APPENDIX C CONSTRUCTION GENERAL PERMIT SWPPP RISK LEVEL ASSESSMENT

- Summary of Risk Level Determination
- Risk Determination Worksheet (State Water Resources Control Board)
- Web Soil Survey (USDA Natural Resources Conservation Service)

C CONSTRUCTION GENERAL PERMIT SWPPP RISK LEVEL ASSESSMENT

The General National Pollutant Discharge Elimination System Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order 2012-0006-DWQ) (Construction General Permit) regulates stormwater discharges for construction activities under Clean Water Act Section 402. Dischargers whose projects disturb 1 or more acres of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the Construction General Permit. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The Construction General Permit separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and are based on potential erosion and transport to receiving waters. Requirements apply according to the Risk Level determined. For example, a Risk Level 3 (highest risk) project would require compulsory storm water runoff pH and turbidity monitoring, and pre- and post-construction aquatic biological assessments during specified seasonal windows.

C.1 Summary

The Central Valley Wye would require disturbance of approximately 3,041 acres, 3,426 acres, 2,669 acres, and 2,871 acres of soil for the SR 152 (North) to Road 13 Wye, SR 152 (North) to Road 19 Wye, Avenue 21 to Road 13 Wye, and the SR 152 (North) to Road 11 Wye, respectively, and therefore a SWPPP is required for the Central Valley Wye. More information on SWPPP requirements is provided in the *Merced to Fresno Section: Central Valley Wye Hydrology and Water Resources Technical Report*, Section 3.1.1.5, National Pollutant Discharge Elimination System (§ 402). A construction site risk assessment has been performed for the Project SWPPP and the resultant risk level is **Risk Level 2**. The risk level was determined based on the procedure described in the General Permit and based on two major elements – (1) project sediment risk (the relative amount of sediment that can be discharged, given the project and location details) and (2) receiving water risk (the risk sediment discharges pose to the receiving waters). Project Sediment Risk is determined by multiplying the R, K, and LS factors from the Revised Universal Soil Loss Equation (RUSLE) to obtain an estimate of project-related bare ground soil loss expressed in tons/acre. Receiving water risk is based on whether a project drains to a sediment-sensitive waterbody. A sediment-sensitive waterbody is either on the most recent 303d list for waterbodies impaired for sediment; has a U.S. Environmental Protection Agency-approved Total Maximum Daily Load implementation plan for sediment; or has the beneficial uses of COLD, SPAWN, and MIGRATORY.

Tables C.1 and C.2 summarize the sediment and receiving water risk factors and document the sources of information used to derive the factors. RUSLE Method 2 was used to determine these values.

Table C-1. Summary of Sediment Risk

RUSLE Factor	Value	Method for Establishing Value
R	317	EPA website: https://developer.epa.gov/lew-calculator
K	0.29	Weighted average for surface layer of soil map units
LS	0.22	Field observations and LS Table from Sediment Risk Factor Worksheet in General Permit. Calculation assumes 1% slope (based on NRCS data) and 400 foot slope length.
Total Predicted Sediment Loss (tons/acre)		20.09
Overall Sediment Risk Low Sediment Risk < 15 tons/ acre Medium Sediment Risk >= 15 and < 75 tons/acre High Sediment Risk >= 75 tons/acre		☐ Low ☒ Medium ☐ High

Revised Universal Soil Loss Equation = RUSLE
EPA = Environmental Protection Agency
NRCS = Natural Resources Conservation Service

Table C-2. Summary of Receiving Water Risk

Receiving Water Name	303(d) Listed for Sediment Related Pollutant(1)	TMDL for Sediment Related Pollutant(1)	Beneficial Uses of COLD, SPAWN, and MIGRATORY(1)
Pleasant Grove Creek	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No
Overall Receiving Water Risk			☐ Low ☒ High
(1) If yes is selected for any option the Receiving Water Risk is High			

TMDL = Total Maximum Daily Load

C.2 Project Sediment Risk

C.2.1 The R-Factor

The R factor is computed by using the following parameters:

Estimated construction start date: May, 2018

Estimated construction end date (date of final stabilization): September, 2025

Latitude: 37° 07'37 Longitude: 120 ° 22'50

C.2.2 The K-Factor

The K factor represents: 1) susceptibility of soil or surface material to erosion; 2) transportability of the sediment; and 3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition.

The K factor is computed by using the following parameters:

K-values were provided per soil unit type via a Natural Resources Conservation District (NRCS) Web Soil Survey. A weighted average was derived from the K-values based on the proportionate areas per soil unit type within the total area of influence (AOI) (50,051 acres). The weighted average was determined to be 0.29, which is characterized as a medium K value within the range (medium values range from about 0.25 to 0.4) of sandy-loam soils and with particles that have a

moderate susceptibility to detachment. Attachment C.1 shows a summary of all the map units with the Central Valley Wye area of influence from which the K-value was calculated.

C.2.3 The LS-Factor

The LS Factor was determined based on the following factors:

Based on the NRCS soil unit map (see attached), slopes within the Central Valley Wye study area are 0-1 percent, 0-2 percent, 0-3 percent, 0-8 percent, 3-8 percent, and 8-15 percent. Therefore a weighted slope of 1 percent slope was determined. Because a topographical map was not available to determine the length of slope, and the topography is near level, a weighted slope length based on soil type was used to determine a slope length of 400 feet. The average slope percentage and slope length was used with the LS Factors for Construction Sites Table to determine the LS Factor of 0.22.

C.3 Receiving Water Risk

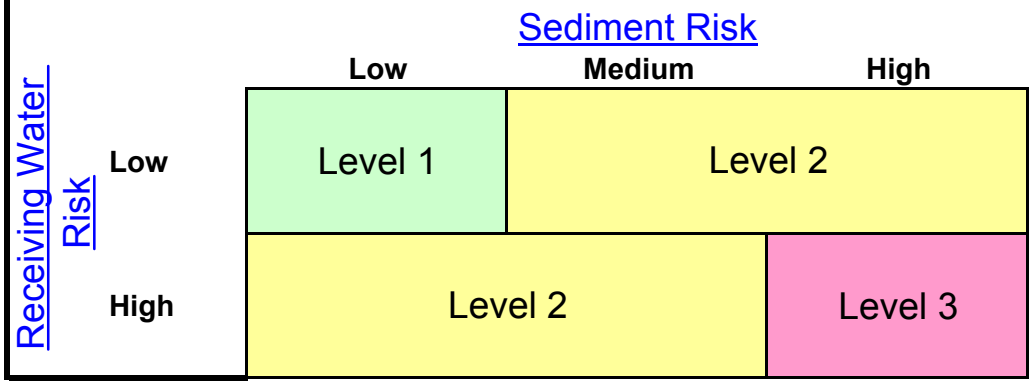
Waterbodies that cross the Central Valley Wye include Chowchilla River (Buchanan Dam to San Joaquin River), San Joaquin River (Sack Dam to Mouth of Merced River), Ash Slough, Berenda Slough, Berenda Creek, and Deadman Creek. The waterbodies in the Central Valley Wye study area ultimately flow to the Sacramento-San Joaquin Delta via the San Joaquin River. Both the Chowchilla River (Buchanan Dam to San Joaquin River) and the San Joaquin River (Sack Dam to Mouth of Merced River) have the following beneficial uses: Municipal and domestic water supply, agricultural supply (irrigation), industrial process supply, water contact and noncontact water recreation, warm freshwater habit, and wildlife habitat. In addition, the San Joaquin River (Sack Dam to Mouth of Merced River) has the following beneficial uses: Agricultural supply (stock watering), cold and warm freshwater migration, and cold and warm spawning, reproduction, or early development. The receiving water risk was determined to be “high” based on the fact the San Joaquin River (Sack Dam to Mouth of Merced River), has designated beneficial uses of COLD, SPAWN and MIGRATORY, which is included in the criteria for receiving water risk determination. However, no waterbodies within the Central Valley Wye study area are impaired for sediment.

Attachment C.1
Summary of Risk Level Determination

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	https://developer.epa.gov/lew-calculator		
5	**R Factor Value**		317
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.29
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.22
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**		20.08746894
16	**Site Sediment Risk Factor**		**Medium**
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?:	**yes**	**High**
http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml		
OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan)		
http://www.waterboards.ca.gov/waterboards_map.shtml		
Region 1 Basin Plan		
Region 2 Basin Plan		
Region 3 Basin Plan		
Region 4 Basin Plan		
Region 5 Basin Plan		
Region 6 Basin Plan		
Region 7 Basin Plan		
Region 8 Basin Plan		
Region 9 Basin Plan		

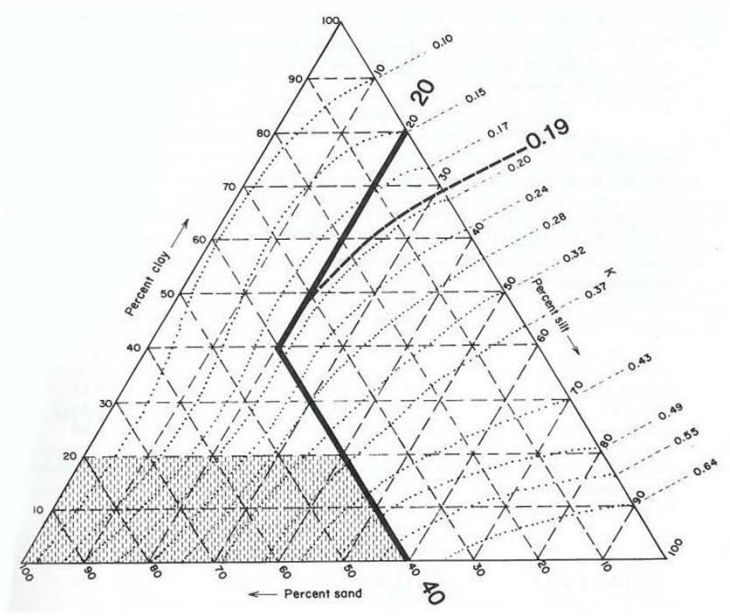
Combined Risk Level Matrix



Project Sediment Risk:	**Medium**
Project RW Risk:	**High**
Project Combined Risk:	**Level 2**

Soil Erodibility Factor (K)

The K factor can be determined by using the nomograph method, which requires that a particle size analysis (ASTM D-422) be done to determine the percentages of sand, very fine sand, silt and clay. Use the figure below to determine appropriate K value.



Erickson triangular nomograph used to estimate soil erodibility (K) factor.
The figure above is the USDA nomograph used to determine the K factor for a soil, based on its texture (% silt plus very fine sand, % sand, % organic matter, soil structure, and permeability). *Nomograph from Erickson 1977 as referenced in Goldman et. al., 1986.*

Sheet Flow Length (ft) \ Average Watershed Slope (%)	0.2	0.5	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0	25.0	30.0	40.0	50.0	60.0
<3	0.05	0.07	0.13	0.17	0.20	0.23	0.26	0.32	0.35	0.36	0.38	0.39	0.41	0.45	0.48	0.53	0.58	0.63
6	0.05	0.07	0.13	0.17	0.20	0.23	0.26	0.32	0.37	0.41	0.45	0.49	0.56	0.64	0.72	0.85	0.97	1.07
9	0.05	0.07	0.13	0.17	0.20	0.23	0.26	0.32	0.38	0.45	0.51	0.56	0.67	0.80	0.91	1.13	1.31	1.47
12	0.05	0.07	0.13	0.17	0.20	0.23	0.26	0.32	0.39	0.47	0.55	0.62	0.76	0.93	1.08	1.37	1.62	1.84
15	0.05	0.07	0.13	0.17	0.20	0.23	0.26	0.32	0.40	0.49	0.58	0.67	0.84	1.04	1.24	1.59	1.91	2.19
25	0.05	0.07	0.16	0.21	0.26	0.31	0.36	0.45	0.57	0.71	0.85	0.98	1.24	1.56	1.86	2.41	2.91	3.36
50	0.05	0.08	0.21	0.30	0.38	0.46	0.54	0.70	0.91	1.15	1.40	1.64	2.10	2.67	3.22	4.24	5.16	5.97
75	0.05	0.08	0.25	0.36	0.47	0.58	0.69	0.91	1.20	1.54	1.87	2.21	2.86	3.67	4.44	5.89	7.20	8.37
100	0.05	0.09	0.28	0.41	0.55	0.68	0.82	1.10	1.46	1.88	2.31	2.73	3.57	4.59	5.58	7.44	9.13	10.63
150	0.05	0.09	0.33	0.50	0.68	0.86	1.05	1.43	1.92	2.51	3.09	3.68	4.85	6.30	7.70	10.35	12.75	14.89
200	0.06	0.10	0.37	0.57	0.79	1.02	1.25	1.72	2.34	3.07	3.81	4.56	6.04	7.88	9.67	13.07	16.16	18.92
250	0.06	0.10	0.40	0.64	0.89	1.16	1.43	1.99	2.72	3.60	4.48	5.37	7.16	9.38	11.55	15.67	19.42	22.78
300	0.06	0.10	0.43	0.69	0.98	1.28	1.60	2.24	3.09	4.09	5.11	6.15	8.23	10.81	13.35	18.17	22.57	26.51
600	0.06	0.12	0.56	0.96	1.42	1.91	2.43	3.52	4.95	6.67	8.45	10.26	13.94	18.57	23.14	31.89	39.95	47.18
800	0.06	0.12	0.63	1.10	1.65	2.25	2.89	4.24	6.03	8.17	10.40	12.69	17.35	23.24	29.07	40.29	50.63	59.93
1000	0.06	0.13	0.69	1.23	1.86	2.55	3.30	4.91	7.02	9.57	12.23	14.96	20.57	27.66	34.71	48.29	60.84	72.15

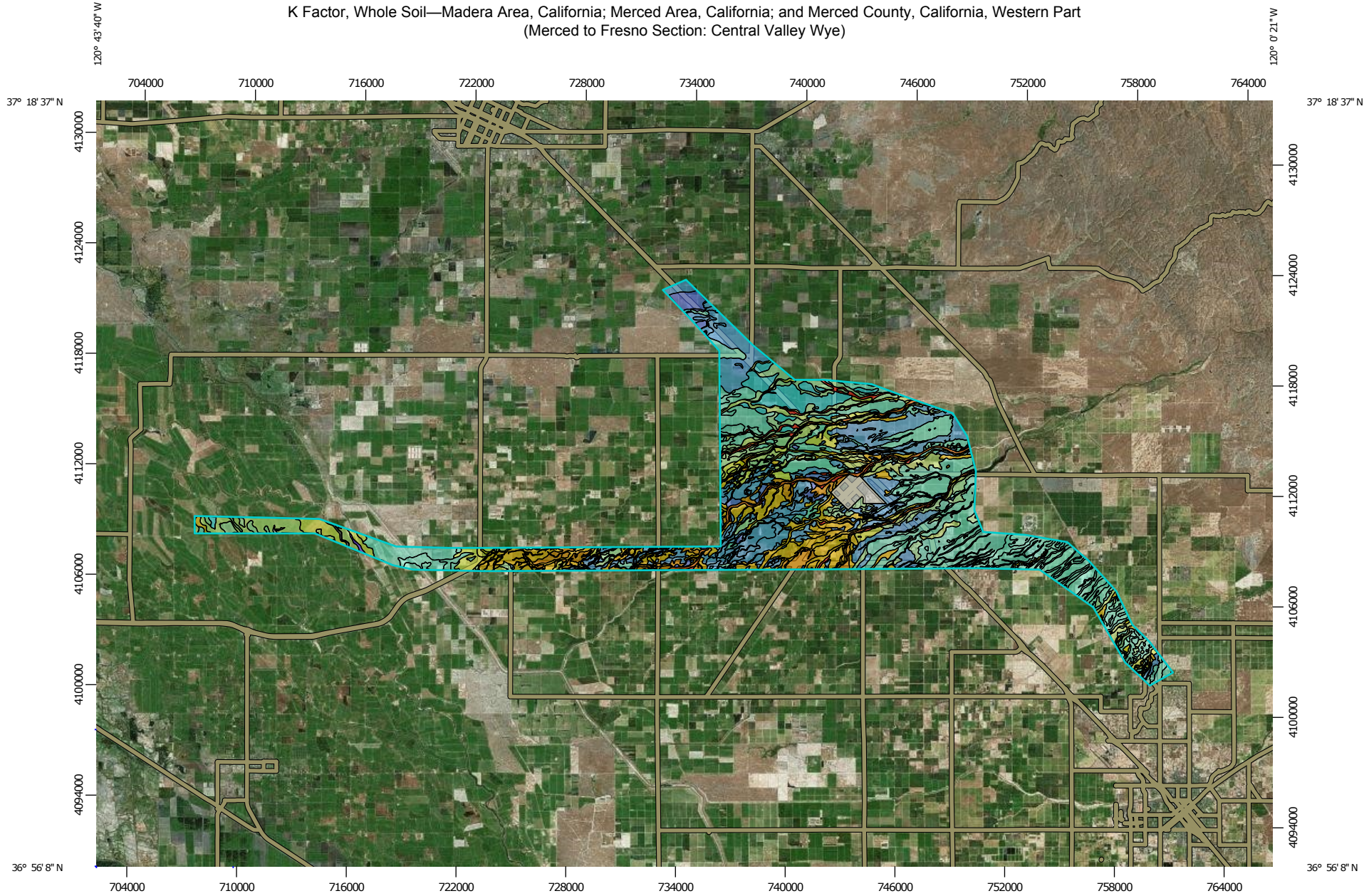
LS Factors for Construction Sites. *Table from Renard et. al., 1997.*

		Slope Mid-point		
Summary	nt slopes 0-1	0.5	124.1	0.20%
nt slopes, MLRA 17	0-3	1.5	721.9	1.40%
nt slopes, MLRA 17	3-8	5.5	274.5	0.50%
to 3 percent slopes	0-3	1.5	287.8	0.60%
to 8 percent slopes	3-8	5.5	59.4	0.10%
to 1 percent slopes	0-1	0.5	136.7	0.30%
to 1 percent slopes	0-1	0.5	836.3	1.70%
to 1 percent slopes	0-1	0.5	10.8	0.00%
to 1 percent slopes	0-1	0.5	8.5	0.00%
to 1 percent slopes	0-1	0.5	262.6	0.50%
to 1 percent slopes	0-1	0.5	94.2	0.20%
to 1 percent slopes	0-1	0.5	3.4	0.00%
to 1 percent slopes	0-1	0.5	119.3	0.20%
to 3 percent slopes	0-3	1.5	0.3	0.00%
to 8 percent slopes	3-8	5.5	1,029.00	2.10%
o 15 percent slopes	8-15	11.5	110	0.20%
nt slopes, MLRA 17	0-3	1.5	160.2	0.30%
nt slopes, MLRA 17	3-8	5.5	111.7	0.20%
to 1 percent slopes	0-1	0.5	291.1	0.60%
to 1 percent slopes	0-1	0.5	212.9	0.40%
to 1 percent slopes	0-1	0.5	155.5	0.30%
to 1 percen slopes	0-1	0.5	261	0.50%
to 1 percent slopes	0-1	0.5	503.3	1.00%
to 1 percen slopes	0-1	0.5	713.9	1.40%
nt slopes, MLRA 17	0-1	0.5	978.5	2.00%
o 1 percent slopes	0-1	0.5	194.1	0.40%
to 1 percent slopes	0-1	0.5	2,805.20	5.60%
o 1 percent slopes	0-1	0.5	633.5	1.30%
to 1 percent slopes	0-1	0.5	4.8	0.00%
to 1 percent slopes	0-1	0.5	91.4	0.20%
to 1 percent slopes	0-1	0.5	180.1	0.40%
o 1 percent slopes	0-1	0.5	12	0.00%
to 1 percent slopes	0-1	0.5	298.7	0.60%
o 1 percent slopes	0-1	0.5	20.3	0.00%
to 3 percent slopes	0-3	1.5	377	0.80%
to 3 percent slopes	0-3	1.5	469	0.90%
to 3 percent slopes	0-3	1.5	284	0.60%
to 8 percent slopes	3-8	5.5	336.2	0.70%
to 3 percent slopes	0-3	1.5	450.5	0.90%
to 8 percent slopes	3-8	5.5	40.7	0.10%
to 1 percent slopes	0-1	0.5	9.8	0.00%
to 1 percent slopes	0-1	0.5	631.7	1.30%
to 3 percent slopes	0-3	1.5	248.3	0.50%
to 3 percent slopes	0-3	1.5	75.8	0.20%
to 3 percent slopes	0-3	1.5	3,570.90	7.10%
to 3 percent slopes	0-3	1.5	16.7	0.00%
to 1 percent slopes	0-1	0.5	116.4	0.20%
to 1 percent slopes	0-1	0.5	467.8	0.90%
to 1 percen slopes	0-1	0.5	438	0.90%
to 1 percent slopes	0-1	0.5	12.5	0.00%
to 1 percent slopes	0-1	0.5	12	0.00%
to 1 percent slopes	0-1	0.5	62.6	0.10%
to 3 percent slopes	0-3	1.5	1,658.90	3.30%
Riverwash	0		936.3	1.90%
nt slopes, MLRA 17	0-3	1.5	7,633.10	15.30%
to 3 percent slopes	0-3	1.5	262.7	0.50%
to 1 percent slopes	0-1	0.5	917.3	1.80%
to 1 percent slopes	0-1	0.5	1,318.10	2.60%
to 1 percent slopes	0-1	0.5	769.1	1.50%
to 3 percent slopes	0-3	1.5	1,663.30	3.30%
to 3 percent slopes	0-3	1.5	2.3	0.00%
to 8 percent slopes	0-8	4	202.2	0.40%
wns (not surveyed)			722.3	1.40%
to 1 percent slopes	0-1	0.5	48.7	0.10%
to 3 percent slopes	0-3	1.5	130.5	0.30%
to 3 percent slopes	0-3	1.5	20.7	0.00%
Water			27.1	0.10%
to 1 percent slopes	0-1	0.5	273.9	0.50%
to 1 percent slopes	0-1	0.5	164.1	0.30%
to 1 percent slopes	0-1	0.5	24.1	0.00%
Summary	nt slopes 0-2	1	943.1	1.90%
to 2 percent slopes	0-2	1	51.2	0.10%
to 1 percent slopes	0-1	0.5	39.6	0.10%
to 1 percent slopes	0-1	0.5	0.5	0.00%
to 3 percent slopes	0-3	1.5	132	0.30%
to 1 percent slopes	0-1	0.5	2,225.50	4.40%
to 1 percent slopes	0-1	0.5	531.3	1.10%
to 1 percent slopes	0-1	0.5	410	0.80%

nt slopes, MLRA 17	0-1	0.5	47.2	0.10%
to 3 percent slopes	0-3	1.5	349.3	0.70%
to 8 percent slopes	3-8	5.5	9.6	0.00%
to 8 percent slopes	0-8	4	27.1	0.10%
to 1 percent slopes	0-1	0.5	111.9	0.20%
to 3 percent slopes	0-3	1.5	3.7	0.00%
to 1 percent slopes	0-1	0.5	29.9	0.10%
to 1 percent slopes	0-1	0.5	5.6	0.00%
to 1 percent slopes	0-1	0.5	1,528.50	3.10%
to 1 percent slopes	0-1	0.5	353.4	0.70%
to 1 percent slopes	0-1	0.5	48.8	0.10%
to 1 percent slopes	0-1	0.5	15.8	0.00%
to 1 percent slopes	0-1	0.5	426.8	0.90%
to 3 percent slopes	0-3	1.5	1,848.80	3.70%
to 3 percent slopes	0-3	1.5	569.4	1.10%
to 8 percent slopes	3-8	5.5	2.4	0.00%
to 1 percent slopes	0-1	0.5	73	0.10%
to 1 percent slopes	0-1	0.5	45.6	0.10%
to 1 percent slopes	0-1	0.5	469.4	0.90%
to 1 percent slopes	0-1	0.5	148.5	0.30%
to 1 percent slopes	0-1	0.5	13.9	0.00%
to 1 percent slopes	0-1	0.5	152.5	0.30%
to 1 percent slopes	0-1	0.5	35.5	0.10%
to 1 percent slopes	0-1	0.5	305.3	0.60%
to 1 percent slopes	0-1	0.5	99.2	0.20%
to 1 percent slopes	0-1	0.5	137.5	0.30%
to 1 percent slopes	0-1	0.5	33.3	0.10%
to 1 percent slopes	0-1	0.5	2.2	0.00%
Riverwash	0		73.6	0.10%
nt slopes, MLRA 17	0-3	1.5	10	0.00%
to 3 percent slopes	0-3	1.5	14.3	0.00%
to 1 percent slopes	0-1	0.5	279.5	0.60%
to 1 percen slopes	0-1	0.5	98.9	0.20%
to 1 percent slopes	0-1	0.5	37.5	0.10%
to 3 percent slopes	0-3	1.5	23.4	0.00%
to 3 percent slopes	0-3	1.5	410.1	0.80%
to 1 percent slopes	0-1	0.5	10.9	0.00%
to 3 percent slopes	0-3	1.5	13.1	0.00%
Summary by drained			272.5	0.50%
d, partially drained			65.5	0.10%
n, partially drained			839.5	1.70%
n, partially drained			25.1	0.10%
n, partially drained			41.7	0.10%
aquents, channeled			11.3	0.00%
erson loam, ponded			46.6	0.10%
n, partially drained			399.6	0.80%
fluvents, channeled			38.4	0.10%
Water			11	0.00%
			1,751.20	3.50%
			1,751.20	0.04
	average	**1.3**	#####	100.00%

Attachment C.2
Web Soil Survey
(USDA Natural Resources Conservation Service)

K Factor, Whole Soil—Madera Area, California; Merced Area, California; and Merced County, California, Western Part
(Merced to Fresno Section: Central Valley Wye)



Map Scale: 1:293,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 4000 8000 16000 24000

Feet
0 10000 20000 40000 60000

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
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Lines
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Points
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- 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: http://websoilsurvey.nrcs.usda.gov
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: Madera Area, California
Survey Area Data: Version 9, Sep 30, 2015

Soil Survey Area: Merced Area, California
Survey Area Data: Version 10, Sep 30, 2015

Soil Survey Area: Merced County, California, Western Part
Survey Area Data: Version 10, Sep 18, 2015

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: Jan 1, 1999—Dec 31, 2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Madera Area, California (CA651)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
AsA	Alamo clay, 0 to 1 percent slopes	.17	124.1	0.2%
AtA	Atwater loamy sand, 0 to 3 percent slopes, MLRA 17	.24	721.9	1.4%
AtB	Atwater loamy sand, 3 to 8 percent slopes, MLRA 17	.15	274.5	0.5%
AwA	Atwater loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes	.15	287.8	0.6%
AwB	Atwater loamy sand, moderately deep and very deep over hardpan, 3 to 8 percent slopes	.15	59.4	0.1%
BfA	Borden fine sandy loam, 0 to 1 percent slopes	.32	136.7	0.3%
BkA	Borden fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.32	836.3	1.7%
BmA	Borden loam, 0 to 1 percent slopes	.43	10.8	0.0%
BoA	Borden loam, slightly saline-alkali, 0 to 1 percent slopes	.43	8.5	0.0%
CfA	Chino fine sandy loam, 0 to 1 percent slopes	.20	262.6	0.5%
CfaA	Chino fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.20	94.2	0.2%
CgA	Chino loam, 0 to 1 percent slopes	.28	3.4	0.0%
CgaA	Chino loam, slightly saline-alkali, 0 to 1 percent slopes	.28	119.3	0.2%
CuA	Cometa sandy loams, 0 to 3 percent slopes	.32	0.3	0.0%
CuB	Cometa sandy loams, 3 to 8 percent slopes	.32	1,029.0	2.1%
CuC	Cometa sandy loams, 8 to 15 percent slopes	.32	110.0	0.2%
DeA	Delhi sand, 0 to 3 percent slopes, MLRA 17	.02	160.2	0.3%

K Factor, Whole Soil— Summary by Map Unit — Madera Area, California (CA651)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
DeB	Delhi sand, 3 to 8 percent slopes, MLRA 17	.02	111.7	0.2%
FeaA	Fresno and El Peco fine sandy loams, slightly saline-alkali, 0 to 1 percent slopes	.28	291.1	0.6%
FebA	Fresno and El Peco fine sandy loams, moderately saline-alkali, to 1 percent slopes	.28	212.9	0.4%
FecA	Fresno and El Peco fine sandy loams, strongly saline-alkali, 0 to 1 percent slopes	.28	155.5	0.3%
FfaA	Fresno and El Peco loams, slightly saline-alkali, 0 to 1 percen slopes	.43	261.0	0.5%
FfbA	Fresno and El Peco loams, moderately saline-alkali, 0 to 1 percent slopes	.43	503.3	1.0%
FfcA	Fresno and El Peco loams, strongly saline-alkali, 0 to 1 percen slopes	.43	713.9	1.4%
GaA	Grangeville fine sandy loam, 0 to 1 percent slopes, MLRA 17	.10	978.5	2.0%
GbA	Grangeville fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.10	194.1	0.4%
GcA	Grangeville fine sandy loam, over traver soils, 0 to 1 percent slopes	.15	2,805.2	5.6%
GdA	Grangeville fine sandy loam, over traver soils, slightly saline alkali, 0 to 1 percent slopes	.15	633.5	1.3%
GeA	Grangeville fine sandy loam, moderately deep and deep over temple soils, 0 to 1 percent slopes	.10	4.8	0.0%
GfA	Grangeville fine sandy loam, deep over hardpan, 0 to 1 percent slopes	.15	91.4	0.2%
GhA	Grangeville fine sandy loam, deep over alkali hardpan, 0 to 1 percent slopes	.15	180.1	0.4%

K Factor, Whole Soil— Summary by Map Unit — Madera Area, California (CA651)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GkA	Grangeville fine sandy loam, deep over alkali hardpan, slightly saline-alkali, 0 to 1 percent slopes	.15	12.0	0.0%
GmA	Grangeville sandy loam, 0 to 1 percent slopes	.10	298.7	0.6%
GnA	Grangeville sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.10	20.3	0.0%
GrA	Greenfield coarse sandy loam, 0 to 3 percent slopes	.24	377.0	0.8%
GsA	Greenfield fine sandy loam, 0 to 3 percent slopes	.32	469.0	0.9%
GuA	Greenfield sandy loam, 0 to 3 percent slopes	.28	284.0	0.6%
GuB	Greenfield sandy loam, 3 to 8 percent slopes	.28	336.2	0.7%
GvA	Greenfield sandy loam, moderately deep and deep over hardpan, 0 to 3 percent slopes	.28	450.5	0.9%
GvB	Greenfield sandy loam, moderately deep and deep over hardpan, 3 to 8 percent slopes	.28	40.7	0.1%
HaA	Hanford fine sandy loam, 0 to 1 percent slopes	.20	9.8	0.0%
HbA	Hanford fine sandy loam, moderately deep and deep over hardpan, 0 to 1 percent slopes	.20	631.7	1.3%
HfA	Hanford sandy loam, 0 to 3 percent slopes	.17	248.3	0.5%
HgA	Hanford sandy loam, moderately deep and deep over hardpan, 0 to 3 percent slopes	.17	75.8	0.2%
MaA	Madera fine sandy loam, 0 to 3 percent slopes	.43	3,570.9	7.1%
MbA	Madera loam, 0 to 3 percent slopes	.49	16.7	0.0%
McA	Madera-Alamo complex, 0 to 1 percent slopes	.43	116.4	0.2%
PaA	Pachappa fine sandy loam, 0 to 1 percent slopes	.24	467.8	0.9%

K Factor, Whole Soil— Summary by Map Unit — Madera Area, California (CA651)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
PbA	Pachappa fine sandy loam, slightly saline-alkali, 0 to 1 percen slopes	.24	438.0	0.9%
PcA	Pachappa sandy loam, 0 to 1 percent slopes	.20	12.5	0.0%
PdA	Pachappa sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.20	12.0	0.0%
PeA	Pachappa sandy loam, moderately deep and deep over hardpan, slightly saline-alkali, 0 to 1 percent slopes	.15	62.6	0.1%
RaA	Ramona sandy loam, 0 to 3 percent slopes	.32	1,658.9	3.3%
Rh	Riverwash	.05	936.3	1.9%
SaA	San Joaquin sandy loam, 0 to 3 percent slopes, MLRA 17	.32	7,633.1	15.3%
SbA	San Joaquin-Alamo complex, 0 to 3 percent slopes	.32	262.7	0.5%
TmA	Traver loam, slightly saline-alkali, 0 to 1 percent slopes	.43	917.3	1.8%
TnA	Traver loam, moderately saline alkali, 0 to 1 percent slopes	.43	1,318.1	2.6%
ToA	Traver loam, strongly saline-alkali, 0 to 1 percent slopes	.43	769.1	1.5%
TwA	Tujunga loamy sand, 0 to 3 percent slopes	.15	1,663.3	3.3%
TxA	Tujunga loamy sand, moderately deep and deep over hardpan, 0 to 3 percent slopes	.24	2.3	0.0%
TzB	Tujunga and Hanford soils, channeled, 0 to 8 percent slopes	.17	202.2	0.4%
URB	Towns (not surveyed)		722.3	1.4%
VaA	Visalia fine sandy loam, 0 to 1 percent slopes	.20	48.7	0.1%
VdA	Visalia sandy loam, 0 to 3 percent slopes	.20	130.5	0.3%
VnA	Visalia sandy loam, moderately deep over sand, 0 to 3 percent slopes	.20	20.7	0.0%

K Factor, Whole Soil— Summary by Map Unit — Madera Area, California (CA651)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
W	Water		27.1	0.1%
WuA	Wunjey very fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.49	273.9	0.5%
WvA	Wunjey very fine sandy loam, moderately saline-alkali, 0 to 1 percent slopes	.49	164.1	0.3%
WxA	Wunjey very fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes	.49	24.1	0.0%
Subtotals for Soil Survey Area			**36,101.5**	**72.1%**
Totals for Area of Interest			**50,051.2**	**100.0%**

K Factor, Whole Soil— Summary by Map Unit — Merced Area, California (CA648)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BeA	Borden fine sandy loam, 0 to 2 percent slopes	.28	943.1	1.9%
BfA	Borden fine sandy loam, slightly saline-alkali, 0 to 2 percent slopes	.28	51.2	0.1%
BkA	Burchell silt loam, slightly saline-alkali, 0 to 1 percent slopes	.32	39.6	0.1%
CcA	Columbia silt loam, moderately deep and deep, 0 to 1 percent slopes	.49	0.5	0.0%
CeA	Columbia soils, channeled, 0 to 3 percent slopes	.24	132.0	0.3%
FpA	Fresno loam, slightly saline-alkali, 0 to 1 percent slopes	.32	2,225.5	4.4%
FrA	Fresno loam, moderately saline alkali, 0 to 1 percent slopes	.32	531.3	1.1%
FsA	Fresno loam, strongly saline-alkali, 0 to 1 percent slopes	.32	410.0	0.8%
GaA	Grangeville fine sandy loam, 0 to 1 percent slopes, MLRA 17	.10	47.2	0.1%
GfA	Greenfield sandy loam, deep over hardpan, 0 to 3 percent slopes	.28	349.3	0.7%

K Factor, Whole Soil— Summary by Map Unit — Merced Area, California (CA648)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GfB	Greenfield sandy loam, deep over hardpan, 3 to 8 percent slopes	.28	9.6	0.0%
HcB	Hanford fine sandy loam, channeled, 0 to 8 percent slopes	.20	27.1	0.1%
HeA	Hanford sandy loam, 0 to 1 percent slopes	.17	111.9	0.2%
HgA	Hilmar loamy sand, 0 to 3 percent slopes	.15	3.7	0.0%
HrA	Honcut fine sandy loam, 0 to 1 percent slopes	.24	29.9	0.1%
LcA	Landlow silt loam, 0 to 1 percent slopes	.49	5.6	0.0%
LkA	Lewis loam, slightly saline-alkali, 0 to 1 percent slopes	.43	1,528.5	3.1%
LmA	Lewis loam, moderately saline-alkali, 0 to 1 percent slopes	.43	353.4	0.7%
LnA	Lewis loam, strongly saline-alkali, 0 to 1 percent slopes	.43	48.8	0.1%
LoA	Lewis silty clay loam, slightly saline-alkali, 0 to 1 percent slopes	.49	15.8	0.0%
LpA	Lewis silty clay loam, moderately saline-alkali, 0 to 1 percent slopes	.49	426.8	0.9%
MaA	Madera fine sandy loam, 0 to 3 percent slopes	.37	1,848.8	3.7%
MdA	Madera sandy loam, 0 to 3 percent slopes	.32	569.4	1.1%
MdB	Madera sandy loam, 3 to 8 percent slopes	.32	2.4	0.0%
MeA	Marguerite loam, 0 to 1 percent slopes	.37	73.0	0.1%
MpA	Merced silt loam, overwashed, slightly saline, 0 to 1 percent slopes	.55	45.6	0.1%
PaA	Pachappa fine sandy loam, 0 to 1 percent slopes	.24	469.4	0.9%
PbA	Pachappa fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.24	148.5	0.3%

K Factor, Whole Soil— Summary by Map Unit — Merced Area, California (CA648)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
PcA	Pachappa fine sandy loam, deep over hardpan, 0 to 1 percent slopes	.24	13.9	0.0%
PdA	Pachappa sandy loam, 0 to 1 percent slopes	.20	152.5	0.3%
PeA	Pachappa sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.20	35.5	0.1%
PfA	Pachappa sandy loam, deep over hardpan, slightly saline-alkali, 0 to 1 percent slopes	.20	305.3	0.6%
PgA	Pachappa sandy loam, deep over hardpan, 0 to 1 percent slopes	.20	99.2	0.2%
PxA	Pozo clay loam, 0 to 1 percent slopes	.20	137.5	0.3%
PyA	Pozo clay loam, slightly saline, 0 to 1 percent slopes	.20	33.3	0.1%
PzA	Pozo clay loam, moderately saline, 0 to 1 percent slopes	.20	2.2	0.0%
Rf	Riverwash	.05	73.6	0.1%
ScA	San Joaquin sandy loam, 0 to 3 percent slopes, MLRA 17	.32	10.0	0.0%
SnA	Snelling sandy loam, 0 to 3 percent slopes	.24	14.3	0.0%
TnA	Traver fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	.28	279.5	0.6%
ToA	Traver fine sandy loam, moderately saline-alkali, 0 to 1 percen slopes	.28	98.9	0.2%
TpA	Traver fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes	.28	37.5	0.1%
TtA	Tujunga loamy sand, 0 to 3 percent slopes	.15	23.4	0.0%
TuA	Tujunga sand, 0 to 3 percent slopes	.02	410.1	0.8%
WpA	Wyman loam, deep over hardpan, slightly saline-alkali, 0 to 1 percent slopes	.37	10.9	0.0%
WrA	Wyman loam, 0 to 3 percent slopes	.37	13.1	0.0%

K Factor, Whole Soil— Summary by Map Unit — Merced Area, California (CA648)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Subtotals for Soil Survey Area			**12,198.5**	**24.4%**
Totals for Area of Interest			**50,051.2**	**100.0%**

K Factor, Whole Soil— Summary by Map Unit — Merced County, California, Western Part (CA647)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
103	Alros clay loam, partially drained	.28	272.5	0.5%
137	Bisgani loamy sand, partially drained	.15	65.5	0.1%
139	Bolfar clay loam, partially drained	.24	839.5	1.7%
180	Elnido clay loam, partially drained	.32	25.1	0.1%
181	Escano clay loam, partially drained	.24	41.7	0.1%
186	Fluvaquents, channeled		11.3	0.0%
200	Kesterson loam, ponded	.37	46.6	0.1%
228	Palazzo sandy loam, partially drained	.20	399.6	0.8%
283	Xerofluvents, channeled		38.4	0.1%
287	Water		11.0	0.0%
Subtotals for Soil Survey Area			**1,751.2**	**3.5%**
Totals for Area of Interest			**50,051.2**	**100.0%**

Description

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 saturated hydraulic conductivity (Ksat). 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 (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)