United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with United States Department of the Interior, Bureau of Land Management, and Mojave Desert Resource Conservation District

Interim Report for the Soil Survey of Chemehuevi Wash Off-Highway Vehicle Area, Part of the Desert Area, California

How To Use This Soil Survey

General Soil Map

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

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

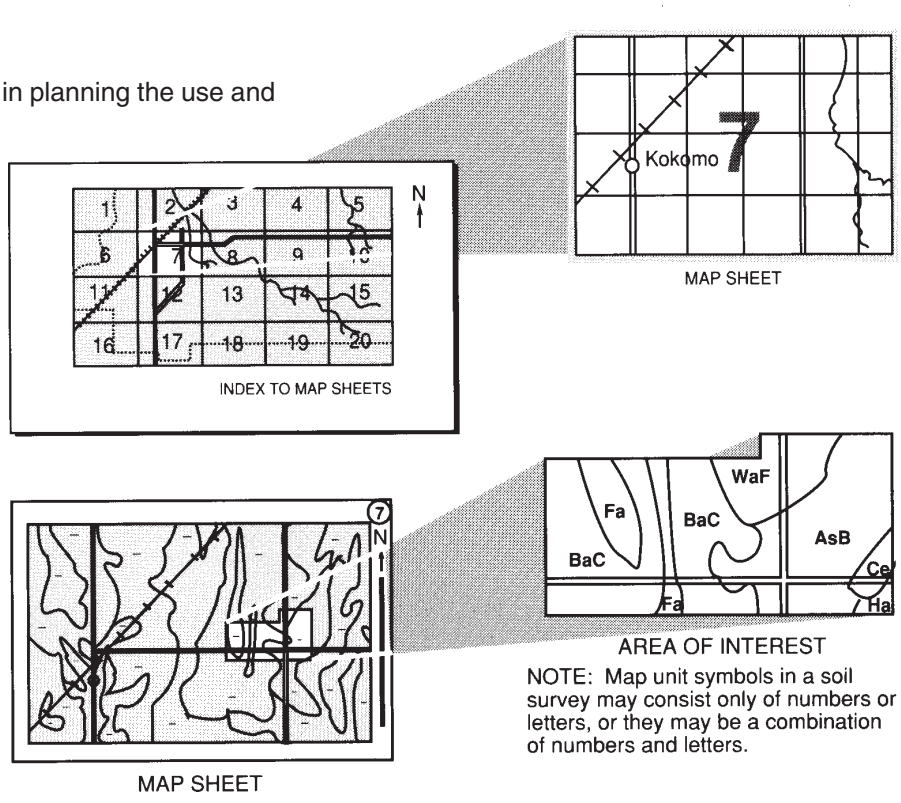
Detailed Soil Maps

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

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the 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 that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

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



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

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 2004. Soil names and descriptions were approved in 2005. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2004. This survey was made cooperatively by the Natural Resources Conservation Service and the Bureau of Land Management and Mojave Desert Resource 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.

Cover: Granitic Fan Remnant 4-6" p.z. ecological site on the Riverbend soil in detailed soil map unit 2010, in the northwest corner of the survey area. (Photograph by Leon Lato, Natural Resources Conservation Service.)

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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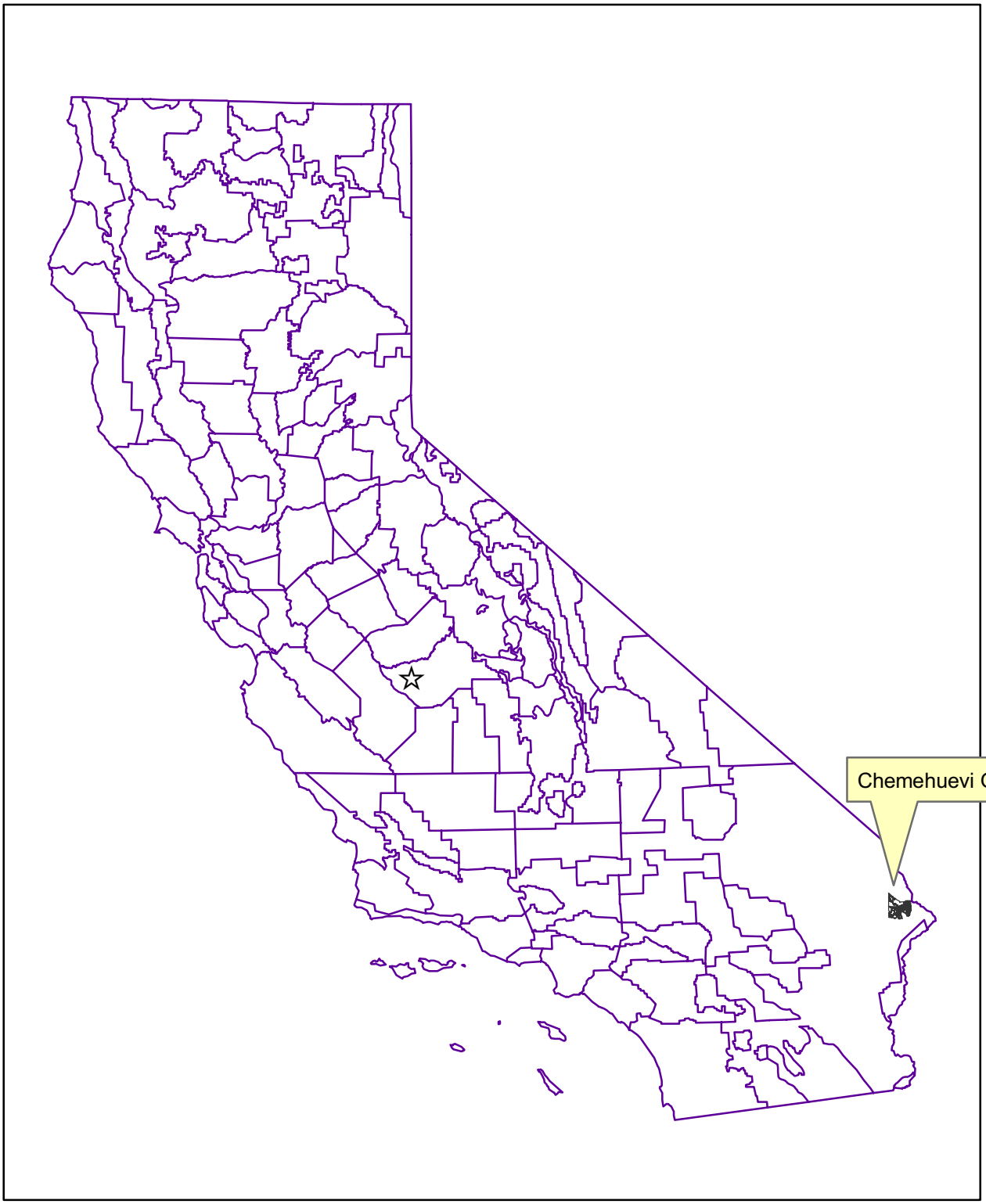
Issued 2005



Location of Chemehuevi Wash Off-Highway Vehicle Area, Part of the Desert Area, California.

Interim Report for the Soil Survey of Chemehuevi Wash Off-Highway Vehicle Area, Part of the Desert Area, California

By Leon Lato, Carrie-Ann Houdeshell, and Heath McAllister, Natural Resources Conservation Service

Fieldwork by Leon Lato, Jeff Goats, Charlie Bauer, and Heath McAllister, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
United States Department of the Interior, Bureau of Land Management, and Mojave Desert Resource Conservation District

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some

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

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

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

The map units in this survey area are broadly defined. Areas of more than 40 acres were plotted and verified. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils on Fan Piedmonts

1. Riverbend-Carrizo-Chemehuevi-Garywash

Very deep, gently sloping to moderately sloping, excessively drained, sandy and sandy-skeletal soils that formed in recent alluvium and very deep, gently sloping to moderately steep, well drained to excessively drained, loamy and loamy-skeletal soils that formed in older alluvium on stable alluvial landforms; on inset fans, fan aprons, fan remnants, and narrow drainageways throughout the survey area

Setting

Landform: Inset fans, fan aprons, fan remnants, and narrow drainageways
Slope: 1 to 30 percent
Elevation: 152 to 550 meters
Average annual air temperature: 21 to 23 degrees C
Frost-free period: 300 to 365 days

Composition

Percent of survey area: 82 percent

Major components
Riverbend and similar soils—30 percent
Carrizo and similar soils—20 percent
Chemehuevi and similar soils—15 percent
Garywash and similar soils—15 percent

Minor components
Snaggletooth and similar soils—11 percent
Carrizo, steep, and similar soils—3 percent
Cololag and similar soils—3 percent
Carrizo, frequently flooded, and similar soils—2 percent
Badland—1 percent

Soil Properties and Qualities

Riverbend
Depth class: Very deep
Drainage class: Excessively drained
Position on landform: Fan remnants
Parent material: Alluvium derived from granitic and mixed sources
Surface textural class: Very gravelly fine sandy loam
Slope: 8 to 30 percent
Typical vegetation: Creosotebush and white bursage

Carrizo
Depth class: Very deep
Drainage class: Excessively drained
Position on landform: Fan remnants, inset fans, fan aprons, and narrow drainageways
Parent material: Alluvium derived from mixed and granitic sources
Surface textural class: Very gravelly loamy sand to extremely gravelly fine sandy loam
Slope: 2 to 8 percent
Typical vegetation: Creosotebush and white bursage

Chemehuevi
Depth class: Very deep
Drainage class: Well drained
Position on landform: Summits of fan remnants
Parent material: Alluvium derived from granitic sources
Surface textural class: Gravelly sandy loam or loam

Slope: 2 to 8 percent
Typical vegetation: Creosotebush, white ratany, and white bursage

Garywash
Depth class: Very deep
Drainage class: Well drained
Position on landform: Summits and side slopes of convex fan remnants
Parent material: Alluvium derived from granitic sources
Surface textural class: Gravelly fine sandy loam
Slope: 2 to 15 percent
Typical vegetation: Creosotebush and white bursage

Minor components
- Snaggletooth soils on smooth fan remnants
- Carrizo, steep, soils on steep side slopes of fan remnants
- Cololag soils on smooth, flat summits of fan remnants
- Carrizo, frequently flooded, soils in drainageways
- Badland on backslopes of eroded lakebeds

Use and Management

Major uses: Wildlife habitat and recreation

Wildlife habitat
Management concern: Excessive sand and gravel, which makes this unit poorly suited to use as habitat for tortoises and other burrowing animals
Management measure: Protect included areas of minor soils and ecological sites that may provide suitable habitat

Recreation
Management concern: Excessive sand, which results in a potential for dustiness when the soils are dry, especially in areas with heavy vehicular traffic
Management measure: Protect vegetation from damage or destruction by minimizing traffic areas or limiting traffic to established trails

2. Carrizo, frequently flooded-Carrwash

Very deep, gently sloping to moderately sloping, excessively drained, sandy-skeletal soils that formed in mixed recent alluvium; in large active drainageways and on inset fans throughout the survey area

Setting

Landform: Active drainageways and inset fans
Slope: 2 to 8 percent
Elevation: 150 to 400 meters
Average annual air temperature: 21 to 23 degrees C
Frost-free period: 320 to 365 days

Composition

Percent of survey area: 7 percent

Major components
Carrizo, frequently flooded, and similar soils—55 percent
Carrwash and similar soils—35 percent

Minor components
Carrizo, steep, and similar soils—5 percent
Riverbend and similar soils—2 percent
Typic Haplocalcids and similar soils—2 percent
Badland—1 percent

Soil Properties and Qualities

Carrizo, frequently flooded
Depth class: Very deep
Drainage class: Excessively drained
Position on landform: Drainageways and braided channels
Parent material: Alluvium derived from granitic and mixed sources
Surface textural class: Sand or extremely gravelly fine sandy loam
Slope: 2 to 8 percent
Typical vegetation: Blue paloverde, catclaw acacia, burrobrush, and smoketree

Carrwash
Depth class: Very deep
Drainage class: Excessively drained
Position on landform: Inset fans
Parent material: Alluvium derived from mixed and granitic sources
Surface textural class: Very gravelly loamy coarse sand or very gravelly loamy sand
Slope: 2 to 4 percent
Typical vegetation: Creosotebush and white bursage

Minor components
- Carrizo, steep, soils on steep side slopes of fan remnants
- Riverbend soils on convex fan remnants
- Typic Haplocalcids on summits of smooth fan remnants
- Badland, which consists of semiconsolidated sand sheets

Use and Management

Major uses: Wildlife habitat and recreation

Wildlife habitat
Management concern: Excessive sand and gravel at the surface, which makes this unit poorly suited to use as habitat for tortoises and other burrowing animals
Management measure: Protect included areas of minor soils and ecological sites that may provide suitable habitat

Recreation
Management concern: Excessive sand, which results in a potential for dustiness when the soils are dry, especially in areas with heavy vehicular traffic
Management measure: Protect vegetation from damage or destruction by minimizing traffic areas or limiting traffic to established trails

Soils on Hills

3. Goldroad-Stormjade-Whipple

Very shallow and shallow to bedrock, strongly sloping to steep, well drained and somewhat excessively drained, loamy-skeletal soils that formed in residuum and colluvium derived from granitic sources; on granitic hills throughout the survey area

Setting

Landform: Granitic hills
Slope: 8 to 50 percent
Elevation: 200 to 600 meters
Average annual air temperature: 21 to 25 degrees C
Frost-free period: 300 to 365 days

Composition

Percent of survey area: 8 percent

Major components
Goldroad and similar soils—35 percent
Stormjade and similar soils—30 percent
Whipple and similar soils—25 percent

Minor components
Garywash and similar soils—3 percent
Riverbend and similar soils—2 percent
Cololag and similar soils—2 percent
Carrizo and similar soils—2 percent
Rock outcrop—1 percent

Soil Properties and Qualities

Goldroad
Depth class: Very shallow and shallow
Drainage class: Well drained and somewhat excessively drained
Position on landform: Backslopes of hills
Parent material: Residuum and colluvium derived from granitic sources
Surface textural class: Very gravelly sandy loam
Slope: 15 to 50 percent
Typical vegetation: White brittlebush and creosotebush

Stormjade
Depth class: Very shallow
Drainage class: Somewhat excessively drained
Position on landform: Backslopes of hills
Parent material: Residuum and colluvium derived from granitic sources
Surface textural class: Very gravelly sandy loam
Slope: 8 to 30 percent
Typical vegetation: White brittlebush, desert Indianwheat, and creosotebush

Whipple
Depth class: Very shallow and shallow
Drainage class: Well drained
Position on landform: Side slopes of backslopes of hills
Parent material: Residuum and colluvium derived from granitic sources
Surface textural class: Very gravelly fine sandy loam
Slope: 8 to 50 percent
Typical vegetation: White brittlebush, desert Indianwheat, creosotebush, and white bursage

Minor components
- Garywash soils on fan remnants
- Riverbend soils on summits of fan remnants
- Cololag soils on fan remnants
- Carrizo soils on fan aprons and in drainageways
- Rock outcrop on backslopes of hills and mountains

Use and Management

Major uses: Wildlife habitat and recreation

Wildlife habitat
Management concern: Very shallow and shallow depth to bedrock, which make the unit poorly suited to use as habitat for tortoises and other burrowing animals
Management measure: Protect included areas of minor soils and ecological sites that may provide suitable habitat

Recreation
Management concern: Slopes of more than 20 percent, which make maneuverability by vehicles difficult and unsafe and can result in an increased risk of erosion if traffic is heavy
Management measure: Restrict use of recreational

vehicles to areas that have slopes of less than 20 percent

4. Sunrock

Very shallow and shallow to bedrock, strongly sloping to steep, somewhat excessively drained, loamy-skeletal soils that formed in residuum and colluvium derived mainly from volcanic sources; on volcanic hills in the northeastern and southwestern parts of the survey area

Setting

Landform: Volcanic hills
Slope: 8 to 50 percent
Elevation: 200 to 550 meters
Average annual air temperature: 21 to 26 degrees C
Frost-free period: 300 to 365 days

Composition

Percent of survey area: 3 percent

Major components
Sunrock and similar soils—80 percent

Minor components
Cheme family and similar soils—7 percent
Rock outcrop—5 percent
Riverbend and similar soils—5 percent
Carrizo, frequently flooded, and similar soils—2 percent
Whipple and similar soils—1 percent

Soil Properties and Qualities

Sunrock
Depth class: Very shallow and shallow
Drainage class: Somewhat excessively drained
Position on landform: Backslopes of hills
Parent material: Residuum and colluvium derived from volcanic sources
Surface textural class: Very gravelly or extremely gravelly sandy loam or fine sandy loam
Slope: 8 to 50 percent
Typical vegetation: Creosotebush and white bursage

Minor components
- Cheme family on footslopes of hills
- Rock outcrop on summits, ridges, and side slopes of mountains
- Riverbend soils on fan remnants
- Carrizo, frequently flooded, soils in drainageways
- Whipple soils on backslopes of hills

Use and Management

*Major uses***:** Wildlife habitat and recreation

Wildlife habitat
Management concern: Very shallow and shallow depth to bedrock, which make the unit poorly suited to use as habitat for tortoises and other burrowing animals
Management measure: Protect included areas of minor soils and ecological sites that may provide suitable habitat

Recreation
Management concern: Slopes of more than 20 percent, which make maneuverability by vehicles difficult and unsafe and can result in an increased risk of erosion if traffic is heavy
Management measure: Restrict use of recreational vehicles to areas that have slopes of less than 20 percent

Detailed Soil Map Units

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

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

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

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

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

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

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

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Garywash-Chemehuevi complex, 2 to 8 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps.

Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Carrizo-Badland-Riverbend association, 8 to 75 percent slopes, is an example.

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

Table 1 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

1200—Goldroad very gravelly sandy loam, 15 to 50 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Hills
Elevation: 655 to 1,230 feet (200 to 375 meters)
Mean annual precipitation: 3 to 5 inches (76 to 127 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 300 to 350 days

Map Unit Composition

Goldroad and similar soils—80 percent
Minor components—20 percent

Goldroad

Slope: 15 to 50 percent
Landform: Backslopes of hills
Parent material: Colluvium and/or residuum derived from granite
Typical vegetation: White brittlebush and creosotebush

Selected properties and qualities
Surface pH: 8.4
Percent of surface area covered with coarse fragments: 70 to 80 percent with coarse subrounded gravel, 0 to 5 percent with subrounded cobbles, and 0 to 2 percent with subrounded stones
Depth to restrictive feature: Bedrock (lithic)—4 to 20 inches
Slowest permeability class: Moderately rapid above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.4 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Well drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY003CA, Steep South Slope 2-4" p.z.

Typical profile
A—0 to 1 inch; very gravelly sandy loam
Bk—1 to 5 inches; very gravelly sandy loam
Rk—5 to 15 inches; bedrock

Minor Components

Riverbend, strongly sloping, and similar soils
Percent of map unit: About 10 percent
Slope: 8 to 30 percent
Landform: Summits of fan remnants
Typical vegetation: Creosotebush, white bursage, and white ratany
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 3 percent
Slope: 2 to 4 percent
Landform: Drainageways
Typical vegetation: White burrobush, creosotebush, catclaw acacia, white bursage, and sweetbush
Ecological site: R031XY019CA, Coarse Gravelly Wash

Goldroad, moist, and similar soils
Percent of map unit: About 3 percent
Slope: 15 to 50 percent
Landform: Backslopes of hills
Typical vegetation: Creosotebush, white bursage, and white ratany
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Carrizo and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 8 percent
Landform: Fan aprons
Typical vegetation: Creosotebush and white ratany
Ecological site: R031XY006CA, Limy 2-4" p.z.

Rock outcrop
Percent of map unit: About 2 percent
Slope: 15 to 50 percent
Landform: Backslopes of hills
Typical vegetation: None assigned
Ecological site: Not assigned

See the "Soil Properties" section, including the "Chemical Properties of the Soils" and "Physical Properties of the Soils" tables, for component horizon data. A typical soil description with range in characteristics is included in the "Classification of the Soils" section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the "Use and Management of the Soils" section.

1210—Stormjade-Goldroad complex, 8 to 50 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash
MLRA: 31—Lower Colorado Desert
Landscape position: Hills
Elevation: 1,230 to 1,965 feet (375 to 600 meters)
Mean annual precipitation: 3 to 5 inches (75 to 127 millimeters)
Mean annual air temperature: 70 to 77 degrees F (21 to 25 degrees C)
Frost-free period: 325 to 365 days

Map Unit Composition

Stormjade and similar soils—40 percent
Goldroad and similar soils—35 percent
Minor components—25 percent

Stormjade

Slope: 8 to 30 percent
Landform: Backslopes of hills
Parent material: Colluvium and/or residuum derived from granite
Typical vegetation: White brittlebush, teddybear cholla, and desert Indianwheat

Selected properties and qualities
Surface pH: 7.8
Percent of surface area covered with coarse fragments: 0 to 4 percent with cobbles and 80 to 91 percent with coarse gravel
Depth to restrictive feature: Bedrock (paralithic)—1 to 10 inches; bedrock (lithic)—5 to 14 inches
Slowest permeability class: Very slow above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.1 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY017CA, Steep Granitic Slope 4-6" p.z.

Typical profile
A—0 to 1 inch; very gravelly sandy loam
Crt—1 to 5 inches; bedrock
R—5 to 9 inches; bedrock

Goldroad

Slope: 15 to 50 percent
Landform: Backslopes of hills
Parent material: Colluvium and/or residuum derived from granite
Typical vegetation: White brittlebush, teddybear cholla, desert Indianwheat, and blond plantain

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 70 to 80 percent with coarse gravel and 0 to 15 percent with cobbles
Depth to restrictive feature: Bedrock (lithic)—4 to 10 inches
Slowest permeability class: Moderately rapid above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.5 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high

Natural drainage class: Somewhat excessively drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY017CA, Steep Granitic Slope 4-6" p.z.

Typical profile
A—0 to 2 inches; very gravelly sandy loam
Bk—2 to 10 inches; extremely gravelly sandy loam
R—10 to 14 inches; bedrock

Minor Components

Rock outcrop
Percent of map unit: About 10 percent
Slope: 8 to 50 percent
Landform: Backslopes of hills
Typical vegetation: None assigned
Ecological site: Not assigned

Lithic Torriorthents and similar soils
Percent of map unit: About 7 percent
Slope: 4 to 15 percent
Landform: Shoulders of hills
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Cololag, bedrock substratum, and similar soils
Percent of map unit: About 4 percent
Slope: 4 to 30 percent
Landform: Summits of fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY005CA, Limy Fan 2-4" p.z.

Typic Haplargids, frequently flooded, and similar soils
Percent of map unit: About 3 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Burrobrush, desert lavender, creosotebush, sweetbush, and catclaw acacia
Ecological site: R031XY018CA, Broad Gravelly Wash

Carrwash, moderately deep, and similar soils
Percent of map unit: About 1 percent
Slope: 2 to 4 percent
Landform: Drainageways
Typical vegetation: Burrobrush, desert lavender, creosotebush, sweetbush, and catclaw acacia
Ecological site: R031XY018CA, Broad Gravelly Wash

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

1211—Stormjade-Whipple complex, 8 to 50 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Hills
Elevation: 1,145 to 1,965 feet (350 to 600 meters)
Mean annual precipitation: 3 to 5 inches (76 to 127 millimeters)
Mean annual air temperature: 70 to 77 degrees F (21 to 25 degrees C)
Frost-free period: 325 to 365 days

Map Unit Composition

Stormjade, dry, and similar soils—40 percent
Whipple and similar soils—30 percent
Whipple, warm, and similar soils—15 percent
Minor components—15 percent

Stormjade, Dry

Slope: 8 to 30 percent
Landform: Backslopes of hills
Parent material: Colluvium and/or residuum derived from granite
Typical vegetation: Creosotebush, white bursage, and desert Indianwheat

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 20 to 25 percent with fine subangular gravel, 0 to 2 percent with subangular cobbles, and 60 to 65 percent with coarse subangular gravel
Depth to restrictive feature: Bedrock (paralithic)—1 to 10 inches; bedrock (lithic)—5 to 14 inches
Slowest permeability class: Very slow above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.4 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY001CA, Limy Hill 4-6" p.z.

Typical profile
A—0 to 2 inches; very gravelly sandy loam
Bk—2 to 6 inches; very gravelly sandy loam
Cr—6 to 12 inches; soft bedrock
R—12 to 14 inches; bedrock

Whipple

Slope: 8 to 30 percent
Landform: Side slopes on backslopes of hills
Parent material: Colluvium and/or residuum derived from granite
Typical vegetation: Creosotebush, white bursage, and desert Indianwheat

Selected properties and qualities
Surface pH: 8.0
Percent of surface area covered with coarse fragments: 20 to 30 percent with fine angular gravel, 3 to 10 percent with angular cobbles, and 55 to 60 percent with coarse angular gravel
Depth to restrictive feature: Bedrock (lithic)—5 to 14 inches
Slowest permeability class: Very slow above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.5 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Well drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY001CA, Limy Hill 4-6" p.z.

Typical profile
A—0 to 1 inch; gravelly fine sandy loam
Btk—1 to 9 inches; extremely gravelly loam
R—9 to 13 inches; bedrock

Whipple, Warm

Slope: 15 to 50 percent
Landform: Side slopes on backslopes of hills
Parent material: Colluvium and/or residuum derived from granite
Typical vegetation: White brittlebush and creosotebush

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 20 to 30 percent with fine angular gravel, 3 to 10 percent with angular cobbles, and 55 to 60 percent with coarse angular gravel
Depth to restrictive feature: Bedrock (lithic)—5 to 14 inches
Slowest permeability class: Very slow above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.8 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Well drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY003CA, Steep South Slope 2-4" p.z.

Typical profile
A—0 to 2 inches; very gravelly fine sandy loam
Btk—2 to 14 inches; extremely gravelly loam
R—14 to 18 inches; bedrock

Minor Components

Garywash and similar soils
Percent of map unit: About 5 percent
Slope: 2 to 8 percent
Landform: Fan remnants
Typical vegetation: Creosotebush and white ratany
Ecological site: R031XY006CA, Limy 2-4" p.z.

Cololag, strongly sloping, and similar soils
Percent of map unit: About 4 percent
Slope: 4 to 15 percent
Landform: Fan remnants

Typical vegetation: Creosotebush and desert Indianwheat
Ecological site: R031XY006CA, Limy 2-4" p.z.

Stormjade and similar soils
Percent of map unit: About 3 percent
Slope: 8 to 30 percent
Landform: Side slopes on backslopes of hills
Typical vegetation: White brittlebush, teddybear cholla, and desert Indianwheat
Ecological site: R031XY017CA, Steep Granitic Slope 4-6" p.z.

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Blue paloverde, desert willow, catclaw acacia, and burrobrush
Ecological site: R031XY010CA, Valley Wash

Typic Calciargids and similar soils
Percent of map unit: About 1 percent
Slope: 2 to 8 percent
Landform: Inset fans
Typical vegetation: Big galleta, white bursage, and creosotebush
Ecological site: R031XY016CA, Claypan

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

1400—Sunrock complex, 8 to 50 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Volcanic hills
Elevation: 655 to 1,230 feet (200 to 375 meters)
Mean annual precipitation: 2 to 6 inches (51 to 152 millimeters)
Mean annual air temperature: 70 to 78 degrees F (21 to 26 degrees C)
Frost-free period: 300 to 360 days

Map Unit Composition

Sunrock, dry, and similar soils—60 percent
Sunrock, warm, and similar soils—25 percent
Minor components—15 percent

Sunrock, Dry

Slope: 8 to 30 percent
Landform: Convex side slopes of hills
Parent material: Colluvium and/or residuum derived from andesite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 60 to 80 percent with coarse angular gravel, 1 to 15 percent with angular cobbles, and 0 to 3 percent with angular stones
Depth to restrictive feature: Bedrock (lithic)—4 to 10 inches
Slowest permeability class: Moderately rapid above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.5 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 3 inches; very gravelly sandy loam
Bk—3 to 8 inches; extremely gravelly sandy loam
R—8 inches; bedrock

Sunrock, Warm

Slope: 15 to 50 percent
Landform: Convex side slopes of hills
Parent material: Colluvium and/or residuum derived from andesite
Typical vegetation: White brittlebush, creosotebush, and white bursage

Selected properties and qualities
Surface pH: 7.8

Percent of surface area covered with coarse fragments: 45 to 70 percent with coarse angular gravel, 3 to 10 percent with angular stones, and 5 to 25 percent with angular cobbles
Depth to restrictive feature: Bedrock (lithic)—4 to 10 inches
Slowest permeability class: Moderately rapid above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.3 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY003CA, Steep South Slope 2-4" p.z.

Typical profile
A—0 to 3 inches; extremely gravelly sandy loam
Bk—3 to 8 inches; very gravelly sandy loam
R—8 inches; bedrock

Minor Components

Riverbend, strongly sloping, and similar soils
Percent of map unit: About 8 percent
Slope: 8 to 30 percent
Landform: Side slopes of fan remnants
Typical vegetation: Creosotebush, white bursage, and desert Indianwheat
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Rock outcrop
Percent of map unit: About 4 percent
Slope: 15 to 50 percent
Landform: Ridges
Typical vegetation: None assigned
Ecological site: Not assigned

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 3 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: White burrobush, creosotebush, catclaw acacia, white bursage, and sweetbush
Ecological site: R031XY019CA, Coarse Gravelly Wash

See the "Soil Properties" section, including the "Chemical Properties of the Soils" and "Physical Properties of the Soils" tables, for component horizon data. A typical soil description with range in characteristics is included in the "Classification of the Soils" section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the "Use and Management of the Soils" section.

1401—Sunrock-Cheme family association, 8 to 50 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Basalt hills
Elevation: 1,230 to 1,490 feet (375 to 455 meters)
Mean annual precipitation: 2 to 6 inches (51 to 152 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 325 to 365 days

Map Unit Composition

Sunrock, cobbly, and similar soils—45 percent
Cheme family and similar soils—30 percent
Minor components—25 percent

Sunrock, Cobbly

Slope: 15 to 50 percent
Landform: Upper backslopes of hills
Parent material: Colluvium and/or residuum derived from basalt
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 0 to 3 percent with angular stones, 1 to 15 percent with angular cobbles, and 60 to 80 percent with coarse angular gravel
Depth to restrictive feature: Bedrock (lithic)—4 to 11 inches
Slowest permeability class: Moderately rapid above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.6 inch (very low)

Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 2 inches; extremely cobbly fine sandy loam
Bkq1—2 to 6 inches; very cobbly fine sandy loam
Bkq2—6 to 11 inches; very gravelly fine sandy loam
Rkq—11 to 21 inches; bedrock

Cheme Family

Slope: 8 to 30 percent
Landform: Footslopes of hills
Parent material: Alluvium derived from basalt
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.0
Percent of surface area covered with coarse fragments: 30 to 40 percent with duripan fragments that are 6 to 75 millimeters in diameter, 0 to 1 percent with subrounded stones, 10 to 20 percent with subrounded cobbles, and 30 to 40 percent with coarse subrounded gravel
Depth to restrictive feature: Duripan—7 to 20 inches
Slowest permeability class: Extremely slow
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.8 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Well drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 2 inches; very cobbly fine sandy loam
Bkq1—2 to 8 inches; extremely gravelly fine sandy loam
Bkq2—8 to 19 inches; extremely gravelly loam
Bkqm—19 to 26 inches; cemented material

Minor Components

Rock outcrop
Percent of map unit: About 10 percent
Slope: 15 to 50 percent
Landform: Summits and side slopes of hills
Typical vegetation: None assigned
Ecological site: Not assigned

Sunrock, cobbly, moist, and similar soils
Percent of map unit: About 7 percent
Slope: 8 to 30 percent
Landform: North-facing side slopes of hills and interfluves
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY001CA, Limy Hill 4-6" p.z.

Sunrock, dry, and similar soils
Percent of map unit: About 6 percent
Slope: 4 to 15 percent
Landform: Side slopes of hills
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Rubble land
Percent of map unit: About 2 percent
Slope: 15 to 50 percent
Landform: None assigned
Typical vegetation: None assigned
Ecological site: Not assigned

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

1402—Sunrock-Cheme family-Rock outcrop association, 8 to 50 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Hills

Elevation: 1,640 to 1,800 feet (500 to 550 meters)
Mean annual precipitation: 2 to 6 inches (51 to 152 millimeters)
Mean annual air temperature: 70 to 78 degrees F (21 to 26 degrees C)
Frost-free period: 300 to 360 days

Map Unit Composition

Sunrock, moist, and similar soils—40 percent
Cheme family and similar soils—35 percent
Rock outcrop, volcanics—15 percent
Minor components—10 percent

Sunrock, Moist

Slope: 15 to 50 percent
Landform: Backslopes and shoulders of hills
Parent material: Colluvium and/or residuum derived from andesite
Typical vegetation: Creosotebush, white bursage, and white ratany

Selected properties and qualities
Surface pH: 8.0
Percent of surface area covered with coarse fragments: 60 to 80 percent with coarse angular gravel, 0 to 3 percent with angular stones, and 1 to 15 percent with angular cobbles
Depth to restrictive feature: Bedrock (lithic)—4 to 10 inches
Slowest permeability class: Moderately rapid above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.5 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: R031XY001CA, Limy Hill 4-6" p.z.

Typical profile
A—0 to 3 inches; very gravelly sandy loam
Bk—3 to 8 inches; extremely gravelly sandy loam
R—8 inches; bedrock

Cheme Family

Slope: 8 to 30 percent
Landform: Footslopes of hills
Parent material: Alluvium derived from andesite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 0 to 1 percent with subrounded stones, 30 to 40 percent with duripan fragments that are 6 to 75 millimeters in diameter, 30 to 40 percent with coarse subrounded gravel, and 10 to 20 percent with subrounded cobbles
Depth to restrictive feature: Duripan—7 to 20 inches
Slowest permeability class: Extremely slow
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 1 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Well drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 3 inches; very gravelly fine sandy loam
Bk—3 to 11 inches; very gravelly loam
Bkqm—11 to 22 inches; cemented material

Rock Outcrop, Volcanics

Slope: 15 to 50 percent
Landform: Ridges and backslopes of hills
Parent material: Volcanic rock
Typical vegetation: None assigned

Minor Components

Whipple and similar soils
Percent of map unit: About 5 percent
Slope: 15 to 50 percent
Landform: Backslopes of hills
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY001CA, Limy Hill 4-6" p.z.

Sunrock, warm, and similar soils
Percent of map unit: About 3 percent
Slope: 15 to 50 percent
Landform: Side slopes of backslopes of hills
Typical vegetation: White brittlebush, white bursage, creosotebush, and white ratany

Ecological site: R031XY003CA, Steep South Slope 2-4" p.z.

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Burrobrush, creosotebush, catclaw acacia, white bursage, and sweetbush
Ecological site: R031XY019CA, Coarse Gravelly Wash

See the "Soil Properties" section, including the "Chemical Properties of the Soils" and "Physical Properties of the Soils" tables, for component horizon data. A typical soil description with range in characteristics is included in the "Classification of the Soils" section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the "Use and Management of the Soils" section.

1500—Carrizo extremely gravelly fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 895 to 1,095 feet (274 to 335 meters)
Mean annual precipitation: 2 to 6 inches (51 to 152 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 300 to 360 days

Map Unit Composition

Carrizo, dry, and similar soils—85 percent
Minor components—15 percent

Carrizo, Dry

Slope: 2 to 8 percent
Landform: Inset fans
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white ratany

Selected properties and qualities
Surface pH: 7.8
Percent of surface area covered with coarse fragments: 0 to 5 percent with subangular stones, 1 to 15 percent with subangular cobbles, and 60 to 80 percent with coarse subangular gravel
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.4 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: Very rare
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 2 inches; extremely gravelly fine sandy loam
C—2 to 60 inches; stratified extremely gravelly coarse sand to very gravelly loamy sand

Minor Components

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 8 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: White burrobush, creosotebush, catclaw acacia, white bursage, and sweetbush
Ecological site: R031XY019CA, Coarse Gravelly Wash

Varwash and similar soils
Percent of map unit: About 4 percent
Slope: 2 to 4 percent
Landform: Flat fan remnants
Typical vegetation: Creosotebush
Ecological site: R031XY002CA, Desert Patina 2-4" p.z.

Riverbend, strongly sloping, and similar soils
Percent of map unit: About 2 percent
Slope: 8 to 30 percent
Landform: Convex fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Riverwash
Percent of map unit: About 1 percent
Slope: 2 to 4 percent
Landform: Active drainageways
Typical vegetation: None assigned
Ecological site: Not assigned

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

1501—Carrizo very gravelly loamy sand, 30 to 75 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 495 to 720 feet (152 to 220 meters)
Mean annual precipitation: 3 to 5 inches (75 to 127 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 320 to 360 days

Map Unit Composition

Carrizo, steep, and similar soils—85 percent
Minor components—15 percent

Carrizo, Steep

Slope: 30 to 75 percent
Landform: Eroded side slopes of fan remnants
Parent material: Alluvium derived from mixed sources
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 7.9
Percent of surface area covered with coarse fragments: 0 to 5 percent with subangular stones, 0 to 10 percent with subangular cobbles, and 30 to 80 percent with coarse subangular gravel
Depth to restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 1.3 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Medium
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 3 inches; gravelly loamy sand
C1—3 to 13 inches; loamy sand
C2—13 to 25 inches; gravelly loamy sand
C3—25 to 62 inches; extremely gravelly sand

Minor Components

Carrwash, dry, and similar soils
Percent of map unit: About 8 percent
Slope: 4 to 15 percent
Landform: Toeslopes of fan remnants and inset fans
Typical vegetation: Creosotebush, white bursage, and white ratany
Ecological site: R031XY006CA, Limy 2-4" p.z.

Badland
Percent of map unit: About 3 percent
Slope: 75 to 150 percent
Landform: Side slopes of eroded fan remnants
Typical vegetation: None assigned
Ecological site: Not assigned

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 3 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Blue paloverde, burrobrush, white brittlebush, catclaw acacia, and white bursage
Ecological site: R031XY019CA, Coarse Gravelly Wash

Riverwash
Percent of map unit: About 1 percent
Slope: 2 to 4 percent
Landform: Active drainageways
Typical vegetation: None assigned
Ecological site: Not assigned

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit,

see the “Use and Management of the Soils” section.

1502—Carrizo-Badland-Riverbend association, 8 to 75 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 555 to 810 feet (170 to 248 meters)
Mean annual precipitation: 3 to 5 inches (75 to 127 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 300 to 360 days

Map Unit Composition

Carrizo, steep, and similar soils—40 percent
Badland, fine—25 percent
Riverbend, strongly sloping, and similar soils—20 percent
Minor components—15 percent

Carrizo, Steep

Slope: 30 to 75 percent
Landform: Steep side slopes of fan remnants
Parent material: Alluvium derived from mixed sources
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 7.9
Percent of surface area covered with coarse fragments: 0 to 5 percent with stones, 0 to 10 percent with cobbles, and 30 to 80 percent with coarse gravel
Depth to restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 1.3 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Medium
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 3 inches; gravelly loamy sand
C1—3 to 13 inches; loamy sand
C2—13 to 25 inches; gravelly loamy sand
C3—25 to 62 inches; extremely gravelly sand

Badland, Fine

Slope: 50 to 75 percent
Landform: Backslopes of eroded lakebeds (relict)
Parent material: Lacustrine and/or marine deposits
Typical vegetation: None assigned

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 0 to 1 percent with fine subrounded gravel
Depth to restrictive feature: Bedrock (paralithic)—5 to 8 inches; bedrock (lithic)—11 to 18 inches
Slowest permeability class: Moderately slow above the bedrock
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 0.8 inch (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very high
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: D

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 8
Ecological site: Not assigned

Typical profile
0 to 2 inches; silty clay loam
2 to 5 inches; silty clay loam
Cr1—5 to 8 inches; bedrock
Cr2—8 to 11 inches; bedrock
R—11 inches; bedrock

Riverbend, Strongly Sloping

Slope: 8 to 30 percent
Landform: Backslopes of upper convex fan remnants
Parent material: Alluvium
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 85 to 92 percent with coarse subrounded gravel and 1 to 5 percent with subrounded cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 3 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Low
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 2 inches; very gravelly fine sandy loam
Bkq1—2 to 8 inches; gravelly sandy loam
Bkq2—8 to 20 inches; very gravelly sandy loam
2Bkq—20 to 60 inches; extremely gravelly loamy sand

Minor Components

Carrwash, dry, and similar soils
Percent of map unit: About 5 percent
Slope: 2 to 8 percent
Landform: Inset fans
Typical vegetation: Creosotebush and white ratany
Ecological site: R031XY006CA, Limy 2-4" p.z.

Chemehuevi and similar soils
Percent of map unit: About 5 percent
Slope: 2 to 8 percent
Landform: Summits of convex fan remnants
Typical vegetation: Creosotebush and white ratany
Ecological site: R031XY006CA, Limy 2-4" p.z.

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Burrobrush, blue paloverde, creosotebush, catclaw acacia, white bursage, and sweetbush
Ecological site: R031XY019CA, Coarse Gravelly Wash

Badland
Percent of map unit: About 1 percent
Slope: 75 to 150 percent
Landform: Side slopes of eroded fan remnants
Typical vegetation: None assigned
Ecological site: Not assigned

Cololag, sandy substratum, and similar soils
Percent of map unit: About 1 percent
Slope: 2 to 4 percent
Landform: Flat fan remnants
Typical vegetation: Creosotebush and white brittlebush
Ecological site: R031XY002CA, Desert Patina 2-4" p.z.

Riverwash
Percent of map unit: About 1 percent
Slope: 2 to 4 percent
Landform: Active drainageways
Typical vegetation: None assigned
Ecological site: Not assigned

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

1503—Carrizo association, 2 to 8 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 1,015 to 1,220 feet (310 to 372 meters)
Mean annual precipitation: 2 to 6 inches (51 to 152 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 300 to 360 days

Map Unit Composition

Carrizo and similar soils—65 percent
Carrizo, frequently flooded, and similar soils—30 percent
Minor components—5 percent

Carrizo

Slope: 2 to 8 percent
Landform: Drainageways and undulating inset fans
Parent material: Alluvium derived from granite
Typical vegetation: White bursage and creosotebush

Selected properties and qualities
Surface pH: 7.8
Percent of surface area covered with coarse fragments: 30 to 80 percent with coarse gravel, 0 to 10 percent with cobbles, and 0 to 5 percent with stones
Depth to restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.4 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Negligible
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY015CA, Limy 4-6" p.z.

Typical profile
A—0 to 2 inches; very gravelly loamy sand
C—2 to 60 inches; stratified extremely gravelly coarse sand to very gravelly loamy sand

Carrizo, Frequently Flooded

Slope: 2 to 8 percent
Landform: Drainageways
Parent material: Alluvium derived from granite
Typical vegetation: Blue paloverde, desert willow, catclaw acacia, and burrobrush

Selected properties and qualities
Surface pH: 8.0
Percent of surface area covered with coarse fragments: 0 to 10 percent with subangular stones, 0 to 10 percent with subangular cobbles, and 60 to 80 percent with coarse subangular gravel
Depth to restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.4 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: Frequent
Present annual ponding: None
Surface runoff: Negligible
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7w
Ecological site: R031XY010CA, Valley Wash

Typical profile
A—0 to 2 inches; fine sandy loam
C—2 to 60 inches; stratified extremely gravelly coarse sand to very gravelly coarse sand

Minor Components

Garywash and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 8 percent
Landform: Smooth fan remnants
Typical vegetation: Creosotebush
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typic Calciargids, occasionally flooded, and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 4 percent
Landform: Interfluves
Typical vegetation: Big galleta, white bursage, and creosotebush
Ecological site: R031XY016CA, Claypan

Riverwash
Percent of map unit: About 1 percent
Slope: 2 to 8 percent
Landform: Active drainageways
Typical vegetation: None assigned
Ecological site: Not assigned

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit,

see the “Use and Management of the Soils” section.

2000—Riverbend very gravelly fine sandy loam, 8 to 30 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 555 to 1,800 feet (170 to 550 meters)
Mean annual precipitation: 3 to 5 inches (76 to 127 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 325 to 365 days

Map Unit Composition

Riverbend, strongly sloping, and similar soils—85 percent
Minor components—15 percent

Riverbend, Strongly Sloping

Slope: 8 to 30 percent
Landform: Convex side slopes of fan remnants
Parent material: Alluvium derived from mixed sources
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 80 to 90 percent with coarse gravel and 1 to 10 percent with cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 3 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Low
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 2 inches; very gravelly fine sandy loam
Bkq1—2 to 8 inches; gravelly sandy loam
Bkq2—8 to 20 inches; very gravelly sandy loam
2Bkq—20 to 60 inches; extremely gravelly loamy sand

Minor Components

Carrwash, dry, and similar soils
Percent of map unit: About 5 percent
Slope: 2 to 8 percent
Landform: Inset fans
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY006CA, Limy 2-4" p.z.

Varwash and similar soils
Percent of map unit: About 4 percent
Slope: 2 to 4 percent
Landform: Summits of smooth fan remnants
Typical vegetation: Creosotebush
Ecological site: R031XY002CA, Desert Patina 2-4" p.z.

Cambidic Haplodurids and similar soils
Percent of map unit: About 3 percent
Slope: 8 to 30 percent
Landform: Convex side slopes of fan remnants
Typical vegetation: Creosotebush
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 3 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Blue paloverde, desert willow, catclaw acacia, and burrobrush
Ecological site: R031XY019CA, Coarse Gravelly Wash

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

2001—Riverbend-Chemehuevi association, 2 to 30 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 785 to 1,390 feet (240 to 425 meters)
Mean annual precipitation: 3 to 5 inches (76 to 127 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 300 to 365 days

Map Unit Composition

Riverbend, strongly sloping, and similar soils—55 percent
Chemehuevi and similar soils—30 percent
Minor components—15 percent

Riverbend, Strongly Sloping

Slope: 8 to 30 percent
Landform: Convex side slopes of fan remnants
Parent material: Alluvium
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 90 to 92 percent with coarse subrounded gravel and 0 to 3 percent with subrounded cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 3.0 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Low
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 2 inches; very gravelly fine sandy loam
Bkq1—2 to 8 inches; gravelly sandy loam
Bkq2—8 to 20 inches; very gravelly sandy loam
2Bkq—20 to 60 inches; extremely gravelly loamy sand

Chemehuevi

Slope: 2 to 4 percent
Landform: Summit of fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white ratany

Selected properties and qualities
Surface pH: 8.4
Percent of surface area covered with coarse fragments: 60 to 80 percent with coarse subangular gravel and 0 to 5 percent with subangular cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Moderate
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.7 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Well drained
Hydrologic soil group: B

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7e
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 3 inches; gravelly loam
Bk1—3 to 7 inches; gravelly fine sandy loam
Bk2—7 to 12 inches; very gravelly fine sandy loam
Bkq1—12 to 31 inches; extremely gravelly sandy loam
Bkq2—31 to 59 inches; extremely gravelly coarse sand

Minor Components

Carrizo, dry, and similar soils
Percent of map unit: About 7 percent
Slope: 2 to 8 percent
Landform: Fan aprons
Typical vegetation: Creosotebush
Ecological site: R031XY006CA, Limy 2-4" p.z.

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 4 percent

Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Blue paloverde, white brittlebush, catclaw acacia, and burrobrush
Ecological site: R031XY019CA, Coarse Gravelly Wash

Gunsight and similar soils
Percent of map unit: About 3 percent
Slope: 4 to 15 percent
Landform: Alluvial fans
Typical vegetation: Creosotebush and white brittlebush
Ecological site: R031XY021CA, Very Gravelly Wash

Typic Calciargids and similar soils
Percent of map unit: About 1 percent
Slope: 2 to 4 percent
Landform: Fan remnants
Typical vegetation: Creosotebush
Ecological site: R031XY002CA, Desert Patina 2-4" p.z.

See the "Soil Properties" section, including the "Chemical Properties of the Soils" and "Physical Properties of the Soils" tables, for component horizon data. A typical soil description with range in characteristics is included in the "Classification of the Soils" section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the "Use and Management of the Soils" section.

2010—Chemehuevi-Carrizo-Riverbend complex, 2 to 30 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 520 to 1,475 feet (160 to 450 meters)
Mean annual precipitation: 2 to 6 inches (51 to 152 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 300 to 365 days

Map Unit Composition

Chemehuevi and similar soils—35 percent
Carrizo and similar soils—30 percent
Riverbend, strongly sloping, and similar soils—20 percent
Minor components—15 percent

Chemehuevi

Slope: 2 to 8 percent
Landform: Summits of fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white ratany

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 60 to 80 percent with coarse subangular gravel and 0 to 5 percent with subangular cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 3.6 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Well drained
Hydrologic soil group: B

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7e
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 2 inches; gravelly sandy loam
Bk1—2 to 7 inches; gravelly sandy loam
Bk2—7 to 13 inches; very gravelly sandy loam
Bkq—13 to 32 inches; gravelly sandy loam
2Bkqy—32 to 61 inches; extremely gravelly coarse sand

Carrizo

Slope: 2 to 8 percent
Landform: Fan aprons and inset fans
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 7.8
Percent of surface area covered with coarse fragments: 1 to 15 percent with subangular cobbles, 0 to 5 percent with subangular stones,

and 60 to 80 percent with coarse subangular gravel
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.4 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: Very rare
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY005CA, Limy Fan 2-4" p.z.

Typical profile
A—0 to 2 inches; very gravelly sandy loam
C—2 to 60 inches; stratified extremely gravelly coarse sand to very gravelly loamy sand

Riverbend, Strongly Sloping

Slope: 8 to 30 percent
Landform: Summits of side slopes of fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 85 to 94 percent with coarse gravel and 1 to 5 percent with cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 3.0 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Low
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typical profile
A—0 to 2 inches; very gravelly fine sandy loam
Bkq1—2 to 8 inches; gravelly sandy loam
Bkq2—8 to 20 inches; very gravelly sandy loam
2Bkq—20 to 60 inches; extremely gravelly loamy sand

Minor Components

Riverbend, rarely flooded, and similar soils
Percent of map unit: About 6 percent
Slope: 2 to 8 percent
Landform: Summits of higher fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY020CA, Granitic Fan Remnant 4-6" p.z.

Carrwash, frequently flooded, and similar soils
Percent of map unit: About 4 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Burrobrush and creosotebush
Ecological site: R031XY018CA, Broad Gravelly Wash

Carrizo, steep, and similar soils
Percent of map unit: About 2 percent
Slope: 30 to 75 percent
Landform: Eroded side slopes of fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Cololag and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 4 percent
Landform: Flat fan remnants
Typical vegetation: Creosotebush
Ecological site: R031XY002CA, Desert Patina 2-4" p.z.

Riverbend and similar soils
Percent of map unit: About 1 percent
Slope: 2 to 4 percent
Landform: Inset fans
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY015CA, Limy 4-6" p.z.

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

2011—Cololag gravelly silt loam, 1 to 4 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 795 to 1,065 feet (243 to 325 meters)
Mean annual precipitation: 3 to 5 inches (76 to 127 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 320 to 365 days

Map Unit Composition

Cololag and similar soils—85 percent
Minor components—15 percent

Cololag

Slope: 1 to 4 percent
Landform: Smooth, flat summits of fan remnants
Parent material: Alluvium derived from metaquartzite
Typical vegetation: Creosotebush and white brittlebush

Selected properties and qualities
Surface pH: 8.6
Percent of surface area covered with coarse fragments: 60 to 75 percent with coarse rounded gravel and 1 to 5 percent with rounded cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Moderate
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 3.4 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Low
Natural drainage class: Somewhat excessively drained
Hydrologic soil group: B

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY002CA, Desert Patina 2-4" p.z. (fig. 1)

Typical profile
A—0 to 2 inches; gravelly silt loam
Btkq1—2 to 5 inches; very gravelly sandy loam
Btkq2—5 to 18 inches; extremely gravelly sandy loam
Btkq3—18 to 33 inches; extremely gravelly sandy loam
Btk—33 to 43 inches; extremely gravelly sandy loam
Bk—43 to 63 inches; very gravelly sandy loam

Minor Components

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 5 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Blue paloverde, desert willow, catclaw acacia, and burrobrush
Ecological site: R031XY019CA, Coarse Gravelly Wash

Gunsight and similar soils
Percent of map unit: About 5 percent
Slope: 4 to 15 percent
Landform: Interfluves
Typical vegetation: White brittlebush, creosotebush, white ratany, and white bursage
Ecological site: R031XY021CA, Very Gravelly Wash

Riverbend, strongly sloping, and similar soils
Percent of map unit: About 3 percent
Slope: 8 to 30 percent
Landform: Convex side slopes of fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Carrwash and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 8 percent
Landform: Inset fans
Typical vegetation: Creosotebush
Ecological site: R031XY006CA, Limy 2-4" p.z.

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

2020—Snaggletooth-Carrizo association, 1 to 8 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area

Figure 1.—Desert Patina 2-4" p.z. ecological site in an area of Cololag gravelly silt loam, 1 to 4 percent slopes.

MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 900 to 1,600 feet (275 to 488 meters)
Mean annual precipitation: 2 to 7 inches (51 to 175 millimeters)
Mean annual air temperature: 70 to 77 degrees F (21 to 25 degrees C)
Frost-free period: 320 to 365 days

Map Unit Composition

Snaggletooth and similar soils—65 percent
Carrizo and similar soils—20 percent
Minor components—15 percent

Snaggletooth

Slope: 1 to 4 percent
Landform: Smooth fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white ratany

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 40 to 50 percent with fine subrounded gravel and 20 to 30 percent with coarse subrounded gravel
Depth to restrictive feature: None noted
Slowest permeability class: Moderate
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 8.1 inches (high)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Well drained
Hydrologic soil group: B

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7e
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 2 inches; sandy loam
Bw—2 to 19 inches; gravelly sandy loam
Btk1—19 to 36 inches; gravelly loam
Btk2—36 to 63 inches; loam

Carrizo

Slope: 2 to 8 percent
Landform: Fan aprons and inset fans
Parent material: Alluvium derived from granite
Typical vegetation: White bursage and creosotebush

Selected properties and qualities
Surface pH: 7.8
Percent of surface area covered with coarse fragments: 60 to 80 percent with coarse subangular gravel, 1 to 15 percent with subangular cobbles, and 0 to 5 percent with subangular stones
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.4 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: Very rare
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY015CA, Limy 4-6" p.z.

Typical profile
A—0 to 2 inches; extremely gravelly sandy loam
C—2 to 60 inches; stratified extremely gravelly coarse sand to very gravelly loamy sand

Minor Components

Typic Calciargids, coarse-loamy, frequently flooded, and similar soils
Percent of map unit: About 7 percent
Slope: 2 to 4 percent
Landform: Fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY005CA, Limy Fan 2-4" p.z.

Riverbend, strongly sloping, and similar soils
Percent of map unit: About 5 percent
Slope: 4 to 15 percent
Landform: Side slopes of fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Carrwash, frequently flooded, and similar soils
Percent of map unit: About 3 percent
Slope: 2 to 8 percent
Landform: Drainageways
Typical vegetation: Blue paloverde, desert willow, catclaw acacia, and burrobrush
Ecological site: R031XY019CA, Coarse Gravelly Wash

See the "Soil Properties" section, including the "Chemical Properties of the Soils" and "Physical Properties of the Soils" tables, for component horizon data. A typical soil description with range in characteristics is included in the "Classification of the Soils" section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the "Use and Management of the Soils" section.

2030—Garywash gravelly fine sandy loam, 4 to 15 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 900 to 1,495 feet (275 to 457 meters)
Mean annual precipitation: 2 to 7 inches (55 to 175 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 320 to 365 days

Map Unit Composition

Garywash and similar soils—85 percent
Minor components—15 percent

Garywash

Slope: 4 to 15 percent
Landform: Convex fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 20 to 30 percent with coarse subrounded gravel and 55 to 65 percent with fine subrounded gravel
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Saline within a depth of 40 inches
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 5.8 inches (moderate)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None

Present annual ponding: None
Surface runoff: Low
Natural drainage class: Well drained
Hydrologic soil group: B

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7e
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 1 inch; gravelly fine sandy loam
Btkqy—1 to 5 inches; gravelly fine sandy loam
Bkqy—5 to 22 inches; very gravelly sandy loam
Bkq1—22 to 46 inches; fine sandy loam
Bkq2—46 to 60 inches; fine sandy loam

Minor Components

Chemehuevi, stony, and similar soils
Percent of map unit: About 6 percent
Slope: 2 to 8 percent
Landform: Smooth summits of fan remnants
Typical vegetation: Creosotebush and white ratany
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typic Calciargids, coarse-loamy, frequently flooded, and similar soils
Percent of map unit: About 4 percent
Slope: 2 to 8 percent
Landform: Undulating inset fans and interfluves
Typical vegetation: Big galleta, white bursage, and creosotebush
Ecological site: R031XY016CA, Claypan

Carrizo and similar soils
Percent of map unit: About 3 percent
Slope: 2 to 8 percent
Landform: Inset fans
Typical vegetation: Creosotebush and white ratany
Ecological site: R031XY006CA, Limy 2-4" p.z.

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 4 percent
Landform: Drainageways
Typical vegetation: Blue paloverde, desert willow, catclaw acacia, and burrobrush
Ecological site: R031XY019CA, Coarse Gravelly Wash

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

2031—Garywash-Chemehuevi complex, 2 to 8 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 900 to 1,800 feet (275 to 550 meters)
Mean annual precipitation: 2 to 7 inches (55 to 175 millimeters)
Mean annual air temperature: 70 to 77 degrees F (21 to 25 degrees C)
Frost-free period: 320 to 365 days

Map Unit Composition

Garywash and similar soils—60 percent
Chemehuevi, stony, and similar soils—25 percent
Minor components—15 percent

Garywash

Slope: 2 to 8 percent
Landform: Summits and side slopes of fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 60 to 90 percent with coarse subrounded gravel, 0 to 5 percent with subangular cobbles, and 0 to 5 percent with subangular stones
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Saline within a depth of 40 inches
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 4.4 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Well drained
Hydrologic soil group: B

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7e
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 1 inch; gravelly fine sandy loam
Btkqy—1 to 5 inches; gravelly fine sandy loam
Bkqy—5 to 22 inches; very gravelly sandy loam
Bkq1—22 to 46 inches; fine sandy loam
Bkq2—46 to 60 inches; fine sandy loam

Chemehuevi, Stony

Slope: 2 to 8 percent
Landform: Summits of fan remnants
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 1 to 10 percent with subangular stones, 60 to 80 percent with coarse subangular gravel, and 5 to 20 percent with subangular cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 3.7 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Well drained
Hydrologic soil group: B

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7e
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 2 inches; gravelly sandy loam
Bk1—2 to 7 inches; gravelly sandy loam
Bk2—7 to 13 inches; very gravelly sandy loam
Bkq—13 to 32 inches; gravelly sandy loam
2Bkqy—32 to 61 inches; extremely gravelly coarse sand

Minor Components

Carrizo, moist, and similar soils
Percent of map unit: About 7 percent
Slope: 2 to 8 percent
Landform: Inset fans
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY005CA, Limy Fan 2-4" p.z.

Carrizo, frequently flooded, and similar soils
Percent of map unit: About 4 percent
Slope: 2 to 4 percent
Landform: Drainageways
Typical vegetation: Blue paloverde, desert willow, catclaw acacia, and burrobrush
Ecological site: R031XY019CA, Coarse Gravelly Wash

Riverbend, strongly sloping, and similar soils
Percent of map unit: About 3 percent
Slope: 8 to 30 percent
Landform: Summits of backslopes of fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typic Calciargids, coarse-loamy, frequently flooded, and similar soils
Percent of map unit: About 1 percent
Slope: 2 to 8 percent
Landform: Inset fans and interfluves
Typical vegetation: Big galleta, creosotebush, and white bursage
Ecological site: R031XY016CA, Claypan

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

2400—Carrizo-Carrwash association, 2 to 8 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 490 to 1,310 feet (150 to 400 meters)
Mean annual precipitation: 2 to 6 inches (51 to 152 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 320 to 365 days

Map Unit Composition

Carrizo, frequently flooded, and similar soils—55 percent
Carrwash, dry, and similar soils—35 percent
Minor components—10 percent

Carrizo, Frequently Flooded

Slope: 2 to 8 percent
Landform: Undulating braided channels
Parent material: Alluvium derived from granite
Typical vegetation: Blue paloverde, catclaw acacia, burrobrush, and smoketree

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 0 to 10 percent with subangular cobbles, 0 to 10 percent with subangular stones, and 60 to 80 percent with coarse subangular gravel
Depth to restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.4 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: Frequent
Present annual ponding: None
Surface runoff: Negligible
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7w
Ecological site: R031XY010CA, Valley Wash

Typical profile
C1—0 to 9 inches; sand
C2—9 to 40 inches; stratified extremely gravelly coarse sand to gravelly sand
2Bt—40 to 59 inches; stratified extremely gravelly coarse sand to gravelly sand

Carrwash, Dry

Slope: 2 to 4 percent
Landform: Smooth inset fans
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 30 to 70 percent with coarse rounded gravel and 1 to 5 percent with rounded cobbles
Depth to restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.9 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Negligible
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 3 inches; very gravelly loamy coarse sand
C1—3 to 8 inches; gravelly loamy sand
C2—8 to 60 inches; stratified extremely gravelly coarse sand to very gravelly loamy coarse sand

Minor Components

Carrizo, steep, and similar soils
Percent of map unit: About 5 percent
Slope: 15 to 50 percent
Landform: Eroded fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Riverbend, strongly sloping, and similar soils
Percent of map unit: About 3 percent
Slope: 8 to 30 percent
Landform: Summits of convex fan remnants
Typical vegetation: Creosotebush and white bursage
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Typic Haplocalcids, loamy-skeletal, mixed, hyperthermic, and similar soils
Percent of map unit: About 2 percent
Slope: 2 to 4 percent
Landform: Flat, smooth summits of fan remnants
Typical vegetation: Creosotebush
Ecological site: R031XY002CA, Desert Patina 2-4" p.z.

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

2401—Carrizo-Carrwash association, eroded, 2 to 8 percent slopes

Map Unit Setting

General location: Lower Colorado Desert, Chemehuevi Wash Area
MLRA: 31—Lower Colorado Desert
Landscape position: Fan piedmonts
Elevation: 520 to 1,310 feet (160 to 400 meters)
Mean annual precipitation: 2 to 6 inches (51 to 152 millimeters)
Mean annual air temperature: 70 to 73 degrees F (21 to 23 degrees C)
Frost-free period: 320 to 365 days

Map Unit Composition

Carrizo, frequently flooded, and similar soils—60 percent
Carrwash dry, and similar soils—25 percent
Minor components—15 percent

Carrizo, Frequently Flooded

Slope: 2 to 8 percent
Landform: Drainageways
Parent material: Alluvium derived from granite
Typical vegetation: Blue paloverde, desert willow, catclaw acacia, and burrobrush

Selected properties and qualities
Surface pH: 7.8
Percent of surface area covered with coarse fragments: 0 to 10 percent with subangular stones, 0 to 10 percent with subangular cobbles, and 60 to 80 percent with coarse subangular gravel
Depth to restrictive feature: None noted
Slowest permeability class: Moderately rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.4 inches (very low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: Frequent
Present annual ponding: None
Surface runoff: Very low
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7w
Ecological site: R031XY010CA, Valley Wash

Typical profile
A—0 to 2 inches; extremely gravelly fine sandy loam
C—2 to 60 inches; stratified extremely gravelly coarse sand to very gravelly loamy sand

Carrwash, Dry

Slope: 2 to 4 percent
Landform: Smooth inset fans
Parent material: Alluvium derived from granite
Typical vegetation: Creosotebush and white bursage

Selected properties and qualities
Surface pH: 8.2
Percent of surface area covered with coarse fragments: 1 to 5 percent with cobbles and 35 to 75 percent with coarse gravel
Depth to restrictive feature: None noted
Slowest permeability class: Rapid
Salinity: Nonsaline
Sodicity: Nonsodic
Available water capacity to a depth of 60 inches: About 2.9 inches (low)
Shrink-swell potential: Low (LEP less than 3)

Selected hydrologic properties
Present annual flooding: None
Present annual ponding: None
Surface runoff: Negligible
Natural drainage class: Excessively drained
Hydrologic soil group: A

California land use interpretive groups
Land capability class (irrigated): Not calculated
Land capability class (nonirrigated): 7s
Ecological site: R031XY006CA, Limy 2-4" p.z.

Typical profile
A—0 to 3 inches; very gravelly loamy coarse sand
C1—3 to 8 inches; gravelly loamy sand
C2—8 to 60 inches; stratified extremely gravelly coarse sand to very gravelly loamy coarse sand

Minor Components

Badland
Percent of map unit: About 5 percent
Slope: 30 to 75 percent
Landform: Backslopes of eroded lakebeds (relict)
Typical vegetation: None assigned
Ecological site: Not assigned

Carrizo, steep, and similar soils
Percent of map unit: About 4 percent
Slope: 30 to 75 percent
Landform: Steep side slopes of fan remnants
Typical vegetation: Creosotebush
Ecological site: R031XY004CA, Limy Hill 2-4" p.z.

Gypsic Haplosalids, sandy-skeletal over clayey, and similar soils
Percent of map unit: About 3 percent
Slope: 2 to 8 percent
Landform: Inset fans over lakebeds (relict)
Typical vegetation: Creosotebush and white ratany
Ecological site: R031XY006CA, Limy 2-4" p.z.

Badland
Percent of map unit: About 2 percent
Slope: 30 to 75 percent
Landform: Semiconsolidated sand sheet
Typical vegetation: None assigned
Ecological site: Not assigned

Riverwash
Percent of map unit: About 1 percent
Slope: 2 to 4 percent
Landform: Active drainageways
Typical vegetation: None assigned
Ecological site: Not assigned

See the “Soil Properties” section, including the “Chemical Properties of the Soils” and “Physical Properties of the Soils” tables, for component horizon data. A typical soil description with range in characteristics is included in the “Classification of the Soils” section.

Use and Management

Major uses: Recreation and wildlife habitat

For information about management of this unit, see the “Use and Management of the Soils” section.

Use and Management of the Soils

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

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

Information in this section can be used to plan the use and management of soils as rangeland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

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

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *slight, moderate,* and *severe*. The suitability ratings are expressed as *well suited, suited,* and *poorly suited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes (USDA, 1961).

In the capability system, soils are generally

grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in the survey.

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

Class 1 soils have slight limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of map units in this survey area is given in the section “Detailed Soil Map Units” and in table 2.

Major Land Resource Area

The land capability classification system is further refined by designating the major land resource area (MLRA) of the soils. A major land resource area is a broad geographic area that has a distinct combination of climate, topography, vegetation, land use, and general type of farming (USDA, 2005). This survey area is in major land resource area 31—Lower Colorado Desert. This area is in the extreme southeastern part of California, in areas along the Colorado River, and in western Arizona. The combination of high temperature, low precipitation, and high potential evapotranspiration makes this one of the most arid areas in North America. The average annual precipitation is 2 to 6 inches (50 to 152 millimeters) with high temporal and spatial variability. The area is comprised of rough, barren, steep, and strongly dissected mountain ranges, generally northwest to southwest trending, that are separated by intermontane basins. The dominant native vegetation is white bursage and creosotebush. Elevation ranges from approximately 275 feet below sea level (-83 meters) at the lowest point in Salton Trough, below the southern part of the Salton Sea, to 1,650 feet above sea level (+500 meters) along low northwest to southeast trending mountain ranges.

The risk of wind erosion is high, and irrigation water management is an important practice. The Imperial Valley, Coachella Valley, and terraces along the Colorado River are used for intensive agriculture.

Rangeland

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 3 shows, for each soil that supports rangeland vegetation, the ecological site; the potential annual production of vegetation in favorable, normal, and unfavorable years; the potential natural vegetation; and the average percentage of each species. An explanation of the column headings in table 3 follows.

An *ecological site* is the product of all the environmental factors responsible for its development.

It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of a site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Total dry-weight production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits 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 about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Potential natural vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name and plant symbol (see table 16). Under *species composition*, the expected 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.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the "National Range and Pasture Handbook" (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html).

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Vegetation

The vegetation in the survey area can loosely be divided into two main groups—creosotebush scrub and desert wash scrub. The creosotebush scrub generally consists of dominantly creosotebush and white bursage, but it commonly also includes white ratany and other shrubs. An exception is on the hills and fan remnants in the northern part of the survey area, where creosotebush and white bursage are only minor components. The desert wash scrub is in washes and drainageways between hills and fan remnants. The largest wash in the area is the Chemehuevi Wash, which receives enough moisture to sustain trees.

The vegetation communities in the survey area have been grouped into ecological sites. An ecological site is a grouping of similar soils that produces a characteristic natural plant community that differs from natural plant communities on other ecological sites in kind, amount and proportion of range plants. For those areas where the relationship between the soils and vegetation was established during this survey, the ecological sites generally can be determined directly from the soil maps. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of plants. Soil pH and salt content are also important.

Dominant Ecological Sites

Desert Patina 2-4" p.z. (R031XY002CA).—This site is on smooth summits of fan remnants. It is easily identifiable by the varnished desert surface, or "desert pavement." Slopes range from 1 to 4 percent. The soils are moderately coarse textured and coarse textured, very deep, and well drained. Runoff is low, and permeability is moderately rapid. The potential plant

community consists dominantly of creosotebush. Of minor extent are white brittlebush, cactus, and sparse perennial grasses and forbs.

Limy 2-4" p.z. (R031XY006CA).—This site is on fan remnants, inset fans, and fan aprons (fig. 2). Slopes range from 1 to 15 percent. The soils are medium textured to coarse textured, very deep, and well drained to excessively drained. Runoff is negligible to low, and permeability is moderate to very rapid. The potential plant community consists dominantly of creosotebush. Of minor extent are white ratany, white bursage, burrobrush, cactus, and sparse perennial grasses and forbs.

Limy 4-6" p.z. (R031XY015CA).—This site is on inset fans and fan aprons (fig. 3). Slopes range from 2 to 8 percent. The soils are coarse textured, very deep, and excessively drained. Runoff is negligible and very low, and permeability is rapid and very rapid. The potential plant community consists dominantly white bursage and creosotebush. Of minor extent are white ratany, cactus, and sparse perennial grasses and forbs.

Limy Fan 2-4" p.z. (R031XY005CA).—This site is on fan aprons (fig. 4). Slopes range from 2 to 8 percent. The soils are coarse textured, very deep, and excessively drained. Runoff is very low, and permeability is rapid and very rapid. The potential plant community consists dominantly of creosotebush and white bursage. Of minor extent are white ratany, cactus, and sparse perennial grasses and forbs.

Limy Hill 2-4" p.z. (R031XY004CA).—This site is on hills, mountains, and strongly sloping to very steep side slopes of fan piedmonts (fig. 5). Slopes range from 8 to 75 percent. The soils are moderately coarse textured and coarse textured, very shallow or very deep, and excessively drained. Runoff is very low and low, and permeability is moderately rapid to very rapid. The potential plant community consists dominantly of creosotebush. Of minor extent are white ratany, white bursage, and sparse perennial grasses and forbs.

Limy Hill 4-6" p.z. (R031XY001CA).—This site is on hills and mountains (fig. 6). Slopes range from 8 to 50 percent. The soils are moderately coarse textured, very shallow and shallow, and somewhat excessively drained. Runoff is very high, and permeability is moderately rapid. The potential plant community consists dominantly of creosotebush and white bursage. Of minor extent are white ratany, burrobrush, cactus, and sparse perennial grasses and forbs.

Steep Granitic Slope 4-6" p.z. (R031XY017CA).—This site is on hills and mountains (fig. 7). Slopes range from 8 to 50 percent. The soils are moderately coarse textured, very shallow, and somewhat excessively drained. Runoff is very high, and permeability is moderately rapid. The potential plant community consists dominantly of white brittlebush, teddybear cholla, ocotillo, creosotebush, and Fremont dalea.

Steep South Slope 2-4" p.z. (R031XY003CA).—This site is on hills and mountains (fig. 8). Slopes range from 15 to 50 percent. The soils are moderately coarse textured, very shallow and shallow, and somewhat excessively drained. Runoff is very high, and permeability is moderately rapid. The potential plant community consists dominantly of white brittlebush and creosotebush. Of minor extent are white ratany, burrobrush, cactus, and sparse perennial grasses and forbs.

Valley Wash (R031XY010CA).—This site is in frequently flooded drainageways (fig. 9). Slopes range from 2 to 8 percent. The soils are coarse textured, very deep, and excessively drained. Runoff is negligible and very low, and permeability is rapid and very rapid. The potential plant community consists dominantly of burrobrush, creosotebush, catclaw, and smoketree. Of minor extent are desert willow and blue paloverde.

Effects of Off-Highway Vehicles on Ecological Sites

The survey area is managed as an off-highway vehicle recreation area. There are two types of areas within the survey area—closed areas and limited use areas. Vehicles are not allowed in the closed areas. In the limited use areas, vehicles are restricted to existing and/or designated routes (USDI, n.d.). No cross-country travel is allowed. The limited use areas make up a small percentage of the survey area.

The impact of vehicle use is predictable over time. In heavily used areas, smaller shrubs such as white bursage and white ratany are removed from the site, leaving only the larger shrubs such as creosotebush, which drivers tend to avoid. The removal of this shrub cover from an area dramatically increases the amount of airborne particulate matter.

Along with removing certain plants from a site, excessive vehicle disturbance can also allow invasive plants to take hold. The loosened topsoil in a disturbed site is easily colonized by invasive grasses and forbs such as schismus and red-stem filaree. These plants have two detrimental effects on a site. First, they increase the fuel load between shrubs, thus increasing the likelihood of sustaining wildfire. Second, they compete with native annuals for water and nutrients. This is important because many species of wildlife depend on native annuals for food, and they rarely use invasive annuals for food.

Figure 2.—Limy 2-4″ p.z. ecological site in an area of Garywash gravelly fine sandy loam, 4 to 15 percent slopes.

Figure 3.—Limy 4-6″ p.z. ecological site in an area of Carrizo association, 2 to 8 percent slopes.

Figure 4.—Limy Fan 2-4″ p.z. ecological site on the Carrizo soil in an area of Chemehuevi-Carrizo-Riverbend complex, 2 to 30 percent slopes.

Figure 5.—Limy Hill 2-4″ p.z. ecological site in an area of Riverbend very gravelly fine sandy loam, 8 to 30 percent slopes.

Figure 6.—Limy Hill 4-6″ p.z. ecological site on the Sunrock soil in an area of Sunrock-Cheme family-Rock outcrop association, 8 to 50 percent slopes.

Figure 7.—Steep Granitic Slope 4-6″ p.z. ecological site in an area of Stormjade-Goldroad complex, 8 to 50 percent slopes.

Figure 8.—Steep South Slope 2-4″ p.z. ecological site on the Whipple soil, warm, in an area of Stormjade-Whipple complex, 8 to 50 percent slopes.

Figure 9.—Valley Wash ecological site on the Carrizo soil in an area of Carrizo-Carrwash association, 2 to 8 percent slopes.

Burrowing Habitat for Desert Tortoise

The desert tortoise (*Gopherus agassizii*) was listed as a Federal "threatened" species in April 1990 under the provisions of the Endangered Species Act of 1973 (USDI, 1992). Of special interest in the survey area is the burrowing habitat for this tortoise.

At least 95 percent of the life of the desert tortoise is spent in burrows (Burge and Royo, 2000). The presence of soils suitable for digging burrows in large part determines the distribution of the tortoise. Some of the burrows are just deep enough for the tortoise to fit into while others extend for several feet.

Soil development is closely tied to the landscape. In this survey area, the soils on mountains and hills generally are poorly suited to use as burrowing habitat for the tortoise. The shallow depth to bedrock and excessive amount of rock fragments make burrowing difficult. The soils on bolson floors commonly are poorly suited because of the risk of flooding or ponding, the fine texture of the soils, and/or the presence of gypsic layers. The soils on fan piedmonts range from well suited to poorly suited to use as burrowing habitat.

For simplicity, the soils on fan piedmonts can be divided into those on recent alluvial fans and those on fan remnants. The soils on recent alluvial fans have undergone little soil development. Moderately coarse textured and medium textured soils commonly are suited to burrowing. Soil properties that limit use as burrowing habitat are flooding, excess sand or clay, large or small rock fragments, and dense layers.

The soils on fan remnants have undergone soil development ranging from an increase in lime deposition to the formation of a duripan. In addition to the soil properties mentioned above, shallow depth to a duripan can limit use as burrowing habitat. Areas where drainageways have been incised below the duripan commonly can be used as burrowing habitat for desert tortoise. Field examination of these drainageways and other micro-environmental characteristics that are too small for the scale of mapping used for this survey is recommended.

Table 4 shows the suitability of the soils in the survey area for use as burrowing habitat for desert tortoise. The soils are rated according to their potential to be excavated by desert tortoise for burrows, which are considered a necessary element of specific local habitat. The interpretive criteria is intended to provide a guideline in the identification and selection of sites that have the most potential for preserving, maintaining, or increasing the local population of desert tortoise.

The information in this table is of a more general nature. It is designed to be used in planning to identify areas of concern prior to application of conservation practices. Based on the objectives for the wildlife habitat, areas can be avoided or practices can be adjusted to minimize damage to the burrowing habitat. Climate and soil temperature, which may influence the presence or distribution of the species, were not taken into account. The presence or absence of the species should be determined locally.

The table gives a suitability class for each soil and identifies the dominant soil characteristics that limit the burrowing habitat for desert tortoise. This information can be used to plan and develop alternatives in site selection by identifying the sites that best meet the habitat requirements.

Soils that are rated *well suited* have no restrictions to use as burrowing habitat by desert tortoise. Colonization and population density may be above average if other habitat factors are favorable. Soils that are rated *suited* are suitable for use as burrowing habitat for desert tortoise, but some features may limit use of the site. Colonization and population density may be average if the other habitat requirements are met. Soils that are rated *poorly suited* have characteristics that limit establishment, maintenance, or use of the site as burrowing habitat. Colonization and population density may be limited even if the other habitat requirements are met.

The final identification and selection of a site suitable for use as burrowing habitat for desert tortoise is determined by the limitations of the soil as they affect excavation, maintenance, and preservation of the burrows. The limiting features that have the most effect on burrowing habitat and the assumptions made about the rating criteria given in the table are as follows:

1. Flooding from stream overflow adversely affects the suitability for burrowing. In areas subject to flooding, the burrowing reptiles may be evicted, species may be drowned, and the walls of the burrows may collapse or become filled with debris. After flooding, return of the burrowing species is delayed until the floodwater has receded and the soils have dried sufficiently to allow renewed activity.
2. Ponding or standing water adversely affects use by burrowing species.
3. Bedrock adversely affects the potential depth of excavation by burrowing species. The layers are either too hard or too dense for the species to excavate.
4. Highly gypsiferous layers are thought to adversely affect the potential depth of excavation by burrowing species. The layers may be too dense for

the species to excavate or may be undesirable because of the high content of gypsum crystals.

5. Cemented layers adversely affect the potential depth of excavation by burrowing species. The layers are either too hard or too dense for the species to excavate.

6. A seasonal high water table can affect burrowing species, restrict burrowing, and possibly result in drowning. Caving in or collapsing of the tunnels may be a problem, especially in areas affected by the capillary fringe.

7. Sandy layers, which are soft and loose, affect the excavation and maintenance of burrows by limiting the stability of the sidewalls. The burrows have a tendency to collapse.

8. Clayey layers, which are slippery and sticky when wet, slow to dry, and commonly hard when dry, affect the ability of the burrowing species to excavate.

9. A high content of organic matter affects maintenance of the burrows by limiting the stability of the sidewalls. The burrows have a tendency to collapse. Highly fibrous organic material is difficult to excavate.

10. A high content of rock fragments adversely affects the excavation of soil by burrowing species. Many species may be unable to dislodge or transport the rock fragments from the burrow.

11. Dense layers adversely affect the potential depth of excavation by burrowing species. The layers are either too hard or too dense for the species to excavate.

Urban Uses and Recreation

The soils of the survey area are rated in tables 5a and 5b according to limitations that affect their suitability for urban uses and 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 urban and recreational uses. *Slight* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Moderate* 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. *Severe* 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 tables 5a and 5b 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

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 fragments. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Following is a description of the major limiting features for camp areas:

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

Dusty.—Soil particles detach easily and result in dustiness.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Permeability.—The movement of water through the soil adversely affects the specified use. The rate may be either too slow or too fast.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

Salinity (EC).—Excess water-soluble salts in the soil restricts the growth of most plants.

Sand or sandy texture.—At some depth the content of sand in the soil or the sandy texture of the soil is such that the soil is soft and loose, droughty, and low in fertility or is too fine to use as a source of gravel.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

Sodicity (SAR).—Excess exchangeable sodium, which imparts poor physical properties, restricts the growth of plants.

Surface clay.—The content of clay in the surface layer or the clayey texture of the surface layer is such that the soil is slippery and sticky when wet and slow to dry. The soil climate may modify the limitation.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

Picnic Areas

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, soil wetness, ponding, flooding, permeability, and fragments. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Following is a description of the major limiting features for picnic areas:

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

Dusty.—Soil particles detach easily and result in dustiness.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Permeability.—The movement of water through the soil adversely affects the specified use. The rate may be either too slow or too fast.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

Salinity (EC).—Excess water-soluble salts in the soil restricts the growth of most plants.

Sand or sandy texture.—At some depth the content of sand in the soil or the sandy texture of the soil is such that the soil is soft and loose, droughty, and low in fertility or is too fine to use as a source of gravel.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

Sodicity (SAR).—Excess exchangeable sodium, which imparts poor physical properties, restricts the growth of plants.

Soil pH.—The pH of the soil is too low (acid) or too high (basic) for most plant growth.

Surface clay.—The content of clay in the surface layer or the clayey texture of the surface layer is such that the soil is slippery and sticky when wet and slow to dry. The soil climate may modify the limitation.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

Playgrounds

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 fragments 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, percent clay or sand, organic matter content, soil wetness, ponding, flooding, permeability, and fragments. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Following is a description of the major limiting features for playgrounds:

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

Dusty.—Soil particles detach easily and result in dustiness.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Permeability.—The movement of water through the soil adversely affects the specified use. The rate may be either too slow or too fast.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

Salinity (EC).—Excess water-soluble salts in the soil restricts the growth of most plants.

Sand or sandy texture.—At some depth the content of sand in the soil or the sandy texture of the soil is such that the soil is soft and loose, droughty, and low in fertility or is too fine to use as a source of gravel.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

Sodicity (SAR).—Excess exchangeable sodium, which imparts poor physical properties, restricts the growth of plants.

Soil pH.—The pH of the soil is too low (acid) or too high (basic) for most plant growth.

Surface clay.—The content of clay in the surface layer or the clayey texture of the surface layer is such that the soil is slippery and sticky when wet and slow to dry. The soil climate may modify the limitation.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

Paths and Trails

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 fragments on the surface, soil wetness, ponding, flooding, slope, texture of the surface layer, percent sand or clay, and organic matter content.

Following is a description of the major limiting features for paths and trails:

Dusty.—Soil particles detach easily and result in dustiness.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

K factor.—The soil is subject to a risk of water erosion.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

Sand or sandy texture.—At some depth the content of sand in the soil or the sandy texture of the soil is such that the soil is soft and loose, droughty, and low in fertility or is too fine to use as a source of gravel.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

Surface clay.—The content of clay in the surface layer or the clayey texture of the surface layer is such that the soil is slippery and sticky when wet and slow to dry. The soil climate may modify the limitation.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

Off-Road Motorcycle Trails

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 fragments on the surface, slope, soil wetness, ponding, flooding, texture of the surface layer, percent of sand or clay, and organic matter content.

Following is a description of the major limiting features for off-road motorcycle trails:

Dusty.—Soil particles detach easily and result in dustiness.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

Sand or sandy texture.—At some depth the content of sand in the soil or the sandy texture of the soil is such that the soil is soft and loose, droughty, and low in fertility or is too fine to use as a source of gravel.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

Surface clay.—The content of clay in the surface layer or the clayey texture of the surface layer is such that the soil is slippery and sticky when wet and slow to dry. The soil climate may modify the limitation.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

Lawns, Landscaping, and Golf Fairways

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, soil wetness, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in 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, soil wetness, ponding, slope, fragments on the surface, 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.

Following is a description of the major limiting features for lawns, landscaping, and golf fairways:

Available water capacity (AWC).—Available water capacity may restrict the growth of plants.

Calcium carbonates.—The amount of calcium carbonates may be high enough to restrict plant growth.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

Salinity (EC).—Excess water-soluble salts in the soil restricts the growth of most plants.

Sand or sandy texture.—At some depth the content of sand in the soil or the sandy texture of the soil is such that the soil is soft and loose, droughty, and low in fertility or is too fine to use as a source of gravel.

Slope.—The slope is steep enough that special

practices are required to ensure satisfactory performance of the soil.

Sodicity (SAR).—Excess exchangeable sodium, which imparts poor physical properties, restricts the growth of plants.

Soil pH.—The pH of the soil is too low (acid) or too high (basic) for most plant growth.

Sulfur content.—The level of sulfur in the soil may be high enough to restrict plant growth.

Surface clay.—The content of clay in the surface layer or the clayey texture of the surface layer is such that the soil is slippery and sticky when wet and slow to dry. The soil climate may modify the limitation.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

Engineering

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

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 between the surface and a depth of 5 to 7 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 particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 6a and 6b show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, and shallow excavations.

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. *Slight* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Moderate* 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. *Severe* 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 and small commercial buildings

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 soil wetness, 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 soil wetness, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of fragments and depth to 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 soil wetness, 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, soil wetness, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of fragments and the depth to fragments.

Following is a description of the major limiting features for dwellings and small commercial buildings. Major management considerations are also given for some of the features.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

- Onsite investigation is needed to identify areas where the soil is deep enough for dwellings.
- If slopes are more than 8 percent, cuts needed to provide level building sites can expose bedrock.
- The bedrock can make a good base for foundations.
- To maintain vegetation, frequent irrigation cycles and controlled application rates should be used.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

- Onsite investigation is needed to identify areas where the soil is deep enough for dwellings.
- If slopes are more than 8 percent, cuts needed to provide level building sites can expose the cemented pan.
- The pan can make a good base for foundations.
- To maintain vegetation, frequent irrigation cycles and controlled application rates should be used to prevent the buildup of a perched water table.
- If deep-rooted plants, such as trees, are planted, the pan should be ripped or broken to provide greater rooting depth.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

- The potential for flooding should be considered before buildings or capital improvements are planned and installed.
- Buildings, roads, and streets should be located above the expected flood level.
- Dikes and channels that have outlets for floodwater can be used to protect buildings from flooding.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

Shrink-swell (LEP).—The shrinking of the soil when dry and swelling when wet is expressed as the linear

extensibility percent (LEP). Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.
- Properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.
- Excavation for roads and buildings increases the risk of erosion.
- All bare ground should be mulched during construction. A ground cover should be established to prevent excessive erosion during periods of high rainfall.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.
- Drainage is needed if roads and building foundations are constructed.

Local roads and streets

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, soil wetness, ponding, flooding, the amount of coarse fragments, 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, soil wetness, and ponding.

Following is a description of the major limiting features for local roads and streets. Major management considerations are also given for some of the features.

AASHTO Group Index (soil strength).—Engineering properties of the soil expressed as the AASHTO Group Index (GI) indicate soil strength. Values of more than 8 indicate low soil strength for road and airfield construction.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.
- Onsite investigation is needed to identify areas where the soil is deep enough for local roads and streets.
- If slopes are more than 8 percent, cuts needed to provide level roads and streets can expose bedrock.
- The bedrock can make a good base for foundations.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.
- Onsite investigation is needed to identify areas where the soil is deep enough for local roads and streets.
- If slopes are more than 8 percent, cuts needed to provide level roads and streets can expose the cemented pan.
- The pan can make a good base for foundations.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Frost action.—The upward or lateral movement of the soil as a result of the formation of ice lenses may damage structures, roads, and plant roots.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.
- Drainage is needed if roads are constructed.

Shrink-swell (LEP).—The shrinking of the soil when dry and swelling when wet is expressed as the linear extensibility percent (LEP). Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.
- Properly designing the road base and diverting runoff away from roads help to prevent structural damage as a result of shrinking and swelling.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.
- Excavation for roads increases the risk of erosion.
- All bare ground should be mulched during construction. A ground cover should be established to prevent excessive erosion during periods of high rainfall.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.
- Drainage is needed if roads are constructed.

*Shallow excavation*s

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 coarse fragments, and dense layers influence the ease of digging, filling, and compacting. Seasonal wetness, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, soil wetness, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Following is a description of the major limiting features for shallow excavations. Major management considerations are also given for some of the features.

Clay or clayey texture.—At some depth the content of clay or clayey texture of the soil is such that the soil is slippery and sticky when wet and slow to dry.

Caving potential.—The walls or sides of excavations tend to cave inward. All soil excavations have the potential to cave in, but some soils have a higher risk than others.

Bulk density (dense layer).—The bulk density of a soil layer is such that the layer is too dense.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

- Onsite investigation is needed to identify areas where the soil is deep enough for excavations.
- If slopes are more than 8 percent, excavations can expose bedrock.
- The bedrock can make a good base for foundations.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

- Onsite investigation is needed to identify areas where the soil is deep enough for excavations.
- If slopes are more than 8 percent, excavations can expose the cemented pan.
- The pan can make a good base for foundations.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

- The potential for flooding should be considered before excavations or capital improvements are planned and installed.
- Dikes and channels that have outlets for floodwater can be used to protect excavations.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

- Drainage is needed for excavations during some periods.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

- Excavation increases the risk of erosion.
- All bare ground should be mulched during construction. A ground cover should be established to prevent excessive erosion during periods of high rainfall.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

- Drainage is needed for excavations during some periods.

Sanitary Facilities

Tables 7a and 7b 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. *Slight* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Moderate* 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. *Severe* 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. The soils are rated *good, fair,* or *poor* as potential source of daily cover for landfill.

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

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. Coarse fragments 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.

Following is a description of the major limiting features for septic tank absorption fields. Major management considerations are also given for some of the features.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

- Onsite investigation is needed to identify areas where the soil is deep enough for septic tank absorption fields.
- The depth to bedrock restricts the filtering capacity of the leach lines and can restrict placement of the lines.
- Enlarging the septic tank absorption fields can help to overcome the limited depth to bedrock.
- If slopes are more than 8 percent, cuts needed to provide essentially level building sites can expose bedrock.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

- The pan limits the soil volume available for filtering effluent. The material below the pan should be tested to determine if the lines should be placed below the pan.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

- The potential for flooding should be considered before capital improvements are planned and the sewage disposal system is installed.
- The sewage disposal system should be located above the expected flood level.
- Dikes and channels that have outlets for floodwater can be used to protect the onsite sewage disposal system from flooding.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Permeability.—The movement of water through the soil adversely affects the specified use. The rate may be either too slow or too fast.

- The restricted permeability increases the risk of failure of septic tank absorption fields.
- The restricted permeability can be overcome by increasing the size of the absorption field and using coarser backfill material or by placing the leach lines in strata that is more permeable.
- Building up or mounding the area with suitable fill material helps to increase the filtering capacity of the absorption field.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

- Use of suitable fill material helps to increase the filtering capacity of the septic tank absorption field.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

- Onsite investigation is needed to identify areas where the soil is suitable for septic tank absorption fields.
- Installing septic tank leach lines on the contour helps to prevent seepage of effluent in downslope areas.
- All bare ground should be mulched during construction. A ground cover should be established to prevent excessive erosion during periods of high rainfall.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

- Use of suitable fill material to raise the filter field to a sufficient depth above the seasonal high water table helps to improve performance.

Sewage lagoons

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, coarse fragments, 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 coarse fragments 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.

Following is a description of the major limiting features for sewage lagoons. Major management considerations are also given for some of the features.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

- Onsite investigation is needed to identify areas where the soil is deep enough for sewage lagoons.
- Enlarging the sewage lagoons can help to overcome the limited depth to bedrock.
- If slopes are more than 2 percent, cuts needed to provide essentially level building sites can expose bedrock.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

- Onsite investigation is needed to identify areas where the soil is deep enough for sewage lagoons.
- Enlarging the sewage lagoons can help to overcome the limited depth to the cemented pan.
- If slopes are more than 2 percent, cuts needed to provide essentially level building sites can expose the cemented pan.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

- The potential for flooding should be considered before capital improvements are planned and the sewage lagoon is installed.
- The sewage lagoon should be located above the expected flood level.
- Dikes and channels that have outlets for floodwater can be used to protect the sewage lagoon from flooding.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Permeability.—The movement of water through the soil adversely affects the specified use. The rate may be either too slow or too fast.

- A suitable lining needs to be installed to prevent seepage and contamination of the groundwater.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

- Use of suitable fill material to raise the sewage lagoon helps to improve performance.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

- Onsite investigation is needed to identify areas where the soil is suitable for sewage lagoons.
- Installing sewage lagoons on the contour helps to prevent seepage of effluent in downslope areas.
- All bare ground should be mulched during construction. A ground cover should be established to prevent excessive erosion during periods of high rainfall.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

- Use of suitable fill material to raise the sewage lagoon to a sufficient depth above the seasonal high water table helps to improve performance.

Trench sanitary landfill

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, soil wetness, 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.

Following is a description of the major limiting features for trench sanitary landfills. Major management considerations are also given for some of the features.

Clay or clayey texture.—At some depth the content of clay or clayey texture of the soil is such that the soil is slippery and sticky when wet and slow to dry.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

- Onsite investigation is needed to identify areas where the soil is deep enough for trench sanitary landfills.
- If slopes are more than 8 percent, cuts needed to provide essentially level building sites can expose bedrock.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

- Onsite investigation is needed to identify areas where the soil is deep enough for trench sanitary landfills.
- If the cemented pan is thick, enlarging the trench sanitary landfill helps to overcome the limited depth to the pan.
- If the cemented pan is thin and suitable material is beneath the pan, ripping the pan may improve performance of the landfill.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.

- The potential for flooding should be considered before capital improvements are planned and trench sanitary landfills are installed.
- Dikes and channels that have outlets for floodwater can be used to protect the landfills.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Permeability.—The movement of water through the soil adversely affects the specified use. The rate may be either too slow or too fast.

- A suitable lining needs to be installed to prevent seepage and contamination of the ground water.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

- Use of suitable fill material to raise the trench sanitary landfill helps to improve performance.

Salinity (EC).—Excess water-soluble salts in the soil restricts the growth of most plants.

Sand or sandy texture.—At some depth the content of sand in the soil or the sandy texture of the soil is such that the soil is soft and loose, droughty, and low in fertility or is too fine to use as a source of gravel.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

- Onsite investigation is needed to identify areas where the soil is suitable for trench sanitary landfills.
- Installing trench sanitary landfills on the contour helps to prevent seepage of effluent in downslope areas.
- All bare ground should be mulched during construction. A ground cover should be established to prevent excessive erosion during periods of high rainfall.

Sodicity (SAR).—Excess exchangeable sodium, which imparts poor physical properties, restricts the growth of plants.

Soil pH.—The pH of the soil is too low (acid) or too high (basic) for most plant growth.

Wetness.—Wetness near the surface or a high

water table affects the growth of plants and construction of facilities.
- Use of suitable fill material to raise the trench sanitary landfill to a sufficient depth above the seasonal high water table helps to improve performance.

Area sanitary landfill

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, soil wetness, 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.

Following is a description of the major limiting features for area sanitary landfills. Major management considerations are also given for some of the features.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.
- Onsite investigation is needed to identify areas where the soil is deep enough for area sanitary landfills.
- Enlarging the area sanitary landfill helps to overcome the limited depth to bedrock.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.
- Onsite investigation is needed to identify areas where the soil is deep enough for area sanitary landfills.
- Enlarging the area sanitary landfill helps to overcome the limited depth to the pan.

Flooding.—The soil is flooded by moving water from stream overflow, runoff, or high tides.
- The potential for flooding should be considered before capital improvements are planned and area sanitary landfills are installed.
- Dikes and channels that have outlets for floodwater can be used to protect the landfills.

Permeability.—The movement of water through the soil adversely affects the specified use. The rate may be either too slow or too fast.
- A suitable lining needs to be installed to prevent seepage and contamination of the ground water.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.
- Use of suitable fill material to raise the area sanitary landfill helps to improve performance.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.
- Onsite investigation is needed to identify areas where the soil is suitable for area sanitary landfills.
- Installing area sanitary landfills on the contour helps to prevent seepage of effluent in downslope areas.
- All bare ground should be mulched during construction. A ground cover should be established to prevent excessive erosion during periods of high rainfall.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.
- Use of suitable fill material to raise the area sanitary landfill to a sufficient depth above the seasonal high water table helps to improve performance.

Daily cover for landfill

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, soil wetness, 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 coarse fragments 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 soil wetness 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.

Following is a description of the major limiting features for daily cover for landfill. Major management considerations are also given for some of the features.

Calcium carbonates.—The amount of calcium carbonates may be high enough to restrict plant growth.

Clay or clayey texture.—At some depth the content of clay or clayey texture of the soil is such that the soil is slippery and sticky when wet and slow to dry.

Depth to bedrock.—Bedrock is at a shallow enough depth to restrict use.

- Onsite investigation is needed to identify areas where the soil is deep enough to obtain cover material.

Depth to pan.—Dense, hard, somewhat impervious cemented soil material at a specific depth restricts use.

- Onsite investigation is needed to identify areas where the soil is deep enough to obtain cover material.

Fragments.—The profile contains enough fragments of a specific size to adversely affect site preparation or trafficability.

Packing.—Unified classes of OL, OH, CH, MH indicate that the soil may be difficult to compact with regular earthwork construction equipment.

Organic matter (OM).—High organic matter content at some depth, sometimes expressed as a Unified soil class (PT, OL, or OH), can result in poor engineering properties and subsidence. Low organic matter content can affect plant growth.

Permeability.—The movement of water through the soil adversely affects the specified use. The rate may be either too slow or too fast.

- The material is too coarse to use as landfill cover. Seepage may contaminate the ground water.

Ponding.—Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration.

- Seasonal ponding may restrict access to cover material.

Salinity (EC).—Excess water-soluble salts in the soil restricts the growth of most plants.

Sand or sandy texture.—At some depth the content of sand in the soil or the sandy texture of the soil is such that the soil is soft and loose, droughty, and low in fertility or is too fine to use as a source of gravel.

Slope.—The slope is steep enough that special practices are required to ensure satisfactory performance of the soil.

- Onsite investigation is needed to identify areas where the soil is suitable as cover material.
- If slopes are more than 8 percent, cuts may expose undesirable material.
- All bare ground should be mulched during construction. A ground cover should be established to prevent excessive erosion during periods of high rainfall.

Sodicity (SAR).—Excess exchangeable sodium, which imparts poor physical properties, restricts the growth of plants.

Soil pH.—The pH of the soil is too low (acid) or too high (basic) for most plant growth.

Wetness.—Wetness near the surface or a high water table affects the growth of plants and construction of facilities.

- Seasonal wetness may restrict access to cover material.

Construction Materials

Tables 8a and 8b 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 table 8a, 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 numbers 0.00 to 0.07 indicate that the layer is a poor source. The numbers 0.75 to 1.00 indicate that the layer is a good source. The

numbers 0.08 to 0.74 indicate the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil, reclamation material, and roadfill. 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.

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.

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 coarse fragments, soil wetness, 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).

Water Management

Table 9 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for embankments, dikes, and levees and pond reservoir areas. 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. *Slight* indicates that the soil has features that are generally favorable for the specified use. The limitations are minor and easily overcome. *Moderate* indicates that the soil has features that are not favorable for the specified use. Special planning, design, or maintenance is needed to overcome or minimize the limitations. *Severe* indicates that the soil has one or more features that are so unfavorable or so difficult to overcome for the specified use that special design, significant increases in construction costs, and possibly increased maintenance are needed.

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).

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. Soil wetness affects the amount of usable material. It also affects trafficability.

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.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

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 are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 10 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

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 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1998) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-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.

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 particle-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 generally omitted in the table.

Physical Properties

Table 11 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the 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.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In table 11, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In table 11, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 11, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each 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. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in micrometers per second (um/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. 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 table

11, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Erosion factors are shown in table 11 as the K factor (Kw and Kf) and the T factor. 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) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

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

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

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

Chemical Properties

Table 12 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the 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.

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

Soil reaction is a measure of acidity or alkalinity. The pH of each soil 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 fraction of the soil less than 2 millimeters in size. 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 expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum 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 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 soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount 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 that have SAR values 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.

Water Features

Table 13 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.

Frequency of ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. 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 is the temporary inundation of an area 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.

Soil Features

Table 14 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 restrict roots or 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.

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

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

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

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2003). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 15 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Aridisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Durid (*Dur*, meaning duripan, plus *id*, from Aridisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplodurids (*Haplo*, meaning minimal horizonation, plus *durid*, the suborder of the Aridisols that has a duripan).

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

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

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

Badland and Taxonomic Units and Their Morphology

In this section, Badland and each taxonomic unit recognized in the survey area are described. Characteristics of the soil and the material in which it formed are identified for each unit. A pedon, a small three-dimensional area of soil, that is typical of the unit in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 2003). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the unit.

Badland

Badland consists of steep and very steep barren land that is dissected by many intermittent drainage channels. The areas commonly are not stony. Badland is most common in semiarid and arid regions where streams have cut into soft geologic material. Potential runoff is very high, and erosion is active. The areas of Badland in this survey area consist of as much as 12

centimeters of poorly consolidated silty clay loam underlain by highly fractured, soft shale.

Carrizo Series

The Carrizo series consists of very deep, excessively drained soils that formed in stratified alluvium derived from mixed sources. The soils are on drainageways, inset fans, fan aprons, and fan remnants. Slopes range from 2 to 75 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is 22 degrees C. The frost-free period is 300 to 365 days.

Taxonomic class: Sandy-skeletal, mixed, hyperthermic Typic Torriorthents

Typical pedon location: Carrizo association, 2 to 8 percent slopes, at an elevation of 348 meters; latitude 34 degrees, 23 minutes, 45.5 seconds north and longitude 114 degrees, 37 minutes, 19.7 seconds west; USGS Savahia Peak NE, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 718,589 meters Easting and 3,808,625 meters Northing (NAD 83).

Typical pedon

Surface rock fragments: 55 percent gravel, 2 percent cobbles, and 1 percent stones

A—0 to 3 centimeters; pale brown (10YR 6/3) very gravelly loamy sand, brown (10YR 4/3) moist; strong very thick platy structure; moderately hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine and common fine interstitial pores; strongly effervescent; 15 percent fine gravel, 20 percent medium and coarse gravel, and 1 percent cobbles; moderately alkaline (pH 8.0); abrupt smooth boundary.

Ckq1—3 to 20 centimeters; pale brown (10YR 6/3) very gravelly loamy sand, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and few fine tubular pores; 10 percent distinct brown (7.5YR 5/3) silica on rock fragments; 10 percent prominent very pale brown (10YR 8/2) coatings of calcium carbonate on rock fragments; strongly effervescent; 10 percent fine gravel, 30 percent medium and coarse gravel, and 2 percent cobbles; moderately alkaline (pH 8.0); abrupt smooth boundary.

Ckq2—20 to 131 centimeters; pale brown (10YR 6/3), stratified extremely gravelly coarse sand to very gravelly sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common fine and very fine and few medium roots; many very fine, common fine, and few medium interstitial pores; 10 percent distinct brown (7.5YR 5/3) silica on rock fragments; 10 percent prominent very pale brown (10YR 8/2) coatings of calcium carbonate on rock fragments; strongly effervescent; averages 20 percent fine gravel, 40 percent medium and coarse gravel, and 3 percent cobbles; moderately alkaline (pH 8.0); abrupt smooth boundary.

2Btkq—131 to 150 centimeters; brown (10YR 5/3) extremely gravelly coarse sand, brown (10YR 4/3) moist; massive; moderately hard, very friable, nonsticky and nonplastic; many very fine and common fine interstitial pores; 10 percent distinct brown (7.5YR 4/3) clay bridges between sand grains; 10 percent distinct brown (7.5YR 5/3) coatings of silica on rock fragments; 10 percent prominent very pale brown (10YR 8/2) coatings of calcium carbonate on rock fragments; strongly effervescent; 20 percent fine gravel, 40 percent medium and coarse gravel, and 2 percent cobbles; moderately alkaline (pH 8.0).

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime

Soil temperature: 22 to 26.7 degrees C

Organic matter content: 0 to 0.5 percent

Control section:

Rock fragment content—averages 35 to 80 percent gravel, cobbles, or stones

Effervescence—slightly effervescent to strongly effervescent with disseminated calcium carbonate

Reaction—slightly alkaline or moderately alkaline

A and Ckq horizons:

Hue—7.5YR or 10YR

Value—4 to 7 dry, 2 to 6 moist

Chroma—2 to 6 dry, 2 to 4 moist

Texture of the fine-earth fraction—coarse sand, sand, loamy coarse sand, or loamy sand modified by stones, cobbles, or gravel

Stratification—loamy sand to coarse sand that is 10 to 85 percent rock fragments

2Btkq horizon:

Hue—7.5YR or 10YR

Value—4 to 7 dry, 2 to 6 moist

Chroma—2 to 6 dry, 2 to 4 moist

Texture of the fine-earth fraction—coarse sand, sand, loamy coarse sand, or loamy sand

Rock fragment content: 50 to 70 percent gravel, cobbles, and stones
Clay bridging—not accompanied by enough of an increase in clay content for an argillic horizon

Carrwash Series

The Carrwash series consists of very deep, excessively drained soils that formed in alluvium derived from mixed rock sources that are dominantly granite. The soils are on inset fans and fan piedmonts. Slopes range from 2 to 4 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 22 degrees C. The frost-free period is 320 to 365 days.

Taxonomic class: Sandy-skeletal, mixed, hyperthermic Typic Torriorthents

Typical pedon location: Carrizo-Carrwash association, 2 to 8 percent slopes, at an elevation of 157 meters; San Bernardino County, California; latitude 34 degrees, 28 minutes, 6.84 seconds north and longitude 114 degrees, 25 minutes, 22.08 seconds west; USGS Havasu Lake, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 736,712 meters Easting and 3,817,126 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: 35 percent gravel and 1 percent cobbles
A—0 to 6 centimeters; yellowish brown (10YR 5/4) very gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; common fine interstitial pores; slightly effervescent; 30 percent fine gravel and 5 percent medium and coarse gravel; moderately alkaline (pH 8.2); abrupt smooth boundary.
C1—6 to 20 centimeters; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine roots; common very fine interstitial pores; slightly effervescent; 10 percent fine gravel and 5 percent medium and coarse gravel; moderately alkaline (pH 8.2); clear wavy boundary.
C2—20 to 38 centimeters; pale brown (10YR 6/3) very gravelly coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; many very fine and common medium and coarse roots; common very fine interstitial pores; strongly effervescent; 25 percent fine gravel and 10 percent medium and coarse gravel; moderately alkaline (pH 8.2); abrupt wavy boundary.
C3—38 to 63 centimeters; pale brown (10YR 6/3) very gravelly coarse sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; common very fine interstitial pores; strongly effervescent; 40 percent fine gravel and 10 percent medium and coarse gravel; moderately alkaline (pH 8.2); abrupt smooth boundary.
C4—63 to 113 centimeters; light yellowish brown (10YR 6/4), stratified very gravelly coarse sand to extremely gravelly coarse sand, brown (10YR 5/3) moist; massive; moderately hard, very friable, nonsticky and nonplastic; many medium roots; common very fine interstitial pores; slightly effervescent; averages 40 percent fine gravel and 10 percent medium and coarse gravel; moderately alkaline (pH 8.2); abrupt smooth boundary.
C5—113 to 170 centimeters; yellowish brown (10YR 5/4) very gravelly coarse sand, brown (10YR 5/3) moist; massive; moderately hard, very friable, nonsticky and nonplastic; very slightly effervescent; 35 percent fine gravel and 5 percent medium and coarse gravel; moderately alkaline (pH 8.0).

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime
Soil temperature: 22 to 26 degrees C
Organic matter content: 0 to 0.5 percent

Control section:
Rock fragment content—averages 35 to 60 percent, of which more than one-half is in the 2- to 5-millimeter fraction
Clay content—2 to 5 percent
Reaction—moderately alkaline or strongly alkaline

A horizon:
Value—5 or 6 dry, 4 or 5 moist
Chroma—3 or 4

C horizon:
Value—5 to 7 dry, 4 or 5 moist
Chroma—3 or 4
Texture of the fine-earth fraction—stratified gravelly loamy sand to extremely gravelly coarse sand
Structure—massive or single grain
Consistence—soft or loose
Effervescence—very slightly effervescent to strongly effervescent
Other feature—few very thin, randomly oriented coatings of lime on pebbles in most pedons

Cheme Family

The Cheme family consists of soils that are very shallow and shallow over a duripan and are well drained. The soils are on lower footslopes of hills. They formed in alluvium derived from basalt and andesite. Slopes range from 4 to 15 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 23 degrees C. The frost-free period is 300 to 365 days.

Taxonomic class: Loamy-skeletal, mixed, superactive, hyperthermic, shallow Typic Haplodurids

Typical pedon location: Sunrock-Cheme family-Rock outcrop association, 8 to 50 percent slopes, at an elevation of 501 meters; latitude 34 degrees, 19 minutes, 38.40 seconds north and longitude 114 degrees, 30 minutes, 58.90 seconds west; USGS Savahia Peak, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 728,501 meters Easting and 3,801,245 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: 35 percent gravel, 10 percent cobbles, 1 percent stones, and 35 percent gravel-sized pan fragments

A—0 to 7 centimeters; pale brown (10YR 6/3) very gravelly fine sandy loam, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine and common fine tubular pores; violently effervescent; 8 percent fine gravel, 16 percent medium and coarse duripan fragments, 16 percent medium and coarse gravel, and 4 percent cobbles; moderately alkaline (pH 8.2); clear smooth boundary.

Bw—7 to 28 centimeters; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine and few fine tubular pores; violently effervescent; 10 percent fine gravel, 30 percent medium and coarse gravel, and 5 percent cobbles; moderately alkaline (pH 8.2); abrupt wavy boundary.

Bkqm—28 to 55 centimeters; white (10YR 8/1) very strongly cemented duripan material, very pale brown (10YR 7/3) moist; massive; rigid, brittle; violently effervescent.

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime

Soil temperature: 22.0 to 26.7 degrees C

Depth to duripan: 15 to 50 centimeters

Organic matter content: 0 to 0.5 percent

Control section:

Clay content—8 to 18 percent

Reaction—moderately alkaline or strongly alkaline

Rock fragment content—35 to 75 percent gravel and cobbles, including as much as 50 percent indurated hardpan fragments

A horizon:

Hue—7.5YR or 10YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—3 or 4 dry or moist

Bw or Bkq horizon:

Hue—7.5YR or 10YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—3 or 4 dry or moist

Texture of the fine-earth fraction—fine sandy loam or loam

Calcium carbonate equivalent—15 to 25 percent in the less than 20-millimeter fraction

Bkqm horizon:

Structure—platy or massive

Cementation—strongly cemented or very strongly cemented

Chemehuevi Series

The Chemehuevi series consists of very deep, well drained soils that formed in alluvium derived from granite, schist, and gneiss (fig. 10). The soils are on fan remnants (fig. 11). Slopes range from 2 to 8 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 23 degrees C. The frost-free period is 325 to 365 days.

Taxonomic class: Loamy-skeletal, mixed, superactive, hyperthermic Typic Haplocalcids

Typical pedon location: Chemehuevi-Carrizo-Riverbend complex, 2 to 30 percent slopes, at an elevation of 272 meters; San Bernardino County, California; latitude 34 degrees, 27 minutes, 10.8 seconds north and longitude 114 degrees, 30 minutes, 29.6 seconds west; USGS Savahia Peak NE, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 728,907 meters Easting and 3,815,203 meters Northing (NAD 83).

Figure 10.—Typical pedon of a Chemehuevi soil in an area of Chemehuevi-Carrizo-Riverbend complex, 2 to 30 percent slopes. Numerals on tape are in centimeters.

Typical Pedon

Surface rock fragments: 65 percent gravel and 1 percent cobbles

A—0 to 4 centimeters; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate very thick platy structure parting to coarse subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots; common very fine and fine tubular pores; strongly effervescent; 10 percent fine gravel, 20 percent medium and coarse gravel, and 1 percent cobbles; moderately alkaline (pH 8.2); abrupt smooth boundary.

Bk1—4 to 18 centimeters; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 3 percent discontinuous prominent very pale brown (10YR 7/3) coatings of carbonate on underside of rock fragments; violently effervescent (12 percent calcium carbonate); 5 percent fine gravel and 10 percent medium and coarse gravel; moderately alkaline (pH 8.2); clear wavy boundary.

Bk2—18 to 33 centimeters; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 3 percent discontinuous prominent very pale brown (10YR 7/3) coatings of carbonate on underside of rock fragments and 15 percent extremely coarse prominent interstitial extremely weakly cemented very pale brown (10YR 8/2) masses of carbonate with clear boundaries in soil matrix; violently effervescent (12 percent calcium carbonate); 10 percent fine gravel, 25 percent medium and coarse gravel, and 1 percent cobbles; moderately alkaline (pH 8.2); clear wavy boundary.

Bkq—33 to 82 centimeters; light yellowish brown (10YR 6/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; moderately hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; 25 percent discontinuous distinct brownish yellow (10YR 6/6) coatings of silica on underside of rock fragments; 20 percent discontinuous faint very pale brown (10YR 7/3) coatings of carbonate on underside of rock fragments; 15 percent fine prominent interstitial extremely weakly cemented very pale brown (10YR 8/2) masses of calcium carbonate with clear boundaries in soil matrix; violently effervescent (17 percent calcium carbonate); 10 percent fine gravel, 20 percent medium and

Figure 11.—Typical area of a Chemehuevi soil.

coarse gravel, and 1 percent cobbles; strongly alkaline (pH 8.6); clear wavy boundary.

2Bkqy—82 to 155 centimeters; light yellowish brown (10YR 6/4) extremely gravelly coarse sand, yellowish brown (10YR 5/4) moist; massive; moderately hard, very friable, nonsticky and nonplastic; common very fine and fine interstitial pores; 55 percent discontinuous distinct brownish yellow (10YR 6/6) coatings of silica on underside of rock fragments; 15 percent very coarse distinct interstitial moderately cemented very pale brown (10YR 8/2) masses of carbonate as bands and pipes in soil matrix; 1 percent fine distinct interstitial extremely weakly cemented very pale brown (10YR 8/2) masses of gypsum with clear boundaries on faces of peds; strongly effervescent (12 percent calcium carbonate); 25 percent fine gravel, 40 percent medium and coarse gravel, and 1 percent cobbles; strongly alkaline (pH 8.6).

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime

Soil temperature: 25 to 28 degrees C

Organic matter content: 0 to 0.5 percent

Depth to calcic horizon: 5 to 25 centimeters

Control section:

Rock fragment content—averages 35 to 60 percent, mainly fine and medium gravel

Clay content—averages 8 to 12 percent

A horizon:

Structure—moderate or strong, fine or medium

Bk1 and Bk2 horizons:

Structure—medium or coarse

Consistence—soft or slightly hard, friable or very friable

Clay content—6 to 12 percent

Rock fragment content—15 to 50 percent

Calcium carbonate equivalent—5 to 15 percent

Bkq horizon:

Structure—weak or moderate, fine or medium

Consistence—slightly hard or moderately hard, very friable or friable
Rock fragment content—25 to 35 percent
Calcium carbonate equivalent—10 to 20 percent
Reaction—moderately alkaline or strongly alkaline

2Bkqy horizon or 2Bkq horizon, where present:
Consistence—slightly hard or moderately hard, very friable or friable
Clay content—2 to 8 percent
Rock fragment content—60 to 75 percent
Calcium carbonate equivalent—5 to 15 percent
Gypsum content—0 to 1 percent
Reaction—moderately alkaline or strongly alkaline
Other features—5 to 25 percent bands and pipes of lime

Cololag Series

The Cololag series consists of very deep, somewhat excessively drained soils that formed in alluvium derived dominantly from metaquartzite. The soils are on fan remnants. Slopes range from 1 to 4 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 22 degrees C. The frost-free period is 320 to 365 days.

Taxonomic class: Loamy-skeletal, mixed, superactive, hyperthermic Typic Calciargids

Typical pedon location: Cololag gravelly silt loam, 1 to 4 percent slopes, at an elevation of 248 meters; San Bernardino County, California; latitude 34 degrees, 25 minutes, 27.84 seconds north and longitude 114 degrees, 25 minutes, 28.26 seconds west; USGS Havasu Lake, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 736,680 meters Easting and 3,812,223 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: 75 percent gravel, 1 percent cobbles, and 1 percent stones

A—0 to 5 centimeters; light brown (7.5YR 6/4) gravelly silt loam, brown (7.5YR 4/4) moist; moderate thick platy structure parting to moderate medium subangular blocky; moderately hard, firm, slightly sticky and slightly plastic; many very fine roots; many very fine and fine vesicular pores; 10 percent fine distinct interstitial very weakly cemented white (10YR 8/1) masses of carbonate with clear boundaries in matrix; strongly effervescent; 15 percent fine gravel; strongly alkaline (pH 8.6); clear wavy boundary.

Btkq1—5 to 13 centimeters; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; moderately hard, firm, slightly sticky and slightly plastic; many very fine roots; many very fine and fine vesicular pores; 2 percent distinct pink (7.5YR 7/3) silica on underside of rock fragments; 20 percent distinct light yellowish brown (10YR 6/4) clay films between sand grains; few distinct coatings of carbonate that are pink (7.5YR 7/3) dry and are on rock fragments; strongly effervescent; 25 percent fine gravel and 10 percent medium and coarse gravel; strongly alkaline (pH 8.8); abrupt wavy boundary.

Btkq2—13 to 45 centimeters; brown (7.5YR 5/4) extremely gravelly sandy loam, brown (7.5YR 4/4) moist; massive; moderately hard, firm, slightly sticky and slightly plastic; many very fine roots; few very fine interstitial pores; 2 percent distinct very pale brown (10YR 7/4) and pink (7.5YR 7/3) silica on underside of rock fragments; 20 percent distinct light brown (10YR 6/4) clay films between sand grains; 40 percent distinct light gray (10YR 7/2) coatings of carbonate on rock fragments and 10 percent fine distinct interstitial very weakly cemented white (10YR 8/1) masses of carbonate with clear boundaries in matrix; slightly effervescent; 50 percent fine gravel, 15 percent medium and coarse gravel, and 5 percent cobbles; moderately alkaline (pH 8.4); gradual wavy boundary.

Btkq3—45 to 83 centimeters; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; moderately hard, friable, nonsticky and nonplastic; few fine interstitial pores; 20 percent distinct very pale brown (10YR 7/4) clay bridging between sand grains; 2 percent distinct very pale brown (10YR 7/4) and pink (7.5YR 7/3) coatings of silica on underside of rock fragments; 40 percent distinct very pale brown (10YR 7/4) coatings of carbonate on rock fragments and 10 percent fine distinct interstitial very weakly cemented white (10YR 8/1) masses of calcium carbonate with clear boundaries in matrix; strongly effervescent; 45 percent fine gravel, 25 percent medium and coarse gravel, and 2 percent cobbles; moderately alkaline (pH 8.0); clear wavy boundary.

Btk—83 to 110 centimeters; yellowish brown (10YR 5/4) extremely gravelly sandy loam, pale brown (10YR 6/3) moist; massive; moderately hard, friable, nonsticky and nonplastic; few fine interstitial pores; 20 percent distinct light yellowish brown (10YR 6/4) clay films bridging sand grains;

40 percent prominent light gray (10YR 7/2) coatings of carbonate on rock fragments and 10 percent fine distinct interstitial very weakly cemented white (10YR 8/1) masses of calcium carbonate with clear boundaries in matrix; violently effervescent; 40 percent fine gravel, 25 percent medium and coarse gravel, 5 percent cobbles, and 5 percent stones; moderately alkaline (pH 8.2); abrupt wavy boundary.

Bk1—110 to 125 centimeters; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine interstitial pores; common prominent light gray (10YR 7/2), coatings of calcium carbonate on rock fragments; 10 percent fine distinct interstitial very weakly cemented white (10YR 8/1) masses of calcium carbonate with clear boundaries in matrix; violently effervescent; 20 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; moderately alkaline (pH 8.2); clear wavy boundary.

Bk2—125 to 170 centimeters; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine interstitial pores; 40 percent prominent light gray (10YR 7/2) coatings of calcium carbonate on rock fragments; slightly effervescent; 40 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; moderately alkaline (pH 8.4).

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime
Soil temperature: 22 to 24 degrees C
Depth to calcic horizon: 5 to 12 centimeters
Depth to base of argillic horizon: 25 to 110 centimeters
Reaction: Moderately alkaline or strongly alkaline

Control section:
Clay content—averages 10 to 18 percent
Calcium carbonate equivalent—5 to 20 percent
Rock fragment content—35 to 70 percent, mainly gravel

A horizon:
Hue—5YR or 7.5YR
Value—6 or 7 dry, 4 or 5 moist
Chroma—3 or 4 dry or moist
Texture of the fine-earth fraction—silt loam

Btkq and Btk horizons, where present:
Hue—5YR, 7.5YR, or 10YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—4 to 6 dry or moist
Texture of the fine-earth fraction—sandy loam or fine sandy loam
Clay content—10 to 18 percent
Rock fragment content—35 to 70 percent, mainly gravel
Calcium carbonate equivalent—5 to 25 percent in the fine-earth fraction
Other feature—some pedons have 2 to 3 percent coatings of silica on underside of rock fragments

Bk1 horizon:
Hue—5YR, 7.5YR, or 10YR
Value—6 or 7 dry
Clay content—8 to 15 percent
Rock fragment content—20 to 50 percent, mainly gravel
Calcium carbonate equivalent—15 to 25 percent in the fine-earth fraction

Bk2 horizon:
Hue—5YR, 7.5YR, or 10YR
Value—6 or 7 dry
Clay content—7 to 15 percent
Rock fragment content—50 to 75 percent, mainly gravel
Calcium carbonate equivalent—15 to 25 percent in the fine-earth fraction

Garywash Series

The Garywash series consists of very deep, well drained soils that formed in alluvium derived from granite (fig. 12). The soils are on fan remnants (fig. 13). Slopes range from 2 to 15 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 24 degrees C. The frost-free period is 320 to 365 days.

Taxonomic class: Coarse-loamy, mixed, superactive, hyperthermic Typic Haplocalcids

Typical pedon location: Garywash gravelly fine sandy loam, 4 to 15 percent slopes, at an elevation of 359 meters; San Bernardino County, California; latitude 34 degrees, 23 minutes, 5.3 seconds north and longitude 114 degrees, 35 minutes, 56.4 seconds west; USGS Savahia Peak NE, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 720,746 meters Easting and 3,807,435 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: Approximately 95 percent gravel

A—0 to 2 centimeters; pale brown (10YR 6/3) gravelly

Figure 12.—Typical pedon of Garywash gravelly fine sandy loam, 4 to 15 percent slopes. Numerals on tape are in centimeters.

fine sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium and thick platy structure; moderately hard, very friable, slightly sticky and nonplastic; many very fine vesicular pores and common fine tubular pores; strongly effervescent (16 percent calcium carbonate equivalent in the fine-earth fraction); 10 percent fine gravel and 24 percent medium and coarse gravel; electrical conductivity 0.5 decisiemen per meter; moderately alkaline (pH 8.2); abrupt smooth boundary.

Btkqy—2 to 13 centimeters; light yellowish brown (10YR 6/4) gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very and fine tubular pores; 20 percent distinct white (10YR 8/1) calcium carbonate and silica films on underside of rock fragments; 3 percent fine to medium distinct interstitial white (10YR 8/1) masses of calcium carbonate in matrix around concentrations with clear boundaries; 1 percent fine white (10YR 8/1) masses of gypsum in matrix around concentrations; violently effervescent (11 percent calcium carbonate equivalent in the fine-earth fraction); 7 percent fine gravel and 18 percent medium and coarse gravel; electrical conductivity 0.1 decisiemen per meter; moderately alkaline (pH 8.2); abrupt wavy boundary.

Bkqy—13 to 55 centimeters; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine tubular pores; 35 percent distinct white (10YR 8/1) films of calcium carbonate and silica on underside of rock fragments; 25 percent fine to coarse distinct interstitial white (10YR 8/1) masses of calcium carbonate in matrix around concentrations with clear boundaries; 1 percent fine white (10YR 8/1) masses of gypsum in matrix around concentrations; violently effervescent (17 percent calcium carbonate equivalent in the fine-earth fraction); 10 percent fine gravel and 35 percent medium and coarse gravel; electrical conductivity 11 decisiemens per meter; moderately alkaline (pH 8.2); clear wavy boundary.

Bkq1—55 to 117 centimeters; pale brown (10YR 6/3) fine sandy loam, yellowish brown (10YR 5/4) moist; moderate coarse subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; many very fine and common fine tubular pores; 20 percent distinct white (10YR 8/1) films of calcium carbonate and silica on underside of rock fragments; 3 percent fine to medium distinct interstitial white (10YR 8/1) masses of calcium carbonate in matrix around concentrations with clear boundaries; violently effervescent (13 percent calcium carbonate equivalent in the fine-earth fraction); 2 percent fine gravel and 8 percent medium and coarse gravel; electrical conductivity 16 decisiemens per meter; moderately alkaline (pH 8.2); clear wavy boundary.

Bkq2—117 to 152 centimeters; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; hard, very friable, nonsticky and nonplastic; 3 percent fine to medium distinct interstitial white (10YR 8/1) masses of calcium carbonate in matrix around concentrations with

Figure 13.—Typical area of a Garywash soil.

clear boundaries; violently effervescent (11 percent calcium carbonate equivalent in the fine-earth fraction); 5 percent fine gravel, 5 percent medium and coarse gravel, and 2 percent cobbles; moderately alkaline (pH 8.2).

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime
Soil temperature: 22 to 27 degrees C
Organic matter content: 0 to 0.5 percent
Depth to calcic horizon: 10 to 25 centimeters

Control section:
Rock fragment content—averages 15 to 35 percent, mainly gravel
Clay content—6 to 15 percent

A horizon:
Value—6 or 7 dry
Structure—weak to strong
Consistence—slightly hard or moderately hard, nonsticky or slightly sticky, nonplastic or slightly plastic
Rock fragment content—0 to 34 percent
Effervescence—strongly effervescent or violently effervescent
Calcium carbonate equivalent—5 to 20 percent
Electrical conductivity—0 to 2 decisiemens per meter

Btkqy horizon:
Hue—7.5YR or 10YR
Value—6 or 7 dry, 4 to 6 moist
Chroma—3 or 4
Texture of the fine-earth fraction—fine sandy loam or sandy loam
Structure—weak or moderate, medium or coarse
Consistence—soft or slightly hard, nonsticky or slightly sticky
Rock fragment content—0 to 45 percent gravel and 0 to 5 percent cobbles
Calcium carbonate equivalent—5 to 15 percent
Electrical conductivity—0 to 2 decisiemens per meter
Clay films—absent in some pedons

Bkqy and Bkq horizons:
Hue—7.5YR or 10YR
Value—6 to 8 dry, 4 to 6 moist
Chroma—3 or 4
Texture of the fine-earth fraction—sandy loam, fine sandy loam, or loam
Structure—weak or moderate, medium or coarse subangular blocky structure, or massive
Consistence—soft to hard, very friable or friable, nonsticky or slightly sticky, nonplastic or slightly plastic
Rock fragment content—0 to 60 percent gravel and 0 to 5 percent cobbles
Reaction—moderately alkaline or strongly alkaline
Calcium carbonate equivalent—15 to 25 percent in the upper part and less than 15 percent in the lower part
Electrical conductivity—8 to 16 decisiemens per meter
Clay films—absent in some pedons
Other feature—5 to 40 percent masses of secondary calcium carbonate in the upper part and 1 to 4 percent in the lower part

Goldroad Series

The Goldroad series consists of very shallow and shallow, somewhat excessively drained soils that formed in residuum and colluvium derived from granite. The soils are on hills. Slopes range from 15 to 50 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 22 degrees C. The frost-free period is 300 to 365 days.

Taxonomic class: Loamy-skeletal, mixed, superactive, calcareous, hyperthermic Lithic Torriorthents

Typical pedon location: Stormjade-Goldroad complex, 8 to 50 percent slopes, at an elevation of 521 meters; San Bernardino County, California; latitude 34 degrees, 30 minutes, 45.5 seconds north and longitude 114 degrees, 35 minutes, 33.4 seconds west; USGS Chemehuevi Peak, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 720,995 meters Easting and 3,821,629 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: 75 percent gravel and 3 percent cobbles
A—0 to 4 centimeters; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak very thick platy structure parting to moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; strongly effervescent; 10 percent fine gravel, 25 percent medium and coarse gravel, and 1 percent cobbles; moderately alkaline (pH 8.2); abrupt smooth boundary.
Bk1—4 to 14 centimeters; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and common fine roots; many very fine and common fine tubular pores; 1 percent prominent very pale brown (10YR 8/2) coatings of calcium carbonate on underside of rock fragments; strongly effervescent; 35 percent fine gravel and 25 percent medium and coarse gravel; moderately alkaline (pH 8.2); clear wavy boundary.
Bk2—14 to 25 centimeters; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; 1 percent fine prominent very weakly cemented very pale brown (10YR 8/2) masses of calcium carbonate with sharp boundaries on underside of rock fragments; strongly effervescent; 20 percent fine gravel, 50 percent medium and coarse gravel, and 10 percent cobbles; moderately alkaline (pH 8.2); abrupt wavy boundary.
R—25 centimeters; hard granitic rock with fractures at intervals of 10 to 20 centimeters.

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime
Soil temperature: 22 to 26.7 degrees C
Depth to bedrock: 10 to 50 centimeters
Organic matter content: 0 to 0.5 percent

Control section:
Rock fragment content—35 to 75 percent gravel and cobbles
Calcium carbonate equivalent—0 to 5 percent
Clay content—5 to 15 percent

A horizon:
Hue—10YR or 7.5YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—3 or 4 dry or moist

Bw horizon, where present, or Bk horizon:
Hue—10YR or 7.5YR
Value—5 or 6 dry, 4 to 6 moist
Chroma—3 or 4 dry or moist

Texture of the fine-earth fraction—sandy loam or coarse sandy loam

Riverbend Series

The Riverbend series consists of very deep, excessively drained soils that formed in stratified fan alluvium derived dominantly from granite. The soils are on fan remnants. Slopes range from 8 to 30 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 22 degrees C. The frost-free period is 300 to 365 days.

Taxonomic class: Sandy-skeletal, mixed, hyperthermic Typic Haplocalcids

Typical pedon location: Riverbend very gravelly fine sandy loam, 8 to 30 percent slopes, at an elevation of 369 meters; San Bernardino County, California; latitude 34 degrees, 23 minutes, 2.3 seconds north and longitude 114 degrees, 32 minutes, 2.2 seconds west; USGS Savahia Peak NE, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 726,731 meters Easting and 3,807,488 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: 85 percent gravel and 1 percent cobbles

A—0 to 4 centimeters; light yellowish brown (10YR 6/4) very gravelly fine sandy loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine roots; common very fine, fine, and medium vesicular pores; strongly effervescent; 10 percent fine gravel and 30 percent medium and coarse gravel; moderately alkaline (pH 8.2); abrupt smooth boundary.

Bkq1—4 to 20 centimeters; very pale brown (10YR 7/3) gravelly sandy loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; moderately hard, very friable, slightly sticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 10 percent fine distinct interstitial moderately cemented silica concretions with clear boundaries on underside of rock fragments; 10 percent fine distinct interstitial moderately cemented white (10YR 8/1) calcium carbonate concretions with clear boundaries on underside of rock fragments; strongly effervescent; 10 percent fine gravel and 5 percent medium and coarse gravel; moderately alkaline (pH 8.2); clear wavy boundary.

Bkq2—20 to 52 centimeters; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; 10 percent fine distinct interstitial moderately cemented silica concretions with clear boundaries on underside of rock fragments; 10 percent fine distinct interstitial moderately cemented white (10YR 8/1) calcium carbonate concretions with clear boundaries on underside of rock fragments; 5 percent medium prominent interstitial extremely weakly cemented very pale brown (10YR 8/2) calcium carbonate concretions with clear boundaries in matrix; strongly effervescent; 15 percent fine gravel, 30 percent medium and coarse gravel, and 1 percent cobbles; moderately alkaline (pH 8.4); clear wavy boundary.

2Bkq—52 to 150 centimeters; very pale brown (10YR 7/3) extremely gravelly loamy sand, yellowish brown (10YR 5/4) moist; massive; moderately hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; 10 percent fine distinct interstitial moderately cemented silica concretions with clear boundaries on underside of rock fragments and 5 percent very coarse prominent interstitial very weakly cemented durinodes with clear boundaries in matrix; 10 percent fine distinct interstitial moderately cemented white (10YR 8/1) calcium carbonate concretions with clear boundaries on underside of rock fragments, 5 percent fine to medium prominent interstitial very weakly cemented very pale brown (10YR 8/2) calcium carbonate concretions with clear boundaries in matrix, and 5 percent very coarse prominent interstitial very weakly cemented calcium carbonate nodules with clear boundaries in matrix; strongly effervescent; 20 percent fine gravel, 45 percent medium and coarse gravel, and 1 percent cobbles; strongly alkaline (pH 8.6).

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime

Soil temperature: 22 to 26 degrees C

Organic matter content: 0 to 0.5 percent

Depth to calcic horizon: 10 to 50 centimeters

Control section:
Rock fragment content—35 to 75 percent, mostly gravel but 0 to 5 percent cobbles
Calcium carbonate equivalent—5 to 20 percent

A horizon:
Hue—7.5YR or 10YR
Value—5 to 7 dry, 4 to 6 moist
Chroma—3 or 4 dry or moist

Bk horizon, where present, and Bkq horizon:
Hue—7.5YR or 10YR
Value—5 to 7 dry, 4 to 6 moist
Chroma—3 or 4 dry or moist
Texture of the fine-earth fraction—loamy sand, but ranges to include thin strata of sandy loam in some pedons

Snaggletooth Series

The Snaggletooth series consists of very deep, well drained soils that formed in alluvium derived from granite (fig. 14). The soils are on fan remnants (fig. 15). Slopes range from 1 to 4 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 24 degrees C. The frost-free period is 320 to 365 days.

Taxonomic class: Fine-loamy, mixed, superactive, hyperthermic Typic Calciargids

Typical pedon location: Snaggletooth-Carrizo association, 1 to 8 percent slopes, at an elevation of 346 meters; San Bernardino County, California; latitude 34 degrees, 26 minutes, 34.2 seconds north and longitude 114 degrees, 37 minutes, 3.9 seconds west; USGS Savahia Peak NE, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 718,869 meters Easting and 3,813,834 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: 65 percent gravel
A—0 to 4 centimeters; light brown (7.5YR 6/3) sandy loam, brown (7.5YR 4/3) moist; strong very thick platy structure; moderately hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine vesicular and tubular pores; violently effervescent; 7 percent fine gravel and 3 percent medium and coarse gravel; moderately alkaline (pH 8.2); abrupt smooth boundary.
Bw—4 to 49 centimeters; light brown (7.5YR 6/3) gravelly sandy loam, brown (7.5YR 4/3) moist; weak coarse subangular blocky structure; soft and slightly hard, very friable, nonsticky and nonplastic; many very fine and few fine and medium roots; many very fine tubular pores; violently effervescent; 10 percent fine gravel and 5 percent medium and coarse gravel; moderately alkaline (pH 8.4); abrupt wavy boundary.
Btk1—49 to 92 centimeters; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; moderately hard, very friable, slightly sticky and moderately plastic; common very fine roots; many

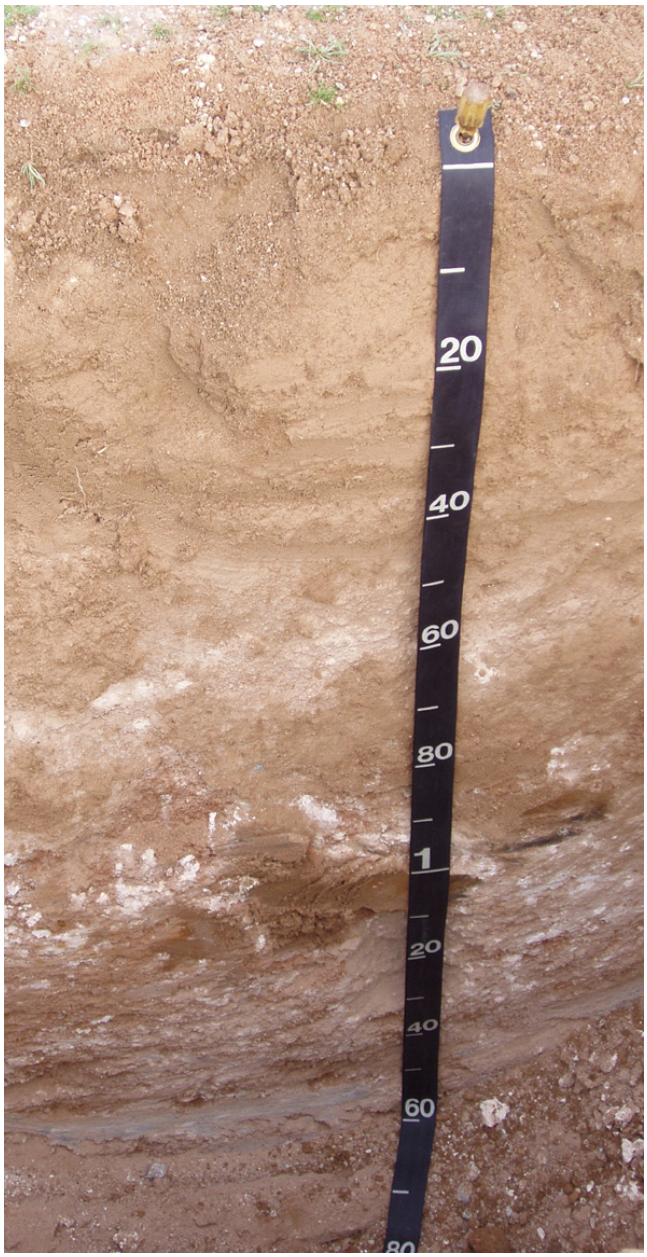


Figure 14.—Typical pedon of a Snaggletooth soil in an area of Snaggletooth-Carrizo association, 1 to 8 percent slopes. The numerals on the tape are in centimeters.

Figure 15.—Typical area of a Snaggletooth soil.

very fine and common fine tubular pores; 15 percent faint brown (7.5YR 5/4) clay films on faces of peds and bridging sand grains; 10 percent fine to coarse interstitial extremely weakly cemented white (10YR 8/1) masses of calcium carbonate in matrix around concentrations with clear boundaries; violently effervescent; 10 percent fine gravel and 5 percent medium and coarse gravel; strongly alkaline (pH 8.6); abrupt wavy boundary.

Btk2—92 to 135 centimeters; light brown (7.5YR 6/3) loam, brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure; moderately hard, very friable, slightly sticky and moderately plastic; many very fine and common fine tubular pores; 15 percent faint brown (7.5YR 5/4) clay films on faces of peds and bridging sand grains; 15 percent fine to coarse interstitial extremely weakly cemented white (10YR 8/1) masses of calcium carbonate in matrix around concentrations with clear boundaries; violently effervescent; 2 percent fine gravel and 1 percent medium and coarse gravel; strongly alkaline (pH 8.6); clear wavy boundary.

Btk3—135 to 165 centimeters; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; moderately hard, very friable, slightly sticky and moderately plastic; many very fine and few fine tubular pores and few very fine interstitial pores; 15 percent faint brown (7.5YR 5/4) clay films on faces of peds and bridging sand grains; 10 percent fine to coarse interstitial extremely weakly cemented white (10YR 8/1) masses of calcium carbonate in matrix around concentrations with clear boundaries; violently effervescent; 15 percent fine gravel and 5 percent medium and coarse gravel; strongly alkaline (pH 8.6).

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime

Soil temperature: 22 to 27 degrees C

Organic matter content: 0 to 0.5 percent

Depth to argillic horizon: 2 to 50 centimeters

Depth to base of argillic horizon: 100 to 150 centimeters

Depth to calcic horizon: 2 to 50 centimeters

Control section:
Rock fragment content—averages 0 to 15 percent, mainly fine and medium gravel
Clay content—averages 18 to 30 percent

A horizon:
Hue—7.5YR or 10YR
Chroma—3 or 4
Structure—weak to strong, thick and very thick
Consistence—soft to moderately hard, nonsticky or slightly sticky, and nonplastic or slightly plastic
Rock fragment content—0 to 15 percent
Calcium carbonate equivalent—5 to 15 percent

Bw horizon:
Value—4 or 5 moist
Chroma—3 or 4
Structure—moderate or coarse subangular blocky, or massive
Rock fragment content—0 to 35 percent
Calcium carbonate equivalent—5 to 15 percent
Other features—texture typically sandy loam, but some pedons are very gravelly coarse sand; 1 to 4 percent masses of secondary calcium carbonate in some pedons; clay films in some pedons, but pedons do not meet the requirements for an argillic horizon

Btk horizon:
Value—6 or 7 dry, 4 or 5 moist
Chroma—3, 4, or 6
Texture of the fine-earth fraction—loam, clay loam, or sandy loam
Structure—moderate or strong
Consistence—moderately hard or hard, very friable or friable, slightly sticky or moderately sticky, and slightly plastic or moderately plastic
Rock fragment content—averages 0 to 15 percent, but ranges from 0 to 20 percent
Reaction—moderately alkaline or strongly alkaline
Calcium carbonate equivalent—10 to 25 percent
Other feature—5 to 35 percent masses of secondary calcium carbonate

Stormjade Series

The Stormjade series consists of very shallow, somewhat excessively drained soils that formed in residuum and colluvium derived dominantly from granitic sources. The soils are on hills. Slopes range from 8 to 30 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 23 degrees C. The frost-free period is 325 to 365 days.

Taxonomic class: Loamy-skeletal, mixed, superactive, calcareous, hyperthermic, shallow Typic Torriorthents

Typical pedon location: Stormjade-Whipple complex, 8 to 50 percent slopes, at an elevation of 521 meters; San Bernardino County, California; latitude 34 degrees, 20 minutes, 14.5 seconds north and longitude 114 degrees, 34 minutes, 31.1 seconds west; USGS Savahia Peak, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 723,050 meters Easting and 3,802,228 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: 20 percent fine gravel and 60 percent medium and coarse gravel
A—0 to 4 centimeters; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate thick platy structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots; many very fine and common fine tubular pores; strongly effervescent; 15 percent fine gravel and 20 percent medium and coarse gravel; moderately alkaline (pH 8.2); clear smooth boundary.
Bk—4 to 14 centimeters; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and few medium roots; many very fine and common fine tubular pores; violently effervescent; 10 percent fine gravel and 35 percent medium and coarse gravel; moderately alkaline (pH 8.4); clear wavy boundary.
Cr—14 to 30 centimeters; weathered bedrock; common very fine and fine roots in fractures; abrupt wavy boundary.
R—30 centimeters; hard granitic rock.

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime
Soil temperature: 22.0 to 26.7 degrees C
Organic matter content: 0 to 0.5 percent
Depth to paralithic contact: 10 to 25 centimeters
Depth to lithic contact: 20 to 36 centimeters

A horizon:
Hue—10YR or 7.5YR
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 to 4
Texture of the fine-earth fraction—loamy sand or sandy loam

Clay content—6 to 15 percent
Structure—soft or slightly hard, nonsticky or slightly sticky, and nonplastic or slightly plastic
Rock fragment content—35 to 70 percent, dominantly gravel
Effervescence—slightly effervescent to violently effervescent
Reaction—neutral to moderately alkaline

Bk horizon, or Bw or Bt horizon, where present:
Hue—10YR or 7.5YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—2 to 4, or 6
Clay content—8 to 15 percent
Structure—soft or slightly hard, nonsticky or slightly sticky, and nonplastic or slightly plastic
Rock fragment content—40 to 65 percent, dominantly gravel
Effervescence—strongly effervescent or violently effervescent
Reaction—slightly alkaline or moderately alkaline
Other feature—secondary calcium carbonate or clay films, which are not diagnostic, in some pedons

Sunrock Series

The Sunrock series consists of very shallow and shallow, somewhat excessively drained soils that formed in colluvium and residuum derived from volcanic rock. The soils are on hills. Slopes range from 8 to 50 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 24 degrees C. The frost-free period is 300 to 365 days.

Taxonomic class: Loamy-skeletal, mixed, superactive, calcareous, hyperthermic Lithic Torriorthents

Typical pedon location: Sunrock complex, 8 to 50 percent slopes, at an elevation of 244 meters; San Bernardino County, California; latitude 34 degrees, 26 minutes, 37.26 seconds north and longitude 114 degrees, 28 minutes, 18.30 seconds west; USGS Havasu Lake, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 732,284 meters Easting and 3,814,253 meters Northing (NAD 83).

Typical Pedon

Surface rock fragments: 85 percent gravel and 1 percent cobbles
A—0 to 5 centimeters; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; common very fine, fine, and medium interstitial pores; violently effervescent; 10 percent fine gravel and 30 percent medium and coarse gravel; moderately alkaline (pH 8.2); clear smooth boundary.
Btk—5 to 20 centimeters; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common very fine, fine, and medium roots; common very fine, fine, and medium interstitial pores; few discontinuous faint brown (10YR 4/3) moist clay films between sand grains and few discontinuous faint brown (10YR 4/3) moist clay films on underside of rock fragments; 4 percent fine distinct interstitial very weakly cemented very pale brown (10YR 8/2) carbonate concretions with diffuse boundaries on underside of rock fragments; violently effervescent; 20 percent fine gravel and 55 percent medium and coarse gravel; moderately alkaline (pH 8.2); abrupt wavy boundary.
R—20 centimeters; moderately fractured hard andesite.

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring and for 10 to 20 days cumulatively between July and October following convection storms; typic aridic moisture regime
Soil temperature: 22 to 26 degrees C
Depth to bedrock: 4 to 11 inches
Organic matter content: 0 to 0.5 percent

Control section:
Rock fragment content—35 to 70 percent andesite rock fragments, commonly gravel
Clay content—5 to 18 percent
Reaction—slightly alkaline or moderately alkaline

A horizon:
Hue—7.5YR or 10YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—3 or 4 dry or moist
Texture of the fine-earth fraction—sandy loam or fine sandy loam
Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline or moderately alkaline

Btk horizon, or Bk or Bw horizon, where present:
Hue—7.5YR or 10YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—3 or 4 dry or moist
Texture of the fine-earth fraction—fine sandy loam or sandy loam, dominantly fine and medium in sand fraction

Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline or moderately alkaline
Other feature—accumulations of secondary carbonates absent in some pedons

Whipple Series

The Whipple series consists of very shallow and shallow, well drained soils that formed in residuum and colluvium derived from granite (fig. 16). The soils are on backslopes of hills (fig. 17). Slopes range from 8 to 50 percent. The mean annual precipitation is about 100 millimeters, and the mean annual air temperature is about 24 degrees C. The frost-free period is 325 to 365 days.

Taxonomic class: Loamy-skeletal, mixed, superactive, hyperthermic Lithic Haplargids

Typical pedon location: Stormjade-Whipple complex, 8 to 50 percent slopes, at an elevation of 397 meters; San Bernardino County, California; latitude 34 degrees, 21 minutes, 30.50 seconds north and longitude 114 degrees, 35 minutes, 48.70 seconds west; USGS Savahia Peak, California, 7.5-minute topographic quadrangle; UTM coordinates Zone 11, 721,011 meters Easting and 3,804,517 meters Northing (NAD 83).

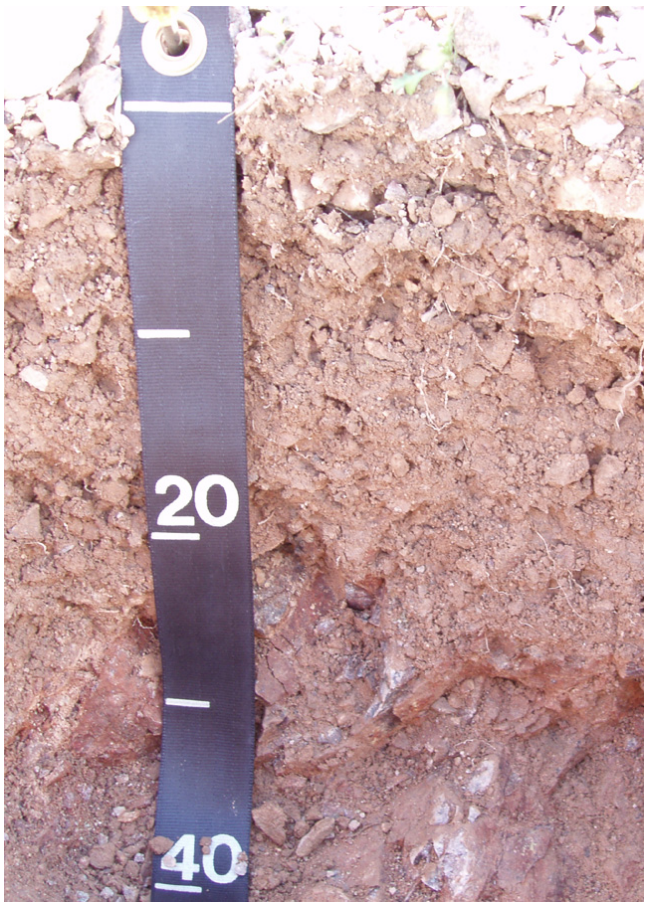


Figure 16.—Typical pedon of a Whipple soil in an area of Stormjade-Whipple complex, 8 to 50 percent slopes. The numerals on the tape are in centimeters.

Typical Pedon

Surface rock fragments: 85 percent gravel and 8 percent cobbles
A—0 to 3 centimeters; light yellowish brown (10YR 6/4) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores and few fine tubular pores; strongly effervescent; 15 percent fine gravel and 25 percent medium and coarse gravel; moderately alkaline (pH 8.0); clear smooth boundary.
Btk—3 to 24 centimeters; strong brown (7.5YR 5/6) extremely gravelly loam, strong brown (7.5YR 4/6) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, common fine, and few medium roots; common very fine interstitial pores; 20 percent distinct brown (7.5YR 5/4) clay films on faces of peds, 5 percent faint brown (7.5YR 5/4) clay films between sand grains, and 15 percent distinct brown (7.5YR 5/4) clay films on rock fragments; 5 percent medium to coarse distinct interstitial very pale brown (10YR 8/2) masses of calcium carbonate with clear boundaries in matrix and 15 percent distinct very pale brown (10YR 8/2) coatings of carbonate on underside of rock fragments; violently effervescent; 25 percent fine gravel, 45 percent medium and coarse gravel, and 1 percent cobbles; moderately alkaline (pH 8.2); clear wavy boundary.
R—24 to 31 centimeters; hard granitic rock.

Range in Characteristics

Soil moisture control section: Usually dry, but moist in some part for short periods in winter and early in spring; typic aridic moisture regime
Soil temperature: 22.0 to 26.7 degrees C
Depth to argillic horizon: 2 to 4 centimeters
Depth to bedrock: 13 to 36 centimeters
Organic matter content: 0 to 0.5 percent

Control section:
Clay content—averages 12 to 18 percent

A horizon:
Value—3 or 4 moist
Chroma—3 or 4

Figure 17.—Typical area of a Whipple soil.

Clay content—8 to 12 percent
Structure—weak or fine, thin or medium, platy or subangular blocky
Consistence—soft or slightly hard, nonsticky or slightly sticky
Rock fragment content—35 to 60 percent with 0 to 5 percent cobbles or stones
Effervescence—slightly effervescent or strongly effervescent
Calcium carbonate equivalent—0 to 5 percent

Btk horizon, or Btkq horizon, where present:
Hue—10YR or 7.5YR
Chroma—4 or 6
Texture of the fine-earth fraction—loam or sandy loam
Clay content—12 to 20 percent
Structure—massive or subangular blocky
Consistence—soft to moderately hard, nonsticky or slightly sticky, and nonplastic or slightly plastic
Rock fragment content—60 to 85 percent gravel with 0 to 5 percent cobbles or stones
Effervescence—strongly effervescent or violently effervescent
Calcium carbonate equivalent—0 to 5 percent

References

American Association of State Highway and Transportation Officials (AASHTO). 2000. Standard specifications for transportation materials and methods of sampling and testing. 20th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 1998. Standard classification of soils for engineering purposes. ASTM Standard D 2487.

Burge B., and A.R. Royo. February 27, 2000. The desert tortoise. Desert USA. http://www.desertusa.com/june96/du_tort.html.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

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

Soil Survey Staff. 2003. Keys to soil taxonomy. 9th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

United States Department of Agriculture, Natural Resources Conservation Service. National engineering handbook. (Available at the State office of the Natural Resources Conservation Service at Davis, California.)

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html)

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov/technical/handbook/)

United States Department of Agriculture, Natural Resources Conservation Service. 2005. Land resource regions and major land resource areas of the United States. U.S. Department of Agriculture Handbook 296.

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of the Interior, Bureau of Land Management. 1992. Fact sheet, Las Vegas.

United States Department of the Interior, Bureau of Land Management. n.d. West Well OHV trail guide and map. (Available at the Bureau of Land Management field office at Needles, California.)

Glossary

AASHTO classification. A system that classifies soils specifically for geotechnical engineering purposes related to highway and airfield construction. It is based on particle-size distribution and Atterberg limits.

AASHTO Group Index (GI). An empirical index number used to evaluate clayey and silty clay material.

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.

Alluvial fan. A low, outspread mass of loose material and/or rock material washed down the sides of mountains and hills. It commonly has gentle slopes and is shaped like an open fan or a segment of a cone. It is deposited by a stream at the place where the stream issues from a narrow mountain valley or where a tributary stream is near or at its junction with the main stream. An alluvial fan is steepest near its apex that points upstream, and it slopes gently and convexly outward with a gradual decrease in gradient.

Alluvial flat. A nearly level, graded alluvial surface in bolsons and semibolsons that commonly does not exhibit traceable channels, terraces, or flood plain levels.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

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.

Aridic moisture regime. Soils that have an aridic moisture regime are dry for at least one-half of the year. They commonly occur in areas that have an aridic climate. A few are in areas that have a semiarid climate, but they either have physical properties that keep them dry, such as a crusty surface that virtually precludes the infiltration of water, or have steep slopes with a high rate of runoff. Little, if any, leaching occurs in this moisture regime, and soluble salts accumulate in the soils if there is a source of salts.

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 volume of water that should be available to plants if the soil, inclusive of fragments, were at field capacity. It is commonly estimated as the difference between the amount of water at field capacity and the amount at wilting point with adjustments for salinity, fragments, and rooting depth. 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 2.5
Low	2.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10.0
Very high	more than 10.0

AWC. See Available water capacity.

Backslope. The hillslope profile position that forms the steepest and generally linear, middle portion of the slope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below. They may or may not include cliff segments, or free faces. Backslopes

are commonly erosional forms produced by mass movement, colluvial action, and running water.

Badland. A landscape that is intricately dissected and is characterized by a very fine drainage network with high drainage density and short, steep slopes with narrow interfluves. Badland develops on surfaces that have little, if any, vegetative cover, are underlain by unconsolidated or poorly cemented material (clay, silt, or sand), and in some areas have soluble minerals such as gypsum and halite.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Basin. Nearly level to gently sloping bottom surface of a wide structural depression between mountain ranges.

Basin floor. A general term for the nearly level, lowermost part of intermontane basins (i.e. bolsons and semibolsons). The floor includes all of the alluvial, eolian, and erosional landforms below the piedmont slope.

Batholith. A large body of igneous intrusive (plutonic) rock, commonly regional in extent, such as the Sierra Nevada batholith.

Beach terrace. A landform that consists of a wave-cut scarp and wave-built terrace of well-sorted marine and lacustrine sand and gravel. Colloquially, in the western United States, a relict shoreline from pluvial lakes, generally restricted to valleysides.

Bedrock. A general term for the solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bolson. An internally drained (closed) intermontane basin into which drainageways from surrounding mountains converge inward toward a central depression.

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.

Bulk density. A measurement of the oven-dry weight of the soil material that is less than 2 millimeters in diameter per unit volume. Common measurements are taken at $^1/_3$-, $^1/_{10}$-, or 15-bar moisture tension. Bulk density influences plant growth and engineering applications. It is used to convert measurements from a weight basis to a volume basis. Within a family particle-size class, bulk density is an indicator of how well plant roots are able to extend into the soil. Bulk density is used to calculate porosity.

Butte. An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs. It is characterized by a summit width that is less than the height of bounding escarpments, commonly has a cap of resistant rock, and represents an erosional remnant carved from flat-lying rock.

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

Calcic horizon. A mineral soil horizon of secondary carbonate enrichment that is more than 15 centimeters thick and has a calcium carbonate equivalent of more than 15 percent and at least 5 percent higher than the underlying horizon.

Calcium carbonate equivalent. The percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size.

Caliche. A general term for a prominent zone of secondary carbonate accumulation in surficial material of warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Fine crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) material. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other accessory cementing minerals (carbonates, silicate, and sulfate) may be present. Most petrocalcic horizons and some calcic horizons are caliche.

Cambic horizon. A mineral soil horizon that has the texture of loamy very fine sand or finer, has soil structure rather than rock structure, and contains some weatherable minerals. It is characterized by the alteration or removal of mineral material as indicated by mottling or gray color, stronger chroma or redder hue than the underlying horizons, or the removal of carbonates. The cambic horizon lacks cementation or induration and has too few evidences of illuviation to meet the requirements for an argillic horizon.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

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

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence of soils on a landscape that are about the same age and formed in similar kinds of parent material under similar climatic conditions 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 (CEC). 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.

CEC. See Cation exchange capacity.

Cement rock. Shaly limestone used in the manufacture of cement.

Channel. Colloquially, in the western United States, the bed of a single or braided watercourse that is commonly barren of vegetation and formed in modern alluvium. Channels may be enclosed by banks or splayed across a fan surface and slightly mounded. They include bars and mounds of cobbles and stones.

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.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey. Sandy clay, silty clay, and clay soil textures.

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

Claypan. A dense, compact, slowly permeable layer in the subsoil that has a much higher content of clay than the overlying material. A claypan is commonly hard when dry and plastic or sticky 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.

Coarse fragments. See Rock fragments.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is dominantly cobbles and has a specified percent, by volume, of rock fragments. Cobbly soil material has 15 to 35 percent rock fragments, very cobbly soil material has 35 to 60 percent, and extremely cobbly soil material has 60 to 90 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Unconsolidated, unsorted earth material transported or deposited on side slopes and/or at the base of slopes by mass movement, such as direct gravitational action, and by local unconcentrated runoff.

Compaction. The process by which the soil grains are rearranged to decrease void space and bring them into closer contact with one another, thereby increasing bulk density.

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, sedimentary

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 and is cemented with silica, calcium carbonate, and iron oxide. Conglomerate is the consolidated equivalent of gravel.

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."

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.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbation. A collective term used to describe all soil movement as a result of frost action, including the folding, breaking, and dislocating of beds and lenses of unconsolidated material.

Cryptogamic crust. A type of microbiotic crust consisting of a thin biotic layer at the ground surface composed dominantly of cryptogams (i.e. algae, lichen, mosses, and liverwort). This crust is most commonly in semiarid and arid areas. (See Microbiotic crust.)

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Debris flow (mass movement). The process, associated sediment (debris flow deposit), or resultant landform characterized by a very rapid type of flow dominated by sudden downslope movement of a mass of rock, soil, and mud (more than 50 percent particles that are more than 2 millimeters in size) that behaves much like viscous fluid whether it is saturated or relatively dry.

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. See Depth, soil.

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

Depth, soil. Generally, the thickness of the soil over a root-limiting layer such as a duripan or bedrock. Very deep soils are more than 60 inches deep; deep soils, 40 to 60 inches; moderately deep soils, 20 to 40 inches; shallow soils, 10 to 20 inches; and very shallow soils, less than 10 inches.

Depth to bedrock (in tables). Bedrock is too near the surface for the specified use.

Desert pavement. A natural, residual concentration of wind-polished, closely packed gravel, boulders, and other rock fragments that mantle a desert surface where wind action and sheetwash have removed all smaller particles. It commonly protects the underlying finer grained material from further deflation. The coarse fragments commonly are cemented with mineral material.

Desert varnish. See Rock varnish.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedded rock (for example, the long, gently inclined surface of a cuesta).

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. A general term for a course or channel along which water moves in draining an area.

Draw. A small stream channel that generally is more open and has a broader floor than a ravine or gulch.

Dune. A low mound, ridge, bank, or hill of loose, windblown, granular material (generally sand), either barren or covered with vegetation, that is

capable of movement from place to place but always retains its characteristic shape.

Duripan. A subsurface soil horizon that is cemented by illuvial silica, commonly opal or microcrystalline forms, to the degree that less than 50 percent of the volume of air-dry fragments will slake in water or hydrochloric acid.

EC. See Electrical conductivity.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological 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 ecological sites in kind and/or proportion of species or in total production.

Electrical conductivity (EC). The electrolytic conductivity of an extract from saturated soil paste.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian material. Material transported and deposited by wind, including earth material such as dune sand, sand sheets, loess, and clay.

Ephemeral stream. Generally, a stream, or upper 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.

Epipedon. A soil horizon that has developed at the soil surface. The rock structure of the horizon has been destroyed, and the horizon either has been darkened by organic matter or has been eluviated. Thin alluvial or eolian deposits may cover the horizon.

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. The term is used most commonly to refer to cliffs produced by differential erosion. Synonym: scarp.

Excess lime (in tables). Excess carbonates in the soil, which restricts the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil, which restricts the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil, which results in poor physical properties that restrict the growth of plants.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface. It includes lava flows and tephra deposits.

Family, soil. The most specific hierarchical category in soil taxonomy.

Fan apron. A sheetlike mantle of relatively young alluvium and soils covering part of the surface of an older fan piedmont (or alluvial fan in some areas), commonly thicker and further downslope than a fan collar (midfan or midfan piedmont). It buries an older soil that can be traced to the edge of the fan apron, where the older soil emerges as the land surface, or relict soil. Buried soils do not occur within the mantle of the fan apron itself.

Fan piedmont. The most extensive landform on piedmont slopes that is formed either by the lateral downslope coalescence of mountain-front alluvial fans into one generally smooth slope with or without the transverse undulations of the semiconical alluvial fans or by the accretion of fan aprons.

Fan remnant. A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, fan aprons, inset fans, and fan skirts, that either have been dissected (erosional fan remnants) or partially buried (nonburied fan remnants). An erosional fan remnant has a relatively flat summit that is a relict fan surface. A nonburied fan remnant is a relict surface in its entirety.

Fan skirt. The area of smooth, laterally coalescing, small alluvial fans that issue from gullies cut into the fan piedmont of a basin or are extensions of the inset fans of the fan piedmont and that merge with the basin floor at the toeslopes. Generally, these are younger fans overlying older fan surfaces.

Fan terrace. See Fan remnant.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified

plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the 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.

Flood plain. The nearly level plain that borders a stream and is subject to inundation under floodstage conditions unless protected artificially. It is commonly a constructional landform consisting of sediment deposited during overflow and lateral migration of a stream.

Fluvial. Of or pertaining to rivers; produced by river action.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The hillslope 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.

Fragments. Unattached cemented pieces of bedrock, bedrock-like material, durinodes, concretions, and nodules 2 millimeters in diameter or larger in mineral soils; woody material 20 millimeters in diameter or larger in organic soils.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures and plant roots.

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

Gilgai. The microrelief of soils that expand and contract with changes in moisture. It is characteristic of soils that contain large amounts of smectitic clay and that swell and shrink considerably with wetting and drying. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Also referred to, in part or in total, as crabhole, Bay of Biscay, or hushabye in older literature.

Granitic. A textural term commonly pertaining to an igneous intrusive rock of felsic to intermediate composition. Referring to granite-like rock, but not necessarily true granite. Commonly applied to granite, quartz monzonite, granodiorite, and diorite.

Granite. A felsic igneous intrusive rock containing quartz and orthoclase with smaller amounts of sodic plagioclase and commonly muscovite.

Granodiorite. An igneous intrusive rock that is intermediate between felsic and mafic in composition and contains quartz and somewhat more plagioclase than orthoclase.

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. The size fractions, in millimeters, of the gravel classes are:

Fine	2 to 5
Medium	5.1 to 20
Coarse	20.1 to 75

Gravelly soil material. Material that contains a specified amount of rock fragments, by volume, that are dominantly gravel. The classes, based on volume percentages, are:

Gravelly	15 to 35 percent
Very gravelly	35 to 60 percent
Extremely gravelly	60 to 90 percent

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides cut by the concentrated but intermittent flow of water commonly during and immediately following heavy rainfall or following icemelt or snowmelt. A gully generally is an obstacle to wheeled vehicles 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. The percent, by weight, of hydrated calcium sulfates in the less-than-20-millimeter fraction of a soil.

Halophytic. Pertaining to vegetation that is adapted to salty soils.

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.

Head out. To form a flower head.

Hill. A generic term for an area of the land surface that rises as much as 1,000 feet (300 meters) above surrounding lowlands, commonly has limited summit area relative to surrounding surfaces, and has a well-defined outline; hill slopes generally have slopes of more than 15 percent. The distinction between a hill and a mountain is commonly dependent on local usage.

Holocene. The epoch of the Quaternary period of geologic time that extends from the end of the Pleistocene (about 10 to 12 thousand years ago) to the present.

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.

Hummock. Rounded or conical mound or other small rise.

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.

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.

Inset fan. Specific name for the flood plain of an ephemeral stream that is confined between fan remnants, ballenas, basin floor remnants, or closely opposed fan toeslopes of a basin.

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

irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

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

Interfluve. A landform composed of the relatively undissected upland or ridge between two adjacent valleys that contain streams flowing in the same general direction; an elevated area between two drainageways that sheds water into the drainageways.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round (commonly is dry for 3 months or more annually). It flows only when it receives baseflow during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other erratic surface and shallow subsurface sources.

Intrusive. Pertaining to igneous rock derived from molten matter (magma) that invaded pre-existing rock and cooled below the surface of the earth.

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.

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.

K factor. A measurement of potential soil erodibility caused by detachment of soil particles by water.

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

Lacustrine deposit. Clastic sediment and chemical precipitates deposited in lakes.

Lake plain. A nearly level surface marking the floor of an extinct lake filled with well-sorted, generally fine textured, stratified deposits, commonly containing varves.

Landform. Any physical, recognizable form or feature on the earth's surface that has a characteristic shape and was produced by natural causes.

Landscape. A collection of related natural landforms; commonly, the land surface that the eye can comprehend in a single view.

Landslide. The rapid downhill movement of a mass of soil and loose rock that generally is wet or saturated. The speed and distance of movement as well as the amount of soil and rock material are highly variable.

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

LEP. See Linear extensibility percent.

Limestone. A sedimentary rock consisting mainly of calcium carbonate (more than 50 percent) dominantly in the form of calcite. Limestone is commonly formed by a combination of organic and inorganic processes and includes chemical and clastic (soluble and insoluble) constituents. Fossils are common in limestone.

Linear extensibility percent (LEP). The linear expression of the volume difference between the water content of the natural soil fabric at $^1/_3$- or $^1/_{10}$-bar and oven dryness. The volume change is reported as a percent for the whole soil.

Liquid limit (LL). The moisture content at which the soil passes from a plastic to a liquid state.

LL. See Liquid limit.

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. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam soil textures.

Loess. Material transported and deposited by wind that consists dominantly of silt-sized clastics.

Magma. Molten rock material that originates deep in the earth and solidifies to form igneous rock.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts (35 to 65 percent of each). It is formed primarily under freshwater lacustrine conditions, but some is associated with a more saline environment.

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.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement in the earth's crust. Nearly all such rocks are crystalline. Examples are schist, gneiss, quartzite, slate, and marble.

Metasediment. A sediment or sedimentary rock that shows evidence of having been subjected to metamorphism.

Metavolcanic. A volcanic rock that shows evidence of metamorphism but has not been fully metamorphosed into metamorphic rock.

Microbiotic crust. A thin surface layer (crust) of soil particles bound together primarily by living organisms and their organic byproducts. Thickness ranges from less than 1 centimeter to as much as 10 centimeters, and coverage of the ground surface ranges from 10 to 100 percent. The crust stabilizes loose earth material.

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. See Depth, soil.

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).

Mountain. A natural elevation of the land surface that rises more than 1,000 feet (300 meters) above surrounding lowlands, commonly has limited summit area relative to surrounding surfaces, and generally has steep sides (slopes of more than 25 percent) with or without considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action and secondarily by differential erosion.

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.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon,

hydrogen, and oxygen obtained from the air and water.

OM. See Organic matter.

Organic matter (OM). 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

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 and more or less chemically weathered mineral or organic matter from which the solum forms as a result of pedogenic processes.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pediment. A gently sloping erosional surface at the foot of a receding hill or mountain slope. The surface may be essentially bare, exposing earth material that extends beneath adjacent uplands, or it may have a thin mantle of alluvium and colluvium, ultimately in transit from the upland front to the basin or valley lowland. On hill footslope terrain, the mantle is designated "pedisediment." The term pediment is used in several geomorphic contexts: (1) landscape positions, for example, intermontane basin piedmont or valley border footslope surfaces, or respectively, apron and terrace pediments (Cooke and Warren, 1973); (2) type of material eroded, either bedrock or regolith; or (3) a combination of these.

Pedisediment. A layer of sediment eroded from the shoulder and backslope of an erosional slope that is being transported or was transported across a pediment.

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.

Perched water table. The upper surface of unconfined ground water separated from an underlying main body of ground water by an unsaturated zone.

Percolation. The downward movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

PI. See Plasticity index.

Piedmont (adjective). Lying or formed at the base of a mountain or mountain range; for example, a piedmont terrace or a piedmont pediment.

Piedmont (noun). An area, plain, slope, glacier, or other feature at the base of a mountain; for example, a foothill or bajada. In the United States, the Piedmont is a low plateau that extends from New Jersey to Alabama and lies east of the Appalachian Mountains.

Piedmont slope. Colloquially, in western United States, the dominant gentle slope at the foot of a mountain; generally used to refer to intermontane basin terrain in arid to subhumid regions. The main components of a piedmont slope include an erosional surface on bedrock adjacent to the receding mountain front (pediment or rock pediment); a constructional surface comprising individual alluvial fans and interfan valleys, also near the mountain front; and a distal complex of coalescent fans (bajada) and alluvial slopes that do not have the form of a fan. Piedmont slopes grade to basin floor depressions with alluvial plains and temporary lake plains or to surfaces

associated with drainages (for example, axial streams).

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index (PI). 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. A comparatively flat area of great extent and elevation. Specifically, an extensive land region considerably elevated (more than 100 meters) above adjacent lower lying terrain that is commonly limited on at least one side by an abrupt descent and has a flat or nearly level surface. A relatively large part of a plateau surface is near summit level.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation runoff. Playas consist of fine grained deposits and may or may not have a high water table and saline conditions.

Pleistocene. The epoch of the Quaternary period of geologic time following the Pliocene and preceding the Holocene (approximately 2 million to 10 thousand years ago). Also refers to the corresponding (time-stratigraphic) "series" of earth material.

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.

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.

Pyroclastic. Pertaining to fragmental material produced by commonly explosive aerial ejection of clastic particles from a volcanic vent. Such material may accumulate on land or under 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 differs from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind, proportion, or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. All unconsolidated earth material above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial,

glacial, eolian, lacustrine, and pyroclastic deposits. Soil scientists regard as soil only that part of the regolith that is modified by organisms and soil-forming processes. Most engineers regard the whole regolith as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Remnant. The remaining part of a larger landform or land surface that has been dissected or partially buried.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rhyolite. Extrusive igneous rock, generally porphyritic and exhibiting flow texture, with phenocrysts of quartz and alkali feldspar in a glassy cryptocrystalline ground mass. The extrusive equivalent of granite.

Riverwash. Barren alluvial areas of unstabilized sand, silt, clay, or gravel reworked frequently by stream activity.

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, gravel, cobbles, stones, and boulders.

Rock outcrop. Exposures of bedrock, excluding lava and rock-lined pits.

Rock varnish. A thin, dark, shiny film or coating composed of iron oxide with traces of manganese oxide and silica that forms on the surface of gravel, boulders, and other rock fragments. Commonly on rock outcroppings in arid regions. It is believed to be caused by exudation of mineralized solutions from within and deposition by evaporation on the surface.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

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 is expressed as the electrical conductivity of a saturation extract at 25 degrees C. Salinity classes, expressed in millimhos per centimeter, are 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

Saline-sodic soil. A soil that contains sufficient exchangeable sodium to interfere with the growth of most crops and appreciable quantities of soluble salts. The exchangeable sodium ratio is greater than 0.15; the conductivity of the soil solution, when saturated, is greater than 4 decisiemens per meter (at 25 degrees C), and the pH is commonly 8.5 or less in the saturated soil.

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. Sand and loamy sand soil textures.

Sand sheet. A large, irregularly shaped, commonly thin, surficial mantle of eolian sand that does not have the discernible slip faces that are common on dunes.

Saprolite. Soft, friable, isovolumetrically weathered bedrock that retains the fabric and structure of the parent rock and exhibits extensive intercrystal and intracrystal weathering (Colman and Dethier, 1986). In pedology, saprolite has been used to refer to any unconsolidated residual material that underlies the soil and grades to hard bedrock below.

SAR. See Sodium adsorption ratio.

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.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under "normal" low temperature and pressure conditions. Sedimentary rock includes the consolidated equivalents of alluvial, colluvial, drift, eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

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 that formed as a result of the induration of a clay, silty clay, or silty clay loam deposit and has the tendency to split into thin layers (fissility).

Shallow soil. See Depth, soil.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

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.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

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, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 30 percent
Steep	30 to 50 percent
Very steep	50 percent and higher

Slope (in tables). The slope is steep enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slope aspect. The direction in which the surface of the soil faces.

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:

Nonsodic	0-5:1
Very slightly sodic	5-13:1
Slightly sodic	13-30:1
Moderately sodic	30-45:1
Strongly sodic	45-90:1
Very strongly sodic	more than 90:1

Sodium adsorption ratio (SAR)**.** A measure of the amount 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.

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 erodibility factors. The Kw and Kf factors quantify the susceptibility of soil to detachment by water. These erodibility factors predict the long-term average soil loss that results from sheet and rill erosion when various cropping systems and

conservation techniques are used. The whole soil is considered in the Kw factor, but only the fine-earth fraction is considered in the Kf factor, which is the material less than 2 millimeters in diameter. The procedure for determining the Kf factor is outlined in the U.S. Department of Agriculture Handbook 537 (USDA, 1978). The K factors for Hawaii and the Pacific Basin were extrapolated from local research; the nomograph was not used.

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.

Stone line. A sheetlike lag concentration of coarse fragments in surficial sediment. In cross section, the line may be marked only by scattered fragments or it may be a discrete layer of fragments. The fragments are more commonly pebbles or cobbles than stones. A stone line generally overlies material that was subject to weathering, soil formation, and erosion before deposition of the overlying material. Many stone lines appear to be buried erosion pavement originally formed by running water on the land surface and concurrently covered by surficial sediment.

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. Referring to geologic deposits that were formed, arranged, or laid down in layers. Layers in soils that are a result of the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stream terrace. One of a series of platforms in a stream valley that flanks and is more or less parallel to the stream channel, originally formed near the level of the stream, and represents the dissected remnants of an abandoned flood plain, streambed, or valley floor produced during an earlier period of erosion or deposition.

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).

Subsidence. The decrease in surface elevation as a result of the drainage of wet soils that have organic layers or semifluid mineral layers.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

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.

T factor. The soil loss tolerance, which is defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. Maintaining the quality of the soil includes maintaining the surface soil as a seedbed for plants, maintaining the atmosphere-soil interface to allow the entry of air and water into the soil and still protect the underlying soil from wind and water erosion, and maintaining the total soil volume as a reservoir for water and plant nutrients, which is preserved by minimizing soil loss.

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.

Temperature regime, soil. A system that categorizes for taxonomic purposes general, long-term soil temperature conditions at the standard depth of 20 inches or at the bedrock surface, whichever is shallower. The various regimes are defined according to the freezing point of water or to the high and low extremes for significant biological activity.

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 (geomorphologic). A steplike surface bordering a valley floor or shoreline that represents the former position of a flood plain, lake, or seashore. The term is commonly applied to both the relatively flat summit surface (tread) that has been cut or builtup by stream or wave action and the steeper descending slope (scarp or riser) that grades to a lower base level of erosion. Practically, terraces are considered to be generally flat alluvial areas above the 100-year flood stage.

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." The abbreviations (see tables) are *c—clay, cl—clay loam, cos—coarse sand, cosl—coarse sandy loam, fs—fine sand, fsl—fine sandy loam, l—loam, lcos—loamy coarse sand, lfs—loamy fine sand, ls—loamy sand, lvfs—loamy very fine sand, s—sand, sc—sandy clay, scl—sandy clay loam, sg—sand and gravel, si—silt, sic—silty clay, sicl—silty clay loam, sil—silt loam, sl—sandy loam, vfs—very fine sand,* and *vfsl—very fine sandy loam*.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

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.

Torric moisture regime. See Aridic moisture regime.

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 under a wide range of moisture conditions.

Unified soil classification. A system for classifying mineral and organic soils for engineering purposes based on particle-size characteristics, liquid limit, and plasticity index.

Upland (geomorphologic). A general term for the higher land of a region in contrast to the low-lying, adjacent land, such as a valley or plain; land at a higher elevation than the flood plain or low stream terrace; or land above the footslope zone of the hillslope continuum.

Valley fill. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) that fills or partly fills a valley.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Vegetative cover. The crown cover of all live plants in relation to the ground surface.

Very deep soil. See Depth, soil.

Very shallow soil. See Depth, soil.

Wash. Colloquially, in the western United States, the broad, flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks. When channels reach intersect zones of ground-water discharge, they are more properly referred to as intermittent stream channels.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water table. The upper surface of ground water or the level below which the soil is saturated by water. Also, the top of an aquifer.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

WEG. See Wind erodibility group.

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.

Wind erodibility group (WEG). A grouping of soils that have similar properties affecting their resistance to wind erosion in cultivated areas.

Xerophytic. Pertaining to vegetation that is adapted to dry areas.

Tables

Table 1.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1200	Goldroad very gravelly sandy loam, 15 to 50 percent slopes	2,588	2.7
1210	Stormjade-Goldroad complex, 8 to 50 percent slopes	882	0.9
1211	Stormjade-Whipple complex, 8 to 50 percent slopes	3,910	4.1
1400	Sunrock complex, 8 to 50 percent slopes	2,285	2.4
1401	Sunrock-Cheme family association, 8 to 50 percent slopes	500	0.5
1402	Sunrock-Cheme family-Rock outcrop association, 8 to 50 percent slopes	136	0.1
1500	Carrizo extremely gravelly fine sandy loam, 2 to 8 percent slopes	3,164	3.3
1501	Carrizo very gravelly loamy sand, 30 to 75 percent slopes	549	0.6
1502	Carrizo-Badland-Riverbend association, 8 to 75 percent slopes	3,158	3.3
1503	Carrizo association, 2 to 8 percent slopes	486	0.5
2000	Riverbend very gravelly fine sandy loam, 8 to 30 percent slopes	11,276	11.9
2001	Riverbend-Chemehuevi association, 2 to 30 percent slopes	10,769	11.4
2010	Chemehuevi-Carrizo-Riverbend complex, 2 to 30 percent slopes	19,647	20.8
2011	Cololag gravelly silt loam, 1 to 4 percent slopes	2,211	2.3
2020	Snaggletooth-Carrizo association, 1 to 8 percent slopes	10,767	11.4
2030	Garywash gravelly fine sandy loam, 4 to 15 percent slopes	10,080	10.7
2031	Garywash-Chemehuevi complex, 2 to 8 percent slopes	5,631	6.0
2400	Carrizo-Carrwash association, 2 to 8 percent slopes	5,583	5.9
2401	Carrizo-Carrwash association, eroded, 2 to 8 percent slopes	838	0.9
	Total	94,460	100.0

Table 2.--Land Capability Classification

(Land capability classification is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deterioration of the soils over a long period of time. The classification given in the table is for nonirrigated soils only)

Map symbol and soil name	Land capability
1200:	
Goldroad	8
1210:	
Stormjade	8
Goldroad	8
1211:	
Stormjade, dry	8
Whipple	8
Whipple, warm	8
1400:	
Sunrock, dry	8
Sunrock, warm	8
1401:	
Sunrock, cobbly	8
Cheme family	8
1402:	
Sunrock, moist	8
Cheme family	7s
Rock outcrop, volcanics	---
1500:	
Carrizo, dry	7s
1501:	
Carrizo, steep	7s
1502:	
Carrizo, steep	7s
Badland, fine	8
Riverbend, strongly sloping	7s
1503:	
Carrizo	7s
Carrizo, frequently flooded	7w
2000:	
Riverbend, strongly sloping	7s

Table 2.--Land Capability Classification--Continued

Map symbol and soil name	Land capability
2001:	
Riverbend, strongly sloping	7s
Chemehuevi	7e
2010:	
Chemehuevi	7e
Carrizo	7s
Riverbend, strongly sloping	7s
2011:	
Cololag	7s
2020:	
Snaggletooth	7e
Carrizo	7s
2030:	
Garywash	7e
2031:	
Garywash	7e
Chemehuevi, stony	7e
2400:	
Carrizo, frequently flooded	7w
Carrwash, dry	7s
2401:	
Carrizo, frequently flooded	7w
Carrwash, dry	7s

Table 3.--Rangeland Ecological Sites, Productivity, and Potential Natural Vegetation

Map symbol and soil name	Ecological site	Total dry-weight production			Potential natural vegetation	Species composition (by weight)
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
1200:						
Goldroad	Steep South Slope 2-4" p.z. R031XY003CA	400	250	100	White brittlebush (ENFA)	35
					Creosotebush (LATR2)	15
					White bursage (AMDU2)	12
					Other perennial forbs (PPFF)	10
					Catclaw acacia (ACGR)	8
					Other perennial grasses (PPGG)	5
					Pygmycedar (PESC4)	3
1210:						
Stormjade	Steep Granitic Slope 4-6" p.z. R031XY017CA	450	400	250	White brittlebush (ENFA)	30
					Teddybear cholla (OPBI)	12
					Creosotebush (LATR2)	10
					Ocotillo (FOSP2)	10
					Fremont dalea (PSFR)	8
					White bursage (AMDU2)	8
					White ratany (KRGR)	7
					Other annual forbs (AAFF)	5
					Mojave woodyaster (XYTOT)	4
					Blond plantain (PLOV)	4
					Barrel cactus (ECHIN2)	2
Goldroad	Steep Granitic Slope 4-6" p.z. R031XY017CA	450	400	250	White brittlebush (ENFA)	30
					Teddybear cholla (OPBI)	12
					Creosotebush (LATR2)	10
					Ocotillo (FOSP2)	10
					Fremont dalea (PSFR)	8
					White bursage (AMDU2)	8
					White ratany (KRGR)	7
					Other annual forbs (AAFF)	5
					Mojave woodyaster (XYTOT)	4
					Blond plantain (PLOV)	4
					Barrel cactus (ECHIN2)	2
1211:						
Stormjade, dry	Limy Hill 4-6" p.z. R031XY001CA	250	175	100	Creosotebush (LATR2)	55
					White bursage (AMDU2)	28
					White brittlebush (ENFA)	8
					Other perennial grasses (PPGG)	3
					Blond plantain (PLOV)	2
					Other annual grasses (AAGG)	2
					Other shrubs (SSSS)	2
Whipple	Limy Hill 4-6" p.z. R031XY001CA	250	175	100	Creosotebush (LATR2)	55
					White bursage (AMDU2)	28
					White brittlebush (ENFA)	8
					Other perennial grasses (PPGG)	3
					Blond plantain (PLOV)	2
					Other annual grasses (AAGG)	2
					Other shrubs (SSSS)	2
Whipple, warm	Steep South Slope 2-4" p.z. R031XY003CA	250	175	100	White brittlebush (ENFA)	35
					Creosotebush (LATR2)	15
					White bursage (AMDU2)	12
					Other perennial forbs (PPFF)	10
					Catclaw acacia (ACGR)	8
					Other perennial grasses (PPGG)	5
					Pygmycedar (PESC4)	3

Table 3.--Rangeland Ecological Sites, Productivity, and Potential Natural Vegetation--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Potential natural vegetation	Species composition (by weight)
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
1400:						
Sunrock, dry----------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3
Sunrock, warm----------	Steep South Slope 2-4" p.z. R031XY003CA	400	250	100	White brittlebush (ENFA)-------	35
					Creosotebush (LATR2)----------	15
					White bursage (AMDU2)----------	12
					Other perennial forbs (PPFF)---	10
					Catclaw acacia (ACGR)----------	8
					Other perennial grasses (PPGG)	5
					Pygmycedar (PESC4)-------------	3
1401:						
Sunrock, cobbly---------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3
Cheme family----------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3
1402:						
Sunrock, moist----------	Limy Hill 4-6" p.z. R031XY001CA	250	175	100	Creosotebush (LATR2)----------	55
					White bursage (AMDU2)----------	28
					White brittlebush (ENFA)-------	8
					Other perennial grasses (PPGG)	3
					Blond plantain (PLOV)----------	2
					Other annual grasses (AAGG)----	2
					Other shrubs (SSSS)----------	2
Cheme family----------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3
Rock outcrop, volcanics.						
1500:						
Carrizo, dry----------	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)----------	70
					White ratany (KRGR)----------	10
					Other shrubs (SSSS)----------	8
					Blond plantain (PLOV)----------	5
					White bursage (AMDU2)----------	5
					Other annual grasses (AAGG)----	2

Table 3.--Rangeland Ecological Sites, Productivity, and Potential Natural Vegetation--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Potential natural vegetation	Species composition (by weight)
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
1501:						
Carrizo, steep----------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3
1502:						
Carrizo, steep----------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3
Riverbend, strongly sloping----------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3
1503:						
Carrizo----------	Limy 4-6" p.z. R031XY015CA	200	150	100	White bursage (AMDU2)----------	42
					Creosotebush (LATR2)----------	40
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	4
					Blond plantain (PLOV)----------	2
					Other annual grasses (AAGG)----	2
Carrizo, frequently flooded----------	Valley Wash-R031XY010CA	450	325	200	Catclaw acacia (ACGR)----------	40
					White burrobush (HYSA)---------	16
					Other annual forbs (AAFF)------	12
					Creosotebush (LATR2)----------	10
					Blue paloverde (PAFL6)---------	8
					Desert willow (CHLI2)----------	6
					Smoketree (PSSP3)--------------	4
					Rabbitbrush (CHRYS9)----------	2
					Sweetbrush (BEJU)--------------	1
					White bursage (AMDU2)----------	1
2000:						
Riverbend, strongly sloping----------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3
2001:						
Riverbend, strongly sloping----------	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)----------	70
					White bursage (AMDU2)----------	10
					White ratany (KRGR)----------	10
					Other annual forbs (AAFF)------	3
					Other perennial forbs (PPFF)---	3
					Other perennial grasses (PPGG)	3

Table 3.--Rangeland Ecological Sites, Productivity, and Potential Natural Vegetation--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Potential natural vegetation	Species composition (by weight)
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
2001:						
Chemehuevi	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)	70
					White ratany (KRGR)	10
					Other shrubs (SSSS)	8
					Blond plantain (PLOV)	5
					White bursage (AMDU2)	5
					Other annual grasses (AAGG)	2
2010:						
Chemehuevi	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)	70
					White ratany (KRGR)	10
					Other shrubs (SSSS)	8
					Blond plantain (PLOV)	5
					White bursage (AMDU2)	5
					Other annual grasses (AAGG)	2
Carrizo	Limy Fan 2-4" p.z. R031XY005CA	200	150	100	White bursage (AMDU2)	42
					Creosotebush (LATR2)	40
					White ratany (KRGR)	10
					Other annual forbs (AAFF)	4
					Blond plantain (PLOV)	2
					Other annual grasses (AAGG)	2
Riverbend, strongly sloping	Limy Hill 2-4" p.z. R031XY004CA	125	75	25	Creosotebush (LATR2)	70
					White bursage (AMDU2)	10
					White ratany (KRGR)	10
					Other annual forbs (AAFF)	3
					Other perennial forbs (PPFF)	3
					Other perennial grasses (PPGG)	3
2011:						
Cololag	Desert Patina 2-4" p.z. R031XY002CA	100	50	25	Creosotebush (LATR2)	65
					White brittlebush (ENFA)	8
					Other shrubs (SSSS)	8
					Other annual forbs (AAFF)	5
					White ratany (KRGR)	4
					Big galleta (PLRI3)	2
					Blond plantain (PLOV)	2
					Ocotillo (FOSP2)	2
					Other perennial grasses (PPGG)	2
					White bursage (AMDU2)	2
2020:						
Snaggletooth	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)	70
					White ratany (KRGR)	10
					Other shrubs (SSSS)	8
					Blond plantain (PLOV)	5
					White bursage (AMDU2)	5
					Other annual grasses (AAGG)	2
Carrizo	Limy 4-6" p.z. R031XY015CA	200	150	100	White bursage (AMDU2)	42
					Creosotebush (LATR2)	40
					White ratany (KRGR)	10
					Other annual forbs (AAFF)	4
					Blond plantain (PLOV)	2
					Other annual grasses (AAGG)	2

Table 3.--Rangeland Ecological Sites, Productivity, and Potential Natural Vegetation--Continued

Map symbol and soil name	Ecological site	Total dry-weight production			Potential natural vegetation	Species composition (by weight)
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	*Lb/acre*	*Lb/acre*		*Pct*
2030:						
Garywash	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)	70
					White ratany (KRGR)	10
					Other shrubs (SSSS)	8
					Blond plantain (PLOV)	5
					White bursage (AMDU2)	5
					Other annual grasses (AAGG)	2
2031:						
Garywash	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)	70
					White ratany (KRGR)	10
					Other shrubs (SSSS)	8
					Blond plantain (PLOV)	5
					White bursage (AMDU2)	5
					Other annual grasses (AAGG)	2
Chemehuevi, stony	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)	70
					White ratany (KRGR)	10
					Other shrubs (SSSS)	8
					Blond plantain (PLOV)	5
					White bursage (AMDU2)	5
					Other annual grasses (AAGG)	2
2400:						
Carrizo, frequently flooded	Valley Wash-R031XY010CA	400	300	200	Catclaw acacia (ACGR)	40
					White burrobush (HYSA)	16
					Other annual forbs (AAFF)	12
					Creosotebush (LATR2)	10
					Blue paloverde (PAFL6)	8
					Desert willow (CHLI2)	6
					Smoketree (PSSP3)	4
					Rabbitbrush (CHRYS9)	2
					Sweetbrush (BEJU)	1
					White bursage (AMDU2)	1
Carrwash, dry	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)	70
					White ratany (KRGR)	10
					Other shrubs (SSSS)	8
					Blond plantain (PLOV)	5
					White bursage (AMDU2)	5
					Other annual grasses (AAGG)	2
2401:						
Carrizo, frequently flooded	Valley Wash-R031XY010CA	400	300	200	Catclaw acacia (ACGR)	40
					White burrobush (HYSA)	16
					Other annual forbs (AAFF)	12
					Creosotebush (LATR2)	10
					Blue paloverde (PAFL6)	8
					Desert willow (CHLI2)	6
					Smoketree (PSSP3)	4
					Rabbitbrush (CHRYS9)	2
					Sweetbrush (BEJU)	1
					White bursage (AMDU2)	1
Carrwash, dry	Limy 2-4" p.z. R031XY006CA	100	75	50	Creosotebush (LATR2)	70
					White ratany (KRGR)	10
					Other shrubs (SSSS)	8
					Blond plantain (PLOV)	5
					White bursage (AMDU2)	5
					Other annual grasses (AAGG)	2

Table 4.--Desert Tortoise Burrowing Habitat

(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 potential limitation. The rating is based on the limitation with the highest value. Only the three limitations with the highest value are listed; there may be more limitations. Fine-earth fraction and content of coarse fragments are given on a weight basis. A brief summary of the rating criteria is at the end of this table. See text for further explanation of ratings in the table. For an explanation of the texture abbreviations, see "Texture, soil" in the Glossary)

Map symbol and soil name	Pct. of map unit	Suitability class and and limiting features	Value
1200:			
Goldroad	80	Poorly suited	
		Depth to bedrock <10"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
1210:			
Stormjade	40	Poorly suited	
		Depth to bedrock <10"	1.00
		Fragments (0.2-3") 50-75% in 0-30"	0.95
Goldroad	35	Poorly suited	
		Depth to bedrock <10"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
1211:			
Stormjade, dry	40	Poorly suited	
		Depth to bedrock <10"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
Whipple	30	Poorly suited	
		Depth to bedrock <10"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
Whipple, warm	15	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Depth to bedrock 10-20"	0.56
1400:			
Sunrock, dry	60	Poorly suited	
		Depth to bedrock <10"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
Sunrock, warm	25	Poorly suited	
		Depth to bedrock <10"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
1401:			
Sunrock, cobbly	45	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Depth to bedrock 10-20"	0.88
		Fragments (>3") 10 to 25%	0.87
Cheme family	30	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Fragments (>3") >25%	1.00
		Depth to pan 10-20"	0.02
1402:			
Sunrock, moist	40	Poorly suited	
		Depth to bedrock <10"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00

Table 4.--Desert Tortoise Burrowing Habitat--Continued

Map symbol and soil name	Pct. of map unit	Suitability class and and limiting features	Value
1402:			
Cheme family	35	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Depth to pan 10-20"	0.85
Rock outcrop, volcanics	15	Not rated	
1500:			
Carrizo, dry	85	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
		Fragments (>3") 10 to 25%	0.69
1501:			
Carrizo, steep	85	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Bulk density >1.8g/cc 10-20" depth	0.80
1502:			
Carrizo, steep	40	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Bulk density >1.8g/cc 10-20" depth	0.80
Badland, fine	25	Suited	
		Sicl, cl, scl in 0-30"	0.50
Riverbend, strongly sloping	20	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Cosl, ls, lfs, or lvfs in 0-30"	0.50
1503:			
Carrizo	65	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
		Fragments (>3") 10 to 25%	0.15
Carrizo, frequently flooded	30	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Flooding >/= occasional	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
2000:			
Riverbend, strongly sloping	85	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Cosl, ls, lfs, or lvfs in 0-30"	0.50
2001:			
Riverbend, strongly sloping	55	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Cosl, ls, lfs, or lvfs in 0-30"	0.50
Chemehuevi	30	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
		Bulk density >1.8g/cc 10-20" depth	0.88
2010:			
Chemehuevi	35	Poorly suited	
		Bulk density >1.8g/cc <10" depth	1.00
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Fragments (0.2-3") 50-75% in 0-30"	0.84

Table 4.--Desert Tortoise Burrowing Habitat--Continued

Map symbol and soil name	Pct. of map unit	Suitability class and and limiting features	Value
2010:			
Carrizo	30	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
		Fragments (>3") 10 to 25%	0.66
Riverbend, strongly sloping	20	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Cosl, ls, lfs, or lvfs in 0-30"	0.50
2011:			
Cololag	85	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
2020:			
Snaggletooth	65	Well suited	
Carrizo	20	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
		Fragments (>3") 10 to 25%	0.67
2030:			
Garywash	85	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
2031:			
Garywash	60	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
Chemehuevi, stony	25	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Fragments (0.2-3") 50-75% in 0-30"	0.84
2400:			
Carrizo, frequently flooded	55	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Flooding >/= occasional	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
Carrwash, dry	35	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Cosl, ls, lfs, or lvfs in 0-30"	0.50
2401:			
Carrizo, frequently flooded	60	Poorly suited	
		Cos, s, fs, vfs, or lcos in 0-30"	1.00
		Flooding >/= occasional	1.00
		Fragments (0.2-3") >75% in 0-30"	1.00
Carrwash, dry	25	Poorly suited	
		Fragments (0.2-3") >75% in 0-30"	1.00
		Cosl, ls, lfs, or lvfs in 0-30"	0.50

The interpretations for desert tortoise burrowing habitat evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, clay and sand textures, organic matter content, fragments greater than 3 inches in diameter, depth to bedrock, depth to cemented pan, soil bulk density, gypsum content, and fragments 0.2 to 3.0 inches in diameter.

Table 5a.--Urban Uses and Recreation (Part 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 potential limitation. The ratings are based on the limitation with the highest value. Only the three limitations with the highest value are listed; there may be more limitations. Fine-earth fraction and coarse fragment content are estimated on a weight basis. Brief summaries of the rating criteria are at the end of the table. See text for further explanation of ratings and limiting features)

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
1200:							
Goldroad	80	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Surface fragments (<3") >25%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Depth to bedrock <20"	1.00
1210:							
Stormjade	40	Severe		Severe		Severe	
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Slope >6%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Surface fragments (<3") >25%	1.00
		Fragments (<3") 25-50%	0.83	Fragments (<3") 25-50%	0.83	Depth to bedrock <20"	1.00
Goldroad	35	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Surface fragments (<3") >25%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Depth to bedrock <20"	1.00
1211:							
Stormjade, dry	40	Severe		Severe		Severe	
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Slope >6%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Depth to bedrock <20"	1.00
Whipple	30	Severe		Severe		Severe	
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Slope >6%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Depth to bedrock <20"	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Surface fragments (<3") >25%	1.00
Whipple, warm	15	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00

Table 5a.--Urban Uses and Recreation (Part 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
1400:							
Sunrock, dry	60	Severe		Severe		Severe	
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Slope >6%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Slope >15%	1.00	Slope >15%	1.00		
					1.00	Depth to bedrock <20"	1.00
Sunrock, warm	25	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Surface fragments (<3") >25%	1.00
		Fragments (>10") >3%	1.00	Fragments (>10") >3%	1.00		
						Depth to bedrock <20"	1.00
1401:							
Sunrock, cobbly	45	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Surface fragments (<3") >25%	1.00
Cheme family	30	Severe		Severe		Severe	
		Depth to pan </= 20"	1.00	Depth to pan </= 20"	1.00	Slope >6%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Fragments > 3" > 30%	1.00
		Fragments (>3") 25 to 75%	0.58	Fragments (>3") 25 to 75%	0.58	Permeability 0.06-0.6"/hr	0.50
1402:							
Sunrock, moist	40	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Depth to bedrock <20"	1.00	Depth to bedrock <20"	1.00	Surface fragments (<3") >25%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00		
						Depth to bedrock <20"	1.00
Cheme family	35	Severe		Severe		Severe	
		Depth to pan </= 20"	1.00	Depth to pan </= 20"	1.00	Slope >6%	1.00
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Slope >15%	1.00	Slope >15%	1.00		
						Permeability 0.06-0.6"/hr	0.50
Rock outcrop, volcanics	15	Not rated		Not rated		Not rated	
1500:							
Carrizo, dry	85	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50		
						Slope 2 to 6%	0.50
						Permeability 0.06-0.6"/hr	0.50

Table 5a.--Urban Uses and Recreation (Part 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
1501:							
Carrizo, steep	85	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Surface sand fraction 70-90%	0.88
1502:							
Carrizo, steep	40	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Surface sand fraction 70-90%	0.88
Badland, fine	25	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >6%	1.00
		Permeability 0.06-0.6"/hr	0.24	Permeability 0.06-0.6"/hr	0.24	Permeability 0.06-0.6"/hr	0.24
Riverbend, strongly sloping	20	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Slope >6%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50
1503:							
Carrizo	65	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Slope 2 to 6%	0.50
Carrizo, frequently flooded	30	Severe		Severe		Severe	
		Flooding >/= rare	1.00	Fragments (>10") >3%	1.00	Flooding >occasional	1.00
		Fragments (>10") >3%	1.00	Permeability 0.06-0.6"/hr	0.50	Fragments (>10") >3%	1.00
		Permeability 0.06-0.6"/hr	0.50	Frequent flooding	0.50	Slope 2 to 6%	0.50
2000:							
Riverbend, strongly sloping	85	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Slope >6%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50

Table 5a.--Urban Uses and Recreation (Part 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
2001:							
Riverbend, strongly sloping--	55	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Slope >6%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50
Chemehuevi----------	30	Moderate		Moderate		Severe	
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Surface fragments (<3") >25%	1.00
		Dusty	0.50	Dusty	0.50	Permeability 0.06-0.6"/hr	0.50
		Fragments (<3") 25-50%	0.12	Fragments (<3") 25-50%	0.12	Dusty	0.50
2010:							
Chemehuevi----------	35	Moderate		Moderate		Severe	
		Fragments (<3") 25-50%	0.82	Fragments (<3") 25-50%	0.82	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50
						Slope 2 to 6%	0.26
Carrizo----------	30	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Slope 2 to 6%	0.50
						Permeability 0.06-0.6"/hr	0.50
Riverbend, strongly sloping--	20	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Slope >6%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50
2011:							
Cololag----------	85	Moderate		Moderate		Severe	
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Surface fragments (<3") >25%	1.00
		Dusty	0.50	Dusty	0.50	Permeability 0.06-0.6"/hr	0.50
		Fragments (<3") 25-50%	0.16	Fragments (<3") 25-50%	0.16	Dusty	0.50
2020:							
Snaggletooth----------	65	Moderate		Moderate		Moderate	
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50
						Surface fragments (<3") 10-25%	0.32
						Slope 2 to 6%	0.02

Table 5a.--Urban Uses and Recreation (Part 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
2020:							
Carrizo	20	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Slope 2 to 6%	0.50
						Permeability 0.06-0.6"/hr	0.50
2030:							
Garywash	85	Moderate		Moderate		Severe	
		Fragments (<3") 25-50%	0.97	Fragments (<3") 25-50%	0.97	Slope >6%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Surface fragments (<3") >25%	1.00
		Slope 8 to 15%	0.04	Slope 8 to 15%	0.04	Permeability 0.06-0.6"/hr	0.50
2031:							
Garywash	60	Moderate		Moderate		Severe	
		Fragments (<3") 25-50%	0.97	Fragments (<3") 25-50%	0.97	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Slope 2 to 6%	0.50
		Fragments >10" 0.1 to 3%	0.19	Fragments >10" .1 to 3%	0.19	Permeability 0.06-0.6"/hr	0.50
Chemehuevi, stony	25	Severe		Severe		Severe	
		Fragments (>10") >3%	1.00	Fragments (>10") >3%	1.00	Surface fragments (<3") >25%	1.00
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Fragments (>10") >3%	1.00
		Fragments (<3") 25-50%	0.05	Fragments (<3") 25-50%	0.05	Permeability 0.06-0.6"/hr	0.50
2400:							
Carrizo, frequently flooded	55	Severe		Severe		Severe	
		Flooding >/= rare	1.00	Surface sand fraction >90%	1.00	Flooding >occasional	1.00
		Surface sand fraction >90%	1.00	Fragments (>10") >3%	1.00	Surface sand fraction >90%	1.00
		Fragments (>10") >3%	1.00	Permeability 0.06-0.6"/hr	0.50	Fragments (>10") >3%	1.00
Carrwash, dry	35	Moderate		Moderate		Severe	
		Fragments (<3") 25-50%	0.95	Fragments (<3") 25-50%	0.95	Surface fragments (<3") >25%	1.00
		Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50
2401:							
Carrizo, frequently flooded	60	Severe		Severe		Severe	
		Fragments (<3") >50%	1.00	Fragments (<3") >50%	1.00	Surface fragments (<3") >25%	1.00
		Flooding >/= rare	1.00	Fragments (>10") >3%	1.00	Flooding >occasional	1.00
		Fragments (>10") >3%	1.00	Permeability 0.06-0.6"/hr	0.50	Fragments (>10") >3%	1.00

Table 5a.--Urban Uses and Recreation (Part 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
2401:							
Carrwash, dry----------	25	Moderate		Moderate		Severe	
		Fragments (<3") 25-50%	0.95	Fragments (<3") 25-50%	0.95	Surface fragments (<3") >25%	1.00
		Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88
		Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50	Permeability 0.06-0.6"/hr	0.50

The interpretations for camp areas evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, depth to bedrock, depth to cemented pan, fragments less than, equal to, or greater than 3 inches in diameter, sodium content (SAR), salinity (EC), content of sand or clay, Unified class for high organic matter content (PT, OL, OH), soil dustiness, and permeability that is so high that seepage occurs under some climatic conditions.

The interpretations for picnic areas evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, depth to bedrock, depth to cemented pan, salinity (EC), soil pH, soil dustiness, fragments greater than 3 inches in diameter, fragments on the surface greater than 10 inches in diameter, content of sand or clay, Unified class for high organic matter content (PT, OL, OH), and permeability that is so high that seepage occurs under some climatic conditions.

The interpretations for playgrounds evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, depth to bedrock, depth to cemented pan, fragments on the surface greater than 10 inches in diameter, fragments equal to or less than 3 inches in diameter, Unified class for high organic matter content (PT, OL, OH), soil dustiness, content of sand or clay, soil pH, salinity (EC), and permeability that is so high that seepage occurs under some climatic conditions.

Table 5b.--Urban Uses and Recreation (Part 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 potential limitation. The ratings are based on the limitation with the highest value. Only the three limitations with the highest value are listed; there may be more limitations. Fine-earth fraction and coarse fragment content are estimated on a weight basis. Brief summaries of the rating criteria are at the end of the table. See text for further explanation of ratings and limiting features)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Lawns, landscaping, and golf fairways,	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1200:							
Goldroad	80	Severe		Moderate		Severe	
		Slope >25%	1.00	Slope 25 to 40%	0.22	Depth to bedrock <20"	1.00
		Fragments (>10") 0.1 to 3.0%	0.19	Surface fragments (>10") 0.1-3.0%	0.19	Slope >15%	1.00
						AWC <2" to 40"	1.00
1210:							
Stormjade	40	Slight		Slight		Severe	
						Depth to bedrock <20"	1.00
						AWC <2" to 40"	1.00
						Slope >15%	1.00
Goldroad	35	Severe		Moderate		Severe	
		Slope >25%	1.00	Slope 25 to 40%	0.22	Depth to bedrock <20"	1.00
		Surface sand fraction 70-90%	0.12	Surface sand fraction 70-90%	0.12	Slope >15%	1.00
						AWC <2" to 40"	1.00
1211:							
Stormjade, dry	40	Slight		Slight		Severe	
						Depth to bedrock <20"	1.00
						AWC <2" to 40"	1.00
						Slope >15%	1.00
Whipple	30	Moderate		Slight		Severe	
		Slope 15-25%	0.50			Depth to bedrock <20"	1.00
						AWC <2" to 40"	1.00
						Slope >15%	1.00
Whipple, warm	15	Severe		Moderate		Severe	
		Slope >25%	1.00	Slope 25 to 40%	0.22	Depth to bedrock <20"	1.00
						Slope >15%	1.00
						AWC <2" to 40"	1.00

Table 5b.--Urban Uses and Recreation (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Lawns, landscaping, and golf fairways,	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1400:							
Sunrock, dry	60	Moderate Fragments (>10") 0.1 to 3.0%	0.19	Moderate Surface fragments (>10") 0.1-3.0%	0.19	Severe Depth to bedrock <20" AWC <2" to 40" Fragments (gravel) >50%	1.00 1.00 1.00
Sunrock, warm	25	Severe Fragments (>10") >3% Slope >25% Surface fragments (<3") >65%	1.00 1.00 1.00	Severe Surface fragments (>10") >3% Surface fragments (<3") >65%	1.00 1.00	Severe Depth to bedrock <20" Slope >15% AWC <2" to 40"	1.00 1.00 1.00
1401:							
Sunrock, cobbly	45	Severe Slope >25% Fragments >3" 25 to 75% Fragments (>10") 0.1 to 3.0%	1.00 0.29 0.19	Moderate Surface fragments (>3") 25-75% Slope 25 to 40% Surface fragments (>10") 0.1-3.0%	0.29 0.22 0.19	Severe Depth to bedrock <20" Slope >15% AWC <2" to 40"	1.00 1.00 1.00
Cheme family	30	Moderate Fragments >3" 25 to 75% Fragments (>10") 0.1 to 3.0%	0.58 0.19 0.19	Moderate Surface fragments (>3") 25-75% Surface fragments (>10") 0.1-3.0%	0.58 0.19	Severe Depth to pan <20" AWC <2" to 40" Fragments (>3") >30%	1.00 1.00 1.00
1402:							
Sunrock, moist	40	Severe Slope >25% Fragments (>10") 0.1 to 3.0%	1.00 0.19	Moderate Slope 25 to 40% Surface fragments (>10") 0.1-3.0%	0.22 0.19	Severe Depth to bedrock <20" Slope >15% AWC <2" to 40"	1.00 1.00 1.00
Cheme family	35	Moderate Slope 15-25% Fragments (>10") 0.1 to 3.0%	0.82 0.19	Moderate Surface fragments (>10") 0.1-3.0%	0.19	Severe Depth to pan <20" AWC <2" to 40" Fragments (gravel) >50%	1.00 1.00 1.00
Rock outcrop, volcanics	15	Not rated		Not rated		Not rated	

Table 5b.--Urban Uses and Recreation (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Lawns, landscaping, and golf fairways,	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1500:							
Carrizo, dry	85	Severe Surface fragments <3" >65%	1.00	Severe Surface fragments <3" >65%	1.00	Severe Fragments (gravel) >50% AWC <2" to 40" Fragments (>3") 5 to 30%	1.00 1.00 0.01
1501:							
Carrizo, steep	85	Severe Slope >25% Surface sand fraction 70-90% .	1.00 0.88	Severe Slope >40% Surface sand fraction 70-90% .	1.00 0.88	Severe Slope >15% AWC <2" to 40" Fragments (gravel) 25-50%	1.00 1.00 0.05
1502:							
Carrizo, steep	40	Severe Slope >25% Surface sand fraction 70-90%	1.00 0.88	Severe Slope >40% Surface sand fraction 70-90%	1.00 0.88	Severe Slope >15% AWC <2" to 40" Fragments (gravel) 25-50%	1.00 1.00 0.05
Badland, fine	25	Severe Slope >25%	1.00	Severe Slope >40%	1.00	Severe Slope >15% AWC <2" to 40"	1.00 1.00
Riverbend, strongly sloping	20	Slight		Slight		Severe Fragments (gravel) >50% Slope >15% AWC 2-4" to 40"	1.00 1.00 0.98
1503:							
Carrizo	65	Moderate Surface sand fraction 70-90% Fragments (>10") 0.1 to 3.0%	0.88 0.19	Moderate Surface sand fraction 70-90% Surface fragments (>10") 0.1-3.0%	0.88 0.19	Severe AWC <2" to 40" Fragments (gravel) >50%	1.00 1.00 1.00
Carrizo, frequently flooded	30	Severe Fragments (>10") >3% Frequent flooding Surface sand fraction 70-90% .	1.00 0.50 0.12	Severe Surface fragments (>10") >3% Frequent flooding Surface sand fraction 70-90% .	1.00 0.50 0.12	Severe AWC <2" to 40" Frequent flooding	1.00 0.90

Table 5b.--Urban Uses and Recreation (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Lawns, landscaping, and golf fairways,	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2000:							
Riverbend, strongly sloping--	85	Slight		Slight		Severe	
						Fragments (gravel) >50%	1.00
						Slope >15%	1.00
						AWC 2-4" to 40"	0.98
2001:							
Riverbend, strongly sloping--	55	Slight		Slight		Severe	
						Fragments (gravel) >50%	1.00
						Slope >15%	1.00
						AWC 2-4" to 40"	0.98
Chemehuevi----------	30	Moderate		Moderate		Moderate	
		Dusty	0.50	Dusty	0.50	AWC 2-4" to 40"	0.98
						Fragments (gravel) 25-50%	0.11
2010:							
Chemehuevi----------	35	Slight		Slight		Moderate	
						Fragments (gravel) 25-50%	0.82
						AWC 2-4" to 40"	0.47
Carrizo----------	30	Slight		Slight		Severe	
						AWC <2" to 40"	1.00
						Fragments (gravel) >50%	1.00
Riverbend, strongly sloping--	20	Slight		Slight		Severe	
						Fragments (gravel) >50%	1.00
						Slope >15%	1.00
						AWC 2-4" to 40"	0.98
2011:							
Cololag----------	85	Moderate		Moderate		Severe	
		Dusty	0.50	Dusty	0.50	AWC <2" to 40"	1.00
						Fragments (gravel) 25-50%	0.16

Table 5b.--Urban Uses and Recreation (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Lawns, landscaping, and golf fairways,	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2020:							
Snaggletooth----------	65	Slight		Slight		Slight	
Carrizo----------	20	Severe		Severe		Severe	
		Surface fragments <3" >65%	1.00	Surface fragments <3" >65%	1.00	Fragments (gravel) >50%	1.00
						AWC <2" to 40"	1.00
2030:							
Garywash----------	85	Slight		Slight		Moderate	
						Fragments (gravel) 25-50%	0.97
						AWC 2-4" to 40"	0.05
						Slopes 8 to 15%	0.04
2031:							
Garywash----------	60	Moderate		Moderate		Moderate	
		Fragments (>10") 0.1 to 3%	0.19	Surface fragments (>10") 0.1-3.0%	0.19	Fragments (gravel) 25-50%	0.97
						AWC 2-4" to 40"	0.05
Chemehuevi, stony----------	25	Severe		Severe		Moderate	
		Fragments (>10") >3%	1.00	Surface fragments (>10") >3%	1.00	AWC 2-4" to 40"	0.36
						Fragments (gravel) 25-50%	0.05
						Fragments (>3") 5 to 30%	0.05
2400:							
Carrizo, frequently flooded--	55	Severe		Severe		Severe	
		Surface sand fraction >90% .	1.00	Surface sand fraction >90% .	1.00	AWC <2" to 40"	1.00
		Fragments (>10") >3%	1.00	Surface fragments (>10") >3%	1.00	Frequent flooding	0.90
		Frequent flooding	0.50	Frequent flooding	0.50	Loamy coarse sand surface	0.50
Carrwash, dry----------	35	Moderate		Moderate		Severe	
		Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88	AWC <2" to 40"	1.00
						Fragments (gravel) 25-50%	0.95
						Loamy coarse sand surface	0.50

Table 5b.--Urban Uses and Recreation (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Lawns, landscaping, and golf fairways,	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2401:							
Carrizo, frequently flooded--	60	Severe		Severe		Severe	
		Surface fragments (<3") >65%	1.00	Surface fragments (<3") >65%	1.00	Fragments (gravel) >50%	1.00
		Fragments (>10") >3%	1.00	Surface fragments (>10") >3%	1.00	AWC <2" to 40"	1.00
		Frequent flooding	0.50	Frequent flooding	0.50	Frequent flooding	0.90
Carrwash, dry----------	25	Moderate		Moderate		Severe	
		Surface sand fraction 70-90%	0.88	Surface sand fraction 70-90%	0.88	AWC <2" to 40"	1.00
						Fragments (gravel) 25-50%	0.95
						Loamy coarse sand surface	0.50

The interpretations for paths and trails evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, fragments less than, equal to, or greater than 3 inches in diameter, content of clay or sand, fragments on the surface greater than or equal to 10 inches in diameter, Unified class for high organic matter content (PT, OL, OH), soil dustiness, and the susceptibility of the soil to erosion by water.

The interpretations for off-road motorcycle trails evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, soil dustiness, fragments less than, equal to, or greater than 3 inches in diameter, content of sand or clay, and Unified class for high organic matter content (PT, OL, OH).

The interpretations for lawns, landscaping, and golf fairways evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, depth to bedrock, depth to cemented pan, fragments greater than, equal to, or less than 3 inches in diameter, Unified class for high organic matter content (PT, OL, OH), soil dustiness, content of sand or clay, fragments on the surface greater than or equal to 10 inches in diameter, soil pH, salinity (EC), sodium content (SAR), calcium carbonate content, and sulfur content.

Table 6a.--Building Site Development (Part 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 potential limitation. The ratings are based on the limitation with the highest value. Only the three limitations with the highest value are listed; there may be more limitations. Fine-earth fraction and coarse fragment content are estimated on a weight basis. Brief summaries of the rating criteria are at the end of the table. See text for further explanation of ratings and limiting features)

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
1200:							
Goldroad	80	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Depth to hard bedrock <20"	1.00
1210:							
Stormjade	40	Severe		Severe		Severe	
		Depth to soft bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Depth to soft bedrock <20"	1.00
		Depth to hard bedrock <20"	1.00	Depth to soft bedrock <20"	1.00	Slope >8%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Depth to hard bedrock <20"	1.00
Goldroad	35	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Depth to hard bedrock <20"	1.00
1211:							
Stormjade, dry	40	Severe		Severe		Severe	
		Depth to soft bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Depth to soft bedrock <20"	1.00
		Depth to hard bedrock <20"	1.00	Depth to soft bedrock <20"	1.00	Slope >8%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Depth to hard bedrock <20"	1.00
Whipple	30	Severe		Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Slope >8%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Depth to hard bedrock <20"	1.00
Whipple, warm	15	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Depth to hard bedrock <20"	1.00
1400:							
Sunrock, dry	60	Severe		Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Slope >8%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Depth to hard bedrock <20"	1.00
Sunrock, warm	25	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Depth to hard bedrock <20"	1.00

Table 6a.--Building Site Development (Part 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
1401:							
Sunrock, cobbly	45	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Depth to hard bedrock <20"	1.00
Cheme family	30	Severe		Severe		Severe	
		Depth to thick pan <20"	1.00	Depth to thick pan <40"	1.00	Slope >8%	1.00
		Slope >15%	1.00	Slope >15%	1.00	Depth to thick pan <20"	1.00
		Fragments (>3") 25 to 50%	0.61	Fragments (>3") 25 to 50%	0.61	Fragments (>3") 25 to 50%	0.61
1402:							
Sunrock, moist	40	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00	Depth to hard bedrock <20"	1.00
Cheme family	35	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
Rock outcrop, volcanics	15	Not rated		Not rated		Not rated	
1500:							
Carrizo, dry	85	Slight		Slight		Moderate	
						Slope 4 to 8%	0.02
1501:							
Carrizo, steep	85	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
1502:							
Carrizo, steep	40	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
Badland, fine	25	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
Riverbend, strongly sloping	20	Severe		Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00	Slope >8%	1.00
1503:							
Carrizo	65	Slight		Slight		Moderate	
						Slope 4 to 8%	0.02
Carrizo, frequently flooded	30	Severe		Severe		Severe	
		Flooding >/= rare	1.00	Flooding >/= rare	1.00	Flooding >/= rare	1.00
						Slope 4 to 8%	0.02

Table 6a.--Building Site Development (Part 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
2000:							
Riverbend, strongly sloping	85	Severe Slope >15%	1.00	Severe Slope >15%	1.00	Severe Slope >8%	1.00
2001:							
Riverbend, strongly sloping	55	Severe Slope >15%	1.00	Severe Slope >15%	1.00	Severe Slope >8%	1.00
Chemehuevi	30	Slight		Slight		Slight	
2010:							
Chemehuevi	35	Slight		Slight		Slight	
Carrizo	30	Slight		Slight		Moderate Slope 4 to 8%	0.02
Riverbend, strongly sloping	20	Severe Slope >15%	1.00	Severe Slope >15%	1.00	Severe Slope >8%	1.00
2011:							
Cololag	85	Slight		Slight		Slight	
2020:							
Snaggletooth	65	Slight		Slight		Slight	
Carrizo	20	Slight		Slight		Moderate Slope 4 to 8%	0.02
2030:							
Garywash	85	Moderate Slope 8 to 15%	0.04	Moderate Slope 8 to 15%	0.04	Severe Slope >8%	1.00
2031:							
Garywash	60	Slight		Slight		Moderate Slope 4 to 8%	0.02
Chemehuevi, stony	25	Slight		Slight		Slight	
2400:							
Carrizo, frequently flooded	55	Severe Flooding >/= rare	1.00	Severe Flooding >/= rare	1.00	Severe Flooding >/= rare	1.00
Carrwash, dry	35	Slight		Slight		Slight	

Table 6a.--Building Site Development (Part 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
2401:							
Carrizo, frequently flooded	60	Severe Flooding >/= rare	1.00	Severe Flooding >/= rare	1.00	Severe Flooding >/= rare	1.00
Carrwash, dry----------	25	Slight		Slight		Slight	

The interpretations for dwellings without basements evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear extensibility percent (LEP), organic Unified class for low soil strength (PT, OL or OH), depth to hard or soft bedrock, depth to thick or thin cemented pan, and fragments greater than 3 inches in diameter.

The interpretations for dwellings with basements evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear extensibility percent (LEP), organic Unified class for low soil strength (PT, OL, OH), depth to hard or soft bedrock, depth to thick or thin cemented pan, and fragments greater than 3 inches in diameter.

The interpretations for small commercial buildings evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear extensibility percent (LEP), depth to hard or soft bedrock, depth to thick or thin cemented pan, and fragments greater than 3 inches in diameter.

Table 6b.--Building Site Development (Part 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 potential limitation. The ratings are based on the limitation with the highest value. Only the three limitations with the highest value are listed; there may be more limitations. Fine-earth fraction and coarse fragment content are estimated on a weight basis. Brief summaries of the rating criteria are at the end of the table. See text for further explanation of ratings and limiting features)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1200:					
Goldroad	80	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
1210:					
Stormjade	40	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Depth to soft bedrock <20"	1.00	Depth to soft bedrock <20"	1.00
		Slope >15%	1.00	Slope >15%	1.00
Goldroad	35	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
1211:					
Stormjade, dry	40	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Depth to soft bedrock <20"	1.00	Depth to soft bedrock <20"	1.00
		Slope >15%	1.00	Slope >15%	1.00
Whipple	30	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
Whipple, warm	15	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
1400:					
Sunrock, dry	60	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
Sunrock, warm	25	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
1401:					
Sunrock, cobbly	45	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
Cheme family	30	Severe		Severe	
		Depth to thick pan <20"	1.00	Depth to thick pan <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
		Fragments (>3") 25 to 50%	0.61	Fragments (>3") 25 to 50%	0.61

Table 6b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1402:					
Sunrock, moist	40	Severe		Severe	
		Depth to hard bedrock <20"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
Cheme family	35	Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
Rock outcrop, volcanics	15	Not rated		Not rated	
1500:					
Carrizo, dry	85	Slight		Severe	
				Caving potential	1.00
1501:					
Carrizo, steep	85	Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00
				Caving potential	1.00
				Bulk density >1.8g/cc	0.50
1502:					
Carrizo, steep	40	Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00
				Caving potential	1.00
				Bulk density >1.8g/cc	0.50
Badland, fine	25	Severe		Severe	
		Slope >15%	1.00	Slope >15%	1.00
				Low caving potential	0.10
Riverbend, strongly sloping	20	Severe		Severe	
		Slope >15%	1.00	Caving potential	1.00
				Slope >15%	1.00
1503:					
Carrizo	65	Slight		Severe	
				Caving potential	1.00
Carrizo, frequently flooded	30	Severe		Severe	
		Flooding >/= occasional	1.00	Caving potential	1.00
				Very frequent flooding	0.50
2000:					
Riverbend, strongly sloping	85	Severe		Severe	
		Slope >15%	1.00	Caving potential	1.00
				Slope >15%	1.00
2001:					
Riverbend, strongly sloping	55	Severe		Severe	
		Slope >15%	1.00	Caving potential	1.00
				Slope >15%	1.00
Chemehuevi	30	Slight		Severe	
				Caving potential	1.00
				Bulk density >1.8g/cc	0.50
2010:					
Chemehuevi	35	Slight		Severe	
				Caving potential	1.00
				Bulk density >1.8g/cc	0.50

Table 6b.--Building Site Development (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2010:					
Carrizo	30	Slight		Severe	
				Caving potential	1.00
Riverbend, strongly sloping	20	Severe		Severe	
		Slope >15%	1.00	Caving potential	1.00
				Slope >15%	1.00
2011:					
Cololag	85	Slight		Severe	
				Caving potential	1.00
2020:					
Snaggletooth	65	Slight		Severe	
				Caving potential	1.00
Carrizo	20	Slight		Severe	
				Caving potential	1.00
2030:					
Garywash	85	Moderate		Severe	
		Slope 8 to 15%	0.04	Caving potential	1.00
				Slope 8 to 15%	0.04
2031:					
Garywash	60	Slight		Severe	
				Caving potential	1.00
Chemehuevi, stony	25	Slight		Severe	
				Caving potential	1.00
2400:					
Carrizo, frequently flooded	55	Severe		Severe	
		Flooding >/= occasional	1.00	Caving potential	1.00
				Very frequent flooding	0.50
Carrwash, dry	35	Slight		Severe	
				Caving potential	1.00
2401:					
Carrizo, frequently flooded	60	Severe		Severe	
		Flooding >/= occasional	1.00	Caving potential	1.00
				Very frequent flooding	0.50
Carrwash, dry	25	Slight		Severe	
				Caving potential	1.00

The interpretations for local roads and streets evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, organic Unified class for low soil strength (PT, OL or OH), content of clay, depth to hard or soft bedrock, depth to thick or thin cemented pan, fragments greater than 3 inches in diameter, soil bulk density, and the potential of the soil to cave in.

The interpretations for shallow excavations evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear extensibility percent (LEP), potential frost action, depth to hard or soft bedrock, depth to thick or thin cemented pan, fragments greater than 3 inches in diameter, and soil strength expressed as the AASHTO group index number (AASHTO GI).

Table 7a.--Sanitary Facilities (Part 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 potential limitation. The ratings are based on the limitation with the highest value. Only the three limitations with the highest value are listed; there may be more limitations. Fine-earth fraction and coarse fragment content are estimated on a weight basis. Brief summaries of the rating criteria are at the end of the 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
1200:					
Goldroad	80	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
		Permeability <0.01"/hr	1.00		
1210:					
Stormjade	40	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Permeability <0.01"/hr	1.00	Depth to soft bedrock <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
Goldroad	35	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
		Permeability <0.01"/hr	1.00		
1211:					
Stormjade, dry	40	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Permeability <0.01"/hr	1.00	Depth to soft bedrock <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
Whipple	30	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Permeability <0.01"/hr	1.00	Slope >8%	1.00
		Slope >15%	1.00		
Whipple, warm	15	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
		Permeability <0.01"/hr	1.00	Permeability >2"/hr (seepage)	1.00
1400:					
Sunrock, dry	60	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Permeability <0.01"/hr	1.00	Slope >8%	1.00
		Slope >15%	1.00		
Sunrock, warm	25	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
		Permeability <0.01"/hr	1.00		
1401:					
Sunrock, cobbly	45	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
		Permeability <0.01"/hr	1.00		
Cheme family	30	Severe		Severe	
		Depth to pan <40"	1.00	Depth to pan <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
		Fragments (>3") 25-50%	0.61	Permeability >2"/hr (seepage)	1.00

Table 7a.--Sanitary Facilities (Part 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
1402:					
Sunrock, moist	40	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
		Permeability <0.01"/hr	1.00		
Cheme family	35	Severe		Severe	
		Depth to pan <40"	1.00	Depth to pan <40"	1.00
		Slope >15%	1.00	Slope >8%	1.00
Rock outcrop, volcanics	15	Not rated		Not rated	
1500:					
Carrizo, dry	85	Severe		Severe	
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
		Very rare flooding	0.20	Slope 2 to 8%	0.33
1501:					
Carrizo, steep	85	Severe		Severe	
		Permeability >6"/hr (seepage and poor filter)	1.00	Slope >8%	1.00
		Slope >15%	1.00	Permeability >2"/hr (seepage)	1.00
1502:					
Carrizo, steep	40	Severe		Severe	
		Permeability >6"/hr (seepage and poor filter)	1.00	Slope >8%	1.00
		Slope >15%	1.00	Permeability >2"/hr (seepage)	1.00
Badland, fine	25	Severe		Severe	
		Depth to bedrock <40"	1.00	Depth to hard bedrock <40"	1.00
		Slope >15%	1.00	Depth to soft bedrock <40"	1.00
		Permeability <0.01"/hr	1.00	Slope >8%	1.00
Riverbend, strongly sloping	20	Severe		Severe	
		Slope >15%	1.00	Slope >8%	1.00
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
1503:					
Carrizo	65	Severe		Severe	
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.33
Carrizo, frequently flooded	30	Severe		Severe	
		Flooding	1.00	Flooding >/= occasional	1.00
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.33
2000:					
Riverbend, strongly sloping	85	Severe		Severe	
		Slope >15%	1.00	Slope >8%	1.00
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
2001:					
Riverbend, strongly sloping	55	Severe		Severe	
		Slope >15%	1.00	Slope >8%	1.00
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00

Table 7a.--Sanitary Facilities (Part 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
2001:					
Chemehuevi	30	Slight		Severe	
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.17
2010:					
Chemehuevi	35	Slight		Severe	
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.17
Carrizo	30	Severe		Severe	
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.33
		Very rare flooding	0.20		
Riverbend, strongly sloping	20	Severe		Severe	
		Slope >15%	1.00	Slope >8%	1.00
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
2011:					
Cololag	85	Slight		Severe	
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.17
2020:					
Snaggletooth	65	Moderate		Severe	
		Permeability >0.6-2"/hr (slow percolation)	0.32	Permeability >2"/hr (seepage)	1.00
Carrizo	20	Severe		Severe	
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.33
		Very rare flooding	0.20		
2030:					
Garywash	85	Moderate		Severe	
		Slope 8 to 15%	0.04	Permeability >2"/hr (seepage)	1.00
				Slope >8%	1.00
2031:					
Garywash	60	Slight		Severe	
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.33
Chemehuevi, stony	25	Slight		Severe	
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.17
2400:					
Carrizo, frequently flooded	55	Severe		Severe	
		Flooding	1.00	Flooding >/= occasional	1.00
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.17
Carrwash, dry	35	Severe		Severe	
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.17

Table 7a.--Sanitary Facilities (Part 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
2401:					
Carrizo, frequently flooded	60	Severe		Severe	
		Flooding	1.00	Flooding >/= occasional	1.00
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.17
2401:					
Carrwash, dry	25	Severe		Severe	
		Permeability >6"/hr (seepage and poor filter)	1.00	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 8%	0.17

The interpretations for septic tank adsorption fields evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, subsidence of organic soils, depth to hard or soft bedrock, depth to cemented pan, and permeability.

The interpretations for sewage lagoons evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, organic Unified class for low strength (PT, OL, OH), depth to hard or soft bedrock, depth to cemented pan, fragments greater than 3 inches in diameter, and permeability.

Table 7b.--Sanitary Facilities (Part 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 potential limitation. The ratings are based on the limitation with the highest value. Only the three limitations with the highest value are listed; there may be more limitations. Fine-earth fraction and coarse fragment content are estimated on a weight basis. Brief summaries of the rating criteria are at the end of the table. For an explanation of the texture abbreviations, see "Texture, soil" in the Glossary)

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
1200:							
Goldroad	80	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Lithic or paralithic bedrock at <72"	1.00			Depth to bedrock <40"	1.00
						Slope >15%	1.00
1210:							
Stormjade	40	Severe		Severe		Poor	
		Lithic or paralithic bedrock at <72"	1.00	Slope >15%	1.00	Depth to bedrock <40"	1.00
						Slope >15%	1.00
		Slope >15%	1.00			Fragments (<3") 25-50%	0.83
Goldroad	35	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Lithic or paralithic bedrock at <72"	1.00			Depth to bedrock <40"	1.00
						Slope >15%	1.00
1211:							
Stormjade, dry	40	Severe		Severe		Poor	
		Lithic or paralithic bedrock at <72"	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
						Depth to bedrock <40"	1.00
		Slope >15%	1.00			Slope >15%	1.00
Whipple	30	Severe		Severe		Poor	
		Lithic or paralithic bedrock at <72"	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
						Depth to bedrock <40"	1.00
		Slope >15%	1.00			Slope >15%	1.00
Whipple, warm	15	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Lithic or paralithic bedrock at <72"	1.00			Depth to bedrock <40"	1.00
						Slope >15%	1.00
1400:							
Sunrock, dry	60	Severe		Severe		Poor	
		Lithic or paralithic bedrock at <72"	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
						Depth to bedrock <40"	1.00
		Slope >15%	1.00			Slope >15%	1.00

Table 7b.--Sanitary Facilities (Part 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
1400:							
Sunrock, warm	25	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Lithic or paralithic bedrock at <72"	1.00			Depth to bedrock <40"	1.00
						Slope >15%	1.00
1401:							
Sunrock, cobbly	45	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Depth to bedrock <40"	1.00
		Lithic or paralithic bedrock at <72"	1.00			Slope >15%	1.00
		Fragments (3-10") 15-35%	0.06			Fragments (<3") 25-50%	0.91
Cheme family	30	Severe		Severe		Poor	
		Depth to thick cemented pan	1.00	Slope >15%	1.00	Depth to pan <40"	1.00
		Slope >15%	1.00			Slope >15%	1.00
		Fragments (3-10") 15-35%	0.32			Fragments (<3") 25-50%	0.89
1402:							
Sunrock, moist	40	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Lithic or paralithic bedrock at <72"	1.00			Depth to bedrock <40"	1.00
						Slope >15%	1.00
Cheme family	35	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
						Depth to pan <40"	1.00
						Slope >15%	1.00
Rock outcrop, volcanics	15	Not rated		Not rated		Not rated	
1500:							
Carrizo, dry	85	Severe		Moderate		Poor	
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00	Very rare flooding	0.20	Fragments (<3") >50%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00
1501:							
Carrizo, steep	85	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Slope >15%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00

Table 7b.--Sanitary Facilities (Part 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
1502:							
Carrizo, steep	40	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Slope >15%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00
Badland, fine	25	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Slope >15%	1.00
						Packing (OL, OH, CH, or MH)	1.00
Riverbend, strongly sloping	20	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Sand or sandy texture (cosl, ls, lfs, or lvfs)	0.50			Permeability >2.0"/hr	1.00
						Slope >15%	1.00
1503:							
Carrizo	65	Severe		Slight		Poor	
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Fragments (<3") >50%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00
Carrizo, frequently flooded	30	Severe		Moderate		Poor	
		Flooding >/= occasional	1.00	Frequent flooding	0.80	Fragments (<3") >50%	1.00
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00
2000:							
Riverbend, strongly sloping	85	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Sand or sandy texture (cosl, ls, lfs, or lvfs)	0.50			Permeability >2.0"/hr	1.00
						Slope >15%	1.00
2001:							
Riverbend, strongly sloping	55	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Sand or sandy texture (cosl, ls, lfs, or lvfs)	0.50			Permeability >2.0"/hr	1.00
						Slope >15%	1.00
Chemehuevi	30	Severe		Slight		Poor	
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Fragments (<3") >50%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00

Table 7b.--Sanitary Facilities (Part 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
2010:							
Chemehuevi	35	Severe		Slight		Poor	
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Fragments (<3") >50%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00
Carrizo	30	Severe		Moderate		Poor	
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00	Very rare flooding	0.20	Fragments (<3") >50%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00
Riverbend, strongly sloping	20	Severe		Severe		Poor	
		Slope >15%	1.00	Slope >15%	1.00	Fragments (<3") >50%	1.00
		Sand or sandy texture (cosl, ls, lfs, or lvfs)	0.50			Permeability >2.0"/hr	1.00
						Slope >15%	1.00
2011:							
Cololag	85	Slight		Slight		Poor	
						Fragments (<3") >50%	1.00
						Permeability >2.0"/hr	0.50
2020:							
Snaggletooth	65	Slight		Slight		Good	
Carrizo	20	Severe		Moderate		Poor	
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00	Very rare flooding	0.20	Fragments (<3") >50%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00
2030:							
Garywash	85	Moderate		Moderate		Fair	
		Slope 8 to 15%	0.04	Slope 8 to 15%	0.04	Permeability >2.0"/hr	0.63
						Fragments (<3") 25-50%	0.06
						Slope 8 to 15%	0.04
2031:							
Garywash	60	Slight		Slight		Fair	
						Permeability >2.0"/hr	0.63
						Fragments (<3") 25-50%	0.23

Table 7b.--Sanitary Facilities (Part 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
2031:							
Chemehuevi, stony----------	25	Severe		Slight		Poor	
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Fragments (<3") >50%	1.00
						Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00
2400:							
Carrizo, frequently flooded--	55	Severe		Moderate		Poor	
		Flooding >/= occasional	1.00	Frequent flooding	0.80	Sand or sandy texture (s, fs, cos, or sg)	1.00
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Permeability >2.0"/hr	1.00
						Fragments (<3") >50%	1.00
Carrwash, dry----------	35	Moderate		Slight		Poor	
		Sand or sandy texture (cosl, ls, lfs, or lvfs)	0.50			Fragments (<3") >50%	1.00
						Permeability >2.0"/hr	1.00
						Sand or sandy texture (lcos, ls, lfs, or vfs)	0.50
2401:							
Carrizo, frequently flooded--	60	Severe		Moderate		Poor	
		Flooding >/= occasional	1.00	Frequent flooding	0.80	Fragments (<3") >50%	1.00
		Sand or sandy texture (cos, s, fs, lcos, or vfs)	1.00			Sand or sandy texture (s, fs, cos, or sg)	1.00
						Permeability >2.0"/hr	1.00
Carrwash, dry----------	25	Moderate		Slight		Poor	
		Sand or sandy texture (cosl, ls, lfs, or lvfs)	0.50			Fragments (<3") >50%	1.00
						Permeability >2.0"/hr	1.00
						Sand or sandy texture (lcos, ls, lfs, or vfs)	0.50

The interpretations for trench sanitary landfill evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, depth to hard or soft bedrock, depth to thick or thin cemented pan, fragments 3 to 10 inches in size, sodium content (SAR), soil pH, clayey or sandy textures, and permeability that is so fast that seepage occurs under some climatic conditions.

The interpretations for area sanitary landfill evaluate the following soil properties, some at various depths in the soil: Flooding, ponding, wetness, slope, depth to bedrock, depth to cemented pan, and permeability that is so fast that seepage occurs under some climatic conditions.

The interpretations for daily cover for landfill evaluate the following soil properties, some at various depths in the soil: Ponding, wetness, slope, depth to bedrock, depth to cemented pan, fragments greater than or less than 3 inches in diameter, Unified class for peat (PT), Unified class for packing (OL, OH, CH, MH), sandy or clayey textures, soil pH, carbonate content, sodium content (SAR), salinity (EC), soil climate, kaolinitic mineralogy, and permeability that is so fast that seepage occurs.

Table 8a.--Construction Materials (Part 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 0.00 to 0.99. The closer the value is to 0.00, the greater the potential limitation. Values of 0.00 are absolute limitations based on the soil property criteria used to develop the interpretation. Values closer to 1.00 have less of a limitation. Limiting features with value 1.00 have no limitation and are not shown in this table. Rating classes are determined by the most limiting value. Fine-earth fraction and rock fragment content are estimated on a weight basis. Brief summaries of the rating criteria used and definitions of some abbreviations are given at the end of the table)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1200:							
Goldroad	80	Poor source		Poor source		Poor source	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Slope >15%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fragment content	0.00
						Depth to bedrock <20"	0.00
1210:							
Stormjade	40	Poor source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fragment content	0.00
				Bottom layer possible source	0.03	Depth to bedrock <20"	0.00
		Bottom layer not a source	0.00			Slope >15%	0.00
Goldroad	35	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Slope >15%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer possible source	0.05	Rock fragment content	0.00
						Depth to bedrock <20"	0.00
						Sand fraction 75-85%	0.96
1211:							
Stormjade, dry	40	Poor source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fragment content	0.00
				Bottom layer possible source	0.02	Depth to bedrock <20"	0.00
		Bottom layer not a source	0.00			Slope >15%	0.00
Whipple	30	Fair source		Poor source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Rock fragment content	0.00
				Thickest layer not a source	0.00	Depth to bedrock <20"	0.00
		Bottom layer possible source	0.05			Slope >15%	0.00
Whipple, warm	15	Fair source		Poor source		Poor source	
		Thickest layer possible source	0.03	Bottom layer not a source	0.00	Slope >15%	0.00
		Bottom layer possible source	0.40	Thickest layer not a source	0.00	Rock fragment content	0.00
						Depth to bedrock <20"	0.00

Table 8a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1400:							
Sunrock, dry	60	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fragment content	0.00
		Bottom layer possible source	0.30	Bottom layer possible source	0.07	Depth to bedrock <20"	0.00
						Slope >15%	0.00
						Sand fraction 75-85%	0.78
Sunrock, warm	25	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Slope >15%	0.00
		Bottom layer possible source	0.07	Bottom layer possible source	0.00	Rock fragment content	0.00
						Depth to bedrock <20"	0.00
1401:							
Sunrock, cobbly	45	Fair source		Poor source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Slope >15%	0.00
		Bottom layer possible source	0.07	Thickest layer not a source	0.00	Rock fragment content	0.00
						Depth to bedrock <20"	0.00
Cheme family	30	Poor source		Poor source		Poor source	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to pan <20"	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fragment content	0.00
						Slope >15%	0.00
						Calcium carbonates 15-40%	0.92
1402:							
Sunrock, moist	40	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Slope >15%	0.00
		Bottom layer possible source	0.12	Bottom layer possible source	0.07	Rock fragment content	0.00
						Depth to bedrock <20"	0.00
						Sand fraction 75-85%	0.78
Cheme family	35	Poor source		Poor source		Poor source	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to pan <20"	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fragment content	0.00
						Slope >15%	0.00
Rock outcrop, volcanics	15	Not rated		Not rated		Not rated	
1500:							
Carrizo, dry	85	Fair source		Poor source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Sand fraction >85%	0.00
		Bottom layer possible source	0.57	Thickest layer not a source	0.00	Hard to reclaim	0.00
						Rock fragment content	0.00

Table 8a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1501:							
Carrizo, steep	85	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Bottom layer possible source	0.22	Slope >15%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.24	Bulk density >1.8 in upper 20"	0.00
						Rock fragment content	0.00
						Hard to reclaim	0.00
						Sand fraction >85%	0.00
1502:							
Carrizo, steep	40	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Bottom layer possible source	0.22	Slope >15%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.24	Bulk density >1.8 in upper 20"	0.00
						Rock fragment content	0.00
						Hard to reclaim	0.00
						Sand fraction >85%	0.00
Badland, fine	25	Poor source		Poor source		Poor source	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Slope >15%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00		
Riverbend, strongly sloping	20	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.06	Hard to reclaim	0.00
				Bottom layer possible source	0.10	Rock fragment content	0.00
		Bottom layer possible source	0.05			Slope >15%	0.00
						Sand fraction 75-85%	0.22
1503:							
Carrizo	65	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Hard to reclaim	0.00
				Thickest layer possible source	0.12	Rock fragment content	0.00
		Bottom layer possible source	0.50				
Carrizo, frequently flooded	30	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Hard to reclaim	0.00
				Thickest layer possible source	0.03	Rock fragment content	0.00
		Bottom layer possible source	0.50				

Table 8a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2000:							
Riverbend, strongly sloping	85	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.06	Hard to reclaim	0.00
				Bottom layer possible source	0.10	Rock fragment content	0.00
		Bottom layer possible source	0.05			Slope >15%	0.00
						Sand fraction 75-85%	0.22
2001:							
Riverbend, strongly sloping	55	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.06	Hard to reclaim	0.00
				Bottom layer possible source	0.10	Rock fragment content	0.00
		Bottom layer possible source	0.05			Slope >15%	0.00
						Sand fraction 75-85%	0.22
Chemehuevi	30	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Thickest layer possible source	0.08	Bulk density >1.8 in upper 20"	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer possible source	0.50	Hard to reclaim	0.00
						Rock fragment content	0.00
						SAR 4 to 13	0.98
2010:							
Chemehuevi	35	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Thickest layer possible source	0.03	Bulk density >1.8 in upper 20"	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer possible source	0.36	Hard to reclaim	0.00
						Rock fragment content	0.00
						Calcium carbonates 15-40%	0.99
Carrizo	30	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Hard to reclaim	0.00
				Thickest layer possible source	0.02	Rock fragment content	0.00
		Bottom layer possible source	0.50				
Riverbend, strongly sloping	20	Fair source		Fair source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.06	Hard to reclaim	0.00
				Bottom layer possible source	0.10	Rock fragment content	0.00
		Bottom layer possible source	0.05			Slope >15%	0.00
						Sand fraction 75-85%	0.22
2011:							
Cololag	85	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Thickest layer possible source	0.02	Hard to reclaim	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer possible source	0.02	Rock fragment content	0.00
						Calcium carbonates 15-40%	0.92

Table 8a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2020:							
Snaggletooth----------	65	Poor source		Fair source		Fair source	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Rock fragment content	0.18
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.03		
Carrizo----------	20	Fair source		Fair source		Poor source	
		Bottom layer possible source	0.50	Bottom layer not a source	0.00	Hard to reclaim	0.00
		Thickest layer possible source	0.57	Thickest layer possible source	0.03	Rock fragment content	0.00
2030:							
Garywash----------	85	Poor source		Poor source		Poor source	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	EC >8 dS/m	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	SAR 4 to 13	0.60
						Rock fragment content	0.82
						Slope 8 to 12%	0.96
2031:							
Garywash----------	60	Poor source		Poor source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	EC >8 dS/m	0.00
		Bottom layer not a source	0.00	Thickest layer not a source	0.60	SAR 4 to 13	0.60
						Rock fragment content	0.82
Chemehuevi, stony----------	25	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Thickest layer possible source	0.03	Hard to reclaim	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer possible source	0.36	Rock fragment content	0.00
						Calcium carbonates 15-40%	0.99
2400:							
Carrizo, frequently flooded	55	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.71	Rock fragment content	0.00
						Hard to reclaim	0.00
Carrwash, dry----------	35	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Thickest layer possible source	0.22	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer possible source	0.90	Rock fragment content	0.00
						Hard to reclaim	0.00

Table 8a.--Construction Materials (Part 1)--Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2401:							
Carrizo, frequently flooded	60	Fair source		Poor source		Poor source	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Sand fraction >85%	0.00
				Thickest layer not a source	0.00	Hard to reclaim	0.00
		Bottom layer possible source	0.57			Rock fragment content	0.00
Carrwash, dry----------	25	Poor source		Fair source		Poor source	
		Bottom layer not a source	0.00	Thickest layer possible source	0.22	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer possible source	0.90	Rock fragment content	0.00
						Hard to reclaim	0.00

The interpretations for potential source of gravel evaluate coarse fragments greater than 0.2 inches in diameter in the bottom layer or in the thickest layer of the soil.

The interpretations for potential source of sand evaluate the amount of sand and fine gravel in the thickest layer or in the bottom layer of the soil. Organic soil layers with a Unified engineering class of peat (PT) are also evaluated.

The interpretations for potential source of topsoil evaluate the following soil properties, some at various depths: Calcium carbonate content, clay content, soil bulk density, sand content, soil wetness, coarse fragments 0.2 to 3.0 inches in diameter, fragments greater than 3 inches in diameter, organic matter content (OM), sodium content expressed as the sodium adsorption ratio (SAR), salinity expressed as millimhos per centimeter of electrical conductivity (EC), depth to bedrock, slope, and soil pH.

Table 8b.--Construction Materials (Part 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 closer the value is to 0.00, the greater the potential limitation. Values of 0.00 are absolute limitations based on the soil property criteria used to develop the interpretation. Values closer to 1.00 have less of a limitation. Limiting features with value 1.00 have no limitation and are not shown in this table. Rating classes are determined by the most limiting value. Fine-earth fraction and rock fragment content are estimated on a weight basis. Brief summaries of the rating criteria used and definitions of some abbreviations are given at the end of the table)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1200:					
Goldroad	80	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00	Slope >25%	0.00
1210:					
Stormjade	40	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00		
Goldroad	35	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00	Slope >25%	0.00
1211:					
Stormjade, dry	40	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00		
Whipple	30	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00	Slope 15 to 25%	0.50
Whipple, warm	15	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00	Slope >25%	0.00
1400:					
Sunrock, dry	60	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00		
Sunrock, warm	25	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00	Slope >25%	0.00
1401:					
Sunrock, cobbly	45	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00	Slope >25%	0.00
				Fragments (>3") 25 to 50%	0.94
Cheme family	30	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to pan <40"	0.00
		OM <0.5%	0.00	Fragments (>3") <25%	0.99
		Fragments (>10") >15%	0.00		
		Depth to pan <20"	0.00		
		Calcium carbonates 15 to 40%	0.92		

Table 8b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1402:					
Sunrock, moist	40	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to bedrock <40"	0.00
		OM <0.5%	0.00	Slope >25%	0.00
Cheme family	35	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Depth to pan <40"	0.00
		OM <0.5%	0.00	Slope 15 to 25%	0.18
		Depth to pan <20"	0.00		
Rock outcrop, volcanics	15	Not rated		Not rated	
1500:					
Carrizo, dry	85	Poor source		Good source	
		Sand fraction >85%	0.00		
		OM <0.5%	0.00		
		AWC <3" to depth of 60"	0.00		
1501:					
Carrizo, steep	85	Poor source		Poor source	
		Sand fraction >85%	0.00	Slope >25%	0.00
		AWC <3" to depth of 60"	0.00		
		OM <0.5%	0.00		
1502:					
Carrizo, steep	40	Poor source		Poor source	
		Sand fraction >85%	0.00	Slope >25%	0.00
		AWC <3" to depth of 60"	0.00		
		OM <0.5%	0.00		
Badland, fine	25	Poor source		Poor source	
		AWC <3" to depth of 60"	0.00	Slope >25%	0.00
Riverbend, strongly sloping	20	Poor source		Good source	
		OM <0.5%	0.00		
		AWC 3-6" to depth of 60"	0.00		
		Sand fraction 75 to 85%	0.50		
1503:					
Carrizo	65	Poor source		Good source	
		OM <0.5%	0.00		
		AWC <3" to depth of 60"	0.00		
Carrizo, frequently flooded	30	Poor source		Good source	
		OM <0.5%	0.00		
		AWC <3" to depth of 60"	0.00		
2000:					
Riverbend, strongly sloping	85	Poor source		Good source	
		OM <0.5%	0.00		
		AWC 3-6" to depth of 60"	0.00		
		Sand fraction 75 to 85%	0.50		
2001:					
Riverbend, strongly sloping	55	Poor source		Good source	
		OM <0.5%	0.00		
		AWC 3-6" to depth of 60"	0.00		
		Sand fraction 75 to 85%	0.50		

Table 8b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2001:					
Chemehuevi	30	Poor source		Good source	
		OM <0.5%	0.00		
		AWC <3" to depth of 60"	0.00		
		SAR 4 to 13	0.97		
2010:					
Chemehuevi	35	Poor source		Good source	
		OM <0.5%	0.00		
		Maximum pH >8.5	0.00		
		AWC 3-6" to depth of 60"	0.11		
		Calcium carbonates 15 to 40%	0.99		
Carrizo	30	Poor source		Good source	
		OM <0.5%	0.00		
		AWC <3" to depth of 60"	0.00		
Riverbend, strongly sloping	20	Poor source		Good source	
		OM <0.5%	0.00		
		AWC 3-6" to depth of 60"	0.00		
		Sand fraction 75 to 85%	0.50		
2011:					
Cololag	85	Poor source		Good source	
		OM <0.5%	0.00		
		Maximum pH >8.5	0.00		
		AWC 3-6" to depth of 60"	0.13		
		Calcium carbonates 15 to 40%	0.92		
		K factor <0.10	0.99		
2020:					
Snaggletooth	65	Poor source		Good source	
		OM <0.5%	0.00		
		Maximum pH >8.5	0.00		
		SAR 4 to 13	0.78		
		Calcium carbonates 15 to 40%	0.92		
Carrizo	20	Poor source		Good source	
		OM <0.5%	0.00		
		AWC <3" to depth of 60"	0.00		
2030:					
Garywash	85	Poor source		Good source	
		OM <0.5%	0.00		
		EC >16 dS/m	0.00		
		SAR 4 to 13	0.60		
		Calcium carbonates 15 to 40%	0.99		
2031:					
Garywash	60	Poor source		Good source	
		OM <0.5%	0.00		
		EC >16 dS/m	0.00		
		AWC 3-6" to depth of 60"	0.48		
		SAR 4 to 13	0.60		
		Calcium carbonates 15 to 40%	0.99		
Chemehuevi, stony	25	Poor source		Good source	
		OM <0.5%	0.00		
		Maximum pH >8.5	0.00		
		AWC 3-6" to depth of 60"	0.15		
		Calcium carbonates 15 to 40%	0.99		

Table 8b.--Construction Materials (Part 2)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2400:					
Carrizo, frequently flooded-------	55	Poor source		Good source	
		Sand fraction >85%	0.00		
		AWC <3" to depth of 60"	0.00		
		OM <0.5%	0.00		
Carrwash, dry----------	35	Poor source		Good source	
		Sand fraction >85%	0.00		
		OM <0.5%	0.00		
		AWC 3-6" to depth of 60"	0.00		
2401:					
Carrizo, frequently flooded-------	60	Poor source		Good source	
		Sand fraction >85%	0.00		
		OM <0.5%	0.00		
		AWC <3" to depth of 60"	0.00		
Carrwash, dry----------	25	Poor source		Good source	
		Sand fraction >85%	0.00		
		OM <0.5%	0.00		
		AWC 3-6" to depth of 60"	0.00		

The interpretations for potential source of reclamation material evaluate the following soil properties at various depths in the soil: The content of sand and clay, content of fragments, wind erodibility group (WEG), available water capacity (AWC), soil pH, salinity (EC), content of sodium (SAR), content of carbonates, and susceptibility of the soil to erosion by water (K factor).

The interpretations for potential source of roadfill evaluate the following soil properties, some at various depths in the soil: Shrink-swell potential expressed as linear extensibility percent (LEP), depth to rock or cemented pan, wetness, slope, soil strength expressed as AASHTO group index number (AASHTO GIN), and content of fragments.

Table 9.--Water Management

(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 potential limitation. The ratings are based on the limitation with the highest value. Only the three limitations with the highest value are listed; there may be more limitations. Fine-earth fraction and coarse fragment content are estimated on a weight basis. Brief summaries of the rating criteria and definitions of some abbreviations are at the end of the table)

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1200:					
Goldroad	80	Severe		Severe	
		Thin layer	1.00	Slope >7%	1.00
				Marly (piping)	1.00
				Depth to bedrock <20"	1.00
1210:					
Stormjade	40	Severe		Severe	
		Thin layer	1.00	Marly (piping)	1.00
				Depth to bedrock <20"	1.00
				Slope >7%	1.00
Goldroad	35	Severe		Severe	
		Thin layer	1.00	Slope >7%	1.00
				Marly (piping)	1.00
				Depth to bedrock <20"	1.00
1211:					
Stormjade, dry	40	Severe		Severe	
		Thin layer	1.00	Marly (piping)	1.00
				Depth to bedrock <20"	1.00
				Slope >7%	1.00
Whipple	30	Severe		Severe	
		Thin layer	1.00	Marly (piping)	1.00
				Depth to bedrock <20"	1.00
				Slope >7%	1.00
Whipple, warm	15	Severe		Severe	
		Thin layer	1.00	Slope >7%	1.00
				Marly (piping)	1.00
				Depth to bedrock <20"	1.00
1400:					
Sunrock, dry	60	Severe		Severe	
		Thin layer	1.00	Marly (piping)	1.00
				Depth to bedrock <20"	1.00
				Slope >7%	1.00
Sunrock, warm	25	Severe		Severe	
		Thin layer	1.00	Slope >7%	1.00
				Marly (piping)	1.00
				Depth to bedrock <20"	1.00
1401:					
Sunrock, cobbly	45	Severe		Severe	
		Thin layer	1.00	Slope >7%	1.00
		Fragments (>3") 15-35%	0.19	Marly (piping)	1.00
				Depth to bedrock <20"	1.00
Cheme family	30	Severe		Severe	
		Thin layer	1.00	Marly (piping)	1.00
		Fragments (>3") >35%	1.00	Depth to pan <20"	1.00
				Permeability >2"/hr (seepage)	1.00

Table 9.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1402:					
Sunrock, moist	40	Severe		Severe	
		Thin layer	1.00	Slope >7%	1.00
				Marly (piping)	1.00
				Depth to bedrock <20"	1.00
Cheme Family	35	Severe		Severe	
		Thin layer	1.00	Marly (piping)	1.00
				Depth to pan <20"	1.00
				Slope >7%	1.00
Rock outcrop, volcanics	15	Not rated		Not rated	
1500:					
Carrizo, dry	85	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
		Fragments (>3") 15-35%	0.09	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.08
1501:					
Carrizo, steep	85	Severe		Severe	
		Seepage	1.00	Slope >7%	1.00
				Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
1502:					
Carrizo, steep	40	Severe		Severe	
		Seepage	1.00	Slope >7%	1.00
				Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
Badland, fine	25	Moderate		Severe	
		MH or CH Unified class	0.50	Slope >7%	1.00
		PI <40%		Marly (piping)	1.00
Riverbend, strongly sloping	20	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope >7%	1.00
1503:					
Carrizo	65	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.08
Carrizo, frequently flooded	30	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
		Fragments (>3") 15-35%	0.08	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.08
2000:					
Riverbend, strongly sloping	85	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope >7%	1.00
2001:					
Riverbend, strongly sloping	55	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope >7%	1.00

Table 9.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2001:					
Chemehuevi	30	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
		Low piping potential	0.02	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.00
2010:					
Chemehuevi	35	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.00
Carrizo	30	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
		Fragments (>3") 15-35%	0.08	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.08
Riverbend, strongly sloping	20	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope >7%	1.00
2011:					
Cololag	85	Slight		Severe	
				Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.00
2020:					
Snaggletooth	65	Moderate		Severe	
		High piping potential	0.22	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
Carrizo	20	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
		Fragments (>3") 15-35%	0.09	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.08
2030:					
Garywash	85	Severe		Severe	
		EC >16 dS/m	1.00	Marly (piping)	1.00
		High piping potential	0.40	Permeability >2"/hr (seepage)	1.00
2031:					
Garywash	60	Severe		Severe	
		EC >16 dS/m	1.00	Marly (piping)	1.00
		High piping potential	0.40	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.08
Chemehuevi, stony	25	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.00
2400:					
Carrizo, frequently flooded	55	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.00

Table 9.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2400:					
Carrwash, dry	35	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.00
2401:					
Carrizo, frequently flooded	60	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
		Fragments (>3") 15-35%	0.09	Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.00
Carrwash, dry	25	Severe		Severe	
		Seepage	1.00	Marly (piping)	1.00
				Permeability >2"/hr (seepage)	1.00
				Slope 2 to 7%	0.00

The interpretations for embankments, dikes, and levees evaluate the following soil properties, some at various depths in the soil: Ponding, wetness, depth to restrictive layer, fragments greater than 3 inches, salinity (EC), Unified class for high organic content (PT, OL, OH), Unified class for hard to pack (MH, CH), permeability that is so fast that seepage occurs, piping as determined by Atterberg limits of liquid limit (LL) and plasticity index (PI), sodium content (SAR), and gypsum content.

The interpretations for pond reservoir areas evaluate the following soil properties, some at various depths in the soil: Slope, depth to hard or soft bedrock, depth to cemented pan, marly textures, gypsum content, and permeability that is so fast that seepage occurs.

Table 10.--Engineering Index Properties

(Absence of an entry indicates that data were not estimated)

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*	
1200:												
Goldroad	0-1	Very gravelly sandy loam	GM, SM	A-1-b	0	0-5	50-67	30-50	22-44	13-28	0-20	NP-10
	1-5	Extremely gravelly sandy loam, very gravelly sandy loam	SM, SP-SM	A-1-b	0	0-5	72-75	30-50	22-43	12-27	0-20	NP-10
	5-15	Bedrock			---	---	---	---	---	---	---	---
1210:												
Stormjade	0-1	Very gravelly sandy loam	SC-SM, SM	A-2-4, A-1-b, A-1-a	0	0-7	49-77	24-62	17-50	8-27	0-30	NP-10
	1-4	Very gravelly sandy loam	GC-GM	A-1-a, A-1-b, A-2-4	0	0-5	45-75	25-60	18-52	9-29	0-30	NP-10
	4-8	Bedrock			---	---	---	---	---	---	---	---
	8-12	Bedrock			---	---	---	---	---	---	---	---
Goldroad	0-2	Very gravelly sandy loam	GM, SM	A-1-b, A-1-a	0	0-5	50-65	30-50	21-40	9-19	15-20	NP-5
	2-10	Extremely gravelly sandy loam, very gravelly sandy loam	SM, SP-SC	A-1-b, A-1-a	0	0-15	67-84	20-45	17-43	7-22	0-30	NP-10
	10-14	Bedrock			---	---	---	---	---	---	---	---
1211:												
Stormjade, dry	0-2	Very gravelly sandy loam	SC-SM, SM	A-2-4, A-1-b, A-1-a	0	0-5	45-75	25-60	18-51	11-33	0-30	NP-10
	2-6	Very gravelly sandy loam	GC-GM	A-1-a, A-1-b, A-2-4	0	0-5	45-75	25-60	18-52	9-29	0-30	NP-10
	6-12	Bedrock			---	---	---	---	---	---	---	---
	12-14	Bedrock			---	---	---	---	---	---	---	---

Table 10.--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*	
1211:												
Whipple	0-1	Gravelly fine sandy loam	SC-SM	A-2-4	0	0-6	66-93	46-78	42-74	20-37	20-30	5-10
	1-9	Extremely gravelly loam, extremely gravelly sandy loam	GC, GP-GC	A-2-4	0	0-5	45-48	6-27	5-25	4-19	20-30	5-15
	9-13	Bedrock			---	---	---	---	---	---	---	---
Whipple, warm	0-2	Very gravelly fine sandy loam	GC-GM	A-4, A-2-4, A-1-b	0	0-6	61-93	41-78	36-71	21-43	20-30	5-10
	2-14	Extremely gravelly loam, extremely gravelly sandy loam	GC-GM, GP-GC	A-1-b, A-1-a, A-2-4	0-1	0-5	34-39	5-27	4-24	3-18	20-30	5-15
	14-18	Bedrock			---	---	---	---	---	---	---	---
1400:												
Sunrock, dry	0-3	Very gravelly sandy loam	GC-GM	A-1-b, A-1-a, A-2-4	0-3	0-10	49-58	30-50	15-45	7-23	20-30	5-10
	3-8	Extremely gravelly sandy loam	GM, SM, GW-GC	A-1-a, A-1-b	0-5	0-5	37-58	10-25	6-22	2-20	0-30	NP-5
	8	Bedrock			---	---	---	---	---	---	---	---
Sunrock, warm	0-3	Extremely gravelly sandy loam	GP-GC	A-1-a, A-1-b	0-5	0-7	37-58	10-50	6-47	3-27	0-30	NP-5
	3-8	Very gravelly sandy loam	GC-GM	A-1-a	0-5	0-7	37-58	9-51	7-47	4-27	0-30	NP-5
	8	Bedrock			---	---	---	---	---	---	---	---

Table 10.--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*	
1401:												
Sunrock, cobbly----------	0-2	Extremely cobbly fine sandy loam	SC-SM, GM, SM	A-1-b, A-2-4	0-7	15-45	38-69	10-55	7-50	4-32	0-20	NP-5
	2-6	Very cobbly fine sandy loam	SM, SC-SM	A-1-b, A-2-4	0-5	4-30	45-77	30-70	22-62	11-36	0-30	NP-5
	6-11	Very gravelly fine sandy loam	GM, GC-GM, SM	A-1-a, A-1-b, A-2-4	0-5	5-20	44-76	30-68	22-65	11-40	0-30	NP-10
	11	Bedrock			---	---	---	---	---	---	---	---
Cheme family----------	0-2	Very cobbly fine sandy loam	GM, SM, SC-SM	A-1-a, A-4, A-1-b, A-2-4	0-22	5-30	39-92	30-92	22-79	11-46	0-30	NP-5
	2-8	Extremely gravelly fine sandy loam	GC-GM	A-1-b	0-22	5-38	29-61	8-50	7-42	4-38	0-30	NP-5
	8-19	Extremely gravelly loam	GP-GC, GC-GM, SP-SC, SC-SM	A-1-a, A-1-b, A-2-4	0-22	4-38	29-62	8-46	7-43	5-34	20-30	5-10
	19-26	Cemented material			---	---	---	---	---	---	---	---
Sunrock, moist----------	0-3	Very gravelly sandy loam	SC-SM, GC-GM	A-2-4, A-1-b, A-1-a	0-3	0-16	39-61	19-54	14-42	8-26	20-30	5-10
	3-8	Extremely gravelly sandy loam	GW-GC, SC-SM	A-2-4, A-1-a, A-1-b	0-3	0-7	39-61	21-54	15-45	6-22	20-30	5-10
	8	Bedrock			---	---	---	---	---	---	---	---
Cheme family----------	0-3	Very gravelly fine sandy loam	SC-SM, GC-GM	A-2-4, A-1-b	0-3	0-7	36-62	18-56	16-52	8-26	20-30	5-10
	3-11	Very gravelly loam	SC-SM	A-2-4	0	0-7	52-67	24-53	20-49	14-37	20-30	5-10
	11-22	Cemented material			---	---	---	---	---	---	---	---
Rock outcrop, volcanics.												

Table 10.--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*	
1500:												
Carrizo, dry	0-2	Extremely gravelly fine sandy loam	SP-SC	A-1-a, A-1-b, A-2-4	0	0-7	71-87	8-41	8-41	4-23	20-30	5-10
	2-60	Stratified extremely gravelly coarse sand to very gravelly loamy sand	GP	A-1-a	0-10	5-20	12-40	8-37	3-19	2-5	0-20	NP-5
1501:												
Carrizo, steep	0-3	Gravelly loamy sand	SM	A-2-4	0	0-9	80-93	52-78	39-63	11-21	0-20	NP-5
	3-13	Loamy sand	SM	A-1-b	0	0-8	81-100	53-85	29-52	10-22	0-20	NP-5
	13-25	Gravelly loamy sand	SM	A-1-b	0	0-8	81-100	54-86	27-47	8-17	0-0	NP
	25-62	Extremely gravelly sand	SP	A-1-a	0	0	79-89	15-31	12-26	2-6	0-0	NP
1502:												
Carrizo, steep	0-3	Gravelly loamy sand	SM	A-2-4	0	0-9	80-93	52-78	39-63	11-21	0-20	NP-5
	3-13	Loamy sand	SM	A-1-b	0	0-8	81-100	53-85	29-52	10-22	0-20	NP-5
	13-25	Gravelly loamy sand	SM	A-1-b	0	0-8	81-100	54-86	27-47	8-17	0-0	NP
	25-62	Extremely gravelly sand	SP	A-1-a	0	0	79-89	15-31	12-26	2-6	0-0	NP
Badland, fine	0-0	Silty clay loam	CL	A-6, A-7	0	0	100	95-100	95-99	84-88	40-50	25-30
	0-2	Silty clay loam, gravelly silty clay loam	CH	A-6, A-7	0	0	100	55-100	44-96	39-85	40-50	25-30
	2-5	Silty clay loam, very gravelly silty clay loam	GC, CL, CH	A-6, A-7	0	0	83-100	50-100	37-98	32-87	40-50	20-30
	5-8	Bedrock			---	---	---	---	---	---	---	---
	8-11	Bedrock			---	---	---	---	---	---	---	---
	11	Bedrock			---	---	---	---	---	---	---	---

Table 10.--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*	
1502:												
Riverbend, strongly sloping----	0-2	Very gravelly fine sandy loam	GC-GM	A-1-b	0	0-3	44-59	30-45	24-44	13-25	20-30	5-10
	2-8	Gravelly sandy loam	SC-SM	A-2-4	0	0-2	74-92	50-75	43-70	22-41	20-30	5-10
	8-20	Very gravelly sandy loam	SC-SM	A-1-a	0	0-2	52-59	30-45	20-40	10-20	20-30	5-10
	20-60	Extremely gravelly loamy sand, very gravelly loamy coarse sand	GM, GW-GM	A-1-a	0	0-1	46-66	12-46	9-41	3-16	0-23	NP-5
1503:												
Carrizo----------	0-2	Very gravelly loamy sand	SP-SM	A-1-b	0	0-1	57-72	30-50	23-48	6-16	0-20	NP-5
	2-60	Stratified extremely gravelly coarse sand to very gravelly loamy sand	GW	A-1-a	0-10	5-17	20-45	10-35	5-15	0-5	5-15	NP
Carrizo, frequently flooded----	0-2	Fine sandy loam	SM	A-2-4	0	0	92-98	85-97	76-93	31-40	0-20	NP-5
	2-60	Stratified extremely gravelly coarse sand to very gravelly coarse sand	GW	A-1-a	0-10	5-20	20-45	10-35	5-15	0-5	5-15	NP
2000:												
Riverbend, strongly sloping----	0-2	Very gravelly fine sandy loam	GC-GM	A-1-b	0	0-3	44-59	30-45	24-44	13-25	20-30	5-10
	2-8	Gravelly sandy loam	SC-SM	A-2-4	0	0-2	74-92	50-75	43-70	22-41	20-30	5-10
	8-20	Very gravelly sandy loam	SC-SM	A-1-a	0	0-2	52-59	30-45	20-40	10-20	20-30	5-10
	20-60	Extremely gravelly loamy sand, very gravelly loamy coarse sand	GM, GW-GM	A-1-a	0	0-1	46-66	12-46	9-41	3-16	0-20	NP-5

Table 10.--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*	
2001:												
Riverbend, strongly sloping----	0-2	Very gravelly fine sandy loam	GC-GM	A-1-b	0	0-3	44-59	30-45	24-44	13-25	20-30	5-10
	2-8	Gravelly sandy loam	SC-SM	A-2-4	0	0-2	74-92	50-75	43-70	22-41	20-30	5-10
	8-20	Very gravelly sandy loam	SC-SM	A-1-a	0	0-2	52-59	30-45	20-40	10-20	20-30	5-10
	20-60	Extremely gravelly loamy sand, very gravelly loamy coarse sand	GM, GW-GM	A-1-a	0	0-1	46-66	12-46	9-41	3-16	0-20	NP-5
Chemehuevi----------	0-3	Gravelly loam	SC	A-4, A-2-4	0	0-4	85-100	56-76	41-61	28-44	20-30	5-10
	3-7	Gravelly fine sandy loam	SC-SM	A-2-4	0	0-5	79-90	59-76	45-66	25-38	20-30	5-10
	7-12	Very gravelly fine sandy loam, gravelly sandy loam	SC-SM	A-2-4, A-1-b	0-3	0-8	78-92	43-75	33-68	20-42	20-30	5-10
	12-31	Extremely gravelly sandy loam	GM, SP, SP-SM	A-1	0	2-8	45-58	6-38	4-31	2-18	0-30	NP-10
	31-59	Extremely gravelly coarse sand	SP-SM, SP	A-1	0	2-7	59-64	7-40	3-21	1-7	0-20	NP-5
2010:												
Chemehuevi----------	0-2	Gravelly sandy loam	SC-SM	A-1-b, A-2-4	0	0-5	73-92	40-77	30-62	16-34	20-30	5-10
	2-7	Gravelly sandy loam	SC-SM	A-1-b, A-2-4	0	0-5	86-92	57-84	42-68	22-38	20-30	5-10
	7-13	Very gravelly sandy loam	SC-SM	A-1-b, A-2-4	0	0-5	65-85	30-70	17-55	10-34	20-30	5-10
	13-32	Gravelly sandy loam	SC-SM	A-1-b, A-2-4	0	0-5	72-85	51-70	38-55	20-30	20-30	5-10
	32-61	Extremely gravelly coarse sand	SP-SM, SP	A-1-a	0	0	59-76	7-25	3-20	1-8	0-20	NP-5

Table 10.--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*	
2010:												
Carrizo----------	0-2	Very gravelly sandy loam	SC-SM	A-1-b	0	0-10	61-65	28-51	22-45	11-26	0-30	NP-5
	2-60	Stratified extremely gravelly coarse sand to very gravelly loamy sand	GW	A-1-a	0-10	5-20	20-45	10-35	5-15	0-5	5-15	NP
Riverbend, strongly sloping----	0-2	Very gravelly fine sandy loam	GC-GM	A-1-b	0	0-3	44-59	30-45	24-44	13-25	20-30	5-10
	2-8	Gravelly sandy loam	SC-SM	A-2-4	0	0-2	74-92	50-75	43-70	22-41	20-30	5-10
	8-20	Very gravelly sandy loam	SC-SM	A-1-a	0	0-2	52-59	30-45	20-40	10-20	20-30	5-10
	20-60	Extremely gravelly loamy sand, very gravelly loamy coarse sand	GM, GP-GM	A-1-a	0	0-1	46-66	12-46	9-41	3-16	0-20	NP-5

Table 10.--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*	
2011:												
Cololag----------	0-2	Gravelly silt loam	SC-SM, CL	A-4	0	0	86-100	50-75	45-74	34-57	20-30	5-10
	2-5	Extremely gravelly loamy sand, very gravelly sandy loam, extremely gravelly sandy loam	SC, SC-SM	A-2-4, A-1-b	0	0	68-78	37-64	27-50	17-32	20-30	5-10
	5-18	Extremely gravelly sandy loam, very gravelly sandy loam	SP-SC	A-1-a	0	3-7	76-80	17-41	13-33	6-18	20-30	5-10
	18-33	Very gravelly sandy loam, extremely gravelly sandy loam	SP-SC	A-1-a	0	0-3	62-81	8-42	6-37	3-22	20-30	5-10
	33-43	Very gravelly sandy loam, extremely gravelly sandy loam	SP-SC	A-1-a	0-7	0-7	63-68	14-37	11-30	5-15	20-30	5-10
	43-63	Very gravelly sandy loam	SC-SM	A-1-a	0	0-7	70-73	21-47	16-38	9-20	20-30	5-10
2020:												
Snaggletooth----------	0-2	Sandy loam	SC-SM, SM	A-4, A-2-4	0	0	88-100	76-100	59-86	28-45	0-30	NP-10
	2-19	Gravelly sandy loam, sandy loam, very gravelly coarse sand	SC-SM, SM	A-4, A-2-4,	0	0	68-100	36-100	26-86	12-45	0-30	NP-10
	19-36	Loam, gravelly loam, clay loam, gravelly clay loam	CL, SC	A-6	0	0	75-100	51-100	41-98	30-76	30-40	10-25
	36-63	Loam, gravelly loam, clay loam	SC, CL	A-4, A-6	0	0	75-100	51-100	42-100	30-76	30-40	10-25

Table 10.--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*	
2020:												
Carrizo	0-2	Extremely gravelly sandy loam	GP-GC	A-1-a	0-7	0-7	15-31	11-27	9-23	4-13	20-30	5-10
	2-60	Stratified extremely gravelly coarse sand to very gravelly loamy sand	GP	A-1-a	0-10	5-20	20-45	10-35	5-15	0-5	0-0	NP
2030:												
Garywash	0-1	Gravelly fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0	67-100	53-100	45-94	27-60	0-30	NP-10
	1-5	Gravelly fine sandy loam, fine sandy loam, sandy loam, very gravelly sandy loam	SC-SM, SC, SM	A-2-4, A-4	0	0-7	80-100	34-100	32-100	15-54	0-30	NP-10
	5-22	Very gravelly sandy loam, sandy loam, loam, very gravelly loam	SM	A-1-a, A-1-b, A-2-4	0	0-6	74-100	30-100	22-82	11-45	0-30	NP-10
	22-46	Fine sandy loam, very gravelly sandy loam	SC-SM, GP-GM, SC	A-4, A-1-b	0	0-5	38-100	30-100	18-79	10-49	0-30	NP-10
	46-60	Fine sandy loam, very gravelly sandy loam	GP-GM, SC, SC-SM	A-1-b, A-4	0	0-5	39-100	30-100	22-90	11-52	0-30	NP-10

Table 10.--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*	
2031:												
Garywash----------	0-1	Gravelly fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0	67-100	53-100	45-94	27-60	0-30	NP-10
	1-5	Gravelly fine sandy loam, fine sandy loam, sandy loam, very gravelly sandy loam	SM, SC-SM, SC	A-2-4, A-4	0	0-7	80-100	34-100	32-100	15-54	0-30	NP-10
	5-22	Very gravelly sandy loam, sandy loam, loam, very gravelly loam	SM	A-1-a, A-1-b, A-2-4	0	0-6	74-100	30-100	22-82	11-45	0-30	NP-10
	22-46	Fine sandy loam, very gravelly sandy loam	SC-SM, GP-GM, SC	A-4, A-1-b	0	0-5	38-100	25-100	18-79	10-49	0-30	NP-10
	46-60	Fine sandy loam, very gravelly sandy loam	GP-GM, SC, SC-SM	A-1-b, A-4	0	0-5	39-100	30-100	22-90	11-52	0-30	NP-10
Chemehuevi, stony----------	0-2	Gravelly sandy loam	SM	A-2-4, A-4	1-4	1-9	69-84	54-76	40-61	25-40	0-20	NP-5
	2-7	Gravelly sandy loam, very gravelly sandy loam	SM, SC-SM	A-2-4	0	0-3	61-85	35-77	26-62	14-34	0-20	NP-5
	7-13	Very gravelly sandy loam, gravelly sandy loam	SC-SM, SM	A-2-4	0	0-5	61-85	35-77	26-62	14-34	0-20	NP-5
	13-32	Gravelly sandy loam	SC-SM	A-2-4	0	0-4	72-78	51-64	38-50	20-27	20-30	NP-10
	32-61	Extremely gravelly coarse sand	SP	A-1-a	0	0-1	55-74	6-25	3-17	1-4	0-10	NP-5

Table 10.--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*	
2400:												
Carrizo, frequently flooded----	0-9	Sand	SP-SM	A-3	0-9	0-13	91-97	80-92	57-77	7-14	0-20	NP-5
	9-40	Stratified extremely gravelly coarse sand to gravelly sand	SP, SP-SM	A-1-a	0-7	1-15	38-73	11-59	5-42	0-9	0-0	NP
	40-59	Stratified extremely gravelly coarse sand to gravelly sand	SP, SP-SM	A-1-a	0-7	1-15	38-73	11-59	5-42	0-9	0-0	NP
Carrwash, dry----------	0-3	Very gravelly loamy coarse sand	SP-SM, SM	A-1-b	0	0	76-93	34-65	18-41	6-18	0-20	NP-10
	3-8	Very gravelly loamy sand, gravelly loamy sand	SP-SM	A-1-b	0	0-10	74-87	30-80	19-53	4-14	0-0	NP
	8-60	Stratified extremely gravelly coarse sand to very gravelly loamy coarse sand	SP-SM, SP	A-1-a	0	0-8	75-86	24-58	12-42	1-9	0-0	NP
2401:												
Carrizo, frequently flooded----	0-2	Extremely gravelly fine sandy loam	SP-SC	A-1-a, A-1-b, A-2-4	0	0-7	71-87	8-41	8-41	4-23	20-30	5-10
	2-60	Stratified extremely gravelly coarse sand to very gravelly loamy sand	GP	A-1-a	0-10	5-20	12-40	8-37	3-19	2-5	0-20	NP-5

Table 10.--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*	
2401:												
Carrwash, dry----------	0-3	Very gravelly loamy coarse sand	SP-SM, SM	A-1-b	0	0	76-93	34-65	18-41	6-18	0-20	NP-10
	3-8	Very gravelly loamy sand, gravelly loamy sand	SP-SM	A-1-b	0	0-10	74-87	30-80	19-53	4-14	0-0	NP
	8-60	Stratified extremely gravelly coarse sand to very gravelly loamy coarse sand	SW, SP-SM	A-1-a	0	0-8	75-86	24-58	12-42	1-9	0-0	NP

Table 11.--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	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*um/sec*	*In/in*	*Pct*	*Pct*					
1200:														
Goldroad	0-1	---	---	5-15	1.55-1.70	14.00-42.00	0.05-0.09	0.0-3.0	0.0-0.5	.15	.43	1	6	48
	1-5	---	---	5-15	1.55-1.75	14.00-42.00	0.05-0.09	0.0-3.0	0.0-0.5	.17	.43			
	5-15	---	---	---	---	0.00-0.01	0.00-0.01	---	---	---	---			
1210:														
Stormjade	0-1	---	---	6-15	1.35-1.50	14.00-42.00	0.05-0.09	0.0-3.0	0.0-0.5	.17	.37	1	5	56
	1-4	---	---	6-15	1.35-1.50	14.00-42.00	0.04-0.09	0.0-3.0	0.0-0.5	.10	.37			
	4-8	---	---	---	---	0.00-0.42	0.01-0.02	---	---	---	---			
	8-12	---	---	---	---	0.05-0.10	0.00-0.01	---	---	---	---			
Goldroad	0-2	---	---	8-12	1.45-1.55	14.00-42.00	0.05-0.08	0.0-3.0	0.0-0.5	.10	.32	1	6	48
	2-10	---	---	5-15	1.55-1.75	14.00-42.00	0.03-0.07	0.0-3.0	0.0-0.5	.05	.32			
	10-14	---	---	---	---	0.00-0.01	0.00-0.01	---	---	---	---			
1211:														
Stormjade, dry	0-2	---	---	6-15	1.35-1.50	14.00-42.00	0.04-0.09	0.0-3.0	0.0-0.5	.17	.43	1	5	56
	2-6	---	---	6-15	1.35-1.50	14.00-42.00	0.04-0.09	0.0-3.0	0.0-0.5	.10	.37			
	6-12	---	---	---	---	0.00-0.42	0.01-0.02	---	---	---	---			
	12-14	---	---	---	---	0.05-0.10	0.00-0.01	---	---	---	---			
Whipple	0-1	---	---	8-12	1.60-1.70	14.00-42.00	0.04-0.11	0.0-3.0	0.0-0.5	.24	.43	1	4	86
	1-9	---	---	12-24	1.45-1.60	4.00-28.00	0.02-0.07	0.0-3.0	0.0-0.2	.10	.43			
	9-13	---	---	---	---	0.05-0.10	0.00-0.01	---	---	---	---			
Whipple, warm	0-2	---	---	8-12	1.60-1.70	14.00-42.00	0.05-0.10	0.0-3.0	0.0-0.5	.20	.49	1	5	56
	2-14	---	---	12-24	1.45-1.60	4.00-28.00	0.02-0.07	0.0-3.0	0.0-0.2	.05	.37			
	14-18	---	---	---	---	0.05-0.10	0.00-0.01	---	---	---	---			
1400:														
Sunrock, dry	0-3	---	---	8-12	1.45-1.55	14.00-42.00	0.05-0.08	0.0-3.0	0.0-0.5	.17	.43	1	6	48
	3-8	---	---	5-18	1.45-1.60	14.00-42.00	0.04-0.08	0.0-3.0	0.0-0.5	.10	.32			
	8	---	---	---	---	0.00-0.01	---	---	---	---	---			
Sunrock, warm	0-3	---	---	6-18	1.45-1.60	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.5	.05	.43	1	8	0
	3-8	---	---	6-18	1.45-1.60	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.5	.10	.43			
	8	---	---	---	---	0.00-0.01	0.00-0.00	---	---	---	---			

Table 11.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*um/sec*	*In/in*	*Pct*	*Pct*					
1401:														
Sunrock, cobbly	0-2	---	---	6-12	1.60-1.70	14.00-42.00	0.03-0.06	0.0-3.0	0.0-0.5	.10	.49	1	8	0
	2-6	---	---	6-12	1.60-1.70	14.00-42.00	0.03-0.06	0.0-3.0	0.0-0.5	.20	.49			
	6-11	---	---	5-18	1.45-1.60	14.00-42.00	0.04-0.08	0.0-3.0	0.0-0.5	.15	.49			
	11	---	---	---	---	0.00-0.01	---	---	---	---	---			
Cheme family	0-2	---	---	6-12	1.60-1.70	14.00-42.00	0.03-0.06	0.0-3.0	0.0-0.5	.15	.43	1	5	56
	2-8	---	---	8-18	1.40-1.50	4.00-14.00	0.03-0.05	0.0-3.0	0.0-0.5	.10	.49			
	8-19	---	---	8-18	1.45-1.65	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.5	.05	.55			
	19-26	---	---	---	---	0.00-0.01	---	---	---	---	---			
1402:														
Sunrock, moist	0-3	---	---	8-12	1.45-1.55	14.00-42.00	0.05-0.08	0.0-3.0	0.0-0.5	.10	.43	1	6	48
	3-8	---	---	8-18	1.45-1.60	14.00-42.00	0.04-0.08	0.0-3.0	0.0-0.5	.10	.32			
	8	---	---	---	---	0.00-0.01	---	---	---	---	---			
Cheme family	0-3	---	---	8-12	1.60-1.70	14.00-42.00	0.05-0.10	0.0-3.0	0.0-0.5	.15	.43	1	5	56
	3-11	---	---	8-18	1.40-1.50	4.00-14.00	0.06-0.12	0.0-3.0	0.0-0.5	.17	.55			
	11-22	---	---	---	---	0.00-0.01	---	---	---	---	---			
Rock outcrop, volcanics.														
1500:														
Carrizo, dry	0-2	---	---	8-18	1.45-1.60	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.2	.05	.37	5	8	0
	2-60	81-96	2-11	2-8	1.60-1.75	141.00-705.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10			
1501:														
Carrizo, steep	0-3	---	---	2-8	1.60-1.70	42.00-141.00	0.02-0.04	0.0-3.0	0.0-0.5	.15	.24	5	4	86
	3-13	---	---	2-8	1.65-1.75	42.00-141.00	0.01-0.03	0.0-3.0	0.0-0.5	.17	.20			
	13-25	---	---	2-6	1.75-1.85	141.00-705.00	0.01-0.04	0.0-3.0	0.0-0.5	.10	.15			
	25-62	---	---	2-6	1.75-1.85	141.00-705.00	0.01-0.03	0.0-3.0	0.0-0.5	.02	.15			
1502:														
Carrizo, steep	0-3	---	---	2-8	1.60-1.70	42.00-141.00	0.02-0.04	0.0-3.0	0.0-0.5	.15	.24	5	4	86
	3-13	---	---	2-8	1.65-1.75	42.00-141.00	0.01-0.03	0.0-3.0	0.0-0.5	.17	.20			
	13-25	---	---	2-6	1.75-1.85	141.00-705.00	0.01-0.04	0.0-3.0	0.0-0.5	.10	.15			
	25-62	---	---	2-6	1.75-1.85	141.00-705.00	0.01-0.03	0.0-3.0	0.0-0.5	.02	.15			
Badland, fine	0-0	---	---	36-40	1.00-1.40	1.40-4.00	0.16-0.21	0.0-3.0	0.0-0.2	.32	.32	1	4	86
	0-2	---	---	36-38	1.00-1.40	1.40-4.00	0.12-0.21	0.0-3.0	0.0-0.1	.32	.32			
	2-5	---	---	30-39	1.00-1.40	1.40-4.00	0.11-0.21	0.0-3.0	0.0-0.1	.32	.32			
	5-8	---	---	---	---	0.00-0.10	---	---	---	---	---			
	8-11	---	---	---	---	0.00-0.10	---	---	---	---	---			
	11	---	---	---	---	0.00-0.10	---	---	---	---	---			

Table 11.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*um/sec*	*In/in*	*Pct*	*Pct*					
1502:														
Riverbend, strongly sloping--	0-2	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.07	0.0-3.0	0.0-0.5	.15	.37	5	5	56
	2-8	---	---	8-10	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.5	.28	.37			
	8-20	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.07	0.0-3.0	0.0-0.5	.10	.28			
	20-60	---	---	2-10	1.60-1.70	42.00-141.00	0.03-0.06	0.0-3.0	0.0-0.5	.05	.24			
1503:														
Carrizo----------	0-2	---	---	4-10	1.55-1.65	42.00-141.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.17	2	4	86
	2-60	---	---	0-8	1.60-1.75	141.00-705.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10			
Carrizo, frequently flooded--	0-2	---	---	8-12	1.65-1.75	42.00-141.00	0.03-0.05	0.0-3.0	0.0-0.2	.24	.28	5	8	0
	2-60	---	---	0-8	1.60-1.75	141.00-705.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10			
2000:														
Riverbend, strongly sloping--	0-2	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.07	0.0-3.0	0.0-0.5	.15	.37	5	6	48
	2-8	---	---	8-10	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.5	.28	.37			
	8-20	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.07	0.0-3.0	0.0-0.5	.10	.28			
	20-60	---	---	2-10	1.60-1.70	42.00-141.00	0.03-0.06	0.0-3.0	0.0-0.5	.05	.24			
2001:														
Riverbend, strongly sloping--	0-2	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.07	0.0-3.0	0.0-0.5	.15	.37	5	6	48
	2-8	---	---	8-10	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.5	.28	.37			
	8-20	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.07	0.0-3.0	0.0-0.5	.10	.28			
	20-60	---	---	2-10	1.60-1.70	42.00-141.00	0.03-0.06	0.0-3.0	0.0-0.5	.05	.24			
Chemehuevi----------	0-3	---	---	8-15	1.45-1.55	4.00-14.00	0.09-0.15	0.0-3.0	0.0-0.5	.24	.37	5	5	56
	3-7	---	---	8-12	1.65-1.75	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.2	.24	.32			
	7-12	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.10	0.0-3.0	0.0-0.5	.15	.32			
	12-31	---	---	5-18	1.50-1.60	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.5	.05	.28			
	31-59	---	---	2-8	1.75-1.85	141.00-705.00	0.02-0.04	0.0-3.0	0.0-0.2	.02	.15			
2010:														
Chemehuevi----------	0-2	---	---	6-12	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.5	.15	.32	5	4	86
	2-7	---	---	6-12	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.2	.17	.32			
	7-13	---	---	8-12	1.50-1.60	14.00-42.00	0.04-0.09	0.0-3.0	0.0-0.2	.10	.32			
	13-32	---	---	8-12	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.2	.15	.32			
	32-61	---	---	2-8	1.75-1.85	141.00-705.00	0.02-0.04	0.0-3.0	0.0-0.2	.02	.15			
Carrizo----------	0-2	---	---	8-18	1.45-1.55	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.28	5	8	0
	2-60	---	---	0-8	1.60-1.75	141.00-705.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10			
Riverbend, strongly sloping--	0-2	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.07	0.0-3.0	0.0-0.5	.15	.37	5	6	48
	2-8	---	---	8-10	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.5	.28	.37			
	8-20	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.07	0.0-3.0	0.0-0.5	.10	.28			
	20-60	---	---	2-10	1.60-1.70	42.00-141.00	0.03-0.06	0.0-3.0	0.0-0.5	.02	.24			

Table 11.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*um/sec*	*In/in*	*Pct*	*Pct*					
2011:														
Cololag	0-2	---	---	10-18	1.35-1.45	4.00-14.00	0.11-0.17	0.0-3.0	0.0-0.5	.37	.55	5	7	38
	2-5	---	---	8-12	1.50-1.60	14.00-42.00	0.05-0.09	0.0-3.0	0.0-0.5	.17	.37			
	5-18	---	---	10-18	1.50-1.60	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.5	.05	.28			
	18-33	---	---	7-18	1.50-1.60	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.5	.05	.37			
	33-43	---	---	8-15	1.50-1.60	14.00-42.00	0.05-0.09	0.0-3.0	0.0-0.5	.05	.32			
	43-63	---	---	7-10	1.50-1.60	14.00-42.00	0.05-0.09	0.0-3.0	0.0-0.5	.10	.37			
2020:														
Snaggletooth	0-2	---	---	6-15	1.40-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.5	.32	.37	5	3	86
	2-19	---	---	2-15	1.40-1.60	14.00-705.00	0.06-0.11	0.0-3.0	0.0-0.2	.24	.37			
	19-36	---	---	18-35	1.30-1.45	4.00-14.00	0.12-0.18	0.0-3.0	0.0-0.2	.32	.37			
	36-63	---	---	18-35	1.30-1.45	4.00-14.00	0.12-0.18	0.0-3.0	0.0-0.2	.32	.37			
Carrizo	0-2	---	---	8-18	1.45-1.60	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.2	.05	.28	5	8	0
	2-60	---	---	0-8	1.60-1.75	141.00-705.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10			
2030:														
Garywash	0-1	---	---	6-15	1.50-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.5	.17	.43	5	4	86
	1-5	---	---	6-15	1.50-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.2	.24	.43			
	5-22	---	---	6-15	1.50-1.60	14.00-42.00	0.05-0.09	0.0-3.0	0.0-0.2	.10	.32			
	22-46	---	---	6-15	1.50-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.2	.28	.32			
	46-60	---	---	6-15	1.50-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.2	.28	.32			
2031:														
Garywash	0-1	---	---	6-15	1.50-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.5	.20	.43	5	4	86
	1-5	---	---	6-15	1.50-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.2	.24	.43			
	5-22	---	---	6-15	1.50-1.60	14.00-42.00	0.05-0.09	0.0-3.0	0.0-0.2	.10	.32			
	22-46	---	---	6-15	1.50-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.2	.24	.32			
	46-60	---	---	6-15	1.50-1.60	14.00-42.00	0.09-0.13	0.0-3.0	0.0-0.2	.28	.32			
Chemehuevi, stony	0-2	---	---	6-12	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.5	.24	.37	5	4	86
	2-7	---	---	6-12	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.2	.24	.28			
	7-13	---	---	6-12	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.2	.17	.28			
	13-32	---	---	8-12	1.50-1.60	14.00-42.00	0.07-0.11	0.0-3.0	0.0-0.2	.15	.28			
	32-61	---	---	2-8	1.55-1.70	141.00-705.00	0.02-0.04	0.0-3.0	0.0-0.2	.02	.10			
2400:														
Carrizo, frequently flooded	0-9	---	---	2-8	1.55-1.70	42.00-141.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10	5	8	0
	9-40	---	---	1-6	1.60-1.75	141.00-705.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10			
	40-59	---	---	1-6	1.60-1.75	141.00-705.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10			
Carrwash, dry	0-3	---	---	2-12	1.55-1.75	42.00-141.00	0.03-0.05	0.0-3.0	0.0-0.5	.05	.17	5	5	56
	3-8	---	---	2-5	1.45-1.65	42.00-141.00	0.04-0.06	0.0-3.0	0.0-0.5	.05	.15			
	8-60	---	---	2-5	1.45-1.65	141.00-705.00	0.03-0.06	0.0-3.0	0.0-0.5	.05	.10			

Table 11.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*um/sec*	*In/in*	*Pct*	*Pct*					
2401:														
Carrizo, frequently flooded--	0-2	---	---	8-18	1.45-1.60	14.00-42.00	0.03-0.05	0.0-3.0	0.0-0.2	.05	.37	5	8	0
	2-60	81-96	2-11	2-8	1.60-1.75	141.00-705.00	0.03-0.05	0.0-3.0	0.0-0.2	.02	.10			
Carrwash, dry----------	0-3	---	---	2-12	1.55-1.75	42.00-141.00	0.03-0.05	0.0-3.0	0.0-0.5	.10	.17	5	5	56
	3-8	---	---	2-5	1.45-1.65	42.00-141.00	0.04-0.06	0.0-3.0	0.0-0.5	.05	.17			
	8-60	---	---	2-5	1.45-1.65	141.00-705.00	0.03-0.06	0.0-3.0	0.0-0.5	.05	.10			

Table 12.--Chemical Properties of the Soils

(The properties in this table are measured or inferred from direct observations in the field or laboratory. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*Pct*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
1200:								
Goldroad	0-1	5-15	4.1-12	7.9-8.4	0-1	0	0	0
	1-5	5-15	4.1-12	7.9-8.4	1-5	0	0	0
	5-15	---	---	---	0-1	---	---	---
1210:								
Stormjade	0-1	6-15	3.0-12	7.4-8.4	0-5	0	0.0-2.0	0-1
	1-4	6-15	4.8-12	7.4-8.4	0-5	0	0.0-2.0	0-1
	4-8	---	---	---	---	---	---	---
	8-12	---	---	---	---	---	---	---
Goldroad	0-2	8-12	3.0-5.0	7.9-8.4	1-5	0	0.0-2.0	0-2
	2-10	5-15	4.1-12	7.9-8.4	1-5	0	0.0-2.0	0
	10-14	---	---	---	---	---	---	---
1211:								
Stormjade, dry	0-2	6-15	4.8-12	7.4-8.4	0-5	0	0.0-2.0	0-1
	2-6	6-15	4.8-12	7.4-8.4	0-5	0	0.0-2.0	0-1
	6-12	---	---	---	---	---	---	---
	12-14	---	---	---	---	---	---	---
Whipple	0-1	8-12	6.2-10	7.9-8.4	0-5	0	0.0-2.0	0
	1-9	12-24	8.9-19	7.9-8.4	0-5	0	0.0-2.0	0
	9-13	---	---	---	---	---	---	---
Whipple, warm	0-2	8-12	6.2-10	7.9-8.4	0-5	0	0.0-2.0	0
	2-14	12-24	8.9-19	7.9-8.4	0-5	0	0.0-2.0	0
	14-18	---	---	---	---	---	---	---
1400:								
Sunrock, dry	0-3	8-12	6.2-10	8.0-8.6	1-5	0	0.0-2.0	0-2
	3-8	5-18	4.1-15	7.9-8.4	1-5	0	0.0-2.0	0-4
	8	---	---	---	---	---	---	---
Sunrock, warm	0-3	6-18	4.8-15	7.4-8.4	1-5	0	0.0-2.0	0-4
	3-8	6-18	4.8-15	7.4-8.4	1-5	0	0.0-2.0	0-4
	8	---	---	---	---	---	---	---
1401:								
Sunrock, cobbly	0-2	6-12	4.8-10	7.9-8.4	1-10	0	0.0-2.0	0-5
	2-6	6-12	4.8-10	7.9-8.4	1-10	0	0.0-2.0	1-4
	6-11	5-18	4.1-15	7.9-8.4	1-5	0	0.0-2.0	0-4
	11	---	---	---	---	---	---	---
Cheme family	0-2	6-12	4.8-10	7.9-8.4	1-10	0	0.0-2.0	1-5
	2-8	8-18	6.2-15	7.9-9.0	5-15	0	0.0-2.0	1-5
	8-19	8-18	5.5-12	7.9-9.0	15-25	0	0.0-2.0	0-5
	19-26	---	---	---	---	---	---	---
1402:								
Sunrock, moist	0-3	8-12	6.2-10	8.0-8.6	1-5	0	0.0-2.0	0-2
	3-8	8-18	6.2-15	7.9-8.4	1-5	0	0.0-2.0	0-4
	8	---	---	---	---	---	---	---
Cheme family	0-3	8-12	6.2-10	7.9-8.4	0-5	0	0.0-2.0	0
	3-11	8-18	6.2-15	7.9-9.0	5-15	0	0.0-2.0	1-5
	11-22	---	---	---	---	---	---	---

Table 12.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*Pct*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
1402:								
Rock outcrop, volcanics.								
1500:								
Carrizo, dry	0-2	8-18	4.7-12	7.4-8.4	0-5	0	0.0-2.0	0-4
	2-60	2-8	1.4-5.7	7.4-8.4	0-5	0	0.0-2.0	0-4
1501:								
Carrizo, steep	0-3	2-8	1.4-6.1	7.4-8.4	0-1	0	0	0
	3-13	2-8	1.4-6.1	7.4-8.4	0-1	0	0	0
	13-25	2-6	1.4-4.7	7.4-8.4	0-1	0	0	0
	25-62	2-6	1.4-4.7	7.4-8.4	0-1	0	0	0
1502:								
Carrizo, steep	0-3	2-8	1.4-6.1	7.4-8.4	0-1	0	0	0
	3-13	2-8	1.4-6.1	7.4-8.4	0-1	0	0	0
	13-25	2-6	1.4-4.7	7.4-8.4	0-1	0	0	0
	25-62	2-6	1.4-4.7	7.4-8.4	0-1	0	0	0
Badland, fine	0-0	36-40	24-29	8.0-8.2	0-5	0-1	0.0-2.0	0-5
	0-2	36-38	24-27	8.0-8.2	0-10	0-1	0.0-2.0	0-5
	2-5	30-39	20-28	8.0-8.2	0-10	0-1	0.0-2.0	0-5
	5-8	---	---	---	---	---	---	---
	8-11	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---
Riverbend, strongly sloping	0-2	8-12	5.8-9.4	7.9-8.4	5-10	0	0.0-2.0	0
	2-8	8-10	5.8-8.1	7.9-8.4	5-10	0	0.0-2.0	0
	8-20	8-12	5.8-9.4	7.9-8.4	10-20	0	0.0-2.0	0
	20-60	2-10	1.9-8.1	7.9-8.4	5-10	0	0.0-2.0	0
1503:								
Carrizo	0-2	4-10	2.5-7.0	7.4-8.4	0-5	0	0.0-2.0	0-4
	2-60	0-8	0.0-5.0	7.4-8.4	0-5	0	0.0-2.0	0-4
Carrizo, frequently flooded	0-2	8-12	4.7-8.2	7.9-8.4	0-5	0	0.0-2.0	0-4
	2-60	0-8	0.0-5.0	7.4-8.4	0-5	0	0.0-2.0	0-4
2000:								
Riverbend, strongly sloping	0-2	8-12	5.8-9.4	7.9-8.4	5-10	0	0.0-2.0	0
	2-8	8-10	5.8-8.1	7.9-8.4	5-10	0	0.0-2.0	0
	8-20	8-12	5.8-9.4	7.9-8.4	10-20	0	0.0-2.0	0
	20-60	2-10	1.9-8.1	7.9-8.4	5-10	0	0.0-2.0	0
2001:								
Riverbend, strongly sloping	0-2	8-12	5.8-9.4	7.9-8.4	5-10	0	0.0-2.0	0
	2-8	8-10	5.8-8.1	7.9-8.4	5-10	0	0.0-2.0	0
	8-20	8-12	5.8-9.4	7.9-8.4	10-20	0	0.0-2.0	0
	20-60	2-10	1.9-8.1	7.9-8.4	5-10	0	0.0-2.0	0
Chemehuevi	0-3	8-15	6.2-12	7.9-8.4	0-5	0	0.0-2.0	0
	3-7	8-12	6.2-9.9	7.9-8.4	5-15	0	0.0-2.0	0
	7-12	8-12	6.2-10	7.9-8.4	5-15	0	0.0-2.0	0
	12-31	5-18	4.1-15	7.9-9.0	10-20	0	0.0-2.0	0-5
	31-59	2-8	1.8-6.9	7.9-9.0	5-15	0-2	0.0-2.0	1-5
2010:								
Chemehuevi	0-2	6-12	4.8-10	7.9-8.4	0-5	0	0.0-2.0	0
	2-7	6-12	4.8-9.9	7.9-8.4	5-15	0	0.0-2.0	0
	7-13	8-12	6.2-9.9	7.9-8.4	5-15	0	0.0-2.0	0
	13-32	8-12	6.2-9.9	7.9-9.0	10-20	0	0.0-2.0	1-5
	32-61	2-8	1.8-6.9	7.9-9.0	5-15	0-2	0.0-2.0	1-5

Table 12.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*Pct*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
2010:								
Carrizo	0-2	8-18	4.0-10	7.4-8.4	0-5	0	0.0-2.0	0-4
	2-60	0-8	0.0-5.0	7.4-8.4	0-5	0	0.0-2.0	0-4
Riverbend, strongly sloping	0-2	8-12	5.8-9.4	7.9-8.4	5-10	0	0.0-2.0	0
	2-8	8-10	5.8-8.1	7.9-8.4	5-10	0	0.0-2.0	0
	8-20	8-12	5.8-9.4	7.9-8.4	10-20	0	0.0-2.0	0
	20-60	2-10	1.9-8.1	7.9-8.4	5-10	0	0.0-2.0	0
2011:								
Cololag	0-2	10-18	7.6-15	7.9-9.0	5-10	0	2.0-4.0	0-2
	2-5	8-12	6.2-10	7.9-9.0	10-20	0	2.0-4.0	0-2
	5-18	10-18	7.6-15	7.9-9.0	5-10	0	2.0-4.0	0-2
	18-33	7-18	5.5-15	7.9-9.0	15-25	0	2.0-4.0	0-2
	33-43	8-15	6.2-12	7.9-9.0	15-25	0	2.0-4.0	0-2
	43-63	7-10	5.5-8.6	7.9-9.0	15-25	0	2.0-4.0	0-2
2020:								
Snaggletooth	0-2	6-15	4.8-12	7.9-8.4	5-15	0	0.0-2.0	0-5
	2-19	2-15	1.8-12	7.9-8.4	5-15	0	0.0-2.0	0-5
	19-36	18-35	13-26	7.9-9.0	10-25	0	4.0-8.0	5-12
	36-63	18-35	13-26	7.9-9.0	10-25	0	4.0-8.0	5-12
Carrizo	0-2	8-18	4.7-12	7.4-8.4	0-5	0	0.0-2.0	0-4
	2-60	0-8	0.0-5.7	7.4-8.4	0-5	0	0.0-2.0	0-4
2030:								
Garywash	0-1	6-15	4.8-12	7.9-8.4	5-20	0	0.0-2.0	0-5
	1-5	6-15	4.8-12	7.9-8.4	5-15	0-2	0.0-2.0	0-5
	5-22	6-15	4.8-9.9	7.9-8.4	10-25	0-2	8.0-16.0	5-12
	22-46	6-15	4.8-9.9	7.9-8.4	10-25	0	8.0-16.0	5-12
	46-60	6-15	4.8-9.9	7.9-8.4	10-25	0	8.0-16.0	5-12
2031:								
Garywash	0-1	6-15	4.8-12	7.9-8.4	5-20	0	0.0-2.0	0-5
	1-5	6-15	4.8-12	7.9-8.4	5-15	0-2	0.0-2.0	0-5
	5-22	6-15	4.8-9.9	7.9-8.4	10-25	0-2	8.0-16.0	5-12
	22-46	6-15	4.8-9.9	7.9-8.4	10-25	0	8.0-16.0	5-12
	46-60	6-15	4.8-9.9	7.9-8.4	10-25	0	8.0-16.0	5-12
Chemehuevi, stony	0-2	6-12	4.8-10	7.9-8.4	0-5	0	0.0-2.0	0
	2-7	6-12	4.8-9.9	7.9-8.4	5-15	0	0.0-2.0	0
	7-13	6-12	4.8-9.9	7.9-8.4	5-15	0	0.0-2.0	0
	13-32	8-12	6.2-9.9	7.9-9.0	10-20	0	0.0-2.0	1-5
	32-61	2-8	1.8-6.9	7.9-9.0	5-15	0-2	0.0-2.0	1-5
2400:								
Carrizo, frequently flooded	0-9	2-8	1.4-5.7	7.9-8.4	0-5	0	0.0-2.0	0-4
	9-40	1-6	0.8-4.5	7.4-8.4	0-5	0	0.0-2.0	0-4
	40-59	1-6	0.8-4.5	7.4-8.4	0-5	0	0.0-2.0	0-4
Carrwash, dry	0-3	2-12	1.4-8.6	7.9-8.4	0-10	0	0.0-2.0	0
	3-8	2-5	1.4-4.0	7.9-9.0	0-5	0	0.0-2.0	0-2
	8-60	2-5	1.4-4.0	7.9-9.0	0-5	0	0.0-2.0	0-2
2401:								
Carrizo, frequently flooded	0-2	8-18	4.7-12	7.4-8.4	0-5	0	0.0-2.0	0-4
	2-60	2-8	1.4-5.7	7.4-8.4	0-5	0	0.0-2.0	0-4
Carrwash, dry	0-3	2-12	1.4-8.6	7.9-8.4	0-10	0	0.0-2.0	0
	3-8	2-5	1.4-4.0	7.9-9.0	0-5	0	0.0-2.0	0-2
	8-60	2-5	1.4-4.0	7.9-9.0	0-5	0	0.0-2.0	0-2

Table 13.--Water 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	Hydrologic group	Month	Frequency of ponding	Flooding	
				Duration	Frequency
1200:					
Goldroad	D	Jan-Dec	None	---	None
1210:					
Stormjade	D	Jan-Dec	None	---	None
Goldroad	D	Jan-Dec	None	---	None
1211:					
Stormjade, dry	D	Jan-Dec	None	---	None
Whipple	D	Jan-Dec	None	---	None
Whipple, warm	D	Jan-Dec	None	---	None
1400:					
Sunrock, dry	D	Jan-Dec	None	---	None
Sunrock, warm	D	Jan-Dec	None	---	None
1401:					
Sunrock, cobbly	D	Jan-Dec	None	---	None
Cheme family	D	Jan-Dec	None	---	None
1402:					
Sunrock, moist	D	Jan-Dec	None	---	None
Cheme family	D	Jan-Dec	None	---	None

Table 13.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Frequency of ponding	Flooding	
				Duration	Frequency
1500:					
Carrizo, dry	A				
		January	None	Extremely brief	Very rare
		February	None	Extremely brief	Very rare
		March	None	Extremely brief	Very rare
		April	None	Extremely brief	Very rare
		July	None	Extremely brief	Very rare
		August	None	Extremely brief	Very rare
		September	None	Extremely brief	Very rare
		October	None	Extremely brief	Very rare
		November	None	Extremely brief	Very rare
		December	None	Extremely brief	Very rare
1501:					
Carrizo, steep	A				
		Jan-Dec	None	---	None
1502:					
Carrizo, steep	A				
		Jan-Dec	None	---	None
Badland, fine	D				
		Jan-Dec	None	---	None
Riverbend, strongly sloping	A				
		Jan-Dec	None	---	None
1503:					
Carrizo	A				
		Jan-Dec	None	---	None

Table 13.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Frequency of ponding	Flooding	
				Duration	Frequency
1503:					
Carrizo, frequently flooded	A				
		January	None	Extremely brief	Frequent
		February	None	Extremely brief	Frequent
		March	None	Extremely brief	Frequent
		April	None	Extremely brief	Occasional
		May	None	Extremely brief	Rare
		June	None	Extremely brief	Rare
		July	None	Extremely brief	Occasional
		August	None	Extremely brief	Frequent
		September	None	Extremely brief	Occasional
		October	None	Extremely brief	Occasional
		November	None	Extremely brief	Frequent
		December	None	Extremely brief	Frequent
2000:					
Riverbend, strongly sloping	A				
		Jan-Dec	None	---	None
2001:					
Riverbend, strongly sloping	A				
		Jan-Dec	None	---	None
Chemehuevi	B				
		Jan-Dec	None	---	None
2010:					
Chemehuevi	B				
		Jan-Dec	None	---	None

Table 13.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Frequency of ponding	Flooding	
				Duration	Frequency
2010:					
Carrizo	A				
		January	None	Extremely brief	Very rare
		February	None	Extremely brief	Very rare
		March	None	Extremely brief	Very rare
		April	None	Extremely brief	Very rare
		July	None	Extremely brief	Very rare
		August	None	Extremely brief	Very rare
		September	None	Extremely brief	Very rare
		October	None	Extremely brief	Very rare
		November	None	Extremely brief	Very rare
		December	None	Extremely brief	Very rare
Riverbend, strongly sloping	A				
		Jan-Dec	None	---	None
2011:					
Cololag	B				
		Jan-Dec	None	---	None
2020:					
Snaggletooth	B				
		Jan-Dec	None	---	None
Carrizo	A				
		January	None	Extremely brief	Very rare
		February	None	Extremely brief	Very rare
		March	None	Extremely brief	Very rare
		April	None	Extremely brief	Very rare
		July	None	Extremely brief	Very rare
		August	None	Extremely brief	Very rare
		September	None	Extremely brief	Very rare
		October	None	Extremely brief	Very rare
		November	None	Extremely brief	Very rare
		December	None	Extremely brief	Very rare

Table 13.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Frequency of ponding	Flooding	
				Duration	Frequency
2030:					
Garywash	B				
		Jan-Dec	None	---	None
2031:					
Garywash	B				
		Jan-Dec	None	---	None
Chemehuevi, stony	B				
		Jan-Dec	None	---	None
2400:					
Carrizo, frequently flooded	A				
		January	None	Extremely brief	Frequent
		February	None	Extremely brief	Frequent
		March	None	Extremely brief	Frequent
		April	None	Extremely brief	Occasional
		May	None	Extremely brief	Rare
		June	None	Extremely brief	Rare
		July	None	Extremely brief	Occasional
		August	None	Extremely brief	Frequent
		September	None	Extremely brief	Occasional
		October	None	Extremely brief	Occasional
		November	None	Extremely brief	Frequent
		December	None	Extremely brief	Frequent
Carrwash, dry	A				
		Jan-Dec	None	---	None

Table 13.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Frequency of ponding	Flooding	
				Duration	Frequency
2401:					
Carrizo, frequently flooded	A				
		January	None	Extremely brief	Frequent
		February	None	Extremely brief	Frequent
		March	None	Extremely brief	Frequent
		April	None	Extremely brief	Occasional
		May	None	Extremely brief	Rare
		June	None	Extremely brief	Rare
		July	None	Extremely brief	Occasional
		August	None	Extremely brief	Frequent
		September	None	Extremely brief	Occasional
		October	None	Extremely brief	Occasional
		November	None	Extremely brief	Frequent
		December	None	Extremely brief	Frequent
Carrwash, dry	A				
		Jan-Dec	None	---	None

Table 14.--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	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
1200:							
Goldroad	Bedrock (lithic)	4-20	---	---	None	High	Low
1210:							
Stormjade	Bedrock (paralithic)	4-10	---	---	None	High	Low
	Bedrock (lithic)	8-14					
Goldroad	Bedrock (lithic)	4-10	---	---	None	High	Low
1211:							
Stormjade, dry	Bedrock (paralithic)	4-10	---	---	None	High	Low
	Bedrock (lithic)	8-14	---				
Whipple	Bedrock (lithic)	5-14	---	---	None	High	Low
Whipple, warm	Bedrock (lithic)	5-14	---	---	None	High	Low
1400:							
Sunrock, dry	Bedrock (lithic)	4-10	---	---	None	High	Low
Sunrock, warm	Bedrock (lithic)	4-10	---	---	None	High	Low
1401:							
Sunrock, cobbly	Bedrock (lithic)	4-11	---	---	None	High	Low
Cheme family	Duripan	7-20	12-24	Indurated	None	High	Low
1402:							
Sunrock, moist	Bedrock (lithic)	4-10	---	---	None	High	Low
Cheme family	Duripan	7-20	---	Indurated	None	High	Low
Rock outcrop, volcanics.							
1500:							
Carrizo, dry	---	---	---	---	None	High	Low
1501:							
Carrizo, steep	---	---	---	---	None	Moderate	Low
1502:							
Carrizo, steep	---	---	---	---	None	Moderate	Low
Badland, fine	---	---	---	---	None	High	High
Riverbend, strongly sloping	---	---	---	---	None	High	Low
1503:							
Carrizo	---	---	---	---	None	Moderate	Low
Carrizo, frequently flooded	---	---	---	---	None	High	Low
2000:							
Riverbend, strongly sloping	---	---	---	---	None	High	Low

Table 14.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	*In*				
2001:							
Riverbend, strongly sloping----	---	---	---	---	None	High	Low
Chemehuevi----------	---	---	---	---	None	High	Low
2010:							
Chemehuevi----------	---	---	---	---	None	High	Low
Carrizo----------	---	---	---	---	None	High	Low
Riverbend, strongly sloping----	---	---	---	---	None	High	Low
2011:							
Cololag----------	---	---	---	---	None	High	Low
2020:							
Snaggletooth----------	---	---	---	---	None	Low	High
Carrizo----------	---	---	---	---	None	High	Low
2030:							
Garywash----------	---	---	---	---	None	Low	High
2031:							
Garywash----------	---	---	---	---	None	Low	High
Chemehuevi, stony----------	---	---	---	---	None	High	Low
2400:							
Carrizo, frequently flooded----	---	---	---	---	None	High	Low
Carrwash, dry----------	---	---	---	---	None	High	Low
2401:							
Carrizo, frequently flooded----	---	---	---	---	None	High	Low
Carrwash, dry----------	---	---	---	---	None	High	Low

Table 15.--Classification of the Soils

Soil name	Family or higher taxonomic class
Badland	Clayey, mixed, superactive, calcareous, hyperthermic Typic Torriorthents
Carrizo	Sandy-skeletal, mixed, hyperthermic Typic Torriorthents
Carrwash	Sandy-skeletal, mixed, hyperthermic Typic Torriorthents
Cheme family	Loamy-skeletal, mixed, superactive, hyperthermic, shallow Typic Haplodurids
Chemehuevi	Loamy-skeletal, mixed, superactive, hyperthermic Typic Haplocalcids
Cololag	Loamy-skeletal, mixed, superactive, hyperthermic Typic Calciargids
Garywash	Coarse-loamy, mixed, superactive, hyperthermic Typic Haplocalcids
Goldroad	Loamy-skeletal, mixed, superactive, calcareous, hyperthermic Lithic Torriorthents
Riverbend	Sandy-skeletal, mixed, hyperthermic Typic Haplocalcids
Snaggletooth	Fine-loamy, mixed, superactive, hyperthermic Typic Calciargids
Stormjade	Loamy-skeletal, mixed, superactive, calcareous, hyperthermic, shallow Typic Torriorthents
Sunrock	Loamy-skeletal, mixed, superactive, calcareous, hyperthermic Lithic Torriorthents
Whipple	Loamy-skeletal, mixed, superactive, hyperthermic Lithic Haplargids

Table 16.--Common and Scientific Plant Names and Symbols

(This table aids in correct plant identification and serves as a cross-reference to plant species listed in table 3. The plant synonymy used is as reported in the USDA-NRCS National Plant Database at the time of publication)

Local common name	Scientific name	Plant symbol
Barrel cactus	*Echinocactus*	ECHIN2
Big galleta	*Pleuraphis rigida*	PLRI3
blond plantain	*Plantago ovata*	PLOV
Blue paloverde	*Parkinsonia florida*	PAFL6
Catclaw acacia	*Acacia greggii*	ACGR
Creosotebush	*Larrea tridentata*	LATR2
Desert willow	*Chilopsis linearis*	CHLI2
Fremont dalea	*Psorothamnus fremontii*	PSFR
Mojave woodyaster	*Xylorhiza tortifolia var. tortifolia*	XYTOT
Ocotillo	*Fouquieria splendens*	FOSP2
Other annual forbs	Unknown	AAFF
Other annual grasses	Unknown	AAGG
Other perennial forbs	Unknown	PPFF
Other perennial grasses	Unknown	PPGG
Other shrubs	Unknown	SSSS
Pygmycedar	*Peucephyllum schottii*	PESC4
Rabbitbrush	*Chrysothamnus*	CHRYS9
Smoketree	*Psorothamnus spinosus*	PSSP3
Sweetbrush	*Bebbia juncea*	BEJU
Teddybear cholla	*Opuntia bigelovii*	OPBI
White brittlebush	*Encelia farinosa*	ENFA
White burrobush	*Hymenoclea salsola*	HYSA
White bursage	*Ambrosia dumosa*	AMDU2
White ratany	*Krameria grayi*	KRGR

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