fair	Fair	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor	---

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
24:												
Kamie	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
25:												
Kamie	Fair	Fair	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor	---
Urban land	---	---	---	---	---	---	---	---	---	---	---	---
26:												
Kanima	Very poor	Poor	Fair	Fair	Poor	---	Very poor	Very poor	Poor	Fair	Very poor	---
27:												
Kiomatia	Poor	Fair	Fair	Fair	---	---	Poor	Very poor	Fair	Fair	Very poor	---
28:												
Larton	Fair	Fair	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor	---
Glenpool	Fair	Fair	Good	Fair	Fair	---	Very poor	Very poor	Fair	Fair	Very poor	---
29:												
Latanier	Fair	Fair	Fair	Good	Poor	Fair	Good	Good	Fair	Good	Good	---
30:												
Lula	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
31:												
Mason	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
32:												
Newtonia	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
33:												
Newtonia	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
34:												
Niotaze	Poor	Fair	Good	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Fair
Darnell	Poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
35:												
Niotaze	Poor	Fair	Good	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Fair
Darnell	Very poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair

Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
36:												
Niotaze	Very poor	Poor	Good	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Fair
Darnell	Very poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
37:												
Niotaze	Poor	Fair	Good	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Fair
Darnell	Poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
Urban land	---	---	---	---	---	---	---	---	---	---	---	---
38:												
Oil waste land	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
39:												
Okay	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
40:												
Okay	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
41:												
Okay	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
42:												
Okay	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
43:												
Okemah	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
44:												
Okemah	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
Parsons	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair	---
Pharoah	Poor	Fair	Fair	---	---	---	Good	Good	Fair	Poor	Good	Fair
45:												
Osage	Fair	Fair	Fair	Fair	Fair	---	Poor	Good	Fair	Fair	Fair	---
46:												
Pits	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
47:												
Radley	Good	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor	Good
48:												
Radley	Good	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor	Good
49:												
Severn	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---

Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
	Potential for habitat elements								Potential as habitat for--			
50:												
Shidler	Very poor	Very poor	Poor	---	---	Poor	Very poor	Very poor	Very poor	---	Very poor	Poor
Rock outcrop	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
51:												
Tullahassee	Very poor	Poor	Poor	Good	Good	---	Fair	Poor	Poor	Fair	Poor	---
52.												
Urban land	---	---	---	---	---	---	---	---	---	---	---	---
53:												
Wynona	Good	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair	---
54:												
Wynona	Good	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair	---
Urban land	---	---	---	---	---	---	---	---	---	---	---	---
DAM:												
Dam	---	---	---	---	---	---	---	---	---	---	---	---
DUM:												
Dumps	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
M-W:												
Miscellaneous water	---	---	---	---	---	---	---	---	---	---	---	---
W:												
Water	---	---	---	---	---	---	---	---	---	---	---	---

Recreation

The soils of the survey area are rated in the tables "Recreational Development 1" and "Recreational Development 2" according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses.

Not limited indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00). The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered.

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

The information in the tables "Recreational Development 1" and "Recreational Development 2" can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

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

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

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

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Recreational Development 1

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
1:							
Apperson	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.77	Depth to saturated zone	0.43	Depth to saturated zone	0.77
2:							
Apperson	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.77	Depth to saturated zone	0.43	Depth to saturated zone	0.77
						Slope	0.50
3:							
Bates	100	Not limited		Not limited		Not limited	
4:							
Bates	66	Not limited		Not limited		Somewhat limited	
						Slope	0.50
						Depth to bedrock	0.29
Coweta	34	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.50
						Content of large stones	0.03
5:							
Catoosa	100	Not limited		Not limited		Not limited	
6:							
Catoosa	60	Not limited		Not limited		Somewhat limited	
						Slope	0.88
						Depth to bedrock	0.65
Shidler	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.88
						Content of large stones	0.01
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Very limited		Not limited		Not limited	
		Flooding	1.00				

Recreational Development 1--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
8:							
Choska	42	Very limited		Not limited		Not limited	
		Flooding	1.00				
Severn	31	Very limited		Not limited		Not limited	
		Flooding	1.00				
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
10:							
Coweta	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.50
						Content of large stones	0.03
Bates	35	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.84
						Slope	0.50
11:							
Coweta	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.50
						Content of large stones	0.03
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.98	Restricted permeability	0.96	Slope	1.00
		Restricted permeability	0.96	Depth to saturated zone	0.75	Depth to saturated zone	0.98
						Restricted permeability	0.96
						Depth to bedrock	0.16
						Gravel content	0.06
12:							
Dennis	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
13:							
Dennis	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
						Slope	0.50

Recreational Development 1--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
14:							
Dennis	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
						Slope	0.50
15:							
Dennis	77	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
Pharoah	23	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
16:							
Dennis	66	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
						Slope	0.12
Radley	34	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
						Slope	0.12
18:							
Endsaw	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.96	Restricted permeability	0.96	Content of large stones	0.99
		Content of large stones	0.01	Content of large stones	0.01	Restricted permeability	0.96
						Gravel content	0.56
Hector	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Content of large stones	0.32	Content of large stones	0.32	Slope	1.00
						Content of large stones	1.00
						Gravel content	0.23

Recreational Development 1--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
19:							
Eram	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.98	Restricted permeability	0.96	Depth to saturated zone	0.98
		Restricted permeability	0.96	Depth to saturated zone	0.75	Restricted permeability	0.96
						Slope	0.50
						Depth to bedrock	0.06
						Gravel content	0.06
20:							
Eram	58	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.98	Restricted permeability	0.96	Slope	1.00
		Restricted permeability	0.96	Depth to saturated zone	0.75	Depth to saturated zone	0.98
		Slope	0.16	Slope	0.16	Restricted permeability	0.96
						Depth to bedrock	0.80
						Gravel content	0.06
Coweta	42	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
						Content of large stones	0.03
21:							
Glenpool	100	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.87	Too sandy	0.87	Slope	1.00
		Slope	0.04	Slope	0.04	Too sandy	0.87
22:							
Hector	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel content	0.29	Gravel content	0.29	Gravel content	1.00
						Slope	0.50
						Content of large stones	0.03
Linker	40	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.35
						Slope	0.12
						Gravel content	0.06
23:							
Kamie	100	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.92	Too sandy	0.92	Slope	1.00
						Too sandy	0.92
24:							
Kamie	100	Not limited		Not limited		Not limited	
25:							
Kamie	62	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.92	Too sandy	0.92	Too sandy	0.92
						Slope	0.88
Urban land	38	Not rated		Not rated		Not rated	

Recreational Development 1--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
26:							
Kanima	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	0.36	Gravel content	0.36	Slope	1.00
						Content of large stones	0.01
27:							
Kiomatia	98	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Too sandy	0.79	Flooding	1.00
		Too sandy	0.79	Flooding	0.40	Too sandy	0.79
28:							
Larton	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.92	Too sandy	0.92	Too sandy	0.92
Glenpool	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.87	Too sandy	0.87	Too sandy	0.87
29:							
Latanier	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Depth to saturated zone	0.19	Flooding	0.60
		Depth to saturated zone	0.39			Depth to saturated zone	0.39
30:							
Lula	100	Not limited		Not limited		Not limited	
31:							
Mason	100	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	0.21	Restricted permeability	0.21
		Restricted permeability	0.21				
32:							
Newtonia	100	Not limited		Not limited		Not limited	
33:							
Newtonia	100	Not limited		Not limited		Somewhat limited	
						Slope	0.50
34:							
Niotaze	72	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.98	Depth to saturated zone	0.75	Content of large stones	1.00
		Restricted permeability	0.41	Restricted permeability	0.41	Slope	1.00
		Content of large stones	0.14	Content of large stones	0.14	Depth to saturated zone	0.98
		Slope	0.04	Slope	0.04	Gravel content	0.98
						Restricted permeability	0.41
Darnell	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Content of large stones	0.14	Content of large stones	0.14	Content of large stones	1.00
		Slope	0.04	Slope	0.04	Slope	1.00
						Gravel content	0.97

Recreational Development 1--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	0.98	Depth to saturated zone	0.75	Content of large stones	1.00
		Restricted permeability	0.41	Restricted permeability	0.41	Depth to saturated zone	0.98
		Content of large stones	0.14	Content of large stones	0.14	Gravel content	0.97
						Restricted permeability	0.41
Darnell	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Content of large stones	0.03
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	0.98	Depth to saturated zone	0.75	Content of large stones	1.00
		Restricted permeability	0.41	Restricted permeability	0.41	Depth to saturated zone	0.98
		Content of large stones	0.14	Content of large stones	0.14	Gravel content	0.97
						Restricted permeability	0.41
Darnell	34	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Content of large stones	0.03
37:							
Niotaze	57	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.98	Slope	0.96	Content of large stones	1.00
		Slope	0.96	Depth to saturated zone	0.75	Slope	1.00
		Restricted permeability	0.41	Restricted permeability	0.41	Depth to saturated one	1.98
		Content of large stones	0.14	Content of large stones	0.14	Gravel content	0.97
						Restricted permeability	0.41
Darnell	21	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.50
						Content of large stones	0.03
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Not limited		Not limited		Not limited	
40:							
Okay	100	Not limited		Not limited		Not limited	

Recreational Development 1--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
41:							
Okay	100	Not limited		Not limited		Somewhat limited	
						Slope	0.50
42:							
Okay	100	Not limited		Not limited		Somewhat limited	
						Slope	0.50
43:							
Okemah	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
44:							
Okemah	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
Parsons	30	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Pharoah	20	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
45:							
Osage	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted peremeability	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00			Flooding	0.60
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
48:							
Radley	99	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
49:							
Severn	100	Very limited		Not limited		Not limited	
		Flooding	1.00				

Recreational Development 1--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.88
						Gravel content	0.02
						Content of large stones	0.01
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Depth to saturated zone	0.48	Flooding	1.00
		Depth to saturated zone	0.81	Flooding	0.40	Depth to saturated zone	0.81
52:							
Urban land	100	Not rated		Not rated		Not rated	
53:							
Wynona	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated one	1.00	Restricted permeability	0.96	Restricted permeability	0.96
		Restricted permeability	0.96			Flooding	0.60
54:							
Wynona	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Restricted permeability	0.96	Restricted permeability	0.96
		Restricted permeability	0.96			Flooding	0.60
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Recreational Development 2

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Apperson	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.08	Depth to saturated zone	0.08	Depth to saturated zone	0.43
2:							
Apperson	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.08	Depth to saturated zone	0.08	Depth to saturated zone	0.43
3:							
Bates	100	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.16
4:							
Bates	66	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.29
Coweta	34	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.87
						Content of large stones	0.03
5:							
Catoosa	100	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.65
6:							
Catoosa	60	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.65
Shidler	25	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
						Content of large stones	0.01
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Not limited		Not limited		Not limited	
8:							
Choska	42	Not limited		Not limited		Not limited	
Severn	31	Not limited		Not limited		Not limited	
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Not limited		Not limited		Somewhat limited	
						Flooding	0.60

Recreational Development 2--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
10:							
Coweta	60	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.83
						Content of large stones	0.03
Bates	35	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.84
11:							
Coweta	30	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.83
						Content of large stones	0.03
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.44	Depth to saturated zone	0.44	Depth to saturated zone	0.75
						Depth to bedrock	0.16
12:							
Dennis	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
13:							
Dennis	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
14:							
Dennis	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
15:							
Dennis	77	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
Pharoah	23	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
16:							
Dennis	66	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
Radley	34	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00

Recreational Development 2--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
18:							
Endsaw	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.18	Content of large stones	0.01	Slope	1.00
		Content of large stones	0.01			Content of large stones	0.99
Hector	25	Somewhat limited		Somewhat limited		Very limited	
		Content of large stones	0.32	Content of large stones	0.32	Depth to bedrock	1.00
						Content of large stones	1.00
						Droughty	1.00
19:							
Eram	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.44	Depth to saturated zone	0.44	Depth to saturated zone	0.75
						Depth to bedrock	0.06
20:							
Eram	58	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.44	Depth to saturated zone	0.44	Depth to bedrock	0.80
						Depth to saturated zone	0.75
						Slope	0.16
Coweta	42	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.73
						Content of large stones	0.03
21:							
Glenpool	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.87	Too sandy	0.87	Droughty	0.34
						Slope	0.04
22:							
Hector	60	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
						Gravel content	0.29
						Content of large stones	0.03
Linker	40	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.35
23:							
Kamie	100	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.92	Too sandy	0.92		
24:							
Kamie	100	Not limited		Not limited		Not limited	

Recreational Development 2--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
25:							
Kamie	62	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.92	Too sandy	0.92		
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.04	Slope	1.00
						Droughty	0.53
						Gravel content	0.36
						Content of large stones	0.01
27:							
Kiomatia	98	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.79	Too sandy	0.79	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Droughty	0.06
28:							
Larton	80	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.92	Too sandy	0.92		
Glenpool	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.87	Too sandy	0.87	Droughty	0.34
29:							
Latanier	99	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
						Flooding	0.60
						Depth to saturated zone	0.19
30:							
Lula	100	Not limited		Not limited		Not limited	
31:							
Mason	100	Not limited		Not limited		Not limited	
32:							
Newtonia	100	Not limited		Not limited		Not limited	
33:							
Newtonia	100	Not limited		Not limited		Not limited	
34:							
Niotaze	72	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.44	Depth to saturated zone	0.44	Content of large stones	1.00
		Content of large stones	0.14	Content of large stones	0.14	Depth to saturated zone	0.75
						Depth to bedrock	0.16
						Slope	0.04
Darnell	25	Somewhat limited		Somewhat limited		Very limited	
		Content of large stones	0.14	Content of large stones	0.14	Depth to bedrock	1.00
						Content of large stones	1.00
						Droughty	0.98
						Slope	0.04

Recreational Development 2--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
35:							
Niotaze	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.50	Depth to saturated zone	0.44	Slope	1.00
		Depth to saturated zone	0.44	Content of large stones	0.14	Content of large stones	1.00
		Content of large stones	0.14			Depth to saturated zone	0.75
						Depth to bedrock	0.10
Darnell	25	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
						Content of large stones	0.03
36:							
Niotaze	66	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Slope	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.44	Content of large stones	1.00
		Content of large stones	0.14	Content of large stones	0.14	Depth to saturated zone	0.75
						Depth to bedrock	0.29
Darnell	34	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
						Content of large stones	0.03
37:							
Niotaze	57	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.44	Depth to saturated zone	0.44	Content of large stones	1.00
		Content of large stones	0.14	Content of large stones	0.14	Slope	0.96
						Depth to saturated zone	0.75
						Depth to bedrock	0.29
Darnell	21	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
						Content of large stones	0.03
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Not limited		Not limited		Not limited	
40:							
Okay	100	Not limited		Not limited		Not limited	
41:							
Okay	100	Not limited		Not limited		Not limited	

Recreational Development 2--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
42:							
Okay	100	Not limited		Not limited		Not limited	
43:							
Okemah	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
44:							
Okemah	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
Parsons	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Pharoah	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
45:							
Osage	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
						Flooding	0.60
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
48:							
Radley	99	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
49:							
Severn	100	Not limited		Not limited		Not limited	
50:							
Shidler	65	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.28
						Content of large stones	0.01
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
		Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
52:							
Urban land	100	Not rated		Not rated		Not rated	

Recreational Development 2--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
53:							
Wynona	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
54:							
Wynona	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Engineering

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

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

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

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

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

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Sanitary Facilities

The tables “Sanitary Facilities 1” and “Sanitary Facilities 2” show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses.

Not limited indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter. Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed. Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill. Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse. The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill,* solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan. Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime. Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion. Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

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

Sanitary Facilities 1

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1:					
Apperson	100	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to hard bedrock	0.26
		Depth to saturated zone	1.00	Depth to saturated zone	0.08
		Depth to bedrock	0.69		
2:					
Apperson	100	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.32
				Depth to hard bedrock	0.26
		Depth to saturated zone	1.00		
				Depth to saturated zone	0.08
		Depth to bedrock	0.69		
3:					
Bates	100	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	0.46		
				Seepage	0.53
4:					
Bates	66	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	0.46		
				Seepage	0.53
				Slope	0.32
Coweta	34	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	0.53
				Slope	0.32
5:					
Catoosa	100	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Restricted permeability	0.46		
				Seepage	0.53
6:					
Catoosa	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Restricted permeability	0.46		
				Slope	0.68
				Seepage	0.53
Shidler	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.68
Rock outcrop	15	Not rated		Not rated	

Sanitary Facilities 1--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
7:					
Choska	99	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
		Flooding	0.40	Flooding	0.40
8:					
Choska	42	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
		Flooding	0.40	Flooding	0.40
Severn	31	Somewhat limited		Very limited	
		Flooding	0.40	Seepage	1.00
				Flooding	0.40
Urban land	27	Not rated		Not rated	
9:					
Cleora	100	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
				Seepage	1.00
10:					
Coweta	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	0.53
				Slope	0.32
Bates	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	0.46	Seepage	0.53
				Slope	0.32
11:					
Coweta	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	0.53
				Slope	0.32
Urban land	30	Not rated		Not rated	
Eram	20	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.01
12:					
Dennis	100	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.53
		Depth to saturated zone	1.00	Depth to saturated zone	0.06

Sanitary Facilities 1--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
13:					
Dennis	100	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.32
		Depth to saturated zone	1.00	Depth to saturated zone	0.06
14:					
Dennis	100	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.32
		Depth to saturated zone	1.00	Depth to saturated zone	0.06
15:					
Dennis	77	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.53
		Depth to saturated zone	1.00	Depth to saturated zone	0.06
Pharoah	23	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
16:					
Dennis	66	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.08
		Depth to saturated zone	1.00	Depth to saturated zone	0.06
Radley	34	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	0.46	Seepage	0.53
17:					
Urban land	57	Not rated		Not rated	
Dennis	43	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.08
		Depth to saturated zone	1.00	Depth to saturated zone	0.06
18:					
Endsaw	75	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to soft bedrock	0.96
		Slope	1.00	Depth to saturated zone	0.81
		Depth to bedrock	0.99		

Sanitary Facilities 1--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
18:					
Hector	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	1.00
				Content of large stones	0.01
19:					
Eram	100	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	0.32
		Depth to saturated zone	1.00	Depth to saturated zone	0.01
20:					
Eram	58	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.01
		Slope	0.16		
Coweta	42	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.53
21:					
Glenpool	100	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	1.00
		Slope	0.04		
22:					
Hector	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	0.32
Linker	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Restricted permeability	0.46	Seepage	0.53
				Slope	0.08
23:					
Kamie	100	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
				Slope	0.92
24:					
Kamie	100	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00

Sanitary Facilities 1--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
25:					
Kamie	62	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
				Slope	0.69
Urban land	38	Not rated		Not rated	
26:					
Kanima	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
27:					
Kiomatia	98	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
		Depth to saturated zone	0.94	Depth to saturated zone	0.39
28:					
Larton	80	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
Glenpool	20	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
29:					
Latanier	99	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	0.21
30:					
Lula	100	Somewhat limited		Somewhat limited	
		Depth to bedrock	0.59	Seepage	0.53
		Restricted permeability	0.46	Depth to hard bedrock	0.13
31:					
Mason	100	Very limited		Somewhat limited	
		Restricted permeability	1.00	Flooding	0.40
		Flooding	0.40		
32:					
Newtonia	100	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
33:					
Newtonia	100	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
				Slope	0.32

Sanitary Facilities 1--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
34:					
Niotaze-------------	72	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	1.00
		Slope	0.04	Content of large stones	0.01
Darnell-------------	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.04	Seepage	1.00
				Slope	1.00
35:					
Niotaze-------------	75	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	1.00	Content of large stones	0.07
Darnell-------------	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	1.00
36:					
Niotaze-------------	66	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	1.00	Seepage	1.00
				Content of large stones	0.23
Darnell-------------	34	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
37:					
Niotaze-------------	57	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	1.00
		Slope	0.96	Seepage	1.00
				Content of large stones	0.23

Sanitary Facilities 1--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
37:					
Darnell-------------	21	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.32
Urban land----------	20	Not rated		Not rated	
38:					
Oil waste land------	100	Not rated		Not rated	
39:					
Okay----------------	100	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
40:					
Okay----------------	100	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
41:					
Okay----------------	100	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
				Slope	0.32
42:					
Okay----------------	100	Somewhat limited		Very limited	
		Restricted permeability	0.46	Seepage	1.00
				Slope	0.32
43:					
Okemah--------------	100	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.06
		Depth to saturated zone	1.00		
44:					
Okemah--------------	50	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.06
		Depth to saturated zone	1.00		
Parsons-------------	30	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.53
		Depth to saturated zone	1.00		
Pharoah-------------	20	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		

Sanitary Facilities 1--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
45:					
Osage	100	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
46:					
Pits	100	Not rated		Not rated	
47:					
Radley	99	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	0.46	Seepage	0.53
48:					
Radley	99	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	0.46	Seepage	0.53
49:					
Severn	100	Somewhat limited		Very limited	
		Flooding	0.40	Seepage	1.00
				Flooding	0.40
50:					
Shidler	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.68
				Seepage	0.53
Rock outcrop	30	Not rated		Not rated	
51:					
Tullahassee	100	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
52:					
Urban land	100	Not rated		Not rated	
53:					
Wynona	100	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		

Sanitary Facilities 1--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
54:					
Wynona	45	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
Urban land	20	Not rated		Not rated	
DAM:					
Dam	100	Not rated		Not rated	
DUM:					
Dumps	100	Not rated		Not rated	
M-W:					
Miscellaneous water	100	Not rated		Not rated	
W:					
Water	100	Not rated		Not rated	

Sanitary Facilities 2

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
1:							
Apperson	100	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.92	Too clayey	1.00
		Depth to bedrock	1.00	Depth to bedrock	0.26	Hard to compact	1.00
		Too clayey	1.00			Depth to saturated zone	0.95
						Depth to bedrock	0.26
2:							
Apperson	100	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.92	Too clayey	1.00
		Depth to bedrock	1.00	Depth to bedrock	0.26	Hard to compact	1.00
		Too clayey	1.00			Depth to saturated zone	0.95
						Depth to bedrock	0.26
3:							
Bates	100	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Too clayey	0.50
4:							
Bates	66	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Too clayey	0.50
Coweta	34	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
5:							
Catoosa	100	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Too clayey	0.50
6:							
Catoosa	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Too clayey	0.50
Shidler	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Very limited		Somewhat limited		Somewhat limited	
		Too sandy	1.00	Flooding	0.40	Too sandy	0.50
		Seepage	1.00			Seepage	0.01
		Flooding	0.40				
8:							
Choska	42	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Seepage	1.00	Too sandy	0.50
		Seepage	1.00	Flooding	0.40	Seepage	0.01
		Flooding	0.40				

Sanitary Facilities 2--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
8:							
Severn	31	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.52
		Too clayey	0.50	Flooding	0.40		
		Flooding	0.40				
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.52
		Seepage	1.00	Seepage	1.00	Too sandy	0.50
		Too sandy	1.00				
10:							
Coweta	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Too clayey	0.50
Bates	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Too clayey	0.50
11:							
Coweta	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Depth to saturated zone	1.00
						Too clayey	0.50
12:							
Dennis	100	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	0.96
13:							
Dennis	100	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Too clayey	1.00
		Too clayey	0.50			Hard to compact	1.00
						Depth to saturated zone	0.96
14:							
Dennis	100	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Hard to compact	1.00
		Too clayey	0.50			Depth to saturated zone	0.96
						Too clayey	0.50

Sanitary Facilities 2--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
15:							
Dennis	77	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	0.96
Pharoah	23	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	1.00
16:							
Dennis	66	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	0.96
Radley	34	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Too clayey	0.50				
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	0.96
18:							
Endsaw	75	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Too clayey	1.00
		Too clayey	1.00	Depth to bedrock	0.96	Hard to compact	1.00
		Slope	1.00	Depth to saturated zone	0.19	Slope	1.00
		Depth to saturated zone	0.86			Depth to bedrock	0.96
						Depth to saturated zone	0.47
Hector	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Seepage	1.00			Seepage	0.52
19:							
Eram	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Depth to saturated zone	1.00
						Too clayey	0.50

Sanitary Facilities 2--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
20:							
Eram	58	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50	Slope	0.16	Depth to saturated zone	1.00
		Slope	0.16			Too clayey	0.50
						Slope	0.16
Coweta	42	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Too clayey	0.50
21:							
Glenpool	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	0.04	Seepage	1.00
		Slope	0.04			Slope	0.04
22:							
Hector	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Seepage	1.00			Seepage	0.52
						Gravel content	0.05
Linker	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
23:							
Kamie	100	Not limited		Not limited		Not limited	
24:							
Kamie	100	Not limited		Not limited		Not limited	
25:							
Kamie	62	Not limited		Not limited		Not limited	
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Too clayey	0.50			Slope	1.00
						Too clayey	0.50
27:							
Kiomatia	98	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage	1.00	Seepage	1.00		
		Too sandy	1.00				
28:							
Larton	80	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Seepage	1.00	Seepage	0.52
						Too sandy	0.50
Glenpool	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00

Sanitary Facilities 2--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
29:							
Latanier	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.86
30:							
Lula	100	Very limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	1.00	Depth to bedrock	0.13	Too clayey	0.50
		Too clayey	0.50			Depth to bedrock	0.13
31:							
Mason	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Flooding	0.40	Too clayey	0.50
		Flooding	0.40				
32:							
Newtonia	100	Somewhat limited		Not limited		Very limited	
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
33:							
Newtonia	100	Very limited		Not limited		Very limited	
		Too clayey	1.00			Hard to compact	1.00
						Too clayey	0.50
34:							
Niotaze	72	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00	Slope	0.04	Hard to compact	1.00
		Slope	0.04			Depth to saturated zone	1.00
						Slope	0.04
Darnell	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Seepage	1.00	Slope	0.04	Seepage	0.52
		Slope	0.04			Slope	0.04
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00	Depth to bedrock	1.00
		Slope	1.00	Depth to saturated zone	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	1.00
Darnell	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage	1.00			Seepage	0.52

Sanitary Facilities 2--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00	Depth to bedrock	1.00
		Slope	1.00	Depth to saturated zone	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	1.00
Darnell	34	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage	1.00			Seepage	0.52
37:							
Niotaze	57	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00	Slope	0.96	Hard to compact	1.00
		Slope	0.96			Depth to saturated zone	1.00
						Slope	0.96
Darnell	21	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Seepage	1.00			Seepage	0.52
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Very limited		Not limited		Somewhat limited	
		Seepage	1.00			Too clayey	0.50
		Too clayey	0.50				
40:							
Okay	100	Very limited		Not limited		Somewhat limited	
		Seepage	1.00			Too clayey	0.50
		Too clayey	0.50				
41:							
Okay	100	Very limited		Not limited		Somewhat limited	
		Seepage	1.00			Too clayey	0.50
						Seepage	0.22
42:							
Okay	100	Very limited		Not limited		Not limited	
		Seepage	1.00				
43:							
Okemah	100	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	0.96

Sanitary Facilities 2--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
44:							
Okemah	50	Very limited		Somewhat limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Hard to compact	1.00
		Too clayey	0.50			Depth to saturated zone	0.96
						Too clayey	0.50
Parsons	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	1.00
Pharoah	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	1.00
45:							
Osage	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
48:							
Radley	99	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
49:							
Severn	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.52
		Too clayey	0.50	Flooding	0.40		
		Flooding	0.40				
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	0.96
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	0.52
		Seepage	1.00	Seepage	1.00		
52:							
Urban land	100	Not rated		Not rated		Not rated	

Sanitary Facilities 2--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
53:							
Wynona--------------	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Hard to compact	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
54:							
Wynona--------------	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Hard to compact	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
Urban land----------	20	Not rated		Not rated		Not rated	
DAM:							
Dam-----------------	100	Not rated		Not rated		Not rated	
DUM:							
Dumps---------------	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water--------------	100	Not rated		Not rated		Not rated	
W:							
Water---------------	100	Not rated		Not rated		Not rated	

Agricultural Waste Management

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

The tables “Agricultural Waste Management 1” and “Agricultural Waste Management 2” show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

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

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

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

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

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

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

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

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

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

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

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

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

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

Agricultural Waste Management 1

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Apperson	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.03	Too acid	0.14	Too acid	0.14
2:							
Apperson	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.03	Too acid	0.14	Too acid	0.14
						Too steep for surface application	0.08
3:							
Bates	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.16	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Depth to bedrock	0.16	Depth to bedrock	0.16
4:							
Bates	66	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.29	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Depth to bedrock	0.29	Depth to bedrock	0.29
		Droughty	0.01	Droughty	0.01	Too steep for surface application	0.08
						Droughty	0.01
Coweta	34	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to dense layer	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Filtering capacity	0.01	Too steep for surface application	0.08
		Filtering capacity	0.01			Filtering capacity	0.01
5:							
Catoosa	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.65	Depth to bedrock	0.65	Depth to bedrock	0.65
		Droughty	0.04	Too acid	0.14	Too acid	0.14
		Too acid	0.03	Droughty	0.04	Droughty	0.04
Catoosa	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.65	Depth to bedrock	0.65	Depth to bedrock	0.65
		Droughty	0.05	Too acid	0.14	Too steep for surface application	0.32
		Too acid	0.03	Droughty	0.05	Too acid	0.14
						Droughty	0.05

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
5:							
Shidler	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to dense layer	1.00			Too steep for surface application	0.32
		Runoff	0.40				
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Not limited		Somewhat limited		Not limited	
				Flooding	0.40		
8:							
Choska	42	Not limited		Somewhat limited		Not limited	
				Flooding	0.40		
Severn	31	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Flooding	0.40	Filtering capacity	0.01
				Filtering capacity	0.01		
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
10:							
Coweta	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to dense layer	1.00	Droughty	1.00	Droughty	1.00
				Too acid	0.42	Too acid	0.42
		Droughty	1.00	Filtering capacity	0.01	Too steep for surface application	0.08
		Too acid	0.11				
		Filtering capacity	0.01				
						Filtering capacity	0.01
Bates	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.84	Depth to bedrock	0.84	Depth to bedrock	0.84
		Droughty	0.36	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Droughty	0.36	Droughty	0.36
						Too steep for surface application	0.08
11:							
Coweta	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to dense layer	1.00	Droughty	1.00	Droughty	1.00
				Too acid	0.42	Too acid	0.42
		Droughty	1.00	Filtering capacity	0.01	Too steep for surface application	0.08
		Too acid	0.11				
		Filtering capacity	0.01				
						Filtering capacity	0.01

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
11:							
Urban land----------	30	Not rated		Not rated		Not rated	
Eram----------------	20	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to bedrock	0.16	Depth to bedrock	0.16	Too steep for surface application	1.00
		Too acid	0.03	Too acid	0.14	Depth to bedrock	0.16
		Droughty	0.01	Droughty	0.01	Too acid	0.14
12:							
Dennis--------------	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.18	Too acid	0.67	Too acid	0.67
13:							
Dennis--------------	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.18	Too acid	0.67	Too acid	0.67
						Too steep for surface application	0.08
14:							
Dennis--------------	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.18	Too acid	0.67	Too acid	0.67
						Too steep for surface application	0.08
15:							
Dennis--------------	77	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.18	Too acid	0.67	Too acid	0.67
Pharoah-------------	23	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40	Sodium content	0.18	Sodium content	0.18
		Sodium content	0.18				
		Salinity	0.01				

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
16:							
Dennis	66	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.18	Too acid	0.67	Too acid	0.67
Radley	34	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.18	Too acid	0.67	Too acid	0.67
18:							
Endsaw	75	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Depth to saturated zone	0.86	Depth to saturated zone	0.86	Too steep for sprinkler application	1.00
		Cobble content	0.50	Too acid	0.67	Depth to saturated zone	0.86
		Too acid	0.18	Cobble content	0.50	Too acid	0.67
Hector	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Large stones on the surface	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Droughty	1.00	Large stones on the surface	1.00	Large stones on the surface	1.00
		Runoff	0.40	Too acid	0.42	Too steep for surface application	0.92
		Too acid	0.11	Filtering capacity	0.01	Too acid	0.42
19:							
Eram	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to bedrock	0.06	Too acid	0.14	Too acid	0.14
		Too acid	0.03	Depth to bedrock	0.06	Too steep for surface application	0.08
						Depth to bedrock	0.06

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
20:							
Eram	58	Very limited Restricted permeability Depth to saturated zone Depth to bedrock Droughty Slope	 1.00 1.00 0.80 0.45 0.16	Very limited Depth to saturated zone Restricted permeability Depth to bedrock Droughty Slope	 1.00 1.00 0.80 0.45 0.16	Very limited Depth to saturated zone Restricted permeability Too steep for surface application Depth to bedrock Droughty	 1.00 1.00 1.00 0.80 0.45
Coweta	42	Very limited Depth to bedrock Depth to dense layer Droughty Too acid Filtering capacity	 1.00 1.00 1.00 0.11 0.01	Very limited Depth to bedrock Droughty Too acid Filtering capacity	 1.00 1.00 0.42 0.01	Very limited Depth to bedrock Droughty Too steep for surface application Too acid Too steep for sprinkler application	 1.00 1.00 0.92 0.42 0.02
21:							
Glenpool	100	Very limited Filtering capacity Leaching Slope Too acid	 1.00 0.45 0.04 0.03	Very limited Filtering capacity Too acid Slope	 1.00 0.14 0.04	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application Too acid	 1.00 1.00 0.22 0.14
22:							
Hector	60	Very limited Depth to bedrock Droughty Runoff Too acid Filtering capacity	 1.00 1.00 0.40 0.11 0.01	Very limited Droughty Depth to bedrock Too acid Filtering capacity	 1.00 1.00 0.42 0.01	Very limited Droughty Depth to bedrock Too acid Too steep for surface application Filtering capacity	 1.00 1.00 0.42 0.08 0.01
Linker	40	Somewhat limited Too acid Droughty Depth to bedrock	 0.73 0.53 0.35	Very limited Too acid Droughty Depth to bedrock	 1.00 0.53 0.35	Very limited Too acid Droughty Depth to bedrock	 1.00 0.53 0.35
23:							
Kamie	100	Somewhat limited Filtering capacity	 0.01	Somewhat limited Filtering capacity	 0.01	Somewhat limited Too steep for surface application Filtering capacity	 0.68 0.01

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
24:							
Kamie	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
25:							
Kamie	62	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for surface application	0.32
						Filtering capacity	0.01
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Droughty	0.01	Droughty	0.01	Too steep for sprinkler application	1.00
						Droughty	0.01
27:							
Kiomatia	98	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Leaching	0.45	Droughty	0.06	Droughty	0.06
		Droughty	0.06				
28:							
Larton	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Leaching	0.45	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Filtering capacity	0.01	Filtering capacity	0.01
		Filtering capacity	0.01				
Glenpool	20	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Leaching limitation	0.45	Too acid	0.14	Too acid	0.14
		Too acid	0.03				
29:							
Latanier	99	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Flooding	0.60	Depth to saturated zone	1.00	Flooding	0.60
		Runoff	0.40				
30:							
Lula	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Too acid	0.14	Too acid	0.14

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
31:							
Mason	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Flooding	0.40	Restricted permeability	0.31
		Too acid	0.02	Restricted permeability	0.31	Too acid	0.07
				Too acid	0.07		
32:							
Newtonia	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Too acid	0.14	Too acid	0.14
33:							
Newtonia	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Too acid	0.14	Too acid	0.14
						Too steep for surface application	0.08
34:							
Niotaze	72	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Cobble content	1.00	Cobble content	1.00	Cobble content	1.00
		Droughty	0.51	Too acid	0.67	Too steep for surface application	1.00
		Too acid	0.18	Droughty	0.51	Too acid	0.67
Darnell	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to dense layer	1.00	Cobble content	1.00	Cobble content	1.00
		Cobble content	1.00	Too acid	0.07	Too steep for surface application	1.00
		Slope	0.04	Slope	0.04	Too steep for sprinkler application	0.22
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00	Too steep for sprinkler application	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Cobble content	1.00	Cobble content	1.00	Restricted permeability	1.00
		Droughty	0.42	Too acid	0.67	Cobble content	1.00

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
35:							
Darnell	25	Very limited		Very limited		Very limited	
		Slope	1.00	Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Droughty	1.00	Slope	1.00	Too steep for surface application	1.00
		Depth to dense layer	1.00	Too acid	0.07	Too steep for sprinkler application	1.00
		Too acid	0.02	Filtering capacity	0.01	Too acid	0.07
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00	Too steep for sprinkler application	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Cobble content	1.00	Cobble content	1.00	Restricted permeability	1.00
		Droughty	0.75	Droughty	0.75	Cobble content	1.00
Darnell	34	Very limited		Very limited		Very limited	
		Slope	1.00	Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Droughty	1.00	Slope	1.00	Too steep for surface application	1.00
		Depth to dense layer	1.00	Too acid	0.07	Too steep for sprinkler application	1.00
		Too acid	0.02	Filtering capacity	0.01	Too acid	0.07
37:							
Niotaze	57	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Cobble content	1.00	Cobble content	1.00	Cobble content	1.00
		Slope	0.96	Slope	0.96	Too steep for surface application	1.00
		Droughty	0.75	Droughty	0.75	Too steep for sprinkler application	0.98
Darnell	21	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to dense layer	1.00	Too acid	0.07	Too steep for surface application	0.08
		Too acid	0.02	Filtering capacity	0.01	Too acid	0.07
		Filtering capacity	0.01			Filtering capacity	0.01

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
37:							
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Too acid	0.14	Too acid	0.14
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
40:							
Okay	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Too acid	0.14	Too acid	0.14
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
41:							
Okay	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Too acid	0.14	Too acid	0.14
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for surface application	0.08
						Filtering capacity	0.01
42:							
Okay	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Too acid	0.14	Too acid	0.14
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for surface application	0.08
						Filtering capacity	0.01
43:							
Okemah	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
44:							
Okemah	50	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Parsons	30	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40	Too acid	0.42	Too acid	0.42
		Too acid	0.11				

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
44:							
Pharoah	20	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40	Sodium content	0.18	Sodium content	0.18
		Sodium content	0.18				
		Salinity	0.01				
45:							
Osage	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Runoff	0.40				
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
48:							
Radley	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
49:							
Severn	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Flooding	0.40	Filtering capacity	0.01
				Filtering capacity	0.01		
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to dense layer	1.00	Droughty	0.98	Droughty	0.98
		Droughty	0.98			Too steep for surface application	0.32
		Runoff	0.40				
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.03	Too acid	0.14	Too acid	0.14
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
52:							
Urban land	100	Not rated		Not rated		Not rated	

Agricultural Waste Management 1--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
53:							
Wynona--------------	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
		Flooding	0.60	Restricted permeability	1.00	Flooding	0.60
		Too acid	0.11	Too acid	0.42	Too acid	0.42
54:							
Wynona--------------	45	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
		Flooding	0.60	Restricted permeability	1.00	Flooding	0.60
		Too acid	0.11	Too acid	0.42	Too acid	0.42
Urban land----------	20	Not rated		Not rated		Not rated	
DAM:							
Dam-----------------	100	Not rated		Not rated		Not rated	
DUM:							
Dumps---------------	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water--------------	100	Not rated		Not rated		Not rated	
W:							
Water---------------	100	Not rated		Not rated		Not rated	

Agricultural Waste Management 2

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
1:							
Apperson	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Seepage	0.69	Depth to bedrock	1.00	Depth to saturated zone	1.00
		Depth to bedrock	0.26			Depth to bedrock	0.26
		Too acid	0.14			Too acid	0.14
2:							
Apperson	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Seepage	0.69	Depth to bedrock	1.00	Depth to saturated zone	1.00
		Depth to bedrock	0.26			Depth to bedrock	0.26
		Too acid	0.14			Too acid	0.14
						Too steep for surface application	0.08
3:							
Bates	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42				
4:							
Bates	66	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42			Too steep for surface application	0.08
Coweta	34	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42			Too steep for surface application	0.08
						Filtering capacity	0.01
5:							
Catoosa	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too acid	0.14
		Too acid	0.14				

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
6:							
Catoosa	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	0.32
		Too acid	0.14	Slope	0.12	Too acid	0.14
Shidler	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	0.32
				Slope	0.12		
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Very limited		Very limited		Not limited	
		Seepage	1.00	Restricted permeability	1.00		
		Flooding	0.40				
8:							
Choska	42	Very limited		Very limited		Not limited	
		Seepage	1.00	Restricted permeability	1.00		
		Flooding	0.40				
Severn	31	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	0.31	Filtering capacity	0.01
		Flooding	0.40				
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Seepage	1.00	Restricted permeability	0.31	Filtering capacity	0.01
10:							
Coweta	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42			Too steep for surface application	0.08
						Filtering capacity	0.01
Bates	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42			Too steep for surface application	0.08

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
11:							
Coweta	30	Very limited Seepage Depth to bedrock Too acid	 1.00 1.00 0.42	Very limited Depth to bedrock Restricted permeability	 1.00 1.00	Very limited Depth to bedrock Too acid Too steep for surface application Filtering capacity	 1.00 0.42 0.08 0.01
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Very limited Depth to bedrock Depth to saturated zone Seepage Too steep for surface application Too acid	 1.00 1.00 0.69 0.22 0.14	Very limited Restricted permeability Depth to bedrock Slope	 1.00 1.00 1.00	Very limited Depth to bedrock Depth to saturated zone Too steep for surface application Restricted permeability Too steep for sprinkler application	 1.00 1.00 1.00 0.96 0.22
12:							
Dennis	100	Very limited Seepage Depth to saturated zone Too acid	 1.00 1.00 0.67	Very limited Restricted permeability	 1.00	Very limited Depth to saturated zone Restricted permeability Too acid	 1.00 0.96 0.67
13:							
Dennis	100	Very limited Seepage Depth to saturated zone Too acid	 1.00 1.00 0.67	Very limited Restricted permeability	 1.00	Very limited Depth to saturated zone Restricted permeability Too acid Too steep for surface application	 1.00 0.96 0.67 0.08
14:							
Dennis	100	Very limited Seepage Depth to saturated zone Too acid	 1.00 1.00 0.67	Very limited Restricted permeability	 1.00	Very limited Depth to saturated zone Restricted permeability Too acid Too steep for surface application	 1.00 0.96 0.67 0.08

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
15:							
Dennis	77	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Restricted permeability	0.96
		Too acid	0.67			Too acid	0.67
Pharoah	23	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
		Sodium content	0.18			Sodium content	0.18
16:							
Dennis	66	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Restricted permeability	0.96
		Too acid	0.67			Too acid	0.67
Radley	34	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Seepage	1.00	Restricted permeability	1.00		
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Restricted permeability	0.96
		Too acid	0.67			Too acid	0.67
18:							
Endsaw	75	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Depth to bedrock	1.00	Too steep for sprinkler application	1.00
		Depth to bedrock	0.96	Slope	1.00	Depth to bedrock	0.96
		Depth to saturated zone	0.86	Depth to saturated zone	0.14	Restricted permeability	0.96
		Too acid	0.67			Depth to saturated zone	0.86

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
18:							
Hector	25	Very limited Seepage Depth to bedrock Stone content Too acid Too steep for surface application	 1.00 1.00 0.85 0.42 0.06	Very limited Depth to bedrock Stone content Slope Restricted permeability	 1.00 0.96 0.88 0.31	Very limited Depth to bedrock Large stones on the surface Too steep for surface application Too acid Too steep for sprinkler application	 1.00 1.00 0.92 0.42 0.06
19:							
Eram	100	Very limited Depth to bedrock Depth to saturated zone Seepage Too acid	 1.00 1.00 0.69 0.14	Very limited Restricted permeability Depth to bedrock	 1.00 1.00	Very limited Depth to bedrock Depth to saturated zone Restricted permeability Too acid Too steep for surface application	 1.00 1.00 0.96 0.14 0.08
20:							
Eram	58	Very limited Depth to bedrock Depth to saturated zone Too steep for surface application Seepage Too acid	 1.00 1.00 0.78 0.69 0.14	Very limited Restricted permeability Depth to bedrock Slope	 1.00 1.00 1.00	Very limited Depth to bedrock Depth to saturated zone Too steep for surface application Restricted permeability Too steep for sprinkler application	 1.00 1.00 1.00 0.96 0.78
Coweta	42	Very limited Seepage Depth to bedrock Too acid Too steep for surface application	 1.00 1.00 0.42 0.06	Very limited Depth to bedrock Restricted permeability Slope	 1.00 1.00 0.88	Very limited Depth to bedrock Too steep for surface application Too acid Too steep for sprinkler application Filtering capacity	 1.00 0.92 0.42 0.06 0.01

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
21:							
Glenpool	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Filtering capacity	1.00
		Too steep for surface application	0.50			Too steep for surface application	1.00
		Too acid	0.14			Too steep for sprinkler application	0.50
						Too acid	0.14
22:							
Hector	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	0.31	Too acid	0.42
		Too acid	0.42			Too steep for surface application	0.08
						Filtering capacity	0.01
Linker	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too acid	1.00
		Too acid	1.00	Too acid	0.14		
23:							
Kamie	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	0.68
				Slope	0.50	Filtering capacity	0.01
24:							
Kamie	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Filtering capacity	0.01
25:							
Kamie	62	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	0.32
				Slope	0.12	Filtering capacity	0.01
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Slope	1.00	Too steep for sprinkler application	1.00

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
27:							
Kiomatia	98	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Filtering capacity	1.00
		Seepage	1.00	Depth to saturated zone	1.00	Flooding	1.00
				Restricted permeability	1.00		
28:							
Larton	80	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42			Filtering capacity	0.01
Glenpool	20	Very limited		Not limited		Very limited	
		Seepage	1.00			Filtering capacity	1.00
		Too acid	0.14			Too acid	0.14
29:							
Latanier	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Flooding	0.60	Flooding	0.60
30:							
Lula	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Depth to bedrock	1.00	Too acid	0.14
		Too acid	0.14	Restricted permeability	1.00	Depth to bedrock	0.13
		Depth to bedrock	0.13				
31:							
Mason	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Restricted permeability	0.21
		Flooding	0.40			Too acid	0.07
		Too acid	0.07				
32:							
Newtonia	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.14
		Too acid	0.14				
33:							
Newtonia	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.14
		Too acid	0.14			Too steep for surface application	0.08

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
34:							
Niotaze	72	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to bedrock	1.00	Cobble content	1.00
		Too acid	0.67	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.50			Restricted permeability	0.96
Darnell	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00	Cobble content	1.00
		Too steep for surface application	0.50	Restricted permeability	0.61	Too steep for surface application	1.00
		Too acid	0.07			Too steep for sprinkler application	0.50
						Too acid	0.07
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Depth to saturated zone	1.00	Too steep for sprinkler application	1.00
		Depth to saturated zone	1.00	Depth to bedrock	1.00	Depth to saturated zone	1.00
		Too acid	0.67			Cobble content	1.00
Darnell	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	0.31	Too steep for sprinkler application	1.00
		Too acid	0.07			Too acid	0.07
						Filtering capacity	0.01
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Depth to saturated zone	1.00	Too steep for sprinkler application	1.00
		Depth to saturated zone	1.00	Depth to bedrock	1.00	Depth to saturated zone	1.00
		Too acid	0.67	Cobble content	0.01	Cobble content	1.00

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
36:							
Darnell	34	Very limited Seepage Depth to bedrock Too steep for surface application Too acid	 1.00 1.00 1.00 0.07	Very limited Slope Depth to bedrock Restricted permeability	 1.00 1.00 0.31	Very limited Depth to bedrock Too steep for surface application Too steep for sprinkler application Too acid Filtering capacity	 1.00 1.00 1.00 0.07 0.01
37:							
Niotaze	57	Very limited Seepage Depth to bedrock Depth to saturated zone Too steep for surface application Too acid	 1.00 1.00 1.00 1.00 0.67	Very limited Restricted permeability Depth to saturated zone Depth to bedrock Slope Cobble content	 1.00 1.00 1.00 1.00 0.01	Very limited Depth to bedrock Depth to saturated zone Cobble content Too steep for surface application Too steep for sprinkler application	 1.00 1.00 1.00 1.00 1.00
Darnell	21	Very limited Seepage Depth to bedrock Too acid	 1.00 1.00 0.07	Very limited Depth to bedrock Restricted permeability	 1.00 0.31	Very limited Depth to bedrock Too steep for surface application Too acid Filtering capacity	 1.00 0.08 0.07 0.01
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Very limited Seepage Too acid	 1.00 0.14	Very limited Restricted permeability	 1.00	Somewhat limited Too acid Filtering capacity	 0.14 0.01
40:							
Okay	100	Very limited Seepage Too acid	 1.00 0.14	Very limited Restricted permeability	 1.00	Somewhat limited Too acid Filtering capacity	 0.14 0.01
41:							
Okay	100	Very limited Seepage Too acid	 1.00 0.14	Very limited Restricted permeability	 1.00	Somewhat limited Too acid Too steep for surface application Filtering capacity	 0.14 0.08 0.01

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
42:							
Okay	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.14
		Too acid	0.14			Too steep for surface application	0.08
						Filtering capacity	0.01
43:							
Okemah	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	1.00			Restricted permeability	0.96
44:							
Okemah	50	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	1.00			Restricted permeability	0.96
Parsons	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Restricted permeability	1.00
		Too acid	0.42			Too acid	0.42
Pharoah	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
		Sodium content	0.18			Sodium content	0.18
45:							
Osage	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
				Flooding	0.60	Flooding	0.60
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	1.00	Flooding	0.60
		Seepage	1.00	Flooding	0.60		
48:							
Radley	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Seepage	1.00	Restricted permeability	1.00		

Agricultural Waste Management 2--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
49:							
Severn	100	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	0.31	Filtering capacity	0.01
		Flooding	0.40				
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	0.32
				Slope	0.12		
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Seepage	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Restricted permeability	0.31	Too acid	0.14
		Too acid	0.14			Filtering capacity	0.01
52:							
Urban land	100	Not rated		Not rated		Not rated	
53:							
Wynona	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	0.96
		Seepage	0.69	Flooding	0.60	Flooding	0.60
		Too acid	0.42			Too acid	0.42
54:							
Wynona	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	0.96
		Seepage	0.69	Flooding	0.60	Flooding	0.60
		Too acid	0.42			Too acid	0.42
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The tables “Building Site Development 1” and “Building Site Development 2” show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping. The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development.

Not limited indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected. Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

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

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

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

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

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

Building Site Development 1

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
1:							
Apperson	100	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.77	Shrink-swell	1.00	Depth to saturated zone	0.77
				Depth to hard bedrock	0.26		
2:							
Apperson	100	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.77	Shrink-swell	1.00	Depth to saturated zone	0.77
				Depth to hard bedrock	0.26		
3:							
Bates	100	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.15		
4:							
Bates	66	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.29		
Coweta	34	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
5:							
Catoosa	100	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.64	Depth to hard bedrock	1.00	Depth to hard bedrock	0.64
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
6:							
Catoosa	60	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.64	Depth to hard bedrock	1.00	Depth to hard bedrock	0.64
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
Shidler	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.12
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Building Site Development 1--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
8:							
Choska	42	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Severn	31	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
10:							
Coweta	60	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
Bates	35	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.84		
11:							
Coweta	30	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.98	Shrink-swell	1.00	Slope	1.00
				Depth to soft bedrock	0.15	Depth to saturated zone	0.98
12:							
Dennis	100	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.81	Shrink-swell	1.00	Depth to saturated zone	0.81
		Shrink-swell	0.50	Depth to saturated zone	1.00	Shrink-swell	0.50
13:							
Dennis	100	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
14:							
Dennis	100	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
15:							
Dennis	77	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81

Building Site Development 1--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
15:							
Pharoah	23	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
16:							
Dennis	66	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
Radley	34	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
18:							
Endsaw	75	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to saturated zone	1.00		
Hector	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.88
19:							
Eram	100	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.98	Shrink-swell	1.00	Depth to saturated zone	0.98
				Depth to soft bedrock	0.06		
20:							
Eram	58	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.98	Shrink-swell	1.00	Slope	1.00
		Slope	0.16	Depth to soft bedrock	0.79	Depth to saturated zone	0.98
				Slope	0.16		
Coweta	42	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	0.88
21:							
Glenpool	100	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00

Building Site Development 1--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
22:							
Hector	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
Linker	40	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.35	Depth to hard bedrock	1.00	Depth to hard bedrock	0.35
23:							
Kamie	100	Not limited		Not limited		Somewhat limited	
						Slope	0.50
24:							
Kamie	100	Not limited		Not limited		Not limited	
25:							
Kamie	62	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
27:							
Kiomatia	98	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.47		
28:							
Larton	80	Not limited		Not limited		Not limited	
Glenpool	20	Not limited		Not limited		Not limited	
29:							
Latanier	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39			Depth to saturated zone	0.39
30:							
Lula	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to hard bedrock	0.13		
31:							
Mason	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
32:							
Newtonia	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Building Site Development 1--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
33:							
Newtonia	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
34:							
Niotaze	72	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.98	Shrink-swell	1.00	Slope	1.00
		Slope	0.04	Depth to soft bedrock	0.15	Depth to saturated zone	0.98
				Slope	0.04		
Darnell	25	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.04	Slope	0.04	Slope	1.00
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.98	Shrink-swell	1.00	Depth to saturated zone	0.98
				Depth to soft bedrock	0.10		
Darnell	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.98	Shrink-swell	1.00	Depth to saturated zone	0.98
				Depth to soft bedrock	0.29		
Darnell	34	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
37:							
Niotaze	57	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.98	Shrink-swell	1.00	Slope	1.00
		Slope	0.96	Slope	0.96	Depth to saturated zone	0.98
				Depth to soft bedrock	0.29		
Darnell	21	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
Urban land	20	Not rated		Not rated		Not rated	

Building Site Development 1--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Not limited		Not limited		Not limited	
40:							
Okay	100	Not limited		Not limited		Not limited	
41:							
Okay	100	Not limited		Not limited		Not limited	
42:							
Okay	100	Not limited		Not limited		Not limited	
43:							
Okemah	100	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
44:							
Okemah	50	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
Parsons	30	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
Pharoah	20	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
45:							
Osage	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
48:							
Radley	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
49:							
Severn	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Building Site Development 1--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
52:							
Urban land	100	Not rated		Not rated		Not rated	
53:							
Wynona	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Depth to saturated one	1.00	Shrink-swell	1.00
		Depth to saturated zone	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
54:							
Wynona	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	1.00	Shrink-swell	0.50
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Building Site Development 2

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
1:							
Apperson	100	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.43
		Low strength	1.00	Cutbanks cave	1.00		
		Depth to	0.43	Too clayey	0.50		
				Depth to dense layer	0.50		
				Depth to hard bedrock	0.26		
2:							
Apperson	100	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.43
		Low strength	1.00	Cutbanks cave	1.00		
		Depth to saturated zone	0.43	Too clayey	0.50		
				Depth to dense layer	0.50		
				Depth to hard bedrock	0.26		
3:							
Bates	100	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.15	Depth to bedrock	0.16
				Cutbanks cave	0.10		
4:							
Bates	66	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.29	Depth to bedrock	0.29
				Cutbanks cave	0.10		
Coweta	34	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
						Droughty	0.87
				Depth to dense layer	0.50	Content of large stones	0.03
				Cutbanks cave	0.10		
5:							
Catoosa	100	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to hard bedrock	1.00	Depth to bedrock	0.65
		Depth to hard bedrock	0.64	Depth to dense layer	0.50		
		Shrink-swell	0.50	Cutbanks cave	0.10		
6:							
Catoosa	60	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to hard bedrock	1.00	Depth to bedrock	0.65
		Depth to hard bedrock	0.64	Depth to dense layer	0.50		
		Shrink-swell	0.50	Cutbanks cave	0.10		

Building Site Development 2--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
6:							
Shidler	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Depth to dense layer	0.50	Droughty	1.00
				Cutbanks cave	0.10	Content of large stones	0.01
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Somewhat limited		Very limited		Not limited	
		Flooding	0.40	Cutbanks cave	1.00		
8:							
Choska	42	Somewhat limited		Very limited		Not limited	
		Flooding	0.40	Cutbanks cave	1.00		
Severn	31	Somewhat limited		Very limited		Not limited	
		Flooding	0.40	Cutbanks cave	1.00		
Urban land	27	Not rated		Not rated		Not rated	
Cleora	100	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
				Flooding	0.60		
10:							
Coweta	60	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
				Depth to dense layer	0.50	Droughty	0.83
				Cutbanks cave	0.10	Content of large stones	0.03
Bates	35	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.84	Depth to bedrock	0.84
				Cutbanks cave	0.10		
11:							
Coweta	30	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
				Depth to dense layer	0.50	Droughty	0.83
				Cutbanks cave	0.10	Content of large stones	0.03
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.75
		Shrink-swell	1.00	Depth to dense layer	0.50	Depth to bedrock	0.16
		Depth to saturated zone	0.75	Depth to soft bedrock	0.15		
				Too clayey	0.12		
				Cutbanks cave	0.10		

Building Site Development 2--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
12:							
Dennis	100	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.48
		Shrink-swell	0.50	Too clayey	0.12		
		Depth to saturated zone	0.48	Cutbanks cave	0.10		
13:							
Dennis	100	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.48
		Shrink-swell	1.00	Too clayey	0.12		
		Depth to saturated zone	0.48	Cutbanks cave	0.10		
14:							
Dennis	100	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.48
		Shrink-swell	1.00	Too clayey	0.12		
		Depth to saturated zone	0.48	Cutbanks cave	0.10		
15:							
Dennis	77	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.48
		Shrink-swell	1.00	Too clayey	0.12		
		Depth to saturated zone	0.48	Cutbanks cave	0.10		
Pharoah	23	Very limited		Very limited		Very limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.50		
		Depth to saturated zone	1.00	Cutbanks cave	0.10		
16:							
Dennis	66	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.48
		Shrink-swell	1.00	Too clayey	0.12		
		Depth to saturated zone	0.48	Cutbanks cave	0.10		
Radley	34	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.80	Flooding	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.48
		Shrink-swell	1.00	Too clayey	0.12		
		Depth to saturated zone	0.48	Cutbanks cave	0.10		

Building Site Development 2--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
18:							
Endsaw	75	Very limited		Very limited		Very limited	
		Low strength	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	1.00	Depth to saturated zone	1.00	Content of large stones	0.99
		Slope	1.00	Too clayey	0.50		
				Depth to dense layer	0.50		
				Cutbanks cave	0.10		
Hector	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Cutbanks cave	0.10	Content of large stones	1.00
						Droughty	1.00
19:							
Eram	100	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.75
		Shrink-swell	1.00	Depth to dense layer	0.50	Depth to bedrock	0.06
		Depth to saturated zone	0.75	Too clayey	0.12		
				Cutbanks cave	0.10		
				Depth to soft bedrock	0.06		
20:							
Eram	58	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to bedrock	0.80
		Shrink-swell	1.00	Depth to soft bedrock	0.79	Depth to saturated zone	0.75
		Depth to saturated zone	0.76	Depth to dense layer	0.50	Slope	0.16
		Slope	0.16	Slope	0.16		
				Too clayey	0.12		
Coweta	42	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
				Depth to dense layer	0.50	Droughty	0.73
				Cutbanks cave	0.10	Content of large stones	0.03
21:							
Glenpool	100	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Cutbanks cave	1.00	Droughty	0.34
				Slope	0.04	Slope	0.04
22:							
Hector	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Cutbanks cave	0.10	Droughty	1.00
						Gravel content	0.29
						Content of large stones	0.03

Building Site Development 2--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
22:							
Linker	40	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.35	Depth to hard bedrock	1.00	Depth to bedrock	0.35
				Cutbanks cave	1.00		
23:							
Kamie	100	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
24:							
Kamie	100	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
25:							
Kamie	62	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
				Slope	1.00	Droughty	0.53
						Gravel content	0.36
						Content of large stones	0.01
27:							
Kiomatia	98	Very limited		Very limited		Very limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	1.00
				Flooding	0.80	Droughty	0.06
				Depth to saturated zone	0.47		
28:							
Larton	80	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
Glenpool	20	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.34
29:							
Latanier	99	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Low strength	1.00		1.00	Depth to saturated zone	0.19
		Depth to saturated zone	0.19	Flooding	0.60		
				Too clayey	0.28		
30:							
Lula	100	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Depth to dense layer	0.50		
		Shrink-swell	0.50				
				Depth to hard bedrock	0.13		
				Cutbanks cave	0.10		

Building Site Development 2--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
31:							
Mason	100	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Flooding	0.40				
32:							
Newtonia	100	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
33:							
Newtonia	100	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
34:							
Niotaze	72	Very limited		Very limited		Very limited	
		Low strength	1.00	Depth to saturated zone	1.00	Content of large stones	1.00
		Shrink-swell	1.00	Depth to soft bedrock	0.15	Depth to saturated zone	0.75
		Depth to saturated zone	0.75	Too clayey	0.12	Depth to bedrock	0.16
		Slope	0.04	Cutbanks cave	0.10	Slope	0.04
				Slope	0.04		
Darnell	25	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Slope	0.04	Depth to dense layer	0.50	Content of large stones	1.00
				Cutbanks cave	0.10	Droughty	0.98
				Slope	0.04	Slope	0.04
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Depth to saturated zone	1.00	Content of large stones	1.00
		Shrink-swell	1.00	Too clayey	0.12	Depth to saturated zone	0.75
		Depth to	0.75	Cutbanks cave	0.10	Depth to bedrock	1.10
				Depth to soft bedrock	0.10		
Darnell	25	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Slope	1.00
				Depth to dense layer	0.50	Droughty	1.00
				Cutbanks cave	0.10	Content of large stones	0.03
							0
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Depth to saturated zone	1.00	Content of large stones	1.00
		Shrink-swell	1.00	Depth to soft bedrock	0.29	Depth to saturated zone	0.75
		Depth to saturated zone	0.75	Too clayey	0.12	Depth to bedrock	0.29
				Cutbanks cave	0.10		

Building Site Development 2--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
36:							
Darnell	34	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00			Slope	1.00
				Slope	1.00	Droughty	1.00
				Depth to dense layer	0.50	Content of large stones	0.03
				Cutbanks cave	0.10		
37:							
Niotaze	57	Very limited		Very limited		Very limited	
		Low strength	1.00	Depth to saturated zone	1.00	Content of large stones	1.00
		Shrink-swell	1.00				
		Slope	0.96	Slope	0.96	Slope	0.96
		Depth to saturated zone	0.76	Depth to soft bedrock	0.29	Depth to saturated zone	0.75
				Too clayey	0.12	Depth to bedrock	0.29
				Cutbanks cave	0.10		
Darnell	21	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
						Droughty	1.00
				Depth to dense layer	0.50	Content of large stones	0.03
				Cutbanks cave	0.10		
Urban land	20	Not rated		Not rated		Not rated	
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
40:							
Okay	100	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
41:							
Okay	100	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
42:							
Okay	100	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
43:							
Okemah	100	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.48
		Shrink-swell	1.00				
		Depth to saturated zone	0.48	Too clayey	0.12		
				Cutbanks cave	0.10		
44:							
Okemah	50	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.48
		Shrink-swell	1.00				
		Depth to saturated zone	0.48	Too clayey	0.12		
				Cutbanks cave	0.10		

Building Site Development 2--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
44:							
Parsons	30	Very limited		Very limited		Very limited	
		Low strength	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.28		
		Depth to saturated zone	1.00	Cutbanks cave	0.10		
Pharoah	20	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Too clayey	0.50		
		Depth to saturated one	1.00	Cutbanks cave	0.10		
45:							
Osage	100	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Too clayey	0.28		
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
48:							
Radley	99	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.80	Flooding	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
49:							
Severn	100	Somewhat limited		Very limited		Not limited	
		Flooding	0.40	Cutbanks cave	1.00		
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
						Droughty	0.28
		Low strength	1.00	Depth to dense layer	0.50	Content of large stones	0.01
		Shrink-swell	0.50				
				Cutbanks cave	0.10		
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Depth to saturated zone	0.48			Depth to saturated zone	0.48
				Flooding	0.80		
				Cutbanks cave	0.10		
52:							
Urban land	100	Not rated		Not rated		Not rated	

Building Site Development 2--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
53:							
Wynona	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Flooding	0.60	Flooding	0.60
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	1.00				
54:							
Wynona	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Flooding	0.60	Flooding	0.60
		Depth to saturated zone	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Construction Materials

The tables “Construction Materials 1” and “Construction Materials 2” give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table “Construction Materials 1,” only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness. The soils are rated good, fair, or poor as potential sources of sand and gravel. A rating of good or fair means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources reclamation material, roadfill, and topsoil. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments. The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread. The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material. The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Construction Materials 1

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
1:					
Apperson	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2:					
Apperson	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
3:					
Bates	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4:					
Bates	66	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Coweta	34	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5:					
Catoosa	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
6:					
Catoosa	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Shidler	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rock outcrop	15	Not rated		Not rated	
7:					
Choska	99	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.06
8:					
Choska	42	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.05
Severn	31	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.06

Construction Materials 1--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
8:					
Urban land	27	Not rated		Not rated	
9:					
Cleora	100	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.09
10:					
Coweta	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Bates	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
11:					
Coweta	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Urban land	30	Not rated		Not rated	
Eram	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
12:					
Dennis	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
13:					
Dennis	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
14:					
Dennis	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
15:					
Dennis	77	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Pharoah	23	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
16:					
Dennis	66	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Radley	34	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Construction Materials 1--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Potential source of gravel: Value	Potential source of sand: Rating class	Potential source of sand: Value
17:					
Urban land	57	Not rated		Not rated	
Dennis	43	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
18:					
Endsaw	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Hector	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
19:					
Eram	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
20:					
Eram	58	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Coweta	42	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
21:					
Glenpool	100	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.49
		Thickest layer	0.00	Thickest layer	0.91
22:					
Hector	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Linker	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.03
		Thickest layer	0.00	Bottom layer	0.04
23:					
Kamie	100	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.03
		Thickest layer	0.00	Bottom layer	0.04
24:					
Kamie	100	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.03
		Thickest layer	0.00	Bottom layer	0.04
25:					
Kamie	62	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.03
		Thickest layer	0.00	Bottom layer	0.04
Urban land	38	Not rated		Not rated	

Construction Materials 1--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
26:					
Kanima	100	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.56	Thickest layer	0.00
27:					
Kiomatia	98	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.18
		Thickest layer	0.00	Thickest layer	0.39
28:					
Larton	80	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.06
		Thickest layer	0.00	Thickest layer	0.26
Glenpool	20	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.49
		Thickest layer	0.00	Thickest layer	0.96
29:					
Latanier	99	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.06
30:					
Lula	100	Not Rated		Not Rated	
		Bottom layer	0.00	Bottom layer	0.00
31:					
Mason	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
32:					
Newtonia	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
33:					
Newtonia	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
34:					
Niotaze	72	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darnell	25	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.07
35:					
Niotaze	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darnell	25	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07

Construction Materials 1--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
36:					
Niotaze	66	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darnell	34	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07
37:					
Niotaze	57	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Darnell	21	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07
Urban land	20	Not rated		Not rated	
38:					
Oil waste land	100	Not rated		Not rated	
39:					
Okay	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
40:					
Okay	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
41:					
Okay	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
42:					
Okay	100	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.03
		Thickest layer	0.00	Bottom layer	0.06
43:					
Okemah	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
44:					
Okemah	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Parsons	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Pharoah	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Construction Materials 1--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
45:					
Osage	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
46:					
Pits	100	Not rated		Not rated	
47:					
Radley	99	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
48:					
Radley	99	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
49:					
Severn	100	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.06
50:					
Shidler	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rock outcrop	30	Not rated		Not rated	
51:					
Tullahassee	100	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.07
52:					
Urban land	100	Not rated		Not rated	
53:					
Wynona	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
54:					
Wynona	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Urban land	20	Not rated		Not rated	
DAM:					
Dam	100	Not rated		Not rated	
DUM:					
Dumps	100	Not rated		Not rated	
M-W:					
Miscellaneous water	100	Not rated		Not rated	
W:					
Water	100	Not rated		Not rated	

Construction Materials 2

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
1:							
Apperson	100	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.88	Shrink-swell	0.00	Hard to reclaim	0.00
		Too acid	0.95	Depth to saturated zone	0.32	Depth to saturated zone	0.32
		Water erosion	0.99	Depth to bedrock	0.74		
2:							
Apperson	100	Fair		Poor		Poor	
		Low content of organic matter	0.88	Low strength	0.00	Hard to reclaim	0.00
		Too acid	0.95	Shrink-swell	0.00	Depth to saturated zone	0.32
		Too clayey	0.98	Depth to saturated zone	0.32	Too clayey	0.93
		Water erosion	0.99	Depth to bedrock	0.74		
3:							
Bates	100	Fair		Poor		Fair	
		Depth to bedrock	0.84	Depth to bedrock	0.00	Depth to bedrock	0.84
		Too acid	0.84				
4:							
Bates	66	Fair		Poor		Poor	
		Depth to bedrock	0.71	Depth to bedrock	0.00	Rock fragments	0.00
		Too acid	0.84			Depth to bedrock	0.71
		Low content of organic matter	0.88				
		Droughty	0.99				
Coweta	34	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Hard to reclaim	0.00
		Droughty	0.00			Depth to bedrock	0.00
		Low content of organic matter	0.50			Rock fragments	0.03
		Too acid	0.84				
5:							
Catoosa	100	Fair		Poor		Poor	
		Low content of organic matter	0.12	Depth to bedrock	0.00	Hard to reclaim	0.00
		Depth to bedrock	0.35	Low strength	0.00	Depth to bedrock	0.35
		Too clayey	0.82	Shrink-swell	0.87	Too clayey	0.48
		Too acid	0.95				
		Droughty	0.96				
		Water erosion	0.99				
6:							
Catoosa	60	Fair		Poor		Poor	
		Low content of organic matter	0.12	Depth to bedrock	0.00	Hard to reclaim	0.00
		Depth to bedrock	0.35	Low strength	0.00	Depth to bedrock	0.35
		Too clayey	0.82	Shrink-swell	0.87	Too clayey	0.48
		Droughty	0.95				
		Too acid	0.95				
		Water erosion	0.99				

Construction Materials 2--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
6:							
Shidler	25	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Hard to reclaim	0.00
		Depth to bedrock	0.00	Low strength	0.22	Depth to bedrock	0.00
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.99				
8:							
Choska	42	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.99				
Severn	31	Fair		Good		Good	
		Low content of organic matter	0.88				
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Fair		Good		Good	
		Low content of organic matter	0.50				
10:							
Coweta	60	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Hard to reclaim	0.00
		Droughty	0.00			Depth to bedrock	0.00
		Low content of organic matter	0.50			Rock fragments	0.03
		Too acid	0.84				
Bates	35	Fair		Poor		Poor	
		Depth to bedrock	0.16	Depth to bedrock	0.00	Rock fragments	0.00
		Droughty	0.64			Depth to bedrock	0.16
		Too acid	0.84				
		Low content of organic matter	0.88				
11:							
Coweta	30	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Hard to reclaim	0.00
		Droughty	0.00			Depth to bedrock	0.00
		Low content of organic matter	0.50			Rock fragments	0.03
		Too acid	0.84				
Urban land	30	Not rated		Not rated		Not rated	

Construction Materials 2--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
11:							
Eram	20	Fair		Poor		Fair	
		Too clayey	0.76	Depth to bedrock	0.00	Depth to saturated zone	0.14
		Depth to bedrock	0.84	Low strength	0.00	Hard to reclaim	0.16
		Too acid	0.95	Depth to saturated zone	0.14	Too clayey	0.71
		Water erosion	0.99	Shrink-swell	0.23	Depth to bedrock	0.84
		Droughty	0.99			Rock fragments	0.97
12:							
Dennis	100	Fair		Poor		Fair	
		Too acid	0.54	Low strength	0.00	Depth to saturated zone	0.29
		Low content of organic matter	0.88	Depth to saturated zone	0.29	Too clayey	0.70
		Water erosion	0.90	Shrink-swell	0.42	Too acid	0.98
		Too clayey	0.98				
13:							
Dennis	100	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.54	Depth to saturated zone	0.29	Depth to saturated zone	0.29
		Low content of organic matter	0.88	Shrink-swell	0.34		
		Water erosion	0.90				
14:							
Dennis	100	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.54	Shrink-swell	0.12	Depth to saturated zone	0.29
		Low content of organic matter	0.88	Depth to saturated zone	0.29		
		Water erosion	0.90				
15:							
Dennis	77	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.54	Shrink-swell	0.28	Depth to saturated zone	0.29
		Low content of organic matter	0.88	Depth to saturated zone	0.29		
		Water erosion	0.90				
Pharoah	23	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Shrink-swell	0.00	Depth to saturated zone	0.00
		Water erosion	0.68	Depth to saturated zone	0.00	Salinity	0.88
		Sodium content	0.90			Sodium content	0.90
16:							
Dennis	66	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.54	Shrink-swell	0.17	Depth to saturated zone	0.29
		Low content of organic matter	0.88	Depth to saturated zone	0.29		
		Water erosion	0.90				
Radley	34	Fair		Poor		Good	
		Low content of organic matter	0.50	Low strength	0.00		
				Shrink-swell	0.87		

Construction Materials 2--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.54	Shrink-swell	0.17	Depth to saturated zone	0.29
		Low content of organic matter	0.88	Depth to saturated zone	0.29		
		Water erosion	0.90				
18:							
Endsaw	75	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.50	Depth to bedrock	0.04	Slope	0.00
		Low content of organic matter	0.88	Shrink-swell	0.12	Rock fragments	0.82
				Slope	0.82	Too acid	0.88
		Droughty	0.97	Depth to saturated zone	0.89	Depth to saturated zone	0.89
						Hard to reclaim	0.99
Hector	25	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Stone content	0.15	Rock fragments	0.12
		Stone content	0.04			Too acid	0.88
		Low content of organic matter	0.12				
		Too acid	0.50				
19:							
Eram	100	Fair		Poor		Fair	
		Too clayey	0.76	Depth to bedrock	0.00	Depth to saturated zone	0.14
		Depth to bedrock	0.93	Low strength	0.00		
		Too acid	0.95	Depth to saturated zone	0.14	Hard to reclaim	0.16
		Water erosion	0.99			Too clayey	0.71
				Shrink-swell	0.22	Depth to bedrock	0.93
						Rock fragments	0.97
20:							
Eram	58	Fair		Poor		Poor	
		Depth to bedrock	0.21	Depth to bedrock	0.00	Hard to reclaim	0.00
		Droughty	0.55	Low strength	0.00	Depth to saturated zone	0.14
		Too clayey	0.76	Depth to saturated zone	0.14		
		Too acid	0.95			Depth to bedrock	0.21
		Water erosion	0.99	Shrink-swell	0.19	Too clayey	0.71
						Slope	0.84
						Rock fragments	0.97
Coweta	42	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Hard to reclaim	0.00
		Droughty	0.00			Depth to bedrock	0.00
		Too acid	0.84			Rock fragments	0.95
21:							
Glenpool	100	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.96
		Low content of organic matter	0.12				
		Too acid	0.95				

Construction Materials 2--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
22:							
Hector	60	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.00
		Too acid	0.50				
Linker	40	Fair		Poor		Fair	
		Droughty	0.47	Depth to bedrock	0.00	Rock fragments	0.28
		Too acid	0.50			Too acid	0.59
		Depth to bedrock	0.65			Depth to bedrock	0.65
		Low content of organic matter	0.88				
23:							
Kamie	100	Poor		Good		Fair	
		Wind erosion	0.00			Too acid	0.98
		Low content of organic matter	0.12				
		Too acid	0.54				
24:							
Kamie	100	Fair		Good		Fair	
		Low content of organic matter	0.12			Too acid	0.98
		Too acid	0.54				
25:							
Kamie	62	Poor		Good		Fair	
		Wind erosion	0.00			Too acid	0.98
		Low content of organic matter	0.12				
		Too acid	0.54				
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Fair		Poor		Poor	
		Low content of organic matter	0.50	Slope	0.00	Hard to reclaim	0.00
						Rock fragments	0.00
		Droughty	0.99			Slope	0.00
27:							
Kiomatia	98	Fair		Good		Fair	
		Low content of organic matter	0.08			Too sandy	0.38
		Too sandy	0.38				
		Droughty	0.94				
28:							
Larton	80	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Too acid	0.54				
		Low content of organic matter	0.88				

Construction Materials 2--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
28:							
Glenpool	20	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Low content of organic matter	0.12				
		Too acid	0.95				
29:							
Latanier	99	Poor		Fair		Poor	
		Too clayey	0.00	Shrink-swell	0.02	Too clayey	0.00
		Low content of organic matter	0.88	Depth to saturated zone	0.53	Depth to saturated zone	0.53
		Water erosion	0.99				
30:							
Lula	100	Fair		Poor		Poor	
		Low content of organic matter	0.88	Low strength	0.00	Hard to reclaim	0.00
		Too acid	0.95	Depth to bedrock	0.87	Too clayey	0.70
		Too clayey	0.98	Shrink-swell	0.92		
		Water erosion	0.99				
31:							
Mason	100	Fair		Poor		Good	
		Low content of organic matter	0.88	Low strength	0.00		
		Too acid	0.97	Shrink-swell	0.90		
		Water erosion	0.99				
32:							
Newtonia	100	Fair		Poor		Fair	
		Too clayey	0.05	Low strength	0.00	Too clayey	0.03
		Low content of organic matter	0.12	Shrink-swell	0.89		
		Too acid	0.74				
		Water erosion	0.99				
33:							
Newtonia	100	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.57
		Too acid	0.74	Shrink-swell	0.89		
		Too clayey	0.98				
		Water erosion	0.99				
34:							
Niotaze	72	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Low strength	0.00	Depth to saturated zone	0.14
		Droughty	0.49	Depth to saturated zone	0.14	Depth to bedrock	0.84
		Too acid	0.74	Shrink-swell	0.18	Slope	0.96
		Depth to bedrock	0.84				
Darnell	25	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Hard to reclaim	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Low content of organic matter	0.12			Rock fragments	0.88
		Too acid	0.97			Slope	0.96

Construction Materials 2--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
35:							
Niotaze	75	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Slope	0.00
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.00
		Droughty	0.58	Depth to saturated zone	0.14	Depth to saturated zone	0.14
		Too acid	0.74	Shrink-swell	0.21	Depth to bedrock	0.90
		Depth to bedrock	0.90	Slope	0.50		
Darnell	25	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Slope	0.00
		Depth to bedrock	0.00	Slope	0.50	Hard to reclaim	0.00
		Low content of organic matter	0.12			Depth to bedrock	0.00
		Too acid	0.97			Rock fragments	0.88
36:							
Niotaze	66	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Slope	0.00
		Low content of organic matter	0.12	Slope	0.00	Too clayey	0.00
		Droughty	0.25	Low strength	0.00	Depth to saturated zone	0.14
		Depth to bedrock	0.71	Depth to saturated zone	0.14	Depth to bedrock	0.71
		Too acid	0.74	Shrink-swell	0.31		
Darnell	34	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Slope	0.00
		Depth to bedrock	0.00	Slope	0.00	Hard to reclaim	0.00
		Low content of organic matter	0.12			Depth to bedrock	0.00
		Too acid	0.97			Rock fragments	0.88
37:							
Niotaze	57	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.04
		Droughty	0.25	Depth to saturated zone	0.14	Depth to saturated zone	0.14
		Depth to bedrock	0.71	Shrink-swell	0.31	Depth to bedrock	0.71
		Too acid	0.74				
Darnell	21	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Hard to reclaim	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Low content of organic matter	0.12			Rock fragments	0.88
		Too acid	0.97				
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Fair		Good		Good	
		Too acid	0.84				
		Water erosion	0.99				

Construction Materials 2--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
40:							
Okay	100	Fair		Good		Good	
		Too acid	0.84				
		Water erosion	0.99				
41:							
Okay	100	Fair		Good		Good	
		Low content of organic matter	0.50				
		Too acid	0.84				
		Water erosion	0.99				
42:							
Okay	100	Fair		Good		Good	
		Too acid	0.84				
		Water erosion	0.99				
43:							
Okemah	100	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.88	Shrink-swell	0.25	Depth to saturated zone	0.29
				Depth to saturated zone	0.29		
		Water erosion	0.90				
44:							
Okemah	50	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.88	Shrink-swell	0.27	Depth to saturated zone	0.29
				Depth to saturated zone	0.29		
		Water erosion	0.90				
Parsons	30	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Water erosion	0.68	Depth to saturated zone	0.00	Depth to saturated zone	0.00
		Too acid	0.84	Shrink-swell	0.23		
		Low content of organic matter	0.88				
Pharoah	20	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Shrink-swell	0.00	Depth to saturated zone	0.00
				Depth to saturated zone	0.00		
		Water erosion	0.68			Sodium content	0.40
		Sodium content	0.90			Salinity	0.50
45:							
Osage	100	Poor		Poor		Poor	
		Too clayey	0.00	Depth to saturated zone	0.00	Depth to saturated zone	0.00
		Low content of	0.88				
		Low content of organic matter		Shrink-swell	0.00	Too clayey	0.00
				Low strength	0.00		
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Fair		Poor		Good	
		Low content of organic matter	0.50	Low strength	0.00		
				Shrink-swell	0.87		

Construction Materials 2--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
48:							
Radley	99	Fair		Poor		Good	
		Low content of organic matter	0.50	Low strength	0.00		
				Shrink-swell	0.91		
49:							
Severn	100	Fair		Good		Good	
		Low content of organic matter	0.88				
50:							
Shidler	65	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Hard to reclaim	0.00
		Droughty	0.02	Low strength	0.00	Depth to bedrock	0.00
		Too clayey	0.98	Shrink-swell	0.87	Rock fragments	0.97
						Too clayey	0.98
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Fair		Fair		Fair	
		Low content of organic matter	0.50	Depth to saturated zone	0.29	Depth to saturated zone	0.29
		Too acid	0.95				
52:							
Urban land	100	Not rated		Not rated		Not rated	
53:							
Wynona	100	Fair		Poor		Poor	
		Too clayey	0.12	Low strength	0.00	Depth to saturated zone	0.00
		Too acid	0.74	Depth to saturated zone	0.00	Too clayey	0.09
		Low content of organic matter	0.88	Shrink-swell	0.29		
		Water erosion	0.99				
54:							
Wynona	45	Fair		Poor		Poor	
		Too acid	0.74	Low strength	0.00	Depth to saturated zone	0.00
		Low content of organic matter	0.88	Depth to saturated zone	0.00	Too clayey	0.70
		Too clayey	0.98	Shrink-swell	0.29		
		Water erosion	0.99				
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Water Management

The tables “Water Management 1,” “Water Management 2,” “Water Management 3,” and “Water Management 4” give information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; aquifer-fed excavated ponds; grassed waterways and surface drains; terraces and diversions; tile drains and underground outlets; and irrigation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses.

Not limited indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.

Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

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

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction. The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties. Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Constructing grassed waterways and surface drains is the construction of natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Constructing terraces and diversions is the construction of embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Tile drains and underground outlets consists of the removal of subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The methods that could be utilized are sprinkler, drip or trickle, furrow, graded border, or basin or paddy irrigation. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Water Management 1

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Apperson	100	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.06	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.72		
				Thin layer	0.06		
2:							
Apperson	100	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.06	Depth to saturated zone	1.00	Depth to water	1.00
				Hard to pack	0.60		
				Thin layer	0.06		
3:							
Bates	100	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Depth to water	1.00
		Depth to bedrock	0.05	Thin layer	0.74		
4:							
Bates	66	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Depth to water	1.00
		Depth to bedrock	0.08	Thin layer	0.81		
Coweta	34	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.61	Thin layer	1.00	Depth to water	1.00
		Seepage	0.04	Piping	1.00		
5:							
Catoosa	100	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.91	Thin layer	0.91	Depth to water	1.00
		Seepage	0.72	Piping	0.65		
6:							
Catoosa	60	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.91	Thin layer	0.91	Depth to water	1.00
		Seepage	0.72	Piping	0.53		
Shidler	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
				Piping	0.99		
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
				Seepage	0.06		
8:							
Choska	42	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
				Seepage	0.05		

Water Management 1--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
8:							
Severn	31	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
				Seepage	0.06		
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
				Seepage	0.09		
10:							
Coweta	60	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.58	Thin layer	1.00	Depth to water	1.00
		Seepage	0.04	Piping	1.00		
Bates	35	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Depth to water	1.00
		Depth to bedrock	0.26	Thin layer	0.96		
11:							
Coweta	30	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.58	Thin layer	1.00	Depth to water	1.00
		Seepage	0.04	Piping	1.00		
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.05	Depth to saturated zone	1.00	Depth to water	1.00
				Thin layer	0.74		
12:							
Dennis	100	Somewhat limited		Very limited		Very limited	
		Seepage	0.04	Depth to saturated zone	1.00	Depth to water	1.00
13:							
Dennis	100	Somewhat limited		Very limited		Very limited	
		Seepage	0.04	Depth to saturated zone	1.00	Depth to water	1.00
14:							
Dennis	100	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Depth to water	1.00
15:							
Dennis	77	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Depth to water	1.00
Pharoah	23	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	1.00	Salty water	0.06

Water Management 1--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
16:							
Dennis	66	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Depth to water	1.00
Radley	34	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.67	Depth to water	1.00
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Depth to water	1.00
18:							
Endsaw	75	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.08	Depth to saturated zone	0.86	Depth to water	1.00
		Depth to bedrock	0.01	Thin layer	0.37		
				Hard to pack	0.01		
Hector	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
19:							
Eram	100	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.03	Depth to saturated zone	1.00	Depth to water	1.00
				Thin layer	0.66		
20:							
Eram	58	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.23	Depth to saturated zone	1.00	Depth to water	1.00
				Thin layer	0.95		
Coweta	42	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.58	Thin layer	1.00	Depth to water	1.00
		Seepage	0.04	Piping	1.00		
21:							
Glenpool	100	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.96	Depth to water	1.00
22:							
Hector	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
		Seepage	0.01				
Linker	40	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.83	Thin layer	0.83	Depth to water	1.00
		Seepage	0.72	Piping	0.78		
				Seepage	0.04		
23:							
Kamie	100	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Depth to water	1.00
				Seepage	0.04		

Water Management 1--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
24:							
Kamie	100	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Depth to water	1.00
				Seepage	0.04		
25:							
Kamie	62	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Depth to water	1.00
				Seepage	0.04		
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Seepage	0.56	Depth to water	1.00
		Slope	0.36				
27:							
Kiomatia	98	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.39	Cutbanks cave	1.00
						Depth to water	0.90
28:							
Larton	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.57	Depth to water	1.00
Glenpool	20	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.96	Depth to water	1.00
29:							
Latanier	99	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.47	Depth to saturated zone	1.00	Slow refill	0.53
						Cutbanks cave	0.10
				Seepage	0.06	Depth to water	0.01
30:							
Lula	100	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.72	Depth to water	1.00
		Depth to bedrock	0.03	Thin layer	0.03		
31:							
Mason	100	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.04	Piping	0.82	Depth to water	1.00
32:							
Newtonia	100	Somewhat limited		Not limited		Very limited	
		Seepage	0.72			Depth to water	1.00
33:							
Newtonia	100	Somewhat limited		Not limited		Very limited	
		Seepage	0.72			Depth to water	1.00
34:							
Niotaze	72	Somewhat limited		Very limited		Somewhat limited	
		Depth to bedrock	0.05	Depth to saturated zone	1.00	Slow refill	0.99
		Seepage	0.01			Cutbanks cave	0.10
				Thin layer	0.74		
				Piping	0.11		

Water Management 1--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
34:							
Darnell	25	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.58	Thin layer	1.00	Depth to water	1.00
				Seepage	0.07		
35:							
Niotaze	75	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.12	Depth to saturated zone	1.00	Slow refill	0.99
		Depth to bedrock	0.04			Cutbanks cave	0.10
		Seepage	0.01	Thin layer	0.70		
				Piping	0.13		
Darnell	25	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Depth to water	1.00
		Slope	0.12	Seepage	0.07		
36:							
Niotaze	66	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.72	Depth to saturated zone	1.00	Slow refill	0.99
		Depth to bedrock	0.08			Cutbanks cave	0.10
		Seepage	0.01	Thin layer	0.81		
				Piping	0.33		
Darnell	34	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.78	Thin layer	1.00	Depth to water	1.00
		Slope	0.72	Seepage	0.07		
37:							
Niotaze	57	Somewhat limited		Very limited		Somewhat limited	
		Depth to bedrock	0.08	Depth to saturated zone	1.00	Slow refill	0.99
		Slope	0.02			Cutbanks cave	0.10
		Seepage	0.01	Thin layer	0.81		
				Piping	0.33		
Darnell	21	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.78	Thin layer	1.00	Depth to water	1.00
				Seepage	0.07		
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
40:							
Okay	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
41:							
Okay	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
42:							
Okay	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
				Seepage	0.06		

Water Management 1--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
43:							
Okemah	100	Somewhat limited		Very limited		Very limited	
		Seepage	0.04	Depth to saturated zone	1.00	Depth to water	1.00
44:							
Okemah	50	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Depth to water	1.00
Parsons	30	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Depth to water	1.00
Pharoah	20	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	1.00	Salty water	0.06
45:							
Osage	100	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	0.95		
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.67	Depth to water	1.00
48:							
Radley	99	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.70	Depth to water	1.00
49:							
Severn	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Depth to water	1.00
				Seepage	0.06		
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
				Piping	0.01		
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	0.10
				Piping	1.00		
				Seepage	0.07		
52:							
Urban land	100	Not rated		Not rated		Not rated	

Water Management 1--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
53:							
Wynona	100	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.04	Depth to saturated zone	1.00	Slow refill	0.96
						Cutbanks cave	0.10
54:							
Wynona	45	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.04	Depth to saturated zone	1.00	Slow refill	0.96
						Cutbanks cave	0.10
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Water Management 2

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
1:							
Apperson	100	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.26	Water erosion	1.00	Depth to saturated zone	1.00
		Slope	0.04	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Depth to bedrock	0.26	Too clayey	0.50
				Slope	0.04	Depth to dense layer	0.50
						Depth to hard bedrock	0.26
2:							
Apperson	100	Somewhat limited		Very limited		Very limited	
		Slope	0.36	Water erosion	1.00	Depth to saturated zone	1.00
		Depth to bedrock	0.26	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Slope	0.36	Too clayey	0.50
				Depth to bedrock	0.26	Depth to dense layer	0.50
						Depth to hard bedrock	0.26
3:							
Bates	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to soft bedrock	0.16	Water erosion	0.56	Depth to soft bedrock	0.15
		Slope	0.04	Depth to soft bedrock	0.16	Cutbanks cave	0.10
				Slope	0.04		
4:							
Bates	66	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.36	Water erosion	0.56	Depth to soft bedrock	0.29
		Depth to soft bedrock	0.29	Slope	0.36	Cutbanks cave	0.10
				Depth to soft bedrock	0.29		
Coweta	34	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.36	Water erosion	0.89	Depth to dense layer	0.50
		Content of large stones	0.03	Content of large stones	0.03	Cutbanks cave	0.10
5:							
Catoosa	100	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Water erosion	1.00	Depth to hard bedrock	1.00
		Slope	0.04	Depth to bedrock	1.00	Depth to dense layer	0.50
				Slope	0.04	Cutbanks cave	0.10

Water Management 2--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
6:							
Catoosa	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Water erosion	1.00	Depth to hard bedrock	1.00
		Slope	0.62	Depth to bedrock	1.00	Depth to dense layer	0.50
				Slope	0.62	Cutbanks cave	0.10
Shidler	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.62	Slope	0.62	Depth to dense layer	0.50
				Water erosion	0.17	Cutbanks cave	0.10
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Not limited		Very limited		Very limited	
				Water erosion	1.00	Cutbanks cave	1.00
8:							
Choska	42	Not limited		Very limited		Very limited	
				Water erosion	1.00	Cutbanks cave	1.00
Severn	31	Not limited		Somewhat limited		Very limited	
				Water erosion	0.89	Cutbanks cave	1.00
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Not limited		Somewhat limited		Very limited	
				Water erosion	0.89	Cutbanks cave	1.00
						Flooding	0.60
10:							
Coweta	60	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.36	Water erosion	0.89	Depth to dense layer	0.50
		Content of large stones	0.03	Slope	0.36	Cutbanks cave	0.10
				Content of large stones	0.03		
Bates	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to soft bedrock	0.84	Depth to soft bedrock	0.84	Depth to soft bedrock	0.84
		Slope	0.36	Water erosion	0.56	Cutbanks cave	0.10
				Slope	0.36		
11:							
Coweta	30	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.36	Water erosion	0.89	Depth to dense layer	0.50
		Content of large stones	0.03	Slope	0.36	Cutbanks cave	0.10
				Content of large stones	0.03		

Water Management 2--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
11:							
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Somewhat limited		Very limited		Very limited	
		Slope	1.00	Water erosion	1.00	Depth to saturated zone	1.00
		Depth to soft bedrock	0.16	Depth to saturated zone	1.00	Depth to dense layer	0.50
				Slope	1.00	Depth to soft bedrock	0.15
				Depth to soft bedrock	0.16	Too clayey	0.12
						Cutbanks cave	0.10
12:							
Dennis	100	Somewhat limited		Very limited		Very limited	
		Slope	0.04	Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.12
				Slope	0.04	Cutbanks cave	0.10
13:							
Dennis	100	Somewhat limited		Very limited		Very limited	
		Slope	0.36	Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.12
				Slope	0.36	Cutbanks cave	0.10
14:							
Dennis	100	Somewhat limited		Very limited		Very limited	
		Slope	0.36	Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.12
				Slope	0.36	Cutbanks cave	0.10
15:							
Dennis	77	Somewhat limited		Very limited		Very limited	
		Slope	0.04	Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.12
				Slope	0.04	Cutbanks cave	0.10
Pharoah	23	Somewhat limited		Very limited		Very limited	
		Slope	0.04	Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.50
				Slope	0.04	Cutbanks cave	0.10
16:							
Dennis	66	Somewhat limited		Very limited		Very limited	
		Slope	0.16	Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.12
				Slope	0.16	Cutbanks cave	0.10
Radley	34	Not limited		Somewhat limited		Very limited	
				Water erosion	0.89	Flooding	1.00
						Cutbanks cave	0.10

Water Management 2--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Somewhat limited		Very limited		Very limited	
		Slope	0.16	Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.12
				Slope	0.16	Cutbanks cave	0.10
18:							
Endsaw	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	0.82	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Depth to bedrock	0.82	Too clayey	0.50
				Water erosion	0.56	Depth to dense layer	0.50
						Cutbanks cave	0.10
Hector	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Content of large stones	1.00	Content of large stones	1.00	Cutbanks cave	0.10
		Slope	0.95	Slope	0.95		
19:							
Eram	100	Somewhat limited		Very limited		Very limited	
		Slope	0.36	Water erosion	1.00	Depth to saturated zone	1.00
		Depth to soft bedrock	0.06	Depth to saturated zone	1.00	Depth to dense layer	0.50
				Slope	0.36	Too clayey	0.12
				Depth to soft bedrock	0.06	Cutbanks cave	0.10
						Depth to soft bedrock	0.06
20:							
Eram	58	Very limited		Very limited		Very limited	
		Slope	1.00	Water erosion	1.00	Depth to saturated zone	1.00
		Depth to soft bedrock	0.80	Depth to saturated zone	1.00	Depth to soft bedrock	0.79
				Slope	1.00	Depth to dense layer	0.50
				Depth to soft bedrock	0.80	Slope	0.16
						Too clayey	0.12
Coweta	42	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.95	Slope	0.95	Depth to dense layer	0.50
		Content of large stones	0.02	Water erosion	0.89	Cutbanks cave	0.10
				Content of large stones	0.02		
21:							
Glenpool	100	Very limited		Very limited		Very limited	
		Slope	1.00	Too sandy	1.00	Cutbanks cave	1.00
				Slope	1.00	Slope	0.04

Water Management 2--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
22:							
Hector	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.36	Slope	0.36	Cutbanks cave	0.10
		Content of large stones	0.07	Content of large stones	0.07		
				Water erosion	0.01		
Linker	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.16	Water erosion	0.89	Cutbanks cave	1.00
				Slope	0.16		
23:							
Kamie	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.83	Water erosion	0.89	Cutbanks cave	0.10
				Slope	0.83		
24:							
Kamie	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Water erosion	0.89	Cutbanks cave	0.10
				Slope	0.04		
25:							
Kamie	62	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.62	Water erosion	0.89	Cutbanks cave	0.10
				Slope	0.62		
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Cutbanks cave	1.00
						Slope	1.00
27:							
Kiomatia	98	Not limited		Very limited		Very limited	
				Too sandy	1.00	Flooding	1.00
						Cutbanks cave	1.00
						Depth to saturated zone	0.47
28:							
Larton	80	Not limited		Somewhat limited		Very limited	
				Water erosion	0.01	Cutbanks cave	1.00
Glenpool	20	Somewhat limited		Very limited		Very limited	
		Slope	0.04	Too sandy	1.00	Cutbanks cave	1.00
				Slope	0.04		
29:							
Latanier	99	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Cutbanks cave	1.00
				Water erosion	0.89	Depth to saturated zone	1.00
						Flooding	0.60
						Too clayey	0.28

Water Management 2--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains		Constructing terraces and diversions		Tile drains and underground outlets	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
30:							
Lula	100	Somewhat limited		Very limited		Somewhat limited	
		Depth to bedrock	0.14	Water erosion	1.00	Depth to dense layer	0.50
		Slope	0.04	Depth to bedrock	0.14	Depth to hard bedrock	0.13
				Slope	0.04	Cutbanks cave	0.10
31:							
Mason	100	Not limited		Very limited		Somewhat limited	
				Water erosion	1.00	Cutbanks cave	0.10
32:							
Newtonia	100	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Water erosion	1.00	Cutbanks cave	0.10
				Slope	0.04		
33:							
Newtonia	100	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.36	Water erosion	1.00	Cutbanks cave	0.10
				Slope	0.36		
34:							
Niotaze	72	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Content of large stones	0.62	Slope	1.00	Depth to soft bedrock	0.15
		Depth to soft bedrock	0.16	Content of large stones	0.62	Too clayey	0.12
				Water erosion	0.56	Cutbanks cave	0.10
				Depth to soft bedrock	0.16	Slope	0.04
Darnell	25	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00	Depth to dense layer	0.50
		Content of large stones	0.63	Content of large stones	0.63	Cutbanks cave	0.10
				Water erosion	0.17	Slope	0.04
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Content of large stones	0.74	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to soft bedrock	0.10	Content of large stones	0.74	Too clayey	0.12
				Water erosion	0.56	Cutbanks cave	0.10
				Depth to soft bedrock	0.10	Depth to soft bedrock	0.10
Darnell	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
				Water erosion	0.17	Depth to dense layer	0.50
						Cutbanks cave	0.10

Water Management 2--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Content of large stones	0.88	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to soft bedrock	0.29	Content of large stones	0.88	Depth to soft bedrock	0.29
				Water erosion	0.56	Too clayey	0.12
				Depth to soft bedrock	0.29	Cutbanks cave	0.10
Darnell	34	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to soft bedrock	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
				Water erosion	0.17	Depth to dense layer	0.50
						Cutbanks cave	0.10
37:							
Niotaze	57	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Content of large stones	0.88	Slope	1.00	Slope	0.96
		Depth to soft bedrock	0.29	Content of large stones	0.88	Depth to soft bedrock	0.29
				Water erosion	0.56	Too clayey	0.12
				Depth to soft bedrock	0.29	Cutbanks cave	0.10
Darnell	21	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.36	Slope	0.36	Depth to dense layer	0.50
				Water erosion	0.17	Cutbanks cave	0.10
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Not limited		Very limited		Somewhat limited	
				Water erosion	1.00	Cutbanks cave	0.10
40:							
Okay	100	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Water erosion	1.00	Cutbanks cave	0.10
				Slope	0.04		
41:							
Okay	100	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.36	Water erosion	1.00	Cutbanks cave	0.10
				Slope	0.36		
42:							
Okay	100	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.36	Water erosion	1.00	Cutbanks cave	0.10
				Slope	0.36		

Water Management 2--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
43:							
Okemah	100	Not limited		Very limited		Very limited	
				Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.12
						Cutbanks cave	0.10
44:							
Okemah	50	Not limited		Very limited		Very limited	
				Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.12
						Cutbanks cave	0.10
Parsons	30	Not limited		Very limited		Very limited	
				Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.28
						Cutbanks cave	0.10
Pharoah	20	Not limited		Very limited		Very limited	
				Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Too clayey	0.50
						Cutbanks cave	0.10
45:							
Osage	100	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Water erosion	0.56	Cutbanks cave	1.00
						Flooding	0.60
						Too clayey	0.28
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Not limited		Somewhat limited		Somewhat limited	
				Water erosion	0.89	Flooding	0.60
						Cutbanks cave	0.10
48:							
Radley	99	Not limited		Somewhat limited		Very limited	
				Water erosion	0.89	Flooding	1.00
						Cutbanks cave	0.10
49:							
Severn	100	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Water erosion	0.89	Cutbanks cave	1.00
				Slope	0.04		
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.62	Slope	0.62	Depth to dense layer	0.50
		Content of large stones	0.06	Content of large stones	0.06	Cutbanks cave	0.10
				Water erosion	0.01		
Rock outcrop	30	Not rated		Not rated		Not rated	

Water Management 2--Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains		Constructing terraces and diversions		Tile drains and underground outlets	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
51:							
Tullahassee	100	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Flooding	1.00
				Water erosion	0.01	Depth to saturated zone	1.00
						Cutbanks cave	0.10
52:							
Urban land	100	Not rated		Not rated		Not rated	
53:							
Wynona	100	Not limited		Very limited		Very limited	
				Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Flooding	0.60
						Cutbanks cave	0.10
54:							
Wynona	45	Not limited		Very limited		Very limited	
				Water erosion	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00	Flooding	0.60
						Cutbanks cave	0.10
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Water Management 3

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods)		Sprinkler irrigation		Drip or trickle irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Apperson	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Too acid	0.15				
2:							
Apperson	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Water erosion	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too acid	0.15				
		Slope	0.09				
3:							
Bates	100	Somewhat limited		Very limited		Not limited	
		Available water capacity	0.83	Depth to soft bedrock	1.00		
		Too acid	0.44				
		Depth to bedrock	0.16				
4:							
Bates	66	Somewhat limited		Very limited		Not limited	
		Available water capacity	0.84	Depth to soft bedrock	1.00		
		Too acid	0.44	Available water capacity	0.06		
		Depth to bedrock	0.29				
		Slope	0.09				
Coweta	34	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	0.96		
		Too acid	0.44				
		Slope	0.09				
5:							
Catoosa	100	Somewhat limited		Somewhat limited		Not limited	
		Available water capacity	0.76	Depth to bedrock	0.99		
		Depth to bedrock	0.65	Available water capacity	0.23		
		Too acid	0.15				
6:							
Catoosa	60	Somewhat limited		Very limited		Not limited	
		Available water capacity	0.78	Water erosion	1.00		
		Depth to bedrock	0.65	Depth to bedrock	0.99		
		Slope	0.33	Available water capacity	0.24		
		Too acid	0.15				

Water Management 3--Continued

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods): Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
6:							
Shidler	25	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Percs slowly	1.00	Depth to bedrock	0.98		
		Depth to bedrock	1.00				
		Slope	0.33				
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Not limited		Not limited		Not limited	
8:							
Choska	42	Not limited		Not limited		Not limited	
Severn	31	Not limited		Not limited		Not limited	
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Somewhat limited		Somewhat limited		Not limited	
		Flooding	0.60	Available water capacity	0.05		
		Too acid	0.01				
10:							
Coweta	60	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	0.96		
		Too acid	0.44				
		Slope	0.09				
Bates	35	Somewhat limited		Somewhat limited		Not limited	
		Available water capacity	0.84	Depth to soft bedrock	0.98		
		Depth to bedrock	0.84	Available water capacity	0.64		
		Too acid	0.44				
		Slope	0.09				
11:							
Coweta	30	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	0.96		
		Too acid	0.44				
		Slope	0.09				
Urban land	30	Not rated		Not rated		Not rated	
Eram	20	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to bedrock	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Slope	1.00	Slope	0.10		
		Available water capacity	0.89	Available water capacity	0.03		
		Depth to bedrock	0.16				

Water Management 3--Continued

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods) Rating class and limiting features	Value	Sprinkler irrigation Rating class and limiting features	Value	Drip or trickle irrigation Rating class and limiting features	Value
12:							
Dennis	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Too acid	0.68				
13:							
Dennis	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Water erosion	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too acid	0.68				
		Slope	0.09				
14:							
Dennis	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Water erosion	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too acid	0.68				
		Slope	0.09				
15:							
Dennis	77	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Too acid	0.68				
Pharoah	23	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Excess sodium	0.98	Excess sodium	0.98
		Excess sodium	0.10	Excess salt	0.50	Excess salt	0.50
		Too acid	0.01				
16:							
Dennis	66	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Water erosion	1.00		
		Too acid	0.68				
		Slope	0.01				
Radley	34	Somewhat limited		Very limited		Very limited	
		Flooding	0.80	Flooding	1.00	Flooding	1.00
		Too acid	0.01				
17:							
Urban land	57	Not rated		Not rated		Not rated	
Dennis	43	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Water erosion	1.00		
		Too acid	0.68				
		Slope	0.01				

Water Management 3--Continued

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods)		Sprinkler irrigation		Drip or trickle irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
18:							
Endsaw	75	Very limited		Very limited		Not limited	
		Percs slowly	1.00	Slope	1.00		
		Slope	1.00	Depth to soft bedrock	0.63		
		Depth to saturated zone	0.86	Available water capacity	0.36		
		Too acid	0.68				
Hector	25	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Content of large stones	1.00	Depth to bedrock	0.96		
		Depth to bedrock	1.00	Slope	0.02		
		Slope	0.91				
		Too acid	0.44				
19:							
Eram	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Depth to soft bedrock	0.99		
		Available water capacity	0.89				
		Too acid	0.15				
		Slope	0.09				
20:							
Eram	58	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Depth to soft bedrock	0.98		
		Slope	1.00	Available water capacity	0.71		
		Available water capacity	0.91	Slopes	0.40		
		Depth to bedrock	0.79				
Coweta	42	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	0.96		
		Slope	0.91	Slope	0.02		
		Too acid	0.44				
		Slope	0.03				
21:							
Glenpool	100	Very limited		Very limited		Not limited	
		Slope	1.00	Wind erosion	1.00		
		Too acid	0.15	Available water capacity	1.00		
				Slope	0.22		
22:							
Hector	60	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	0.96		
		Too acid	0.44				
		Slope	0.09				

Water Management 3--Continued

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods) Rating class and limiting features	Value	Sprinkler irrigation Rating class and limiting features	Value	Drip or trickle irrigation Rating class and limiting features	Value
22:							
Linker	40	Very limited		Very limited		Not limited	
		Available water capacity	1.00	Depth to bedrock	1.00		
		Too acid	1.00	Available water capacity	0.77		
		Depth to bedrock	0.35				
		Slope	0.01				
23:							
Kamie	100	Somewhat limited		Very limited		Not limited	
		Slope	0.67	Wind erosion	1.00		
		Too acid	0.01	Available water capacity	0.44		
24:							
Kamie	100	Somewhat limited		Somewhat limited		Not limited	
		Too acid	0.01	Available water capacity	0.05		
25:							
Kamie	62	Somewhat limited		Very limited		Not limited	
		Slope	0.33	Wind erosion	1.00		
		Too acid	0.01	Available water capacity	0.44		
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Very limited		Not limited	
		Slope	1.00	Available water capacity	1.00		
		Available water capacity	0.01	Slope	1.00		
27:							
Kiomatia	98	Somewhat limited		Very limited		Very limited	
		Flooding	0.80	Available water capacity	1.00	Flooding	1.00
		Available water capacity	0.07	Flooding	1.00		
28:							
Larton	80	Somewhat limited		Very limited		Not limited	
		Too acid	0.44	Wind erosion	1.00		
				Available water capacity	0.91		
Glenpool	20	Somewhat limited		Very limited		Not limited	
		Too acid	0.15	Wind erosion	1.00		
				Available water capacity	1.00		
29:							
Latanier	99	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.97		
		Flooding	0.60				
30:							
Lula	100	Somewhat limited		Not limited		Not limited	
		Too acid	0.15				

Water Management 3--Continued

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods): Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
31:							
Mason	100	Somewhat limited		Not limited		Not limited	
		Percs slowly	0.96				
		Too acid	0.08				
32:							
Newtonia	100	Somewhat limited		Not limited		Not limited	
		Too acid	0.15				
33:							
Newtonia	100	Somewhat limited		Very limited		Not limited	
		Too acid	0.15	Water erosion	1.00		
		Slope	0.09				
34:							
Niotaze	72	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to soft bedrock	1.00	Wetness	1.00
		Available water capacity	1.00	Depth to saturated zone	1.00		
		Content of large stones	1.00	Available water water capacity	0.76		
		Slope	1.00	Slope	0.22		
		Too acid	0.68				
Darnell	25	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	0.96		
		Content of large stones	1.00	Slope	0.22		
		Slope	1.00				
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Wetness	1.00
		Available water capacity	1.00	Slope	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Content of large stones	1.00	Available water capacity	0.69		
Darnell	25	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00		
		Depth to bedrock	1.00	Depth to soft bedrock	0.96		
		Too acid	0.08				
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Depth to soft bedrock	1.00	Wetness	1.00
		Slope	1.00	Slope	1.00		
		Depth to	1.00	Depth to	1.00		
		Content of large stones	1.00	Available water capacity	0.97		

Water Management 3--Continued

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods): Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
36:							
Darnell	34	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00		
		Depth to bedrock	1.00	Depth to soft bedrock	0.97		
		Too acid	0.08				
37:							
Niotaze	57	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Depth to soft bedrock	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Content of large stones	1.00	Slope	0.98		
				Available water capacity	0.97		
		Slope	1.00				
Darnell	21	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	0.97		
		Slope	0.09				
		Too acid	0.08				
Urban land	20	Not rated		Not rated		Not rated	
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Somewhat limited		Not limited		Not limited	
		Too acid	0.15				
40:							
Okay	100	Somewhat limited		Not limited		Not limited	
		Too acid	0.15				
41:							
Okay	100	Somewhat limited		Very limited		Not limited	
		Too acid	0.15	Water erosion	1.00		
		Slope	0.09				
42:							
Okay	100	Somewhat limited		Very limited		Not limited	
		Too acid	0.15	Water erosion	1.00		
		Slope	0.09				
43:							
Okemah	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Too acid	0.01				
44:							
Okemah	50	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Too acid	0.01				

Water Management 3--Continued

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods): Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
44:							
Parsons	30	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Too acid	0.44				
Pharoah	20	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Excess sodium	0.98	Excess sodium	0.98
		Excess sodium	0.10	Excess salt	0.50	Excess salt	0.50
		Too acid	0.01				
45:							
Osage	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Flooding	0.60				
		Too acid	0.01				
46:							
Pits	100	Not rated		Not rated		Not rated	
47:							
Radley	99	Somewhat limited		Not limited		Not limited	
		Flooding	0.60				
		Too acid	0.01				
48:							
Radley	99	Somewhat limited		Very limited		Very limited	
		Flooding	0.80	Flooding	1.00	Flooding	1.00
		Too acid	0.01				
49:							
Severn	100	Not limited		Not limited		Not limited	
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Available waer capacity	1.00	Available water capacity	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	0.96		
		Slope	0.33				
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Flooding	0.80	Flooding	1.00	Flooding	1.00
		Too acid	0.15				
52:							
Urban land	100	Not rated		Not rated		Not rated	

Water Management 3--Continued

Map symbol and soil name	Pct. of map unit	Irrigation (all application methods)		Sprinkler irrigation		Drip or trickle irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
53:							
Wynona	100	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Flooding	0.60				
		Too acid	0.44				
54:							
Wynona	45	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00				
		Flooding	0.60				
		Too acid	0.44				
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

Water Management 4

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Furrow irrigation: Rating class and limiting features	Value	Graded border irrigation: Rating class and limiting features	Value	Basin or paddy irrigation (level border): Rating class and limiting features	Value
1:							
Apperson	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
2:							
Apperson	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
3:							
Bates	100	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Sandy or loamy surface	1.00
						Depth to soft bedrock	1.00
4:							
Bates	66	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Sandy or loamy surface	1.00
		Slope	1.00	Slope	1.00	Depth to soft bedrock	1.00
		Available water capacity	0.06	Available water capacity	0.06	Slope	1.00
						Available water capacity	0.06
Coweta	34	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Sandy or loamy surface	1.00
		Slope	1.00	Slope	1.00	Available water capacity	1.00
		Content of large stones	1.00	Content of large stones	1.00	Seepage	1.00
		Depth to soft bedrock	0.96	Depth to soft bedrock	0.96	Slope	1.00
						Depth to soft bedrock	0.96
5:							
Catoosa	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.99	Depth to bedrock	0.99	Depth to bedrock	0.99
		Available water capacity	0.23	Available water capacity	0.23	Available water capacity	0.23
6:							
Catoosa	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	0.99	Depth to bedrock	0.99	Depth to bedrock	0.99
		Available water capacity	0.24	Available water capacity	0.24	Available water capacity	0.24

Water Management 4--Continued

Map symbol and soil name	Pct. of map unit	Furrow irrigation: Rating class and limiting features	Value	Graded border irrigation: Rating class and limiting features	Value	Basin or paddy irrigation (level border): Rating class and limiting features	Value
6:							
Shidler	25	Very limited		Not Rated		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	0.98	Depth to bedrock	0.98	Depth to bedrock	0.98
Rock outcrop	15	Not rated		Not rated		Not rated	
7:							
Choska	99	Not limited		Not limited		Not limited	
8:							
Choska	42	Not limited		Not limited		Not limited	
Severn	31	Not limited		Not limited		Very limited	
						Seepage	1.00
Urban land	27	Not rated		Not rated		Not rated	
9:							
Cleora	100	Somewhat limited		Somewhat limited		Very limited	
		Available water capacity	0.05	Available water capacity	0.05	Seepage	1.00
						Available water capacity	0.05
10:							
Coweta	60	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Sandy or loamy surface	1.00
		Slope	1.00	Slope	1.00	Available water capacity	1.00
		Content of large stones	1.00	Content of large stones	1.00	Seepage	1.00
		Depth to soft bedrock	0.96	Depth to soft bedrock	0.96	Slope	1.00
						Depth to soft bedrock	0.96
Bates	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Sandy or loamy surface	1.00
		Depth to soft bedrock	0.98	Depth to soft bedrock	0.98	Slope	1.00
		Available water capacity	0.64	Available water capacity	0.64	Depth to soft bedrock	0.98
						Available water capacity	0.64
11:							
Coweta	30	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Sandy or loamy surface	1.00
		Slope	1.00	Slope	1.00	Available water capacity	1.00
		Content of large stones	1.00	Content of large stones	1.00	Seepage	1.00
		Depth to soft bedrock	0.96	Depth to soft bedrock	0.96	Slope	1.00
						Depth to soft bedrock	0.96
Urban land	30	Not rated		Not rated		Not rated	

Water Management 4--Continued

Map symbol and soil name	Pct. of map unit	Furrow irrigation: Rating class and limiting features	Value	Graded border irrigation: Rating class and limiting features	Value	Basin or paddy irrigation (level border): Rating class and limiting features	Value
11:							
Eram	20	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
		Available water capacity	0.03	Depth to saturated zone	1.00	Available water capacity	0.03
				Available water capacity	0.03		
12:							
Dennis	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
13:							
Dennis	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
14:							
Dennis	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
15:							
Dennis	77	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
Pharoah	23	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Excess sodium	0.98	Perce slowly	1.00	Excess sodium	0.98
		Excess salt	0.50	Excess sodium	0.98	Excess salt	0.50
				Excess salt	0.50		
16:							
Dennis	66	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
		Slope	1.00	Depth to saturated zone	1.00	Slope	1.00
				Slope	1.00		
Radley	34	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
17:							
Urban land	57	Not rated		Not rated		Not rated	

Water Management 4--Continued

Map symbol and soil name	Pct. of map unit	Furrow irrigation		Graded border irrigation		Basin or paddy irrigation (level border)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
17:							
Dennis	43	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
		Slope	1.00	Depth to saturated zone	1.00	Slope	1.00
				Slope	1.00		
18:							
Endsaw	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Sandy or loamy surface	1.00
		Content of large stones	1.00	Percs slowly	1.00	Slope	1.00
		Depth to soft bedrock	0.63	Content of large stones	1.00	Depth to soft bedrock	0.63
		Available water capacity	0.36	Depth to soft bedrock	0.63	Available water capacity	0.36
				Available water capacity	0.36		
Hector	25	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Sandy or loamy surface	1.00
		Slope	1.00	Slope	1.00	Available water capacity	1.00
		Content of large stones	1.00	Content of large stones	1.00	Seepage	1.00
		Depth to bedrock	0.96	Depth to bedrock	0.96	Slope	1.00
						Depth to bedrock	0.96
19:							
Eram	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
		Depth to soft bedrock	0.99	Depth to saturated zone	1.00	Depth to soft bedrock	0.99
				Depth to soft bedrock	0.99		
20:							
Eram	58	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
		Depth to soft bedrock	0.98	Depth to saturated zone	1.00	Depth to soft bedrock	0.98
		Available water capacity	0.71	Depth to soft bedrock	0.98	Available water capacity	0.71
				Available water capacity	0.71		
Coweta	42	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Sandy or loamy surface textures	1.00
		Slope	1.00	Slope	1.00	Available water capacity	1.00
		Depth to soft bedrock	0.96	Depth to soft bedrock	0.96	Seepage	1.00
						Slope	1.00
						Depth to soft bedrock	0.96

Water Management 4--Continued

Map symbol and soil name	Pct. of map unit	Furrow irrigation: Rating class and limiting features	Value	Graded border irrigation: Rating class and limiting features	Value	Basin or paddy irrigation (level border): Rating class and limiting features	Value
21:							
Glenpool	100	Very limited		Very limited		Very limited	
		Wind erosion	1.00	Wind erosion	1.00	Seepage	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
		Seepage	0.50	Seepage	0.50		
22:							
Hector	60	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Sandy or loamy surface	1.00
		Slope	1.00	Slope	1.00	Available water capacity	1.00
		Depth to bedrock	0.96	Depth to bedrock	0.96	Seepage	1.00
						Slope	1.00
						Depth to bedrock	0.96
Linker	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Sandy or loamy surface	1.00
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Available water capacity	0.77	Available water capacity	0.77	Slope	1.00
						Available water capacity	0.77
23:							
Kamie	100	Very limited		Very limited		Very limited	
		Wind erosion	1.00	Wind erosion	1.00	Seepage	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Available water capacity	0.44	Available water capacity	0.44	Available water capacity	0.44
24:							
Kamie	100	Somewhat limited		Somewhat limited		Very limited	
		Available water capacity	0.05	Available water capacity	0.05	Seepage	1.00
						Available water capacity	0.05
25:							
Kamie	62	Very limited		Very limited		Very limited	
		Wind erosion	1.00	Wind erosion	1.00	Seepage	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Available water capacity	0.44	Available water capacity	0.44	Available water capacity	0.44
Urban land	38	Not rated		Not rated		Not rated	
26:							
Kanima	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
27:							
Kiomatia	98	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Seepage	1.00
		Flooding	1.00	Flooding	1.00	Available water capacity	1.00
		Seepage	0.50	Seepage	0.50	Flooding	1.00

Water Management 4--Continued

Map symbol and soil name	Pct. of map unit	Furrow irrigation		Graded border irrigation		Basin or paddy irrigation (level border)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
28:							
Larton	80	Very limited		Very limited		Very limited	
		Wind erosion	1.00	Wind erosion	1.00	Seepage	1.00
		Available water capacity	0.91	Available water capacity	0.91	Available water capacity	0.91
Glenpool	20	Very limited		Very limited		Very limited	
		Wind erosion	1.00	Wind erosion	1.00	Seepage	1.00
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
		Seepage	0.50	Seepage	0.50		
29:							
Latanier	99	Very limited		Very limited		Somewhat limited	
		Restricted permeability	1.00	Percs slowly	1.00	Depth to saturated zone	0.97
		Depth to saturated zone	0.97	Depth to saturated zone	0.97		
30:							
Lula	100	Not limited		Not limited		Not limited	
31:							
Mason	100	Not limited		Not limited		Not limited	
32:							
Newtonia	100	Not limited		Not limited		Not limited	
33:							
Newtonia	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
34:							
Niotaze	72	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00	Slopes	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Content of large stones	1.00	Content of large stones	1.00	Available water capacity	0.76
		Available water capacity	0.76	Available water capacity	0.76		
Darnell	25	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
		Slope	1.00	Slope	1.00	Seepage	1.00
		Content of large stones	1.00	Content of large stones	1.00	Slope	1.00
		Depth to soft bedrock	0.96	Depth to soft bedrock	0.96	Depth to soft bedrock	0.96

Water Management 4--Continued

Map symbol and soil name	Pct. of map unit	Furrow irrigation: Rating class and limiting features	Value	Graded border irrigation: Rating class and limiting features	Value	Basin or paddy irrigation (level border): Rating class and limiting features	Value
35:							
Niotaze	75	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Deep to saturated zone	1.00
		Content of large stones	1.00	Content of large stones	1.00	Available water capacity	0.69
		Available water capacity	0.69	Available water capacity	0.69		
Darnell	25	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
		Slope	1.00	Slope	1.00	Seepage	1.00
		Depth to soft bedrock	0.96	Depth to soft bedrock	0.96	Slope	1.00
						Depth to soft bedrock	0.96
36:							
Niotaze	66	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Content of large stones	1.00	Depth to soft bedrock	1.00
		Content of large stones	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Available water capacity	0.97
		Available water capacity	0.97	Available water capacity	0.97		
Darnell	34	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
		Slope	1.00	Slope	1.00	Seepage	1.00
		Depth to soft bedrock	0.97	Depth to soft bedrock	0.97	Slope	1.00
						Depth to soft bedrock	0.97
37:							
Niotaze	57	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Content of large stones	1.00	Depth to soft bedrock	1.00
		Content of large stones	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Available water capacity	0.97
		Available water capacity	0.97	Available water capacity	0.97		
Darnell	21	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
		Slope	1.00	Slope	1.00	Seepage	1.00
		Depth to soft bedrock	0.97	Depth to soft bedrock	0.97	Slope	1.00
						Depth to soft bedrock	0.97
Urban land	20	Not rated		Not rated		Not rated	

Water Management 4--Continued

Map symbol and soil name	Pct. of map unit	Furrow irrigation: Rating class and limiting features	Value	Graded border irrigation: Rating class and limiting features	Value	Basin or paddy irrigation (level border): Rating class and limiting features	Value
38:							
Oil waste land	100	Not rated		Not rated		Not rated	
39:							
Okay	100	Not limited		Not limited		Very limited	
						Sandy or loamy surface	1.00
						Seepage	1.00
40:							
Okay	100	Not limited		Not limited		Very limited	
						Sandy or loamy surface	1.00
						Seepage	1.00
41:							
Okay	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Sandy or loamy surface	1.00
						Seepage	1.00
						Slope	1.00
42:							
Okay	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Sandy or loamy surface	1.00
						Seepage	1.00
						Slope	1.00
43:							
Okemah	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
44:							
Okemah	50	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
Parsons	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Deth to saturated zone	1.00
				Percs slowly	1.00		
Pharoah	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Excess sodium	0.98	Percs slowly	1.00	Excess sodium	0.98
		Excess salt	0.50	Excess sodium	0.98	Excess salt	0.50
				Excess salt	0.50		
45:							
Osage	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Percs slowly	1.00		
46:							
Pits	100	Not rated		Not rated		Not rated	

Water Management 4--Continued

Map symbol and soil name	Pct. of map unit	Furrow irrigation: Rating class and limiting features	Furrow irrigation: Value	Graded border irrigation: Rating class and limiting features	Graded border irrigation: Value	Basin or paddy irrigation (level border): Rating class and limiting features	Basin or paddy irrigation (level border): Value
47:							
Radley	99	Not limited		Not limited		Not limited	
48:							
Radley	99	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
49:							
Severn	100	Not limited		Not limited		Very limited	
						Seepage	1.00
50:							
Shidler	65	Very limited		Very limited		Very limited	
		Available water capacity	1.00	Available water capacity	1.00	Available water capacity	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	0.96	Depth to bedrock	0.96	Depth to bedrock	0.96
Rock outcrop	30	Not rated		Not rated		Not rated	
51:							
Tullahassee	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
						Flooding	1.00
52:							
Urban land	100	Not rated		Not rated		Not rated	
53:							
Wynona	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
54:							
Wynona	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Percs slowly	1.00	Depth to saturated zone	1.00
				Depth to saturated zone	1.00		
Urban land	20	Not rated		Not rated		Not rated	
DAM:							
Dam	100	Not rated		Not rated		Not rated	
DUM:							
Dumps	100	Not rated		Not rated		Not rated	
M-W:							
Miscellaneous Water	100	Not rated		Not rated		Not rated	
W:							
Water	100	Not rated		Not rated		Not rated	

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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 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.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

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 the 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, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

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 has, 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.

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

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

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

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 has 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.

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.

Cuesta. A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

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 salt (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.

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 has, 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.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

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

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 has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

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.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

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 of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

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 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, such as those on intermontane basin floors. 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.

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.

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.

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.

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.

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 generally is 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.

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 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	0 to 2
Very slightly saline	2 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 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 is 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 backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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.

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 45 percent
Very steep	45 percent and higher

Classes for complex slopes are as follows:

Nearly level	0 to 3 percent
Gently undulating	1 to 5 percent
Undulating	1 to 8 percent
Gently rolling	5 to 12 percent
Rolling	5 to 15 percent
Hilly	8 to 30 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

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	13-30:1
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 or 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 wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

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. 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. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

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 generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

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

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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.

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.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, 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.