

EXHIBIT D



WATER AVAILABILITY ANALYSIS

ACIERNO TRACK I – VINEYARD BLOCKS G, H, AND I
7070 SILVERADO TRAIL
NAPA, CALIFORNIA 94558

APN 032-070-024

PREPARED FOR:

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7070 Silverado Trail
Napa, CA 94558

Project #4122064.0
February 12, 2024
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EXECUTIVE SUMMARY

The Acierno Track I – Vineyard Block G, H and I project consists of 0.73± acres of new vineyard (0.63± acres planted) located on a 40.33± acre parcel at 7070 Silverado Trail, Napa, CA (APN 032-070-024). There is an existing residence, vineyards, well, and other residential improvements located on the parcel. The existing well will continue to be used for the vineyard irrigation and domestic water. A groundwater recharge rate was calculated for the site and found to be 0.32 ac-ft/ac/yr. This provides an annual groundwater recharge of 12.91 ac-ft/yr (or 14.1% of the 10-year average annual rainfall) for the 40.33± acre parcel.

Below is a summary of the existing and proposed water use. Detailed calculations can be found on the next page.

Usage Type	Existing Usage [af/yr]	Proposed Usage [af/yr]	(P) Temporary Usage [af/yr]
<i>Agricultural</i>			
Irrigation (0.5 af/ac per year)	1.29	1.60	1.60
Frost Protection (0.25 af/ac per year)	0.64	0.80	0.80
Heat Protection (0.25 af/ac per year)	0.64	0.80	0.80
<i>Residential</i>			
Main Residence (including minor landscaping)	0.75	0.75	0.75
Detached Structure (1 bed/1 bath)	0.30	0.30	0.30
<i>Temporary</i>			
Oak Tree Replanting			0.006
Total (Acre-ft per Year)	3.62	4.25	4.26
Estimated Water Recharge Rate (Acre-ft per Year)	12.91		

The proposed modifications for the Acierno Vineyards project will result in a slight increase in groundwater use on the parcel. However, the proposed increase from 3.62 af/yr to 4.25 af/yr (4.26 af/yr including temporary irrigation for the replanted oak trees) is significantly less than the calculated groundwater recharge for the parcel of 12.91 af/yr.



WATER USE CALCULATION

Existing Vineyard Irrigation Water Demand

Vineyard – Irrigation from well (0.5 ac-ft/ac/yr x	2.57	acres vineyard) =	1.29	af/yr
Vineyard – Frost Protection (0.25 ac-ft/ac/yr x	2.57	acres vineyard) =	0.64	af/yr
Vineyard – Heat Protection (0.25 ac-ft/ac/yr x	2.57	acres vineyard) =	0.64	af/yr

Existing Residential Water Demand

Main Residence (including minor landscaping) –	0.75	af/yr) =	0.75	af/yr
Detached Structure (1 bed/1 bath) –	0.30	af/yr) =	0.30	af/yr
Total Existing Water Demand		Total =	3.62	af/yr

Proposed Vineyard Irrigation Water Demand

Vineyard* – Irrigation from well (0.5 ac-ft/ac/yr x	3.20	acres vineyard) =	1.60	af/yr
Vineyard* – Frost Protection (0.25 ac-ft/ac/yr x	3.20	acres vineyard) =	0.80	af/yr
Vineyard* – Heat Protection (0.25 ac-ft/ac/yr x	3.20	acres vineyard) =	0.80	af/yr

Proposed Residential Water Demand

Main Residence (including minor landscaping) –	0.75	af/yr) =	0.75	af/yr
Detached Structure (1 bed/1 bath) –	0.30	af/yr) =	0.30	af/yr
Total Proposed Water Demand		Total =	4.25	af/yr

*Proposed vineyard irrigation totals include 2.57 acres of planted vineyard from Track I - Replant (P22-00412-ECPA)

Temporary Oak Tree Replanting Irrigation Water Demand (3 years)

Oak Trees (Various species – 52 trees x	40	gal/tree/year) =	2,080	gal/yr
	3.06889×10^{-6}			
2,080 gal/year x	6	af/gal) =	0.006	af/yr
Total Water Demand w/Temporary Irrigation		4.25 + 0.006 =	4.26	af/yr



ANNUAL GROUNDWATER RECHARGE RATE METHODOLOGY

The groundwater recharge rate has been determined by examining the monthly rainfall, runoff, and species-specific evapotranspiration throughout the year. The groundwater recharge rate was calculated as the difference of the total annual rainfall and losses from the stormwater runoff and evapotranspiration. Refer to attached calculations.

$$\text{Average Recharge Rate} = \text{Average Rainfall} - \text{Runoff} - \text{Evapotranspiration}$$

The 10-year average monthly rainfall was provided by the PRSIM Climate Group (attached for reference) and the average monthly. Averages for each month were calculated using this data and summarized in Attachment 2.

The monthly stormwater runoff volumes were calculated using the Soil Conservation Service (SCS) Curve Number Method based on the average monthly rainfall and Curve Numbers associated with each distinct pervious/impervious areas on the site. The 2018 aerial image was used to estimate vegetation on the parcel.

The evapotranspiration losses were calculated using the Water Use Classifications of Landscape Species (WUCOLS) methodology for the vineyard, grassland, and coastal oak tree areas. Only vineyard evapotranspiration from the winter (September through March) was considered, as it is assumed that evapotranspiration in summer (April through October) will be from irrigation water.

RECHARGE RATE AS PERCENTAGE OF PRECIPITATION

The groundwater recharge rate has been determined by the Evapotranspiration method. However, the following calculations show the calculated groundwater recharge rate as a percentage of the 10-year average annual precipitation (27.18 inches).

Convert the 10-year average annual rainfall (27.18 inches) to acre feet:

$$\begin{aligned} 10 \text{ yr rainfall} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \text{Parcel Size (acres)} &= \\ &= 27.18 \text{ in} \times \frac{1 \text{ ft}}{12 \text{ in}} \times 40.33 \text{ acres} \\ &= 91.35 \text{ ac ft} \end{aligned}$$

Convert calculated groundwater recharge rate to percentage of rainfall:

$$\begin{aligned} &= \frac{\text{Calculated Recharge (ac ft)}}{10 \text{ yr Annual Precipitation (ac ft)}} \\ &= \frac{12.91 \text{ ac ft}}{91.35 \text{ ac ft}} \times 100\% \\ &= \mathbf{14.1\% \text{ of } 10\text{yr Average Annual Precipitation}} \end{aligned}$$



CONCLUSION

The annual water demand for the proposed project is calculated to increase from 3.62 acre-feet per year to 4.25 acre-feet per year (4.26 acre-feet per year for three years including temporary irrigation for the replanting of oak trees). Based on the 10-year average annual rainfall of 27.18 inches for the project site and estimated recharge, the annual recharge rate for the parcel is calculated to be 12.91 acre-feet per year (or 14.1% of the 10-year average annual rainfall). Therefore, the overall water use for the parcel is estimated to be less than the calculated annual recharge for the parcel and the Tier 1 Water Availability Analysis criteria for the project has been met.

Based on the information available at this time, the project well is not located within 500 feet of another well, not located within 1,500 feet of a spring for residential or agricultural use, and is not located within 1,500 feet of a significant stream per Napa County GIS information. Therefore, the project would not be subject to a Tier II or Tier III analysis.



APPENDIX 1

EXHIBITS

ACIERNO TRACK I - VINEYARD BLOCKS G, H AND I

WELL, SPRING AND SURFACE WATER SETBACK EXHIBIT

NAPA CALIFORNIA

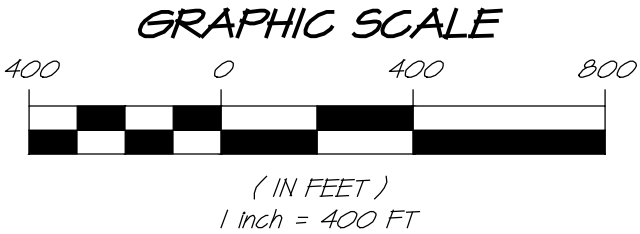


NOTES

1. NEIGHBORING WELL LOCATIONS OBTAINED FROM NAPA COUNTY ELECTRONIC RECORDS
2. NO WELL INFORMATION FOUND IN NAPA COUNTY ELECTRONIC RECORDS
3. NO SPRINGS OR SURFACE WATER INFORMATION FOUND IN NAPA COUNTY ELECTRONIC RECORDS
4. BASED ON INFORMATION PROVIDED BY NAPA COUNTY, APNS 032-200-006 & -007 ARE SERVICED BY TOWN OF YOUNTVILLE MUNICIPAL WATER.

LEGEND

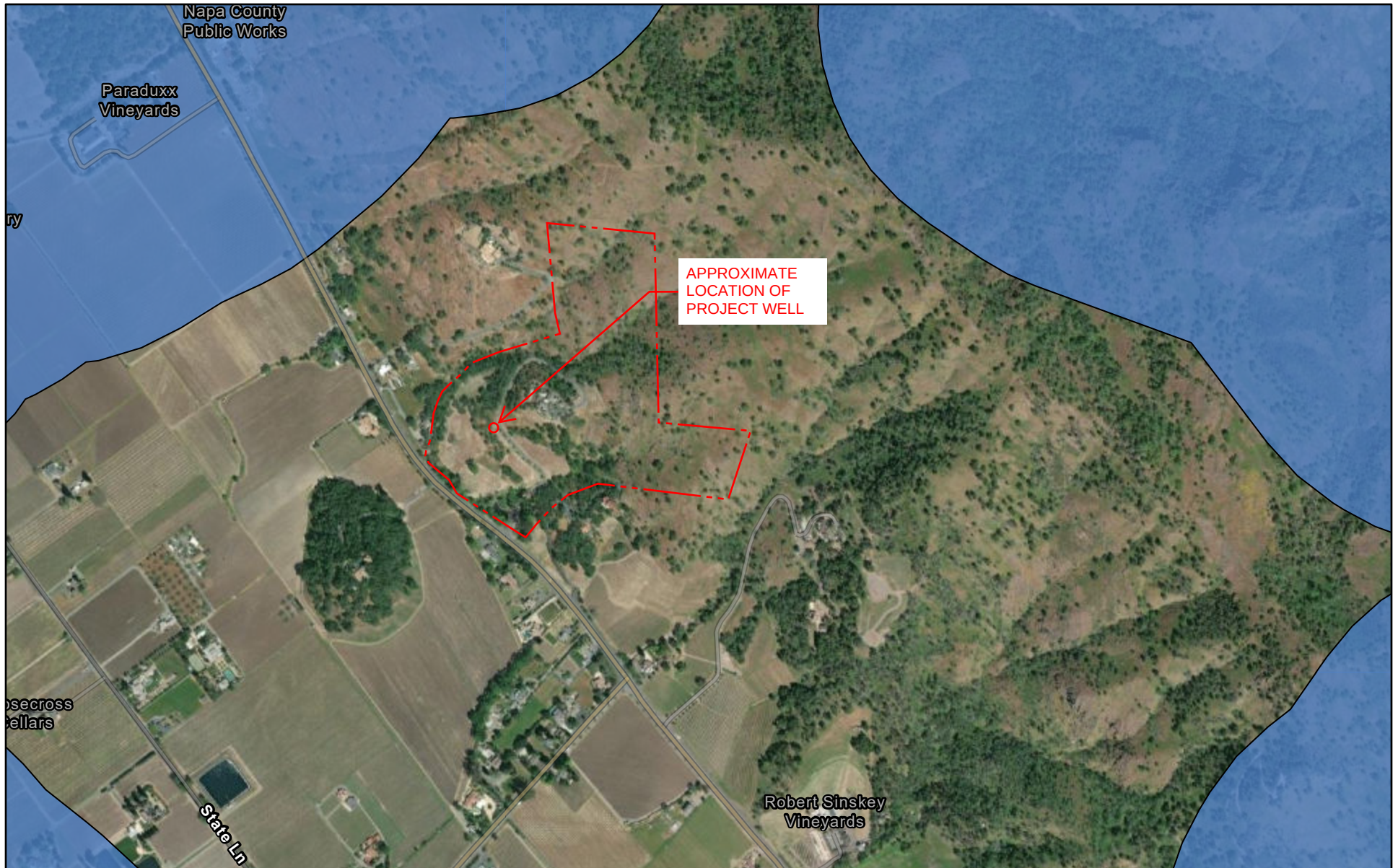
- Ⓜ APPROXIMATE LOCATION OF (E) WELL (SEE NOTE)
- APPROXIMATE PROPERTY LINE
- ADJOINING PROPERTY LINE



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Acierno - Track I New Vineyard



12/16/2022

 Significant_Streams_1500ft_Buffer
World Imagery
Low Resolution 15m Imagery

High Resolution 60cm Imagery
High Resolution 30cm Imagery
Citations

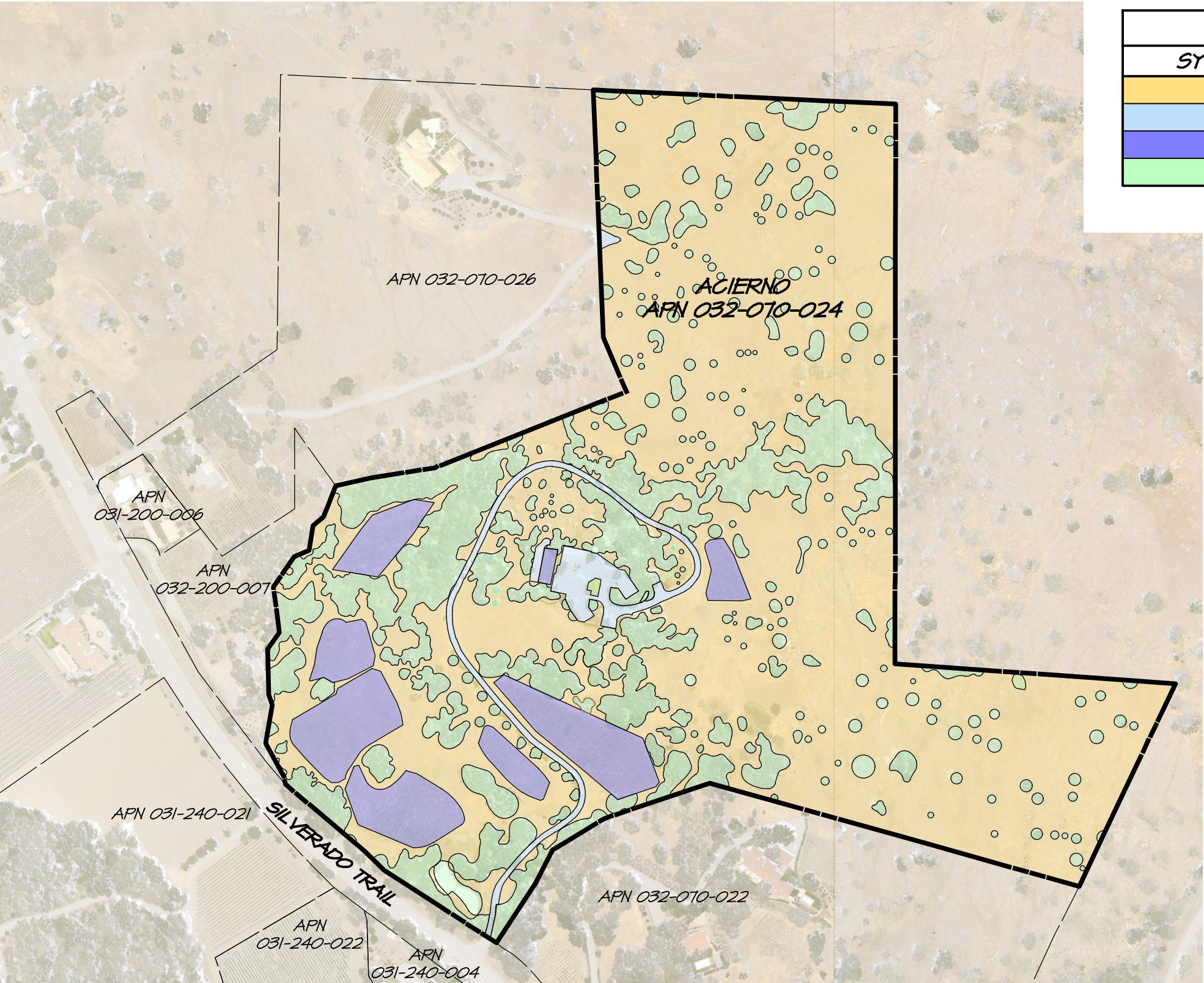
2.4m Resolution Metadata



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0 0.07 0.15 0.3 mi
0 0.13 0.25 0.5 km

Esri Community Maps Contributors, County of Napa, Yolo County, California
State Parks, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/

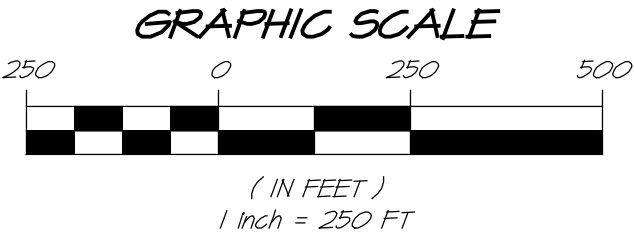
ACIERNO TRACK I - VINEYARD BLOCKS G, H AND I
GROUNDWATER RECHARGE EXHIBIT
NAPA CALIFORNIA



COVERAGE AREA			
SYMBOL	COVERAGE TYPE	AREA S.F.	ACRES
	GRASS AND SHRUBS	1,116,812 S.F.	25.95 ACRES
	IMPERVIOUS	44,082 S.F.	1.01 ACRES
	VINEYARD	146,442 S.F.	3.50 ACRES
	COASTAL OAK TREES	429,940 S.F.	9.87 ACRES

LEGEND

- APPROXIMATE PROPERTY LINE
- ADJOINING PROPERTY LINE



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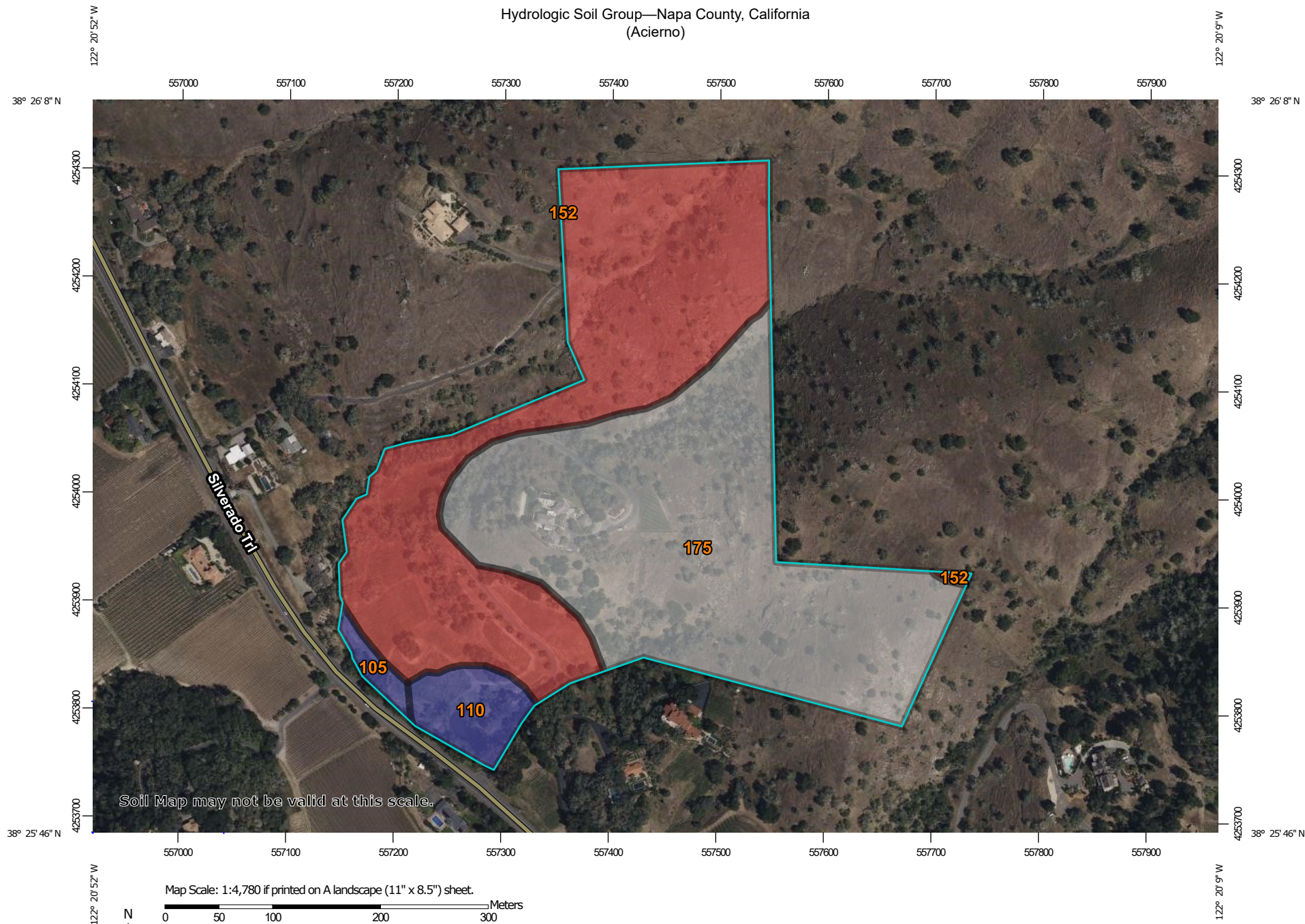
R:\2022\4122064.0_Acierno_Silverado_Trail_Property\DESIGN\EXHIBITS\Exh-Groundwater Recharge Exhibit 2018 - Block F.dwg 11/15/2023



APPENDIX 2

ANNUAL GROUNDWATER RECHARGE RATE CALCULATIONS

Hydrologic Soil Group—Napa County, California (Acierno)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 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 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Napa County, California
Survey Area Data: Version 15, Sep 1, 2022

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

Date(s) aerial images were photographed: Mar 26, 2022—Apr 25, 2022

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
105	Bale clay loam, 2 to 5 percent slopes	B	0.5	1.3%
110	Boomer-Forward-Felta complex, 30 to 50 percent slopes	B	1.9	4.5%
152	Hambright rock-Outcrop complex, 30 to 75 percent slopes	D	17.9	43.5%
175	Rock outcrop		20.8	50.6%
Totals for Area of Interest			41.2	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

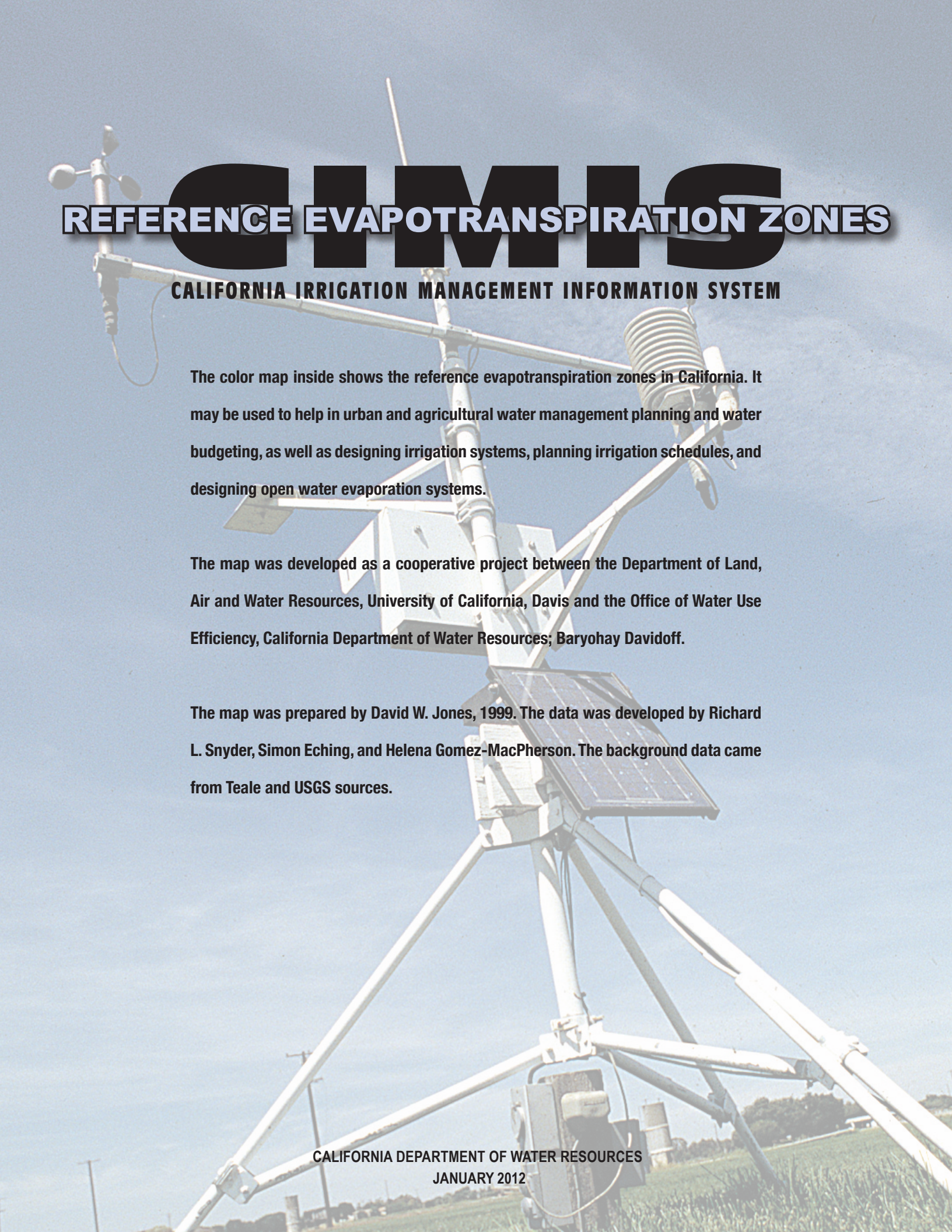
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



CEMIS

REFERENCE EVAPOTRANSPIRATION ZONES

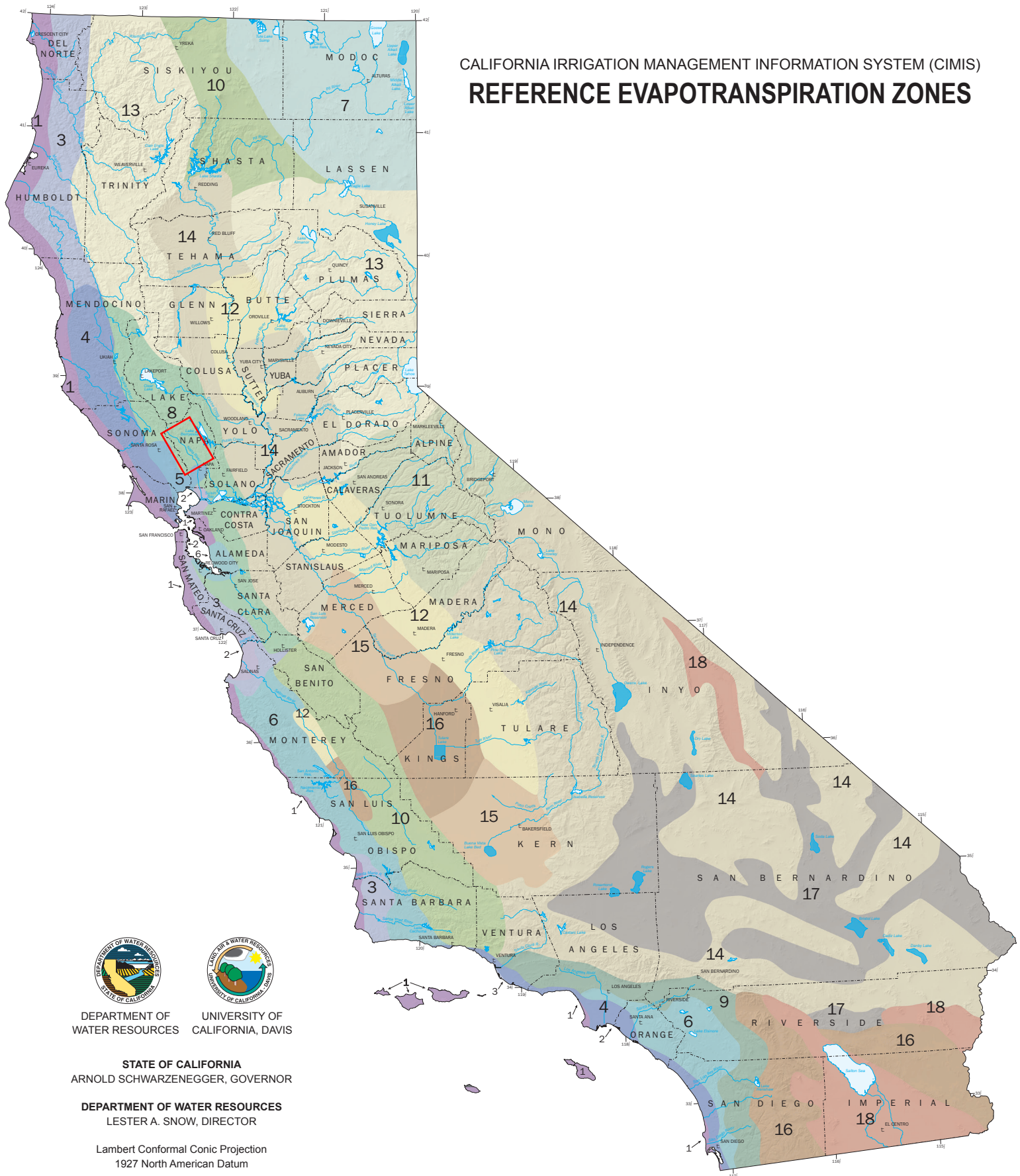
CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM

The color map inside shows the reference evapotranspiration zones in California. It may be used to help in urban and agricultural water management planning and water budgeting, as well as designing irrigation systems, planning irrigation schedules, and designing open water evaporation systems.

The map was developed as a cooperative project between the Department of Land, Air and Water Resources, University of California, Davis and the Office of Water Use Efficiency, California Department of Water Resources; Baryohay Davidoff.

The map was prepared by David W. Jones, 1999. The data was developed by Richard L. Snyder, Simon Eching, and Helena Gomez-MacPherson. The background data came from Teale and USGS sources.

CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM (CIMIS) REFERENCE EVAPOTRANSPIRATION ZONES



DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA



UNIVERSITY OF CALIFORNIA, DAVIS

STATE OF CALIFORNIA
ARNOLD SCHWARZENEGGER, GOVERNOR

DEPARTMENT OF WATER RESOURCES
LESTER A. SNOW, DIRECTOR

Lambert Conformal Conic Projection
1927 North American Datum

Reference EvapoTranspiration (ETo) Zones

- 1** **COASTAL PLAINS HEAVY FOG BELT** lowest ETo in California, characterized by dense fog
- 2** **COASTAL MIXED FOG AREA** less fog and higher ETo than zone 1
- 3** **COASTAL VALLEYS & PLAINS & NORTH COAST MOUNTAINS** more sunlight than zone 2
- 4** **SOUTH COAST INLAND PLAINS & MOUNTAINS NORTH OF SAN FRANCISCO** more sunlight and higher summer ETo than zone 3
- 5** **NORTHERN INLAND VALLEYS** valleys north of San Francisco
- 6** **UPLAND CENTRAL COAST & LOS ANGELES BASIN** higher elevation coastal areas
- 7** **NORTHEASTERN PLAINS**
- 8** **INLAND SAN FRANCISCO BAY AREA** inland area near San Francisco with some marine influence
- 9** **SOUTH COAST MARINE TO DESERT TRANSITION** inland area between marine & desert climates
- 10** **NORTH CENTRAL PLATEAU & CENTRAL COAST RANGE** cool, high elevation areas with strong summer sunlight; zone has limited climate data & the zones selection is somewhat subjective
- 11** **CENTRAL SIERRA NEVADA** mountain valleys east of Sacramento with some influence from delta breeze in summer
- 12** **EAST SIDE SACRAMENTO-SAN JOAQUIN VALLEY** low winter & high summer ETo with slightly lower ETo than zone 14
- 13** **NORTHERN SIERRA NEVADA** northern Sierra Nevada mountain valleys with less marine influence than zone 11
- 14** **MID-CENTRAL VALLEY, SOUTHERN SIERRA NEVADA, TEHACHAPI & HIGH DESERT MOUNTAINS** high summer sunshine and wind in some locations
- 15** **NORTHERN & SOUTHERN SAN JOAQUIN VALLEY** slightly lower winter ETo due to fog and slightly higher summer ETo than zones 12 & 14
- 16** **WESTSIDE SAN JOAQUIN VALLEY & MOUNTAINS EAST & WEST OF IMPERIAL VALLEY**
- 17** **HIGH DESERT VALLEYS** valleys in the high desert near Nevada and Arizona
- 18** **IMPERIAL VALLEY, DEATH VALLEY & PALO VERDE** low desert areas with high sunlight & considerable heat advection

Monthly Average Reference Evapotranspiration by ETo Zone (inches/month)

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	0.93	1.40	2.48	3.30	4.03	4.50	4.65	4.03	3.30	2.48	1.20	0.62	32.9
2	1.24	1.68	3.10	3.90	4.65	5.10	4.96	4.65	3.90	2.79	1.80	1.24	39.0
3	1.86	2.24	3.72	4.80	5.27	5.70	5.58	5.27	4.20	3.41	2.40	1.86	46.3
4	1.86	2.24	3.41	4.50	5.27	5.70	5.89	5.58	4.50	3.41	2.40	1.86	46.6
5	0.93	1.68	2.79	4.20	5.58	6.30	6.51	5.89	4.50	3.10	1.50	0.93	43.9
6	1.86	2.24	3.41	4.80	5.58	6.30	6.51	6.20	4.80	3.72	2.40	1.86	49.7
7	0.62	1.40	2.48	3.90	5.27	6.30	7.44	6.51	4.80	2.79	1.20	0.62	43.3
8	1.24	1.68	3.41	4.80	6.20	6.90	7.44	6.51	5.10	3.41	1.80	0.93	49.4
9	2.17	2.80	4.03	5.10	5.89	6.60	7.44	6.82	5.70	4.03	2.70	1.86	55.1
10	0.93	1.68	3.10	4.50	5.89	7.20	8.06	7.13	5.10	3.10	1.50	0.93	49.1
11	1.55	2.24	3.10	4.50	5.89	7.20	8.06	7.44	5.70	3.72	2.10	1.55	53.1
12	1.24	1.96	3.41	5.10	6.82	7.80	8.06	7.13	5.40	3.72	1.80	0.93	53.4
13	1.24	1.96	3.10	4.80	6.51	7.80	8.99	7.75	5.70	3.72	1.80	0.93	54.3
14	1.55	2.24	3.72	5.10	6.82	7.80	8.68	7.75	5.70	4.03	2.10	1.55	57.0
15	1.24	2.24	3.72	5.70	7.44	8.10	8.68	7.75	5.70	4.03	2.10	1.24	57.9
16	1.55	2.52	4.03	5.70	7.75	8.70	9.30	8.37	6.30	4.34	2.40	1.55	62.5
17	1.86	2.80	4.65	6.00	8.06	9.00	9.92	8.68	6.60	4.34	2.70	1.86	66.5
18	2.48	3.36	5.27	6.90	8.68	9.60	9.61	8.68	6.90	4.96	3.00	2.17	71.6

Variability between stations within single zones is as high as 0.02 inches per day for zone 1 and during winter months in zone 13. The average standard deviation of the ETo between estimation sites within a zone for all months is about 0.01 inches per day for the 200 sites used to develop the map.



STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

CIMIS Information
wwwcimis.water.ca.gov

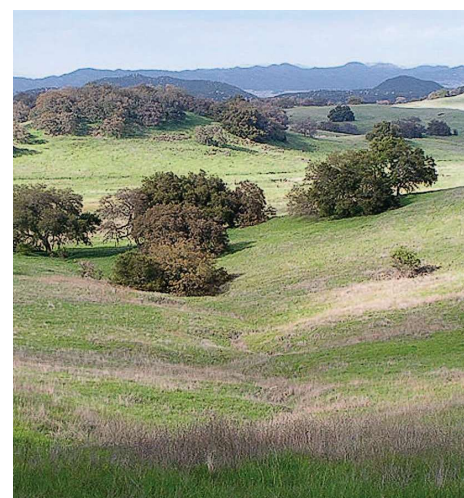
Water inputs to the root zone include effective rainfall (the fraction of total rain that infiltrates the soil after losses to leaf interception, surface runoff and depression storage, and evaporation) and irrigation (vineyard only). Plant consumptive water use (ET_c), that is, water taken up by the grass or trees, removes available soil moisture from the root zone.

In the model (fig. 3), oak trees were allowed to extract groundwater to meet ET_c demand when available soil moisture was zero. No additional water source was available to the grasslands beyond root zone soil moisture, and in the vineyard ET_c demand in excess of available soil moisture was met through irrigation (groundwater pumping). Irrigation events were triggered when water was depleted in the root zone to a specified fraction (maximum allowable depletion, MAD) of its available water capacity.

Effective rain (plus irrigation for grapevines) minus plant consumptive use that was in excess of available water storage capacity in soil in the root zone became deep percolation or groundwater recharge. Grismer et al. (2000) observed that rain-driven groundwater recharge reached depths of nearly 18 feet within 4 to 6 months in drip-irrigated coastal orchards; therefore, we assumed that lag times for groundwater recharge (Grismer 2012) were likely less than 1 year. In other words, the previous year's recharge was available for irrigation pumping in the next year. In comparing oak savannas with vineyards, we focused on annual groundwater use for each system.

To run the model, we used reference evapotranspiration (ET_0) and rainfall depths averaged daily from four meteorological stations across Sonoma County (Bennett Valley, East Petaluma,

Santa Rosa and Windsor) to develop a continuous, approximately 13-year record as input data. We used seasonally dependent K_c values for plant consumptive use from Allen et al. (1998) for grasses and Caprile (2007) for North Coast wine



M. Wisniewski

In this study, groundwater use by oak woodlands was equivalent to that of vineyards when tree canopy cover was about 50%. Groundwater demand by trees was greatest in the late summer and early fall, and averaged 270 milliliters annually.

grape vineyards (table 1). The original K_c values for oak trees were derived from those for olives (Allen et al. 1998) and modified based on studies by Baldocchi et al. (2004), which indicated that oak tree ET_c was 40% to 50% of annual ET_0 in the Sierra foothills.

In this model, plant consumptive use (as annual fractions of ET_0) was consistent with published studies: 23% for the vineyards and 52% for oak trees (the results were slightly higher in our study's cooler and wetter environment than in that of Baldocchi et al. [2004]). Estimated values for maximum available water capacity (AWC_m), effective rain fraction, irrigation

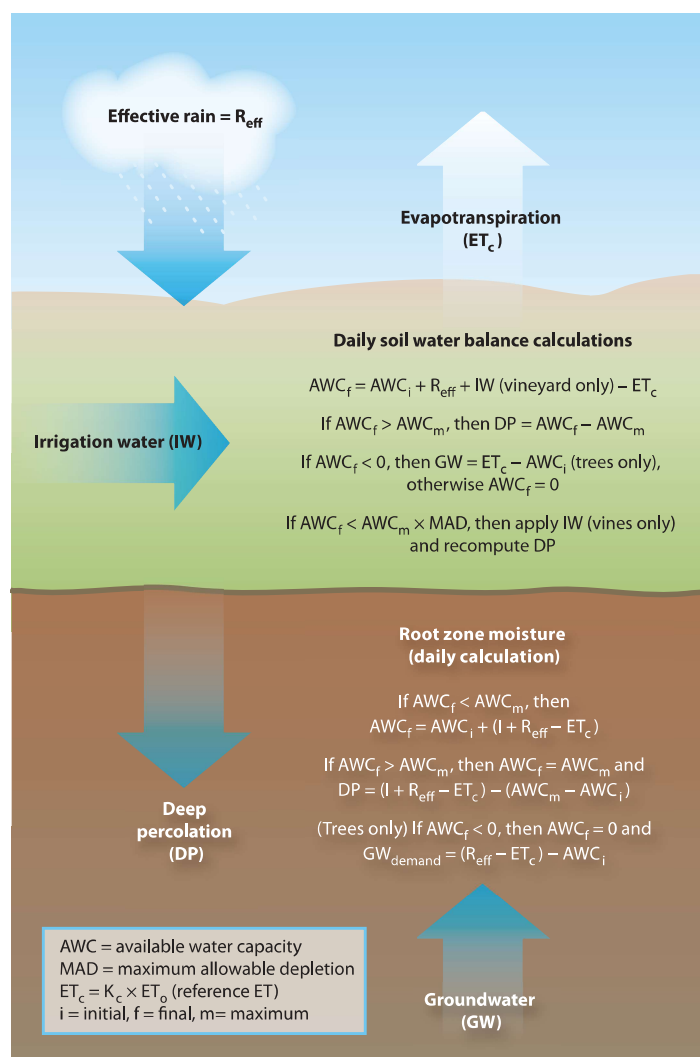


Fig. 3. Water balance model for soil in the root zone.

TABLE 1. Crop coefficients used in daily modeling of soil water processes in vineyards, oak trees and grasslands

Vineyards		Oak trees		Grasslands	
Period	K_c	Period	K_c	Period	K_c
3/1–4/15	0.10	3/1–3/31	0.5	3/1–3/15	0.90
4/16–4/30	0.20	4/1–10/1	0.6	3/16–4/30	0.95
5/1–5/15	0.25	10/2–11/25	0.5	5/1–5/15	0.25
5/16–5/31	0.30	11/26–2/28	0.4	5/16–6/15*	0.10
6/1–6/15	0.35			6/16*–10/13	0.00
6/16–6/30	0.40			10/14–10/31	0.25
7/1–9/30	0.50			11/1–2/28	0.75
10/1–10/15	0.30				
10/16–10/31	0.20				
11/1–11/15	0.15				
11/16–11/30	0.05				
12/1–2/28	0.01				

Sources: Allen et al. 1998 (grasses and trees); Caprile 2007 (vineyards).

* Variable date depending on available soil moisture.



Ground Water Recharge Rate

Acierno Track I - Blocks G, H, and I
7070 Silverado Trail, Napa, CA 94558
Parcel: 032-070-024

Site Description	Hydrologic Soil Group	CN	S	Area (ft ²)	Area (ac)	Annual Precipitation (in/yr)	Annual Precipitation (ft ³ /yr)
Impervious Area	D	98	0.20	44,082	1.01	27.18	99,846
Vineyard Area	B	61	6.39	19,602	0.45	27.18	44,399
Vineyard Area	D	81	2.35	125,453	2.88	27.18	284,151
Grass and Shrubs	B	69	4.49	34,412	0.79	27.18	77,944
Grass and Shrubs	D	84	1.90	1,103,375	25.33	27.18	2,499,145
Coastal Oak Trees	B	65	5.38	47,045	1.08	27.18	106,556
Coastal Oak Trees	D	82	2.20	382,892	8.79	27.18	867,251
				Total	40.33	27.18	3,979,292

Precipitation (P) ¹													
Description	January (in)	February (in)	March (in)	April (in)	May (in)	June (in)	July (in)	August (in)	September (in)	October (in)	November (in)	December (in)	Annual
Rainfall Depth (in)	4.79	5.19	5.26	1.73	0.81	0.33	0	0	0.18	0.93	3.06	4.90	27.18
Rainfall Volume (ft ³)	701,281	759,843	770,091	253,281	118,588	48,314	0	0	26,353	136,157	448,000	717,385	3,979,292

¹Monthly precipitation taken from PRISM monthly 10-year monthly averages from January 2011 to January 2021

Crop coefficient (Kc)												
Description	January	February	March	April	May	June	July	August	September	October	November	December
Impervious Area	0	0	0	0	0	0	0	0	0	0	0	0
Vineyard Area	0.01	0.01	0.1	0.15	0.28	0.38	0.5	0.5	0.5	0.25	0.1	0.01
Grass and Shrubs	0.75	0.75	0.93	0.95	0.18	0.05	0	0	0	0.13	0.75	0.75
Coastal Oak Trees	0.4	0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.45	0.4

Evapotranspiration by Zone (ET _o) ²												
Site	January (in)	February (in)	March (in)	April (in)	May (in)	June (in)	July (in)	August (in)	September (in)	October (in)	November (in)	December (in)
Impervious Area	0	0	0	0	0	0	0	0	0	0	0	0
Vineyard Area	1.24	1.68	3.41	0	0	0	0	0	0	0	1.8	0.93
Grass and Shrubs	1.24	1.68	3.41	4.8	6.2	6.9	7.44	6.51	5.1	3.41	1.8	0.93
Coastal Oak Trees	1.24	1.68	3.41	4.8	6.2	6.9	7.44	6.51	5.1	3.41	1.8	0.93

²Only vineyard evapotranspiration from the winter was considered, as it is assumed evapotranspiration in summer will be from irrigation water.

Evapotranspiration Total (ET _{o, Total}) ²												
	January	February	March	April	May	June	July	August	September	October	November	December
Total (ft ³)	106,099	143,747	364,281	535,544	236,155	181,040	159,937	139,945	109,634	101,502	159,198	79,574

²Only vineyard evapotranspiration from the winter was considered, as it is assumed evapotranspiration in summer will be from irrigation water.

Runoff (RO) ³												
	January (in)	February (in)	March (in)	April (in)	May (in)	June (in)	July (in)	August (in)	September (in)	October (in)	November (in)	December (in)
Impervious Area	4.55	4.95	5.02	1.51	0.61	0.17	0.01	0.01	0.06	0.72	2.83	4.66
Vineyard Area (HSG B)	1.24	1.48	1.53	0.03	0.04	0.17	0.32	0.32	0.23	0.02	0.39	1.31
Vineyard Area (HSG D)	2.80	3.15	3.22	0.44	0.04	0.01	0.12	0.12	0.04	0.08	1.36	2.90
Grass and Shrubs (HSG B)	1.81	2.10	2.15	0.13	0.00	0.08	0.22	0.22	0.14	0.00	0.70	1.89
Grass and Shrubs (HSG D)	3.08	3.44	3.51	0.56	0.08	0.00	0.10	0.10	0.02	0.12	1.57	3.18
Coastal Oak Trees (HSG B)	1.52	1.78	1.83	0.07	0.01	0.12	0.27	0.27	0.18	0.00	0.53	1.59
Coastal Oak Trees (HSG D)	2.89	3.25	3.31	0.48	0.05	0.01	0.11	0.11	0.03	0.09	1.43	2.99
Total Runoff (ft ³)	434,535	487,003	496,255	77,525	11,769	2,003	15,744	15,744	5,385	17,657	218,828	448,893

³Runoff calculated using the SCS Curve Number Runoff Method

Recharge (R) ⁴ = Precipitation - Evapotranspiration - Runoff													
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Recharge (ft ³)	160,647	129,092	0	0	0	0	0	0	0	16,998	69,974	188,918	565,628

⁴When evapotranspiration exceeds rainfall, recharge is equal to zero

Groundwater Recharge Rate		
Annual Groundwater Recharge Rate (ft ³ /yr)	Annual Groundwater Recharge Rate (ac-ft/ac/yr)	Annual Groundwater Recharge Rate (af/yr)
565,628	0.32	12.91

PRISM Time Series Data

Location: Lat: 38.4332 Lon: -122.3415 Elev: 341ft

Climate variable: ppt

Spatial resolution: 4km

Period: 2011-01 - 2021-01

Dataset: AN81m

PRISM day definition: 24 hours ending at 1200 UTC on the day shown

Grid Cell Interpolation: Off

Time series generated: 2022-Nov-21

Details: http://www.prism.oregonstate.edu/documents/PRISM_datasets.pdf

Date	ppt (inches)
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2011-01	1.68
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2011-02	5.87
---------	------

2011-03	11.15
---------	-------

2011-04	0.45
---------	------

2011-05	2.14
---------	------

2011-06	2.1
---------	-----

2011-07	0
---------	---

2011-08	0
---------	---

2011-09	0.02
---------	------

2011-10	1.6
---------	-----

2011-11	2.11
---------	------

2011-12	0.19
---------	------

2012-01	5.3
---------	-----

2012-02	1.73
---------	------

2012-03	8.45
---------	------

2012-04	2.83
---------	------

2012-05	0.12
---------	------

2012-06	0.03
---------	------

2012-07	0
---------	---

2012-08	0
---------	---

2012-09	0
---------	---

2012-10	1.32
---------	------

2012-11	8.01
---------	------

2012-12	10.43
---------	-------

2013-01	0.82
---------	------

2013-02	0.33
---------	------

2013-03	0.98
---------	------

2013-04	1.07
---------	------

2013-05	0.2
---------	-----

2013-06	0.66
---------	------

2013-07	0
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2013-08	0
---------	---

2013-09	0.74
---------	------

2013-10	0.02
---------	------

2013-11	1.1
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2013-12	0.62
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2014-01	0.13
2014-02	10.08
2014-03	2.88
2014-04	2.41
2014-05	0.05
2014-06	0
2014-07	0
2014-08	0.01
2014-09	0.6
2014-10	0.62
2014-11	3.03
2014-12	14.19
2015-01	0
2015-02	3.45
2015-03	0.09
2015-04	1.45
2015-05	0.02
2015-06	0.08
2015-07	0.03
2015-08	0
2015-09	0.42
2015-10	0
2015-11	1.52
2015-12	5.06
2016-01	9.14
2016-02	1.11
2016-03	10.61
2016-04	1.2
2016-05	0.25
2016-06	0
2016-07	0
2016-08	0
2016-09	0
2016-10	4.84
2016-11	2.8
2016-12	6.5
2017-01	16.09
2017-02	13.4
2017-03	4.17
2017-04	3
2017-05	0
2017-06	0.44
2017-07	0
2017-08	0
2017-09	0
2017-10	0.24
2017-11	4.36

2017-12	0.05
2018-01	4.94
2018-02	0.17
2018-03	6.85
2018-04	3.2
2018-05	0.07
2018-06	0
2018-07	0
2018-08	0
2018-09	0
2018-10	0.63
2018-11	5.49
2018-12	2.94
2019-01	8.97
2019-02	15.73
2019-03	6
2019-04	0.57
2019-05	3.78
2019-06	0
2019-07	0
2019-08	0
2019-09	0.05
2019-10	0
2019-11	0.87
2019-12	7.14
2020-01	2.28
2020-02	0
2020-03	1.38
2020-04	1.07
2020-05	1.5
2020-06	0
2020-07	0
2020-08	0.03
2020-09	0
2020-10	0
2020-11	1.35
2020-12	1.88
2021-01	3.31



Month	Average of ppt (inches)
Jan	4.79
Feb	5.19
Mar	5.26
Apr	1.73
May	0.81
Jun	0.33
Jul	0.00
Aug	0.00
Sep	0.18
Oct	0.93
Nov	3.06
Dec	4.90
Sum	27.18

Year	Annual Sum of ppt (inches)
2011	27.31
2012	38.22
2013	6.54
2014	34.00
2015	12.12
2016	36.45
2017	41.75
2018	24.29
2019	43.11
2020	9.49
2021	3.31
Average	25.14