# Appendix H
# Farmers Water District Soils

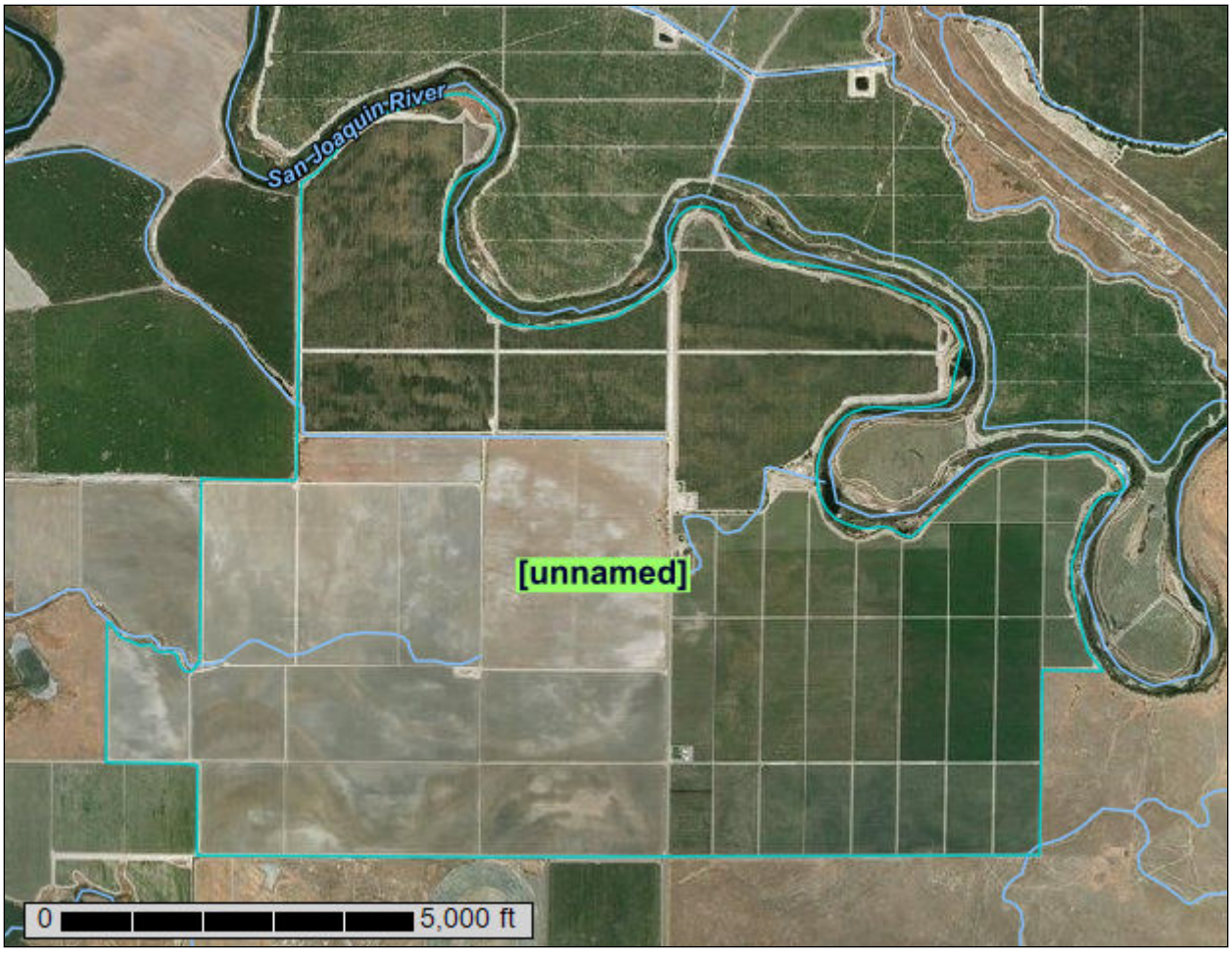
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product 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 participants

# Custom Soil Resource Report for Eastern Fresno Area, California, and Madera Area, California




July 23, 2019

# Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

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

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

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

The National Cooperative Soil Survey is 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 (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

# Contents

# How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile 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 or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur 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.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

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

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

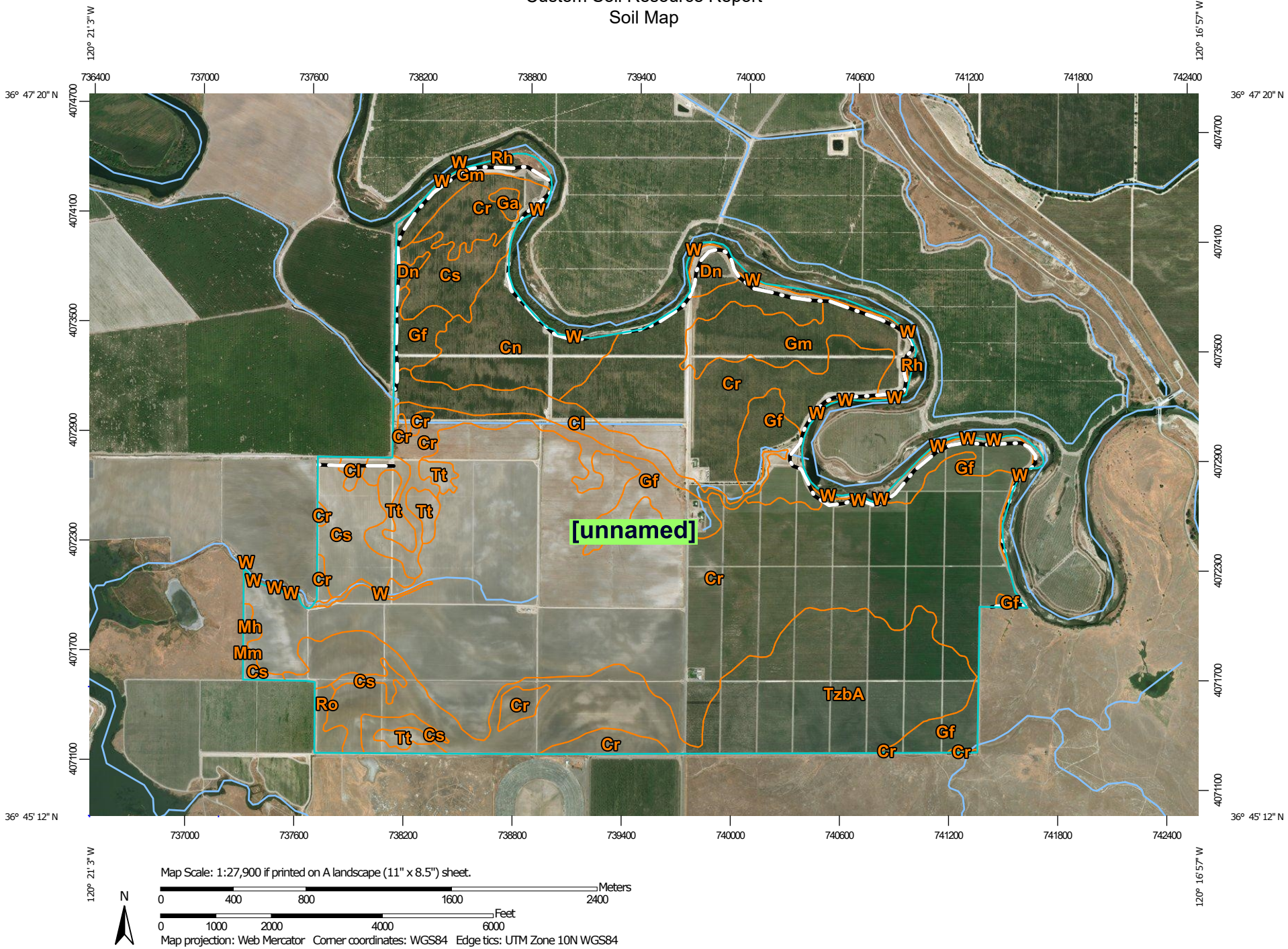
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report
## Soil Map




Map Scale: 1:27,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eastern Fresno Area, California
Survey Area Data: Version 11, Sep 12, 2018

Soil Survey Area: Madera Area, California
Survey Area Data: Version 12, Sep 12, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 23, 2016—Mar 11, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

## MAP LEGEND

## MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| Cl | Chino sandy loam | 62.5 | 2.8% |
| Cn | Chino fine sandy loam | 96.6 | 4.4% |
| Cr | Chino loam | 1,155.0 | 52.2% |
| Cs | Chino loam, saline-alkali | 122.2 | 5.5% |
| Dn | Dello sandy loam | 17.6 | 0.8% |
| Ga | Grangeville sandy loam | 4.8 | 0.2% |
| Gf | Grangeville fine sandy loam, 0 to 1 percent slopes, MLRA 17 | 212.1 | 9.6% |
| Gm | Grangeville fine sandy loam, sandy substratum | 107.2 | 4.8% |
| Mh | Merced clay | 3.5 | 0.2% |
| Mm | Merced clay, saline-alkali | 0.7 | 0.0% |
| Rh | Riverwash | 0.7 | 0.0% |
| Ro | Rossi fine sandy loam | 10.2 | 0.5% |
| Tt | Traver fine sandy loam | 34.1 | 1.5% |
| TzbA | Tujunga loamy sand, 0 to 3 percent slopes | 368.2 | 16.6% |
| W | Water | 18.9 | 0.9% |
| **Subtotals for Soil Survey Area** | | **2,214.3** | **100.0%** |
| **Totals for Area of Interest** | | **2,214.3** | **100.0%** |

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| W | Water | 0.0 | 0.0% |
| **Subtotals for Soil Survey Area** | | **0.0** | **0.0%** |
| **Totals for Area of Interest** | | **2,214.3** | **100.0%** |

# Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

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. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. 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 important soil properties and qualities.

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, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 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. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

# Eastern Fresno Area, California

## CI—Chino sandy loam

### Map Unit Setting

*National map unit symbol:* hl2h
*Elevation:* 160 to 500 feet
*Mean annual precipitation:* 6 to 14 inches
*Mean annual air temperature:* 61 to 63 degrees F
*Frost-free period:* 250 to 275 days
*Farmland classification:* Prime farmland if irrigated and drained

### Map Unit Composition

*Chino and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Chino

#### Setting

*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

#### Typical profile

*A - 0 to 12 inches:* sandy loam
*AC - 12 to 40 inches:* sandy clay loam
*2C - 40 to 60 inches:* stratified sandy loam to loam

#### Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 1 percent
*Salinity, maximum in profile:* Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
*Available water storage in profile:* Moderate (about 8.1 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 1
*Land capability classification (nonirrigated):* 4c
*Hydrologic Soil Group:* C
*Hydric soil rating:* Yes

**Minor Components**

**Unnamed, compact substratum**
*Percent of map unit:* 10 percent
*Landform:* Alluvial fans, flood plains
*Hydric soil rating:* No

**Unnamed**
*Percent of map unit:* 5 percent
*Landform:* Alluvial fans, flood plains
*Hydric soil rating:* No

## Cn—Chino fine sandy loam

**Map Unit Setting**
*National map unit symbol:* hl2k
*Elevation:* 160 to 200 feet
*Mean annual precipitation:* 6 to 10 inches
*Mean annual air temperature:* 61 to 63 degrees F
*Frost-free period:* 250 to 275 days
*Farmland classification:* Prime farmland if irrigated and drained

**Map Unit Composition**
*Chino and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Chino**

**Setting**
*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

**Typical profile**
*A - 0 to 12 inches:* fine sandy loam
*AC - 12 to 18 inches:* clay loam
*2C - 18 to 24 inches:* stratified fine sandy loam to clay loam

**Properties and qualities**
*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:* More than 80 inches

*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 1 percent
*Salinity, maximum in profile:* Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
*Available water storage in profile:* Low (about 3.3 inches)

**Interpretive groups**

*Land capability classification (irrigated):* 1
*Land capability classification (nonirrigated):* 4c
*Hydrologic Soil Group:* C
*Hydric soil rating:* Yes

**Minor Components**

**Unnamed**

*Percent of map unit:* 15 percent
*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Cr—Chino loam

**Map Unit Setting**

*National map unit symbol:* hl2n
*Elevation:* 160 to 200 feet
*Mean annual precipitation:* 6 to 10 inches
*Mean annual air temperature:* 61 to 63 degrees F
*Frost-free period:* 250 to 275 days
*Farmland classification:* Prime farmland if irrigated and drained

**Map Unit Composition**

*Chino and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Chino**

**Setting**

*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

**Typical profile**

*A - 0 to 12 inches:* loam

*AC - 12 to 18 inches:* clay loam
*2C - 18 to 24 inches:* stratified fine sandy loam to clay loam

**Properties and qualities**

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 1 percent
*Salinity, maximum in profile:* Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
*Available water storage in profile:* Low (about 3.7 inches)

**Interpretive groups**

*Land capability classification (irrigated):* 1
*Land capability classification (nonirrigated):* 4c
*Hydrologic Soil Group:* C
*Hydric soil rating:* Yes

**Minor Components**

**Unnamed, compact substratum**

*Percent of map unit:* 10 percent
*Landform:* Alluvial fans, flood plains
*Hydric soil rating:* No

**Unnamed**

*Percent of map unit:* 5 percent
*Landform:* Depressions on alluvial fans
*Hydric soil rating:* Yes

## Cs—Chino loam, saline-alkali

**Map Unit Setting**

*National map unit symbol:* hl2p
*Elevation:* 160 to 200 feet
*Mean annual precipitation:* 6 to 10 inches
*Mean annual air temperature:* 61 to 63 degrees F
*Frost-free period:* 250 to 275 days
*Farmland classification:* Prime farmland if irrigated and reclaimed of excess salts and sodium

**Map Unit Composition**

*Chino and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Chino

#### Setting

*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

#### Typical profile

*A - 0 to 12 inches:* loam
*AC - 12 to 40 inches:* sandy clay loam
*2C - 40 to 60 inches:* stratified sandy loam to loam

#### Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 1 percent
*Salinity, maximum in profile:* Moderately saline to strongly saline (8.0 to 18.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 5.0
*Available water storage in profile:* Low (about 5.9 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 2s
*Land capability classification (nonirrigated):* 4s
*Hydrologic Soil Group:* C
*Hydric soil rating:* Yes

### Minor Components

#### Unnamed

*Percent of map unit:* 10 percent
*Landform:* Depressions on alluvial fans
*Hydric soil rating:* Yes

#### Unnamed, non saline-alkali

*Percent of map unit:* 5 percent
*Landform:* Depressions on alluvial fans
*Hydric soil rating:* Yes

## Dn—Dello sandy loam

### Map Unit Setting

*National map unit symbol:* hl3l
*Elevation:* 160 to 400 feet
*Mean annual precipitation:* 8 to 12 inches
*Mean annual air temperature:* 56 to 63 degrees F
*Frost-free period:* 225 to 250 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Dello and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Dello

#### Setting

*Landform:* Depressions on alluvial fans, depressions on flood plains
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Base slope, rise
*Down-slope shape:* Concave, linear
*Across-slope shape:* Concave, linear
*Parent material:* Alluvium derived from granite

#### Typical profile

*Ap - 0 to 10 inches:* sandy loam
*Cg1 - 10 to 36 inches:* loamy sand
*Cg2 - 36 to 60 inches:* sand

#### Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
*Depth to water table:* About 36 to 60 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Available water storage in profile:* Low (about 4.5 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 3w
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* A
*Hydric soil rating:* Yes

**Minor Components**

**Unnamed**
*Percent of map unit:* 8 percent
*Landform:* Depressions on flood plains
*Hydric soil rating:* Yes

**Unnamed, channeled**
*Percent of map unit:* 5 percent
*Landform:* Channels on flood plains
*Hydric soil rating:* Yes

**Unnamed, hummock**
*Percent of map unit:* 2 percent
*Landform:* Levees on flood plains, hummocks on alluvial fans
*Hydric soil rating:* No

## Ga—Grangeville sandy loam

**Map Unit Setting**
*National map unit symbol:* hl4t
*Elevation:* 160 to 500 feet
*Mean annual precipitation:* 8 to 12 inches
*Mean annual air temperature:* 61 to 63 degrees F
*Frost-free period:* 200 to 250 days
*Farmland classification:* Prime farmland if irrigated and drained

**Map Unit Composition**
*Grangeville and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Grangeville**

**Setting**
*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Recent alluvium derived from granite

**Typical profile**
*Ap - 0 to 8 inches:* sandy loam
*C - 8 to 60 inches:* sandy loam

**Properties and qualities**
*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Very low

*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Available water storage in profile:* Moderate (about 8.3 inches)

**Interpretive groups**
*Land capability classification (irrigated):* 2s
*Land capability classification (nonirrigated):* 4s
*Hydrologic Soil Group:* A
*Hydric soil rating:* Yes

**Minor Components**

**Unnamed, loam surface**
*Percent of map unit:* 10 percent
*Landform:* Alluvial fans, flood plains
*Hydric soil rating:* No

**Unnamed, channeled**
*Percent of map unit:* 5 percent
*Landform:* Alluvial fans, channels on flood plains
*Hydric soil rating:* No

## Gf—Grangeville fine sandy loam, 0 to 1 percent slopes, MLRA 17

**Map Unit Setting**
*National map unit symbol:* 2vncx
*Elevation:* 30 to 1,760 feet
*Mean annual precipitation:* 8 to 25 inches
*Mean annual air temperature:* 61 to 64 degrees F
*Frost-free period:* 240 to 300 days
*Farmland classification:* Prime farmland if irrigated and drained

**Map Unit Composition**
*Grangeville and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Grangeville**

**Setting**
*Landform:* Flood plains, alluvial fans
*Landform position (two-dimensional):* Toeslope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

**Typical profile**

*A - 0 to 12 inches:* fine sandy loam
*C - 12 to 79 inches:* fine sandy loam

**Properties and qualities**

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
*Depth to water table:* About 0 inches
*Frequency of flooding:* Occasional
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 2 percent
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 3.0
*Available water storage in profile:* High (about 9.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* 2w
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* A/D
*Hydric soil rating:* Yes

**Minor Components**

**Traver**

*Percent of map unit:* 5 percent
*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Toeslope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Hanford**

*Percent of map unit:* 5 percent
*Landform:* Flood plains, alluvial fans
*Landform position (two-dimensional):* Toeslope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Unnamed, hydric**

*Percent of map unit:* 3 percent
*Landform:* Flood plains, alluvial fans
*Landform position (two-dimensional):* Toeslope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Unnamed, channeled**

*Percent of map unit:* 2 percent
*Landform:* Alluvial fans on alluvial fans, channels on flood plains on alluvial fans, channels on flood plains on flood plains
*Landform position (two-dimensional):* Toeslope

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Gm—Grangeville fine sandy loam, sandy substratum

### Map Unit Setting

*National map unit symbol:* hl52
*Elevation:* 160 to 500 feet
*Mean annual precipitation:* 8 to 12 inches
*Mean annual air temperature:* 61 to 63 degrees F
*Frost-free period:* 200 to 250 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Grangeville and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Grangeville

#### Setting

*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Recent alluvium derived from granite

#### Typical profile

*Ap - 0 to 8 inches:* fine sandy loam
*C1 - 8 to 40 inches:* sandy loam
*C2 - 40 to 60 inches:* sand

#### Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Available water storage in profile:* Moderate (about 6.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 2s
*Land capability classification (nonirrigated):* 4s

*Hydrologic Soil Group:* A
*Hydric soil rating:* Yes

**Minor Components**

**Dello**
*Percent of map unit:* 8 percent
*Landform:* Depressions on flood plains, alluvial fans
*Hydric soil rating:* No

**Unnamed**
*Percent of map unit:* 6 percent
*Landform:* Alluvial fans, flood plains
*Hydric soil rating:* No

**Unnamed, channeled**
*Percent of map unit:* 1 percent
*Landform:* Drainageways
*Hydric soil rating:* Yes

## Mh—Merced clay

**Map Unit Setting**
*National map unit symbol:* hl71
*Elevation:* 170 to 200 feet
*Mean annual precipitation:* 6 to 10 inches
*Mean annual air temperature:* 61 to 64 degrees F
*Frost-free period:* 225 to 275 days
*Farmland classification:* Prime farmland if irrigated and drained

**Map Unit Composition**
*Merced and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Merced**

**Setting**
*Landform:* Basin floors
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

**Typical profile**
*Ap - 0 to 12 inches:* clay
*C - 12 to 46 inches:* clay
*2Ck - 46 to 70 inches:* clay loam

**Properties and qualities**
*Slope:* 0 to 2 percent

*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Very poorly drained
*Runoff class:* Medium
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 10 percent
*Salinity, maximum in profile:* Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
*Available water storage in profile:* Moderate (about 9.0 inches)

**Interpretive groups**

*Land capability classification (irrigated):* 2s
*Land capability classification (nonirrigated):* 4s
*Hydrologic Soil Group:* C
*Hydric soil rating:* Yes

**Minor Components**

**Unnamed, silty clay loam surface**

*Percent of map unit:* 14 percent
*Landform:* Basin floors
*Hydric soil rating:* No

**Unnamed, depression**

*Percent of map unit:* 1 percent
*Landform:* Depressions on basin floors
*Hydric soil rating:* Yes

## Mm—Merced clay, saline-alkali

**Map Unit Setting**

*National map unit symbol:* hl74
*Elevation:* 170 to 200 feet
*Mean annual precipitation:* 6 to 10 inches
*Mean annual air temperature:* 61 to 64 degrees F
*Frost-free period:* 225 to 275 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

*Merced and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Merced**

**Setting**

*Landform:* Basin floors
*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

**Typical profile**

*Ap - 0 to 12 inches:* clay
*C - 12 to 46 inches:* clay
*2Ck - 46 to 70 inches:* clay loam

**Properties and qualities**

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Very poorly drained
*Runoff class:* Medium
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
*Depth to water table:* About 36 to 60 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 10 percent
*Salinity, maximum in profile:* Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 5.0
*Available water storage in profile:* Moderate (about 9.0 inches)

**Interpretive groups**

*Land capability classification (irrigated):* 4w
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* C
*Hydric soil rating:* Yes

**Minor Components**

**Unnamed**

*Percent of map unit:* 15 percent
*Landform:* Basin floors
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

## Rh—Riverwash

**Map Unit Setting**

*National map unit symbol:* hl8s
*Elevation:* 170 to 3,100 feet
*Mean annual precipitation:* 10 to 34 inches
*Mean annual air temperature:* 57 to 64 degrees F
*Frost-free period:* 180 to 275 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Riverwash:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Riverwash**

**Setting**

*Landform:* Flood plains, flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Rise
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium

**Typical profile**

*C1 - 0 to 6 inches:* coarse sand
*C2 - 6 to 60 inches:* stratified coarse sand to sandy loam

**Properties and qualities**

*Slope:* 0 to 2 percent
*Percent of area covered with surface fragments:* 3.0 percent
*Natural drainage class:* Excessively drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
*Depth to water table:* About 0 to 24 inches
*Frequency of flooding:* Frequent
*Available water storage in profile:* Very low (about 2.9 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 8
*Ecological site:* RIVERWASH (R017XE114CA)
*Hydric soil rating:* Yes

**Minor Components**

**Hanford**

*Percent of map unit:* 5 percent
*Landform:* Flood plains
*Hydric soil rating:* No

**Visalia**

*Percent of map unit:* 5 percent
*Landform:* Depressions on flood plains
*Hydric soil rating:* No

**Grangeville**

*Percent of map unit:* 5 percent
*Landform:* Flood plains
*Hydric soil rating:* Yes

## Ro—Rossi fine sandy loam

### Map Unit Setting

*National map unit symbol:* hl8w
*Elevation:* 170 to 200 feet
*Mean annual precipitation:* 6 to 10 inches
*Mean annual air temperature:* 61 to 63 degrees F
*Frost-free period:* 225 to 275 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Rossi and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Rossi

#### Setting

*Landform:* Basin floors
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Rise
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

#### Typical profile

*Ap - 0 to 12 inches:* fine sandy loam
*Bt - 12 to 38 inches:* clay loam
*C - 38 to 53 inches:* loam
*2C - 53 to 65 inches:* stratified loamy sand to loam

#### Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Negligible
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 10 percent
*Salinity, maximum in profile:* Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 20.0
*Available water storage in profile:* Moderate (about 6.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 4s
*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* C
*Hydric soil rating:* Yes

**Minor Components**

**Unnamed, sandy loam surface**
*Percent of map unit:* 10 percent
*Landform:* Basin floors
*Hydric soil rating:* No

**Unnamed, moderately deep compact subsoil**
*Percent of map unit:* 5 percent
*Landform:* Basin floors
*Hydric soil rating:* No

## Tt—Traver fine sandy loam

**Map Unit Setting**
*National map unit symbol:* hlbj
*Elevation:* 170 to 240 feet
*Mean annual precipitation:* 6 to 10 inches
*Mean annual air temperature:* 62 to 64 degrees F
*Frost-free period:* 225 to 275 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**
*Traver and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Traver**

**Setting**
*Landform:* Fan skirts
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

**Typical profile**
*A - 0 to 10 inches:* fine sandy loam
*Bt - 10 to 23 inches:* sandy clay loam
*C - 23 to 60 inches:* sandy loam

**Properties and qualities**
*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 5 percent
*Salinity, maximum in profile:* Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 20.0
*Available water storage in profile:* Low (about 5.3 inches)

**Interpretive groups**
*Land capability classification (irrigated):* 2s
*Land capability classification (nonirrigated):* 4s
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

**Minor Components**

**Unnamed, loam surface**
*Percent of map unit:* 14 percent
*Landform:* Fan skirts
*Hydric soil rating:* No

**Playas**
*Percent of map unit:* 1 percent
*Landform:* Playas on fan skirts
*Hydric soil rating:* Yes

## TzbA—Tujunga loamy sand, 0 to 3 percent slopes

**Map Unit Setting**
*National map unit symbol:* hlc1
*Elevation:* 180 to 400 feet
*Mean annual precipitation:* 8 to 12 inches
*Mean annual air temperature:* 62 to 64 degrees F
*Frost-free period:* 225 to 275 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**
*Tujunga and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Tujunga**

**Setting**
*Landform:* Alluvial fans, flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear

*Across-slope shape:* Linear
*Parent material:* Alluvium derived from granite

**Typical profile**
*A - 0 to 4 inches:* loamy sand
*C - 4 to 60 inches:* stratified sand to loamy sand

**Properties and qualities**
*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat excessively drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Occasional
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 4.2 inches)

**Interpretive groups**
*Land capability classification (irrigated):* 4s
*Land capability classification (nonirrigated):* 4s
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

**Minor Components**

**Unnamed, loamy coarse sand**
*Percent of map unit:* 12 percent
*Landform:* Flood plains, alluvial fans
*Hydric soil rating:* No

**Unnamed, compact substratum**
*Percent of map unit:* 2 percent
*Landform:* Flood plains, alluvial fans
*Hydric soil rating:* No

**Unnamed, flooded**
*Percent of map unit:* 1 percent
*Landform:* Flood plains
*Hydric soil rating:* Yes

## W—Water

**Map Unit Composition**
*Water:* 100 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

# Madera Area, California

## W—Water

### Map Unit Composition

*Water:* 100 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

# Soil Information for All Uses

## Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

## Soil Physical Properties

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

### Saturated Hydraulic Conductivity (Ksat), Standard Classes (Farmers Water District (Ksat))

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits. The classes are:

Very low: 0.00 to 0.01

Low: 0.01 to 0.1

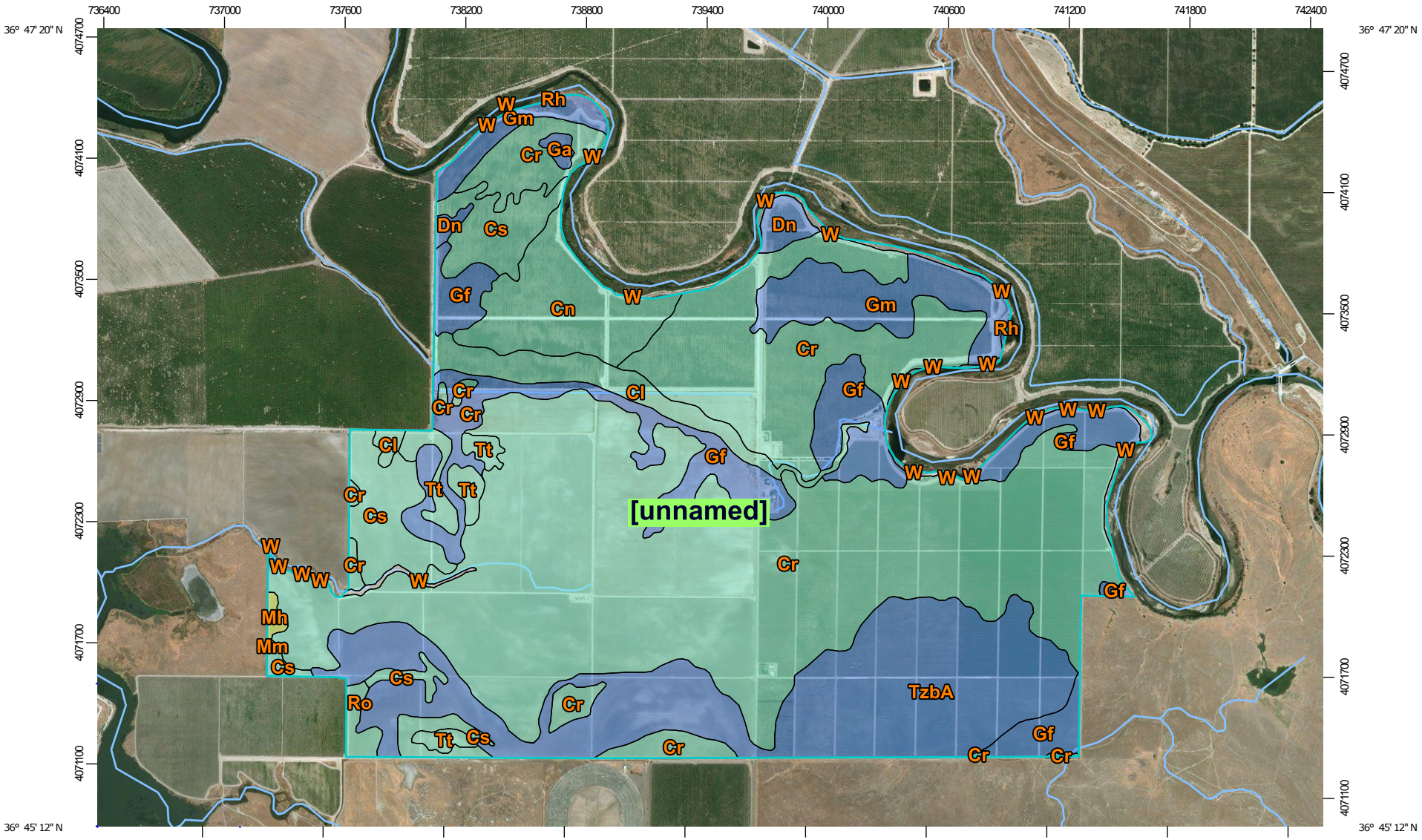
Moderately low: 0.1 to 1.0

Moderately high: 1 to 10

High: 10 to 100

Very high: 100 to 705

Map—Saturated Hydraulic Conductivity (Ksat), Standard Classes (Farmers Water District (Ksat))




Map Scale: 1:27,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## MAP LEGEND

**Area of Interest (AOI)**

Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

**Soil Rating Lines**

- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

**Soil Rating Points**

- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**

- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eastern Fresno Area, California
Survey Area Data: Version 11, Sep 12, 2018

Soil Survey Area: Madera Area, California
Survey Area Data: Version 12, Sep 12, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 23, 2016—Mar 11, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

| MAP LEGEND | MAP INFORMATION |
| --- | --- |
| | imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident. |

## Table—Saturated Hydraulic Conductivity (Ksat), Standard Classes (Farmers Water District (Ksat))

| Map unit symbol | Map unit name | Rating (micrometers per second) | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| Cl | Chino sandy loam | 9.7658 | 62.5 | 2.8% |
| Cn | Chino fine sandy loam | 7.3200 | 96.6 | 4.4% |
| Cr | Chino loam | 7.3200 | 1,155.0 | 52.2% |
| Cs | Chino loam, saline-alkali | 6.0158 | 122.2 | 5.5% |
| Dn | Dello sandy loam | 81.4737 | 17.6 | 0.8% |
| Ga | Grangeville sandy loam | 28.0000 | 4.8 | 0.2% |
| Gf | Grangeville fine sandy loam, 0 to 1 percent slopes, MLRA 17 | 28.0000 | 212.1 | 9.6% |
| Gm | Grangeville fine sandy loam, sandy substratum | 49.0526 | 107.2 | 4.8% |
| Mh | Merced clay | 0.9100 | 3.5 | 0.2% |
| Mm | Merced clay, saline-alkali | 0.9100 | 0.7 | 0.0% |
| Rh | Riverwash | 92.0000 | 0.7 | 0.0% |
| Ro | Rossi fine sandy loam | 3.1186 | 10.2 | 0.5% |
| Tt | Traver fine sandy loam | 3.3476 | 34.1 | 1.5% |
| TzbA | Tujunga loamy sand, 0 to 3 percent slopes | 92.0000 | 368.2 | 16.6% |
| W | Water | | 18.9 | 0.9% |
| **Subtotals for Soil Survey Area** | | | **2,214.3** | **100.0%** |
| **Totals for Area of Interest** | | | **2,214.3** | **100.0%** |

| Map unit symbol | Map unit name | Rating (micrometers per second) | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| W | Water | | 0.0 | 0.0% |
| **Subtotals for Soil Survey Area** | | | **0.0** | **0.0%** |
| **Totals for Area of Interest** | | | **2,214.3** | **100.0%** |

## Rating Options—Saturated Hydraulic Conductivity (Ksat), Standard Classes (Farmers Water District (Ksat))

*Units of Measure:* micrometers per second

*Aggregation Method:* Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

*Component Percent Cutoff: None Specified*

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

*Tie-break Rule:* Fastest

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

*Interpret Nulls as Zero:* No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

*Layer Options (Horizon Aggregation Method):* All Layers (Weighted Average)

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

# References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

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. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf