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Water Availability Analysis and Addendum

Nights in White Satin Winery Use Permit P22-00236-UP
Planning Commission Hearing - August 20, 2025

Water Availability Analysis

Nights in White Satin, LLC
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Introduction

Nights in White Satin, LLC, is seeking permits from County of Napa to establish a 120,000 gallon per year winery in the Carneros region, County of Napa, APN 047-380-009. Water for this project will be supplied from a new well to be drilled on the proposed winery parcel; the alternative supply is from an existing well on an adjacent parcel owned by the applicant (APN 047-380-010). These properties lie in western Napa County near Huichica Creek and are within the County of Napa's hillside groundwater area (Figure 1).

Because groundwater for the proposed winery could potentially be obtained from an existing well on the adjacent parcel, this Water Availability Analysis (WAA) has been developed for both parcels owned by the applicant (APN's 047-380-009 & -010). A permit application (Appendix C) to drill a new well to serve the proposed winery is pending, and this WAA evaluates the proposed well along with an existing irrigation well on the adjacent parcel to the west. The WAA was originally completed in June 2020 and was revised in December 2021 and submitted for review in July 2022.

This revised WAA incorporates additional information requested by County of Napa in response to comments on the July 2022 submittal along with other necessary revisions to comply with new guidelines for WAA submittals requested by PBES including:

- revision of estimated groundwater recharge based on mean annual precipitation for the period 2012-2021 to better represent drier climate conditions per new procedures adopted by PBES in late-November 2022, and
- additional analysis of potential streamflow depletion by proposed wells within 1,500 ft of specified streams identified throughout the County by PBES, including Huichica Creek, which flows on and near the northeast perimeter of the proposed winery parcel; the proposed winery well lies within 1,500 ft of Huichica Creek.

The WAA has been prepared based on the guidance provided in the Napa County Department of Planning, Building, & Environmental Services' Water Availability Analysis Guidance Document formally adopted by the Napa County Board of Supervisors in May 2015 and other applicable PBES policy as of December 2022.

This WAA includes the following elements:

- compilation of Well Completion Reports (WCRs) for the vicinity of the project site,
- characterization of local hydrogeologic conditions based on available geologic maps and interpretation of WCR's that could be adequately geolocated,
- delineation of a "project recharge area/impact area" surrounding the project parcels for purposes of quantifying and comparing groundwater recharge rates to groundwater use rates (Tier 1 WAA),

    - analyses to estimate groundwater recharge rates as a function of annual precipitation rates, soils, vegetation, climate, and terrain using the USGS Soil Water Balance model,
    - estimates of existing and proposed water uses within the project recharge/impact area based on available water use data and estimates using water duty estimates provided in the WAA Guidance
- analysis of the potential for well interference at neighboring wells located within 500-ft of the proposed project well and the alternate existing well (Tier 2 WAA), and
- analysis of potential effect of the project well(s) on streamflow in Huichica Creek (Tier 3 WAA).

Limitations

Groundwater systems of Napa County and the Coast Range are typically complex, and available data rarely allows for more than general assessment of groundwater conditions and delineation of aquifers. Hydrogeologic interpretations are based on the drillers' reports made available to us through the California Department of Water Resources, available geologic maps and hydrogeologic studies, and professional judgment. This analysis is based on limited available data and relies significantly on interpretation of data from disparate sources of disparate quality. Existing and proposed future water use on and near the project site is estimated based on information received from the applicant and on regionally appropriate water duties for the observed and expected uses. The recharge estimates presented below are based on established soil water balance modeling techniques for calculating infiltration recharge and they do not explicitly account for the role of surface water/groundwater interaction as a source of recharge or aquifer conditions that may limit infiltration recharge estimated from soil water balance modeling.

Groundwater recharge processes, aquifer hydraulics, potential interaction between surface water and groundwater, and potential well interference are difficult to quantify in the absence of site-specific studies and/or state-of-the-art hydrologic modeling. Quantification and analysis of hydrogeologic parameters and processes presented in this document utilize available information for the project area and local aquifer. The analytical techniques applied are consistent with prior WAA's we have prepared and submitted to County of Napa. The resulting interpretations of hydrogeologic conditions and potential future conditions under proposed project conditions are consistent with the customary professional standard of care used for WAA's in the County of Napa; nevertheless, there may be substantial uncertainty in quantitative estimates of hydrogeologic parameters, processes, and conditions.

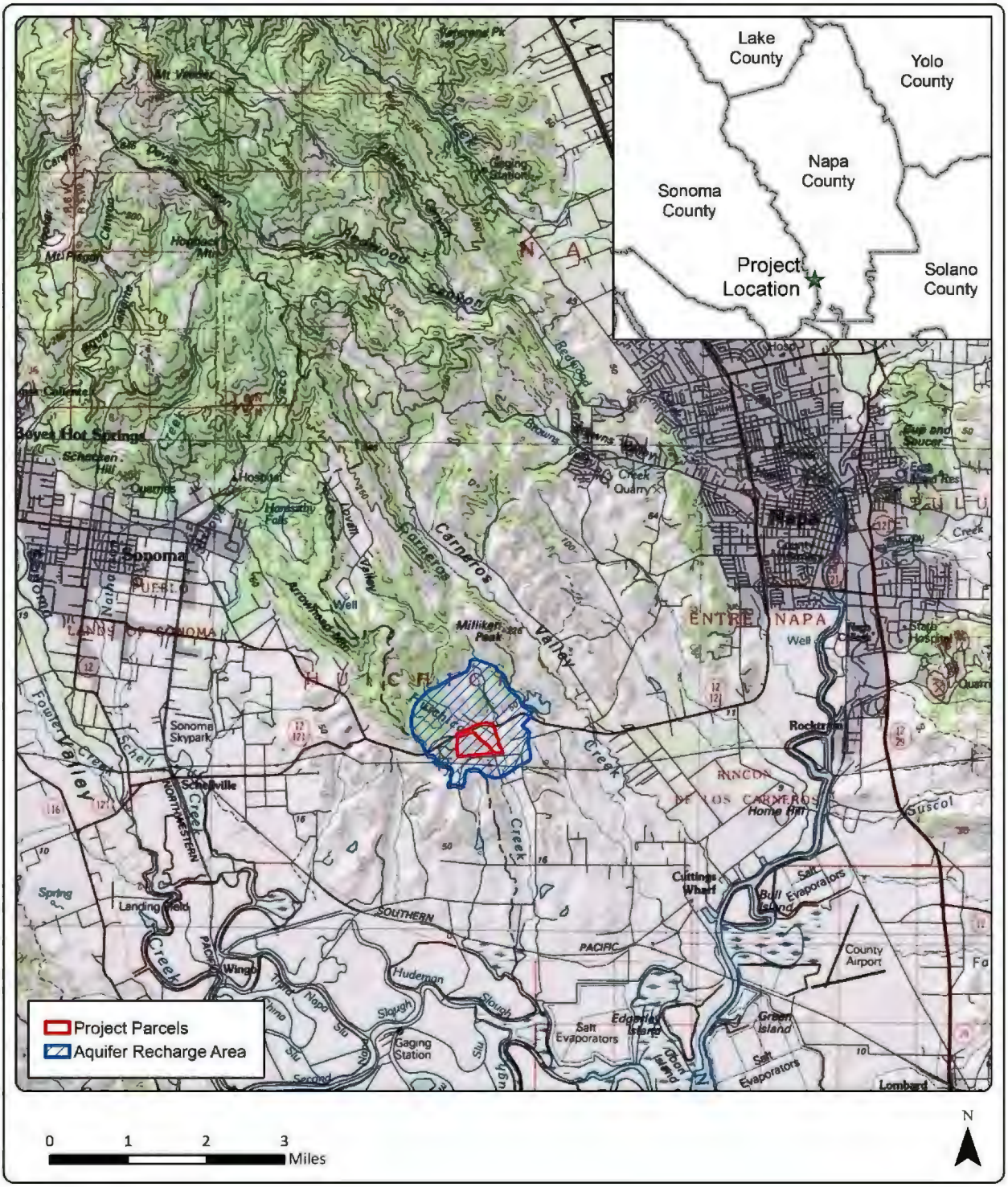


Figure 1: Project location map.

Hydrogeologic Conditions

The two project parcels are in the Carneros region of Napa County along the upper alluvial portion of Huichica Creek (Figure 1). Much of the surrounding area is underlain by the eponymous Pliocene to early Pleistocene-aged Huichica Formation (map unit Ph) which comprised much of the surrounding hills (Figure 2). This fluvial sedimentary unit consists of "massive yellow silt and blue clay with interbedded lenses of sand, gravel, and tuff beds" (Farrar et al., 2006). Much of this material is derived from erosion of the Sonoma Volcanics but coarser materials are mostly derived from the Franciscan Complex (Wagner and Gutierrez, 2010). Hydrogeologically, the Huichica Formation is similar to the relatively low-yielding Glen Ellen Formation with most wells producing less than 20 gallons per minute (gpm) and which has a specific yield of 3 – 7% (Herbst et al., 1982). Other sources indicate that wells in the Huichica Formation typically yield less than 5 gpm (NFCWC, 1991).

The steeper hills north and west of the project parcels are underlain by the late Miocene to Pliocene-aged Sonoma Volcanics. Near the project parcel these hills are principally underlain by light-colored volcanic tuff (map unit Tvst) but bedrock units such as the Dacitic Lava Flows of Huichica Creek (map unit Msvfh) are present a short distance to the north (Figure 2). These volcanic units are known to underly the younger Huichica Formation and in places younger units of the Sonoma Volcanics may be interfingered with the Huichica Formation (Farrar et al., 2006). The Sonoma Volcanics are considered a low-yielding aquifer with reported well yields typically ranging between 16 and 50 gallons per minute (gpm). However, yields greater than 100 gpm have been reported (LSCE and MBK, 2013). Some units, such as unwelded tuff and volcanic sediments are somewhat more productive but overall are still considered low yielding. Bedrock units such as the andesite and rhyolite lava flows have very low primary porosity and groundwater occurs primarily in fractures, resulting in highly variable well production. Where these fracture networks are extensive, aquifers can have relatively high transmissivities (Nishikawa, 2013).

Alluvial bodies are also present along Huichica Creek. However, previous studies have found the alluvium in the Carneros region to generally be thin and unsaturated (County of Napa, 2005).

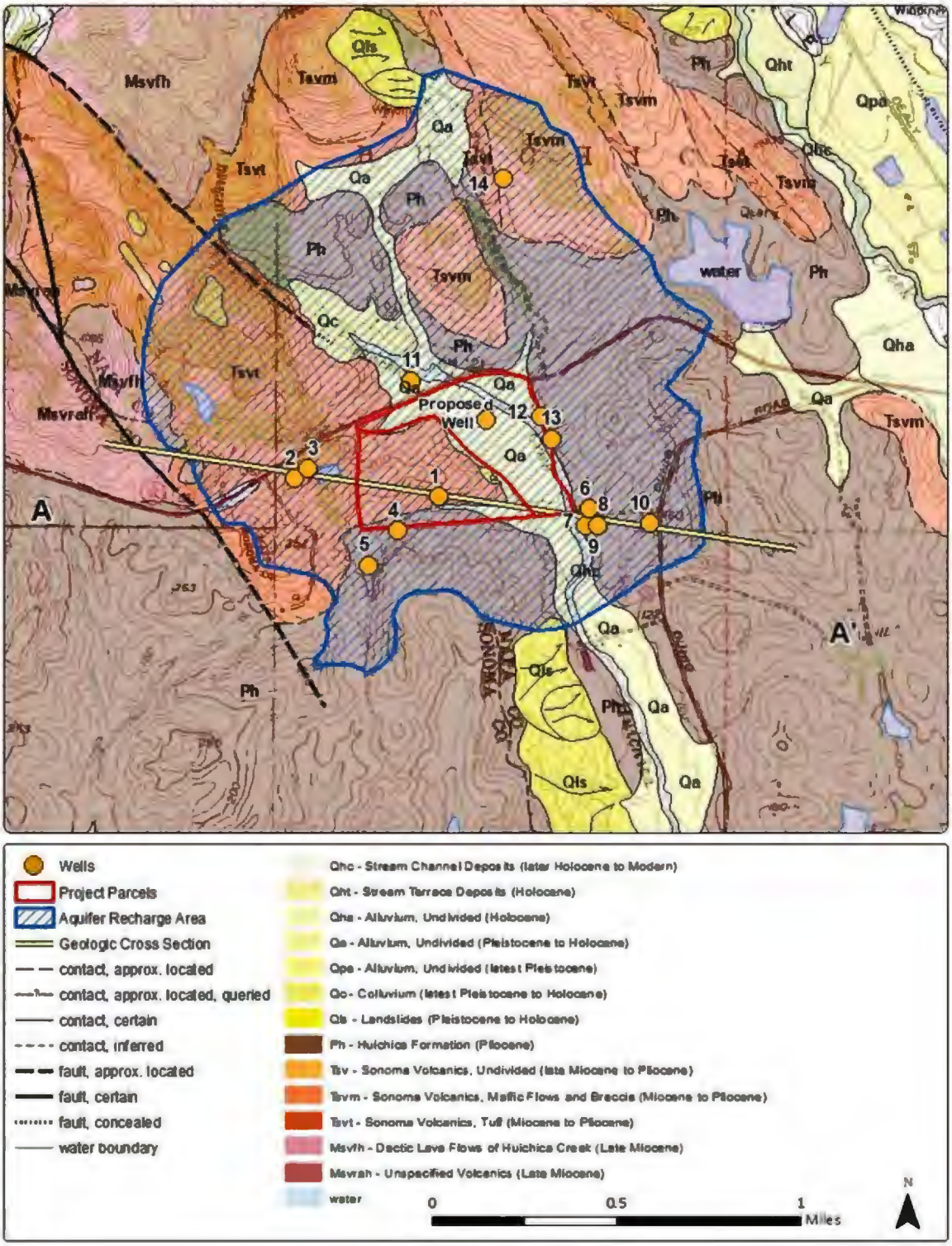


Figure 2: Surficial geology and locations of wells in the vicinity of the project parcel. Surficial geology based on data from the California Geologic Survey (CGS) Geologic Map of the Napa 30' x 60' Quadrangle (Wagner and Gutierrez, 2010).

Well Data

Well Completion Reports (WCR) for wells on and near the project parcel were obtained from the California Department of Water Resources' Well Completion Report Map Application. The subset of these which could be accurately georeferenced based on parcel and location sketch information is discussed below; the WCRs are compiled in Appendix A. Additional information about the "Sonapa Well" for which a Well Completion Report could not be obtained was provided by the project applicant.

The project well (Well 1) was completed in 2019 to a depth of 720 feet. At the time of completion, it had an estimated yield of 110 gpm and a static water level of 38 feet. The Driller's Log indicates that the upper 260 feet of the borehole penetrated a mixture of brown clay and coarse sand, below which a mixture of gravels, clays, hard rocks, and shale was reported. This mixture is consistent with the available characterization of the Huichica Formation. Reported shale lenses and hard rock encountered at depths between 340 and 560 ft below ground surface (bgs) may correspond to interfingered volcanic tuff or other variation in the volcanic flows and deposits. Within this area the Huichica Formation is believed to be hundreds of feet thick and underlain by significant thicknesses of the Sonoma Volcanics (County of Napa, 2005). The well is screened at several intervals between 240 and 660 feet (Table 1) and likely draws groundwater primarily from the Sonoma Volcanics and deeper strata of mixed sand and gravel.

Well completion reports could be accurately georeferenced for 13 other nearby wells (Figure 2); well characteristics obtained from WCRs are summarized in Table 1. Four of these, Wells 2, 3, 5, & 14, were completed in volcanic rocks of the Sonoma Volcanics west and north of the project parcels. Driller's logs in the WCRs for this group of wells typically report mixtures of ash and hard multicolored rocks characteristic of the Sonoma Volcanics throughout their depth and absent are strata of clay, sand and gravel characteristic of the Huichica Formation. Yields reported in WCR's for these wells range from 50 to 300 gpm. Depths range from 218 to 550 ft and screened intervals begin at depths of about 150 to 450 ft.

The other nine wells were drilled in or through the Huichica Formation and can be divided into two categories. The first category comprises Wells 1, 4, 6, 9 & 10 that penetrate clay-rich alluvial materials that include sandy and gravelly strata where groundwater flows more readily to wells. The second category comprises wells 7, 8, 11, 12 & 13; these wells also penetrate clay-rich strata but also intersect materials described by the drillers logs as volcanic in origin, mostly at depths of about 300 ft bgs, in which groundwater is accessed. Both categories of wells are drilled through thick strata of clay found in the upper ~200 ft of the well bores, and both categories of wells pump water from confined aquifers as indicated by water elevation in wells typically 100 to 200 ft above the portions of the wells' screened intervals that intersect water bearing strata (Table 1).

It is possible that there is a false distinction between these two categories of wells owing to differences in style and interpretation of earth materials by drillers and that the underlying volcanic rocks are more generally found in this area underlying much younger sedimentary

materials. In any case, the water bearing strata lie beneath massive clay strata of varying thickness and characteristics that isolate the aquifer from the surface and create confined or semi-confined aquifer conditions. Wells in this area typically exhibit water elevations substantially higher that the depth of perforated (screened) portions of the well casing including some where groundwater rise to ground surface (i.e. artesian conditions), indicating a pressure head on the aquifer characteristic of confined aquifers. Confined aquifers are isolated from overlying surface water (stream flow). In contrast, unconfined aquifers have a water table in equilibrium with atmospheric pressure; unconfined aquifers are thus more likely to interact with surface water. Additional discussion of hydrogeologic characteristics pertaining to potential interaction with surface water and potential streamflow depletion by wells drilled in this area is found in a subsequent section of the WAA addressing Tier 3 criteria.

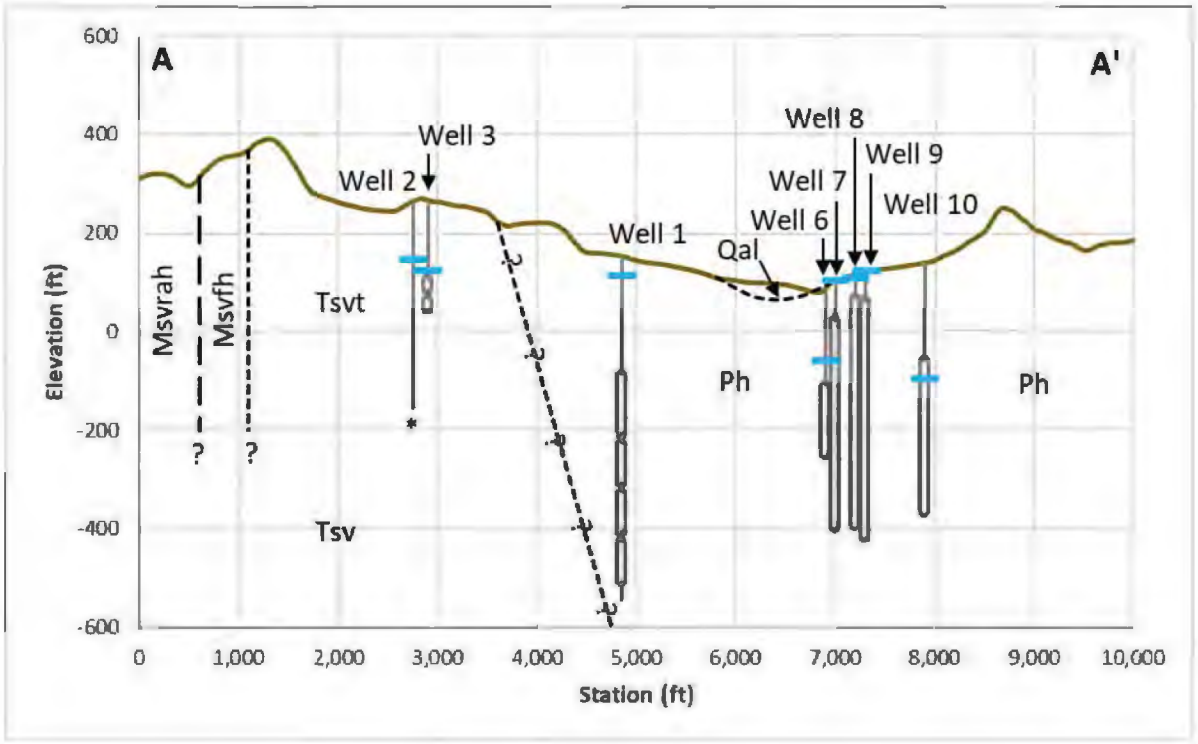
Table 1: Well completion details for wells in the vicinity of the project parcel.

Well ID	1	2	3	4	5	6	7
Year Completed	2019	Unk.	1997	1989	1980	2007	1978
Depth (ft)	720	420	218	610	550	360	500
Depth to First Water (ft)	-	-	-	-	475	170	297
Static Water Level (ft)	38	119	140	+65	10	150	0
Estimated Yield (gpm)	110	150	50	250	300	45	10
Screened Interval, Top (ft)	240	Unk.	158	295	450	200	80
Screened Interval, Bottom (ft)	660	Unk.	218	590	550	340	500
Geologic Map Unit	Ph	Tsv	Tsv	Ph	Tsv	Ph	Ph

Well ID	8	9	10	11	12	13	14
Year Completed	1986	1979	1972	1990	2019	2022	2016
Depth (ft)	510	540	505	700	400	540	250
Depth to First Water (ft)	-	-	365	-	-	-	-
Static Water Level (ft)	8	0	236	41	1	0	150
Estimated Yield (gpm)	4.5	30	2	225	30	100	60
Screened Interval, Top (ft)	50	60	200	290	80	200	140
Screened Interval, Bottom (ft)	510	540	505	650	400	500	250
Geologic Map Unit	Ph	Ph	Ph	Ph	Ph	Ph	Tsvm

Geologic Cross Section

A geologic cross-section oriented west to east is shown in Figure 3 (see Figure 2 for location). This cross-section extends across the ridgelines on either side of Huichica Creek with elevations ranging from 400 feet along the Sonoma-Napa County Line to approximately 100 feet along Huichica Creek. Driller's logs suggest that the Well 1 may intersect groundwater in volcanic rocks underlying the Huichica Formation. Static water elevations appear to be relatively consistent across the cross-section. This suggests that there is a regional water table with a potentiometric head approximately 110 to 120 feet above sea level. However, static water levels within Wells 6 & 10, which are open to the aquifer at depth >150 ft have a greater depth to water below ground surface relative to Wells 7, 8 & 9 that are open to the aquifer beginning at depths of 50 to 80 ft below ground surface. This suggests that there may be local variation in deeper aquifers.



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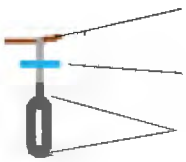
Well



Ground surface

Groundwater Elevation

Screened Section of Well

Fault (Approx.) – – – – – ?

Contact (Approx.) –––––––– ?

Figure 3: Hydrogeologic cross section A -A' through the project parcel (see Figure 2 for location and geologic map units).

Project Recharge Area

These consistent static water levels suggest that the project well is completed within a relatively large regional aquifer. The recharge area for this aquifer has been conceptualized as nearby portions of the Huichica Creek watershed, extending north towards the foothills of the Mayacamas Mountains. To the east and west it is defined by ridgelines which may act as subtle groundwater divides. To the south it is defined by a constriction in these ridgelines which helps define the valley where the project parcels are located. To the north it is defined as the transition to steeper topography upstream where hydrogeologic conditions in the Sonoma Volcanics are likely significantly different than near the project parcels.

As conceptualized, the project recharge area covers approximately 1,043 acres, mostly within the Huichica Formation. Given the significant depth to water-bearing strata, the potentiometric water surface in wells significantly higher than the depth of perforated portions of well casing, and the high clay content of the overlying sediments of the Huichica Formation, the project aquifer is likely confined or semi-confined.

Water Demand

Within the project recharge area, water demand was estimated for both the existing and proposed conditions. Uses on the project parcel were determined using site details provided by the project applicant and verified using satellite imagery. Uses on other neighboring parcels within the project recharge area were determined using satellite imagery.

Existing Use

The two project parcels have a combined 88.1 acres of vineyard and use water for irrigation as well as for frost protection. The proposed winery parcel (APN 047-380-009) has about 41.1 acres of existing vineyard and is referred to as the Sonapa Block. The adjacent parcel, APN 047-380-010, has about 47 acres of irrigated vineyards (per applicant's Water Rights Report of Licensee in 2020 and 2021) and is referred to as the North Hills Block.

Most of the water used in the Sonapa Block (site of proposed winery and new well) is drawn from an offsite well owned by the project applicant referred to as the Sonapa Well (Well 2). Water from this well is pumped into the Sonapa Reservoir, which is an off-channel reservoir located immediately west of the project parcels (Figure 4). A pump station then transfers water from this reservoir to the Sonapa Block. Access to the Sonapa Well, the Sonapa Reservoir, and the accompanying pipelines is guaranteed through easements on file with the County of Napa (Easement Grant Deeds 952 O.R. 97 and 953 O.R. 479). Because the Sonapa Reservoir only captures direct precipitation and does not impound runoff from surrounding areas it does not require a Water Right from the State Water Resources Control Board.

Some of the water used on the North Hills Block comes from the Heller Reservoir, an on-channel reservoir built to capture runoff from an unnamed tributary to Huichica Creek near the southern edge of APN 047-380-010, a parcel under applicant's ownership (Figure 4). A water right has

been perfected for this reservoir (A027796, Appendix B) allowing up to 40 acre-ft/yr to be stored and annual withdrawals of up to 35.5 acre-ft/yr. Surface water diverted to the Heller Reservoir may only be used on APN 047-380-010 per terms of the Water Right. The North Hills Block also uses groundwater from Well 1 which is stored in the Heller Reservoir; water stored in the reservoir from groundwater and surface water diversions must be tracked separately in order that it can be demonstrated that use of stored surface water conforms to terms of the Water Right.

The two project parcels were formerly part of a larger vineyard operation that extended to the north of Highway 12. A Water Resources Report prepared by Wagner and Bonsignore in 2008 indicates that both the Sonapa Well and Heller Reservoir formerly provide water to a series reservoirs south of Highway 12 and that Heller Reservoir also received water from a large agricultural well located immediately south of Highway 12 ("Main Well", Well 4). The applicant has indicated that water is no longer transferred between the project parcels and the vineyards south of Highway 12. Additionally, the Water Resources Report also indicates that an old well was completed in the vicinity of Heller Reservoir. The applicant does not believe this well to be on their property and, if it is, has no plans of using it.

Based on standard vineyard irrigation and frost protection use rates provided in the County of Napa's Water Availability Guidance Document (May 2015), the 88.1 acres of vineyards on the two project parcels are estimated to use 44.05 acre-ft/yr (Table 2) of which 20.5 acre-ft/yr are used on the Sonapa parcel where the proposed winery would be built. A portion of this water is supplied by surface water diversions; the quantity of surface water diversions must be estimated in order that an estimate of groundwater pumping can be developed.

Table 2: Estimated groundwater demand on the project parcel in the existing condition assuming average precipitation for the period 2012-2021.

Water Demand Component	# of Units	Use per Unit	Annual Water Use (AF/yr)
Irrigation & Frost Protection			**44.05**
Vineyard Irrigation	88.1 Acres	0.5 AF/acre/yr	44.05
Frost Protection	0.0 Acres	0.25 AF/acre/yr	0.00
Surface Water & Precipitation Capture & Diversion			**(36.22)**
Heller Reservoir-Avg. Diversion 2012-2021			(25.50)
Heller Reservoir-Avg. Precip. Capture 2012-2021			(7.77)
Sonapa Reservoir-Avg. Precip. Capture 2012-2021			(2.95)
Evaporative Losses from Reservoirs Replaced with Groundwater			**13.80**
Total Groundwater Use			**21.63**

Water Rights data from Report of Licensee filed annually with the Division of Water Rights indicate that surface water diversions from the Heller Reservoir ranged from 14.6 to 35.5 acre-

ft/yr, not including 2017 when reported diversions to storage were much greater than in other years. Over the 10-year period 2012-2021, diversions averaged 25.5 acre-ft/yr (Table 3). The Sonapa Reservoir captures direct precipitation within its approximately 1.5-acre footprint. Using an estimated average annual precipitation of 23.6 in/yr from the 2012-2021 average PRISM precipitation provided by County of Napa, this reservoir will capture approximately 2.98 acre-ft/yr during an average water year. Direct precipitation on the 4-acre surface area of Heller Reservoir adds an average of 7.77 acre-ft/yr to storage. Combined, these two reservoirs are estimated to collect 36.22 acre-ft/yr of water. Water stored in these reservoirs is subject to evaporative losses. Based on the prior Wagner and Bonsignore Report annual evaporative losses for the Heller Reservoir are estimated to average 10.0 acre-ft/yr and losses from the Sonapa Reservoir are estimated to average 3.80 acre-ft/yr; we assume that the evaporation losses are replaced by pumping groundwater. It is likely that net loss to evaporation can be reduced somewhat by over the irrigation season depending on operation of these facilities; however, we assume that the full evaporative loss is replaced by pumping groundwater. The resulting estimate of groundwater demand for agricultural use on the project property is 21.63 acre-ft/yr (Table 2).

The estimated quantity of groundwater required to supplement surface water diversions is calculated for both parcels in aggregate. This estimation method is not intended to contradict or compromise the Water Right permit conditions restricting the place of use of surface water diverted to Heller Reservoir.

Table 3: Annual surface diversion volumes from the Heller Reservoir from Reports of Licensee accessed through the State Water Resources Control Board's eWRIMS Website.Note: Total diversions in 2017 were 55.8 ac-ft; for purposes of average diversion to usable storage, the value used for 2017 is 35.5 ac-ft, the maximum allowed use of water stored in Heller Reservoir.

Year of Licensee Annual Report	Diversion Volume (AF/yr)
2009	31.4
2010	27.0
2011	14.6
2012	35.0
2013	35.5
2014	35.5
2015	23.3
2016	25.7
2017	35.5
2018	16.5
2019	16.2
2020	16.7
2021	14.7
Average 2012-2021	**25.5**

Land use on other parcels within the project recharge area is dominated by vineyards. Based on agricultural lands data publicly available through the County of Napa's GIS Data Catalog, other parcels within the project area contain 502 acres of vineyard. The two project parcels do not use water for frost protection, as is also the practice on neighboring vineyards managed by Domaine Carneros and Global Ag Properties (Figure 4) as verified by Allison Cellini Wilson on behalf of the applicant. The area of vineyard operated by these neighbors within the project groundwater recharge area are 77.8 and 84.7 acres, respectively. Inspection of aerial imagery on Google Earth reveals the presence of fan towers for frost protection on these parcels and on some other vineyards in the project groundwater recharge area. We assume the use of fans for frost protection only for the properties where this practice was verified by Allison Cellini Wilson.

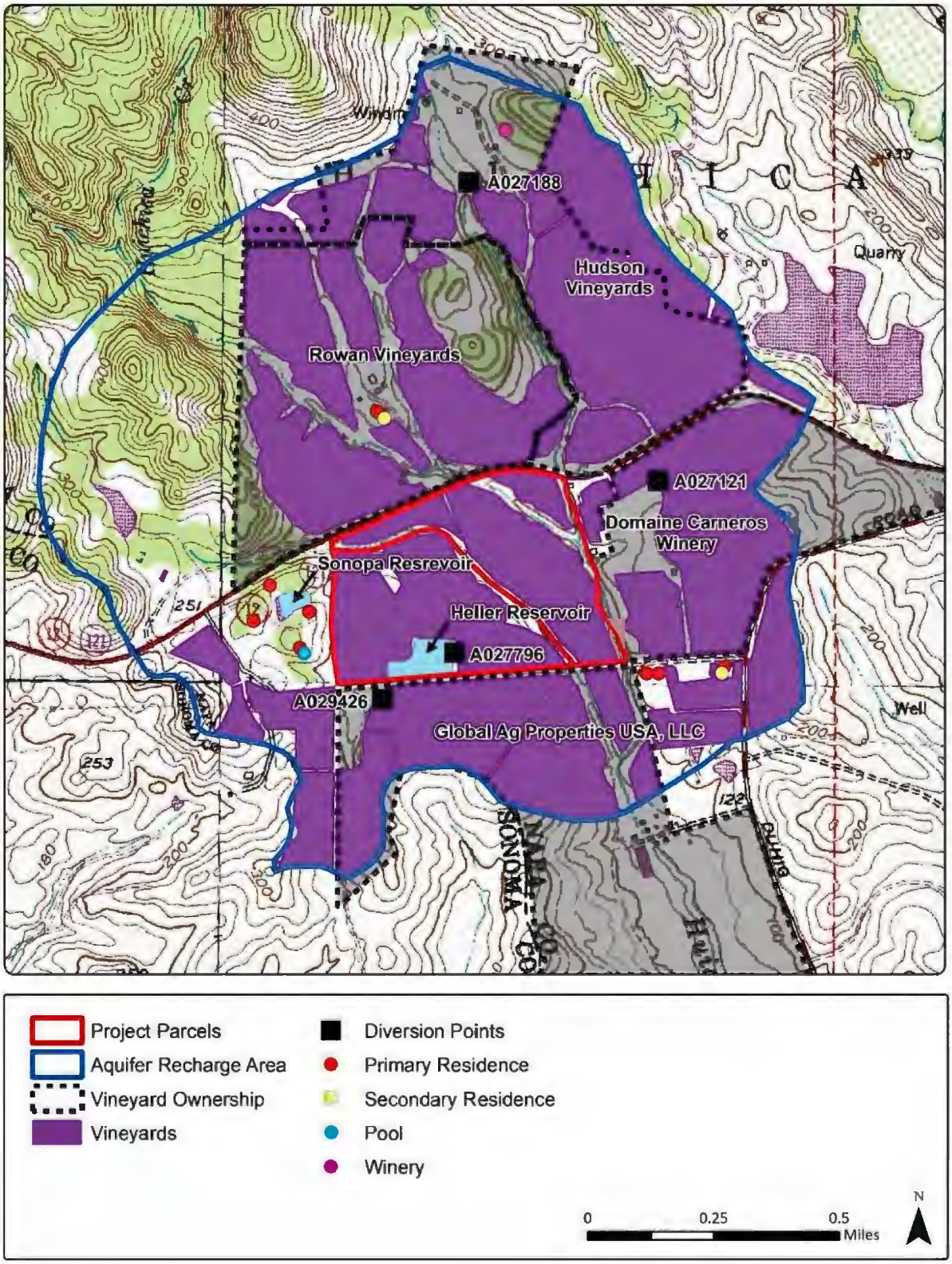


Figure 4: Water uses and major points of diversions within the project recharge area.

Three of the other vineyard properties in project recharge area also have significant surface water rights (A027121, A027188, and A029426). Based on Reports of Licensee from 2012 to 2021, a combined 111.9 acre-ft is diverted from these sources in an average year. Some of the vineyards these reservoirs are used to irrigate are located outside the project recharge area, and the surface water diverted is subject to limitations regarding the place of use. Consequently, it is difficult to estimate how much surface water is used in the project impact/recharge area and how much groundwater might be withdrawn from the project aquifer to supplement surface water diversions. It is assumed that the average volume of water diverted from each source was scaled by the fraction of the vineyards it was used to irrigate that are within the project recharge area. Using this approach, approximately 51.66 acre-ft/yr of surface water is estimated to be used for vineyard irrigation within the project recharge area (Tables 4 & 5).

Table 4: Annual surface diversion to reservoirs within the project recharge area from Reports of Licensee accessed through the State Water Resources Control Board's eWRIMS Website.

	Water Right	A027188	A027121	A029426
Diversion Volume (AF/yr)	2009	34.9	-	-
	2010	39.0	28.0	47.1
	2011	29.9	31.2	22.9
	2012	46.2	23.6	61.0
	2013	46.7	30.5	30.4
	2014	27.6	26.0	62.3
	2015	44.0	32.0	66.0
	2016	39.1	23.6	66.0
	2017	29.0	20.2	54.6
	2018	34.9	31.8	66.0
	2019	38.4	22.6	43.2
	2020	47.5	23.7	41.0
	2021	13.9	26.7	0.0
	Average 2012-2021	**36.7**	**26.1**	**49.1**
	Vineyard Area (ac.)	176	138	303
	Area in Recharge Area (ac.)	111	78	85
	Scaling Factor ()	0.63	0.57	0.28
	Scaled Diversion Volume (AF/yr)	**23.2**	**14.7**	**13.8**

Per the County of Napa's Public Winery Database, one of these vineyard parcels includes a winery (Hudson Vineyards Winery). This winery is permitted to produce up to 80,000 gallons per year, host up to 24,960 tastings, have up to 2,528 guests during marketing events, and have up to 16 full-time employees. Other parcels within the project recharge area also contain seven primary residences, one secondary residence, and one uncovered pool (Figure 4). Water demand for these uses were estimated using standard values from the County of Napa's Water Availability Analysis Guidance Document (County of Napa, 2015).

The foregoing estimates of water use on the project parcels (Table 2) and on other parcels within the project recharge area (Table 5), the total existing groundwater demand within the project recharge area is estimated to be 314.19 acre-ft/yr (Table 6). Most of this use is for vineyard irrigation and frost protection; the use of fans has become common in this area, and we have likely overestimated the use of groundwater for frost protection in project recharge area. Of the total groundwater demand, 21.63 acre-ft/yr is on the project parcels (Table 2).

Table 5: Estimated groundwater demand on other parcels within the project recharge area for existing and proposed condition.

	# of Units	Use per Unit	Annual Water Use (AF/yr)
Residential Use			**5.70**
Residences, Primary	7 Residences	0.75 AF/Residence	5.25
Residences, Secondary	1 Residence	0.35 AF/Residence	0.35
Pools	1 Pool	0.10 AF/Pool	0.10
Agricultural Use			**284.21**
Vineyard Irrigation	502 Acres	0.50 AF/acre/yr	251.00
Frost Protection	339.5 Acres	0.25 AF/acre/yr	84.88
Surface Diversion			(51.66)
Winery Use			**2.12**
Process Water	80000 Gallons	2.15 AF/100,000 gal.	1.72
Domestic & Landscaping	80000 Gallons	0.50 AF/100,000 gal.	0.40
Guest & Employee Use			**0.53**
Tasting Room Visitations	24960 Guests	3 gal./Guest	0.23
Events w/ On-Site Catering	2528 Guests	15 gal./Guest	0.12
Full-Time Employees	16 Employees	15 gal./shift @ 250 shifts/yr	0.18
Total			**292.56**

Table 6: Estimated groundwater demand within the project recharge area in the existing and proposed condition.

Water Demand Component	Existing Condition (acre-ft/yr)	Proposed Condition (acre-ft/yr)
Project Parcel	**21.63**	**22.50**
Irrigation	21.63	22.50
Winery	0.00	0.00
Employees & Guests	0.00	0.00
Neighboring Parcels	**292.56**	**292.56**
Residential	5.70	5.70
Irrigation + Frost Protection	284.2	284.2
Winery	2.12	2.12
Employees & Guests	0.53	0.53
Total	**314.19**	**315.06**

Proposed Use

Proposed groundwater use on the project parcels is detailed in Table 7. The proposed 120,000 gallon per year winery would be constructed on APN 047-380-009. Construction of the winery would remove 5.4 acres of existing vineyard with a corresponding reduction in water demand for irrigation. The winery will receive water either from the recently drilled well on APN 047-380-010 (Well 1) or from a proposed new well near the winery site. The winery will host approximately 10 events per year with up to 50 guests, up to 5 events per month with up to 30 guests, and up to 4 events per year with up to 150 guests. Additionally, it will be staffed by 25 full-time and 10 part-time harvest season employees. The project would increase estimated groundwater use by 0.87 acre-ft/yr from 21.63 acre-ft/yr to on the two project parcels to 22.50 acre-ft/yr (Table 7). Total water use within the project recharge area is estimated to increase by 0.87 acre-ft/yr to 315.45 acre-ft/yr (Table 6).

Table 7: Estimated proposed water demand from the project parcel.

Water Use Component	# of Units	Use per Unit	Annual Water Use (AF/yr)
Irrigation		**Irrigation Sub-total**	**41.35**
Sonapa (APN 047-380-009)	35.7 Acres	0.5 AF/acre/yr	17.85
North Hills (APN 047-380-010)	47 Acres	0.5 AF/acre/yr	23.50
Winery Use		**Winery, Guest & Empl. Sub-total**	**3.57**
Process Water	120,000 gal.	2.15 AF/100,000 gal.	2.58
Guest & Employee Use			
Tasting Room Visitations	2300 Guests	3 gal./Guest	0.02
Events w/ On-Site Catering	600 Guests	15 gal./Guest	0.03
Full-Time Employees	25 Employees	15 gal./shift @ 250 shifts/yr	0.29
Part-Time Employees	10 Employees	15 gal./shift @ 125 shifts/yr	0.06
Domestic & Landscaping	120,000 gal.	0.50 AF/100,000 gal.	0.60
Surface Water & Precipitation Capture & Diversion			**(36.22)**
Evaporative Losses from Reservoirs, Replaced with Groundwater			**13.80**
Total Groundwater Use			**22.50**

Groundwater Recharge Analysis

Groundwater recharge within the project recharge area was estimated using an implementation of the Soil Water Balance (SWB) model of Napa County developed by OEI. This model implements the U.S. Geologic Survey's SWB modeling software and produces a spatially distributed estimate of annual recharge. This model operates on a daily timestep and calculates runoff based on the Natural Resources Conservation Service (NRCS) curve number approach and Actual Evapotranspiration (AET) and recharge based on a modified Thornthwaite-Mather soil-water-balance approach (Westenbroek et al., 2010). Details of this model are included in Appendix D.

Groundwater recharge for this project area was previously simulated for Water Year 2010 which was selected because annual precipitation in that year was nearest to the 30 year average for the period 1981-2010. OEI's SWB modeling also estimated recharge was also simulated recharge for Water Year 2014 to represent drought year conditions. In late-November 2022, County of Napa instituted a new policy prescribing that for purposes of estimating groundwater recharge, the mean annual precipitation to be used is that mean for Water Years 2012-2021 derived from the newest PRISM data. County of Napa has provided gridded GIS data of the mean precipitation for this period for use by WAA practitioners.

OEI's use of the SWB model is believed to provide more accurate estimates of potential groundwater recharge because it is a physically based distributed model that incorporates information characterizing the water balance in the soil column. Calculation of evapotranspiration using local climate data along with soil moisture storage and precipitation is believed to provide a more accurate representation of local conditions; evapotranspiration is the largest component of the water balance. Unfortunately, the SWB model structure does not allow for a groundwater recharge calculation based on a mathematical average because the model is driven by daily climate data. Consequently, OEI has adapted the SWB model estimates for the prior "average year" (WY 2010) and the "drought year" (WY 2014) to provide an estimate for the average annual rainfall for the period 2012-2021 developed by County of Napa.

OEI has utilized SWB models for WY 2010 and WY 2014 for dozens of project sites in the County of Napa. We have observed that potential recharge for WY 2010 is consistently much greater than for WY 2014 across a wide variety of terrain, vegetation, soils and climate. This is most easily characterized by the percentage of annual precipitation available for recharge that we calculate for each project site. Our approach for adapting the SWB model outputs to estimate groundwater recharge for the specified annual average precipitation is to assume that the percentage of annual rainfall available for groundwater recharge is a linear function of annual rainfall and interpolating between the recharge percentage for WY 2010 and WY 2014. The interpolation procedure is unique for each project site; the application for this project site is graphically displayed in Figure 5. The water balance data from the SWB model years is tabulated in Table 8.

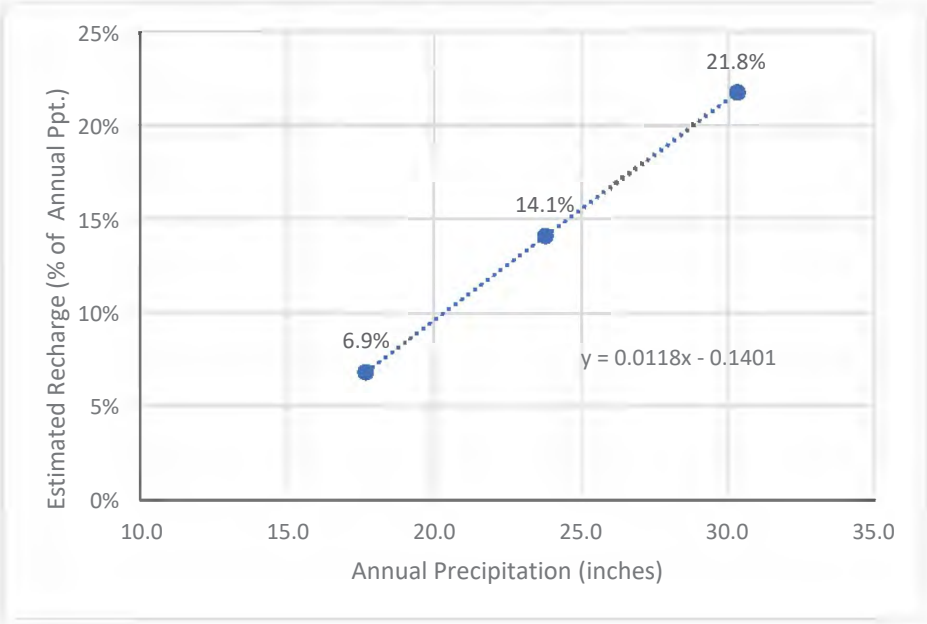


Figure 5: Interpolation of groundwater recharge as a percentage of annual precipitation in the project recharge area; estimated groundwater recharge as a percentage of average annual precipitation for the period 2012-2021 is 14.1% of 23.8 inches.

As summarized in Table 8, simulated Water Year 2010 spatially averaged precipitation was 30.3 inches across the project recharge area and simulated actual evapotranspiration (AET) averaged 18.8 inches. Simulated groundwater recharge for WY 2010 varied from 3.0 to 11.8 inches across the recharge area, with a spatial average of 6.6 inches. For Water Year 2014, spatially averaged precipitation was 17.7 inches across the project recharge area and simulated actual evapotranspiration (AET) averaged 15.2 inches. The spatial average of simulated groundwater recharge for WY 2014 across the recharge area was 2.0 inches. Estimated recharge by interpolation (Figure 5) for the 10-year average precipitation for 2012-2021 was 3.3 inches.

Table 8: Summary of water balance results estimated by the SWB model for Water Years 2010 & 2014; recharge estimated for 10-yr average precipitation estimated per Figure 5.

Water Balance Component	Average Water Year (2010)		Dry Water Year (2014)		Average 10-Year (2012-2021)	
	inches	% of precip	inches	% of precip	inches	% of precip
Precipitation	30.3	-	17.7	-	23.8	-
AET	18.8	62%	15.2	51%	-	-
Runoff	5.5	18%	4.0	14%	-	-
Δ Soil Moisture	-0.6	-2%	-3.5	-12%	-	-
Recharge	6.6	22%	2.0	7%	3.3	14%

Water balance estimates are available for several nearby watersheds including the Napa River watershed, the Santa Rosa Plain, Sonoma Valley, and the Green Valley Creek watershed. These

regional analyses estimated that mean annual recharge was equivalent to between 7% and 28% of mean annual precipitation (Farrar et. al., 2006; Flint and Flint 2014, Kobor and O'Connor, 2016; Wolfenden and Hevesi, 2014). Comparisons to these water balances are useful for determining the overall reasonableness of the results; precise agreement among these estimates is not expected owing to significant variations in climate, land cover, soil types, and underlying hydrogeologic conditions and owing to differences in spatial scale and methods for water balances.

Comparison of Water Demand and Groundwater Recharge

The total groundwater use for the project recharge area (~1,043 acres), including a net increase in use on the project parcels of 0.87 acre-ft/yr, is estimated to be 315.06 acre-ft/yr. This use is equivalent to 55% of the 573.7 acre-ft of recharge the project recharge area is estimated to receive using the SWB model for the near-average Water Year 2010 representative of the 30-yr period 1981-2010. Considering the project parcels (~119 acres) independently, where the estimated use of 22.5 acre-ft/yr is equivalent to 34% of 65.5 acre-ft/yr of recharge estimated to occur on the project parcel during an average year (Table 9). For comparison, during the dry Water Year 2014, SWB predicts much reduced groundwater recharge on the project parcel with project parcel groundwater use representing 112% of estimated recharge.

Estimated groundwater recharge based on the mean annual precipitation for the 10-year period 2012-2021 is 289.3 acre-ft/yr for the project recharge area; estimated groundwater demand is about 109% of estimated recharge across the project recharge area. It is likely that groundwater demand for the project recharge area is over-estimated owing to conservative assumptions about the methods used for frost protection. It is likely that the use of wind machines (fans) for frost protection is more widespread in the project recharge area than assumed in the water demand calculations. Hence, we believe that groundwater demand in the project recharge area is less than estimated groundwater recharge.

Estimated groundwater recharge based on the mean annual precipitation for the 10-year period 2012-2021 is 33.0 acre-ft/yr for the project recharge area; estimated groundwater demand is about 68% of estimated recharge for the area of the project parcels. Hence, groundwater demand for the project parcels with the proposed winery project is substantially less than estimated groundwater recharge.

Table 9: Comparison of proposed water use to average annual groundwater recharge for the project recharge area and for the project parcel.

Domain	Total Groundwateer Demand (ac-ft/yr)	Average Water Year (2010)			Dry Water Year (2014)			Average 10-Year (2012-2021)		
		Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge	Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge	Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge
Project Recharge Area	315.1	573.5	258.5	55%	176.3	-138.7	179%	289.3	-25.8	109%
Project Parcel	22.5	65.5	43.0	34%	20.1	-2.4	112%	33.0	10.5	68%

Tier 2 WAA-Well Interference Analysis

Per County guidelines for Tier 2 WAA's, potential well interference that could be caused by project groundwater wells must be evaluated. The winery will be supplied with groundwater either from Well 1 or the proposed new well (Figure 6). With respect to Well 1, Well 4 is its nearest neighboring well, and is about 760 feet to the southwest of Well 1 on APN 047-120-020. With respect to the proposed new well, Well 12 would be its nearest neighboring well which is about 790 ft to the east on APN 047-380-008. Because there would not be any wells within 500 feet from either the existing well (Well 1) or the proposed new well, the Tier 2 WAA analysis concludes that there is no significant potential well interference.

It is uncertain if there are any wells within 500 feet of the Sonapa Well (Well 2), which is also used to supply water to the project parcels. However, because this well is only used for irrigation and frost protection and will not supply water to the winery, use from the Sonapa Well is not anticipated to increase as part of the project. Given that the project will remove approximately 5.4 acres of vineyard, pumping from the Sonapa Well is expected to decline. Therefore Well 2 is not expected to have the potential to cause project-related drawdown in any well.

Tier 3 WAA-Streamflow Depletion Analysis

As shown in Figure 6, the existing alternative project well (Well 1) is over 1,500 ft from the nearest stream of concern for potential streamflow depletion identified by County of Napa (Huichica Creek). The Tier 3 WAA guidance provides well set-back standards and construction assumptions that "if applicable would be expected to preclude any significant adverse effects on surface waters". Specifically, the "Tier 3 Groundwater Surface Water Interaction Criteria" section (pp. 10-13 of the Napa County guidance document dated May 12, 2015) states:

> *The groundwater/surface water criteria are presumptively met if the distance standards and project well construction assumptions are met (see Tables 3, 4, and 5).* (p. 10)

Hence, Well 1 could be utilized to supply water for the proposed winery without further analysis regarding County WAA criteria.

The site of a proposed new well intended to serve the proposed winery is about 400 ft from Huichica Creek, and the well head elevation would be about 115 ft above mean sea level (Appendix C). Guidance for preparation of Tier 3 WAA's provided by County of Napa (May 2015) describes some conditions where wells nearer than 1,500 ft to a stream of concern may also be regarded as posing no significant risk of streamflow depletion. The transmissivity of the aquifer material and the depth of the well seal from the ground surface are factors that could also demonstrate that there is no significant risk of streamflow depletion.

To assess potential effects of the proposed well on surface flow in Huichica Creek per County guidance for Tier 3 WAA's, the likely well capacity needs to be estimated. The proposed well would serve only the groundwater requirements of the winery and associated employee and visitor use. Per Table 7, groundwater demand for the winery and associated uses is 3.57 acre-ft/yr; that volume of water is equivalent to a continuously pumping well yield of about 2.2 gpm.

Figure 6: Well set-back radii for Tier 2 WAA (500 ft) and Tier 3 WAA (1,500 ft) that County of Napa stipulates are

unconditionally understood to be sufficient to avoid significant draw down in wells (Tier 2 WAA) and significant streamflow depletion (Tier 3 WAA).

A typical well would not operate continuously and would have substantial non-pumping periods. It is possible that a well yielding less than 10 gpm would be sufficient to meet the needs of the winery, including guests and employees. Assuming that the winery well could be operated at pumping rates less than 10 gpm throughout the year, County guidance for construction of wells that would "preclude any significant adverse effects on surface waters" are embodied in the table below reproduced from the County's 2015 guidance document.

Table 3. Well Distance Standards and Construction Assumptions; Very low capacity pumping rates (i.e., less than 10 gpm), constructed in unconsolidated deposits in the upper part of the aquifer system (unconfined aquifer conditions).

Aquifer Hydraulic Conductivity (ft/day)	Acceptable Distance from Surface Water Channel			Minimum Surface Seal Depth (feet)	Depth of Uppermost Perforations (feet)
	500 feet	1000 feet	1500 feet		
80	✓			50	100
50	✓			50	100
30	✓			50	100
0.5	✓			50	100

As indicated in the table above, if the proposed well was constructed in a manner to meet the following conditions, the proposed well would not have significant adverse effects on surface waters:

1. with a surface seal of not less than 50 ft and
2. with its uppermost section of perforated well casing no less than 100 ft from the ground surface, and
3. if the proposed well location was adjusted to a position about 100 ft farther to the southwest so that it would be over 500 ft from Huichica Creek .

As shown in Figure 3 and Table 1, there are several existing wells with perforations starting below 100 ft below ground surface (Wells 1, 6, 10 and 13). This demonstrates that a well meeting the design criteria discussed above is feasible. Consequently, if the proposed new winery well were configured subject to the constraints described above, it would meet Tier 3 criteria for an acceptable level of potential streamflow depletion.

Notwithstanding the foregoing conclusions that Well 1 meets Tier 3 WAA criteria, and the recommended well design conditions described above for the proposed winery well that would meet Tier 3 WAA criteria, a different well configuration is desired for the project well. Use of Well 1 would require installation of a significant pipeline with a stream crossing; the

recommendation above for a winery well limited to a yield of 10 gpm would require significant water storage capacity. The preferred winery well would be drilled at the site as currently proposed in the pending well permit application and would operate with pumping rates up to 30 gpm or higher depending on pumping capacity of the completed well.

Local hydrogeologic conditions (as described in this report, pp. 4-7) indicate that the primary local aquifer lies at depths of 100 to 200 ft or greater below the surface and are isolated from surface water by massive clay strata not less than 80 ft thick. We believe that these clay strata behave as aquitards that significantly restrict the movement of groundwater and would significantly reduce potential streamflow depletion.

To further evaluate potential streamflow depletion that could be caused by the proposed project well and to evaluate potential streamflow depletion caused by existing wells, we carefully reviewed the WCRs for the wells within 1,500 ft of Huichica Creek and converted well construction details and information from geologic logs referenced vertically as a depth from ground surface to an estimated elevation above mean sea level (amsl) as shown in Table 10. Well 1, the alternative project well, is included in Table 10 for reference; it is not within 1,500 ft of Huichica Creek.

Table 10: Summary of well construction details referenced to elevation and the bed of Huichica Creek.

Well	Year Drilled	Approx. Ground Surface Elevation (ft amsl)	Approx. Stream Bed Elevation (ft amsl)	Well Seal Bottom Elevation (ft amsl)	Groundwater Elevation When Drilled (ft amsl)	Elevation Range of Uppermost Confining Stratum (ft amsl)	Elevation of Uppermost Well Screen (ft amsl)	Geologic Material Uppermost Confining Stratum
Well 1	2019	148	80-85	85	110	108 to -112	-92	brown clay & coarse sand
Well 6	2007	130	95-105	74	-20	123 to -80	-70	brown clay
Well 7	2008	100	80-85	80	100	99 to -161	20	brown sticky clay
Well 8	1987	120	80-85	92	112	110 to 35	70	brown clay
Well 9	1979	120	80-85	97	120	114 to 26	60	hard sandy, sticky, clay
Well 10	1972	130	80-85	110	-106	126 to -235	-70	brown clay
Well 12	2019	117	95-105	64	116	117 to 37	37	brown clay, gray clay
Well 13	2022	115	95-105	60	115	109 to -15	-85	tan clay

Evidence of widespread and relatively thick clay strata is given by elevation and description of these clay strata. Evidence of the behavior of the clay strata as aquitards includes well construction with well perforations beginning at depths of at least 50 ft below ground surface and water elevation in wells between 50 and 200 ft above the perforated (screened) sections of well casings as shown in Table 10. Although typical groundwater elevation (100-120 ft amsl) is higher than the streambed elevation of Huichica Creek (80-105 ft amsl), the elevation of the uppermost sections of well screen (perforated well casing) ranges from -92 to 70 ft amsl. The base of the upper confining clay strata ranges from -235 to 37 ft amsl. Consequently, we believe there is strong evidence that little interaction occurs between surface water in Huichica Creek

and groundwater in the local aquifer, and that a well drilled at the proposed site would not be expected to cause significant streamflow depletion in Huichica Creek.

To further reduce potential streamflow depletion from a new well to serve the winery as currently proposed, we recommend that in addition to a 50 deep well seal, the new well would have perforated well casing no nearer the surface than 150 ft (i.e., at an elevation not greater than -35 ft amsl).

Summary

Estimated groundwater recharge for the two project parcels combined based on mean annual precipitation for the period 2012-2021 was estimated to be 33.0 acre-ft/yr. Estimated groundwater demand for the two project parcels combined, including the proposed winery, is 22.5 acre-ft/yr. Consequently, this analysis demonstrates that the proposed project is consistent with Tier 1 WAA standards.

The existing well (Well 1) and the proposed new well at the proposed winery would both be over 500 ft distant from other existing wells and would therefore be consistent with Tier 2 WAA standards.

The existing well (Well 1) is over 1,500 ft, and the proposed new well at the proposed winery can be drilled at a location over 500 ft from Huichica Creek and can be constructed with well seal and uppermost well perforations at depths of greater than 50 ft and 100 ft, respectively. Under these conditions, both the existing and new well would be consistent with Tier 3 WAA standards. The preferred well location shown in the pending well permit application is also unlikely to cause significant streamflow depletion, and we propose that this well be constructed with perforated well casing at a minimum depth of 150 ft below ground surface.

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APPENDIX A

WELL COMPLETION REPORTS

State of California

Well 1

Well Completion Report

Form DWR 188 Submitted 5/13/2020

WCR2020-006275

Owner's Well Number

Date Work Began 07/17/2019

Date Work Ended 08/05/2019

Local Permit Agency Napa County Planning Building and Environmental Services

Secondary Permit Agency

Permit Number E19-00287

Permit Date 06/18/2019

Well Owner (must remain confidential pursuant to Water Code 13752)

Name CLIFF LEDE VINEYARDS, CLIFF LEDE VINEYARDS

Mailing Address 1473 YOUNTVILLE CROSS RD

City YOUNTVILLE State CA Zip 94599

Planned Use and Activity

Activity New Well

Planned Use Water Supply Irrigation - Agriculture

Well Location

Address 0 NEUENSCHWANDER RD

City NAPA Zip 94558 County Napa

Latitude 38 Deg. 15 Min. 4.4028 Sec. N

Longitude -122 Deg. 22 Min. 4.566 Sec. W

Dec. Lat. 38.251223 Dec. Long. -122.367935

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 047-380-010-000

Township 05 N

Range 05 W

Section 25

Baseline Meridian Mount Diablo

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Direct Rotary Drilling Fluid Other - AIR/BENTONITE

Total Depth of Boring 720 Feet

Total Depth of Completed Well 700 Feet

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level 38 (Feet) Date Measured 08/03/2019

Estimated Yield* 110 (GPM) Test Type

Test Length 6 (Hours) Total Drawdown 640 (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	40	TOPSOIL
40	260	BROWN CLAY & COARSE SAND
260	280	COARSE SAND, 30% BROWN CLAY
280	340	70% MULTICOLOR GRAVEL, 30% BROWN CLAY
340	360	40% BROWN CLAY, 40% SHALE
360	460	90% SHALE, 10% SAND
460	480	40% SHALE, 40% GRAVEL, 20% SAND
480	500	40% SHALE, 30% MEDIUM HARD ROCK, 30% COARSE SAND
500	560	90% MEDIUM HARD ROCK, 10% BROWN CLAY
560	620	80% CLAY, 20% COARSE SAND
620	640	40% SHALE, 60% COARSE SAND
640	700	30% CLAY, 70% COARSE SAND
700	720	80% MIXED GRAVEL, 20% COARSE SAND

Well 1, cont.

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	240	Blank	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625			
1	240	360	Screen	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625	Milled Slots	0	
1	360	380	Blank	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625			
1	380	460	Screen	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625	Milled Slots	0	
1	460	480	Blank	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625			
1	480	560	Screen	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625	Milled Slots	0	
1	560	580	Blank	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625			
1	580	660	Screen	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625	Milled Slots	0	
1	660	680	Blank	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625			
1	680	700	Blank	PVC	OD: 8.625 in. | Thickness: 0.500 in.	0.5	8.625	Milled Slots	0	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	63	Cement	Other Cement		6 SACK CEMENT
63	720	Filter Pack	Other Gravel Pack	3/8" Pea Gravel	

Other Observations:

Well 1, cont.

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	63	16
63	720	14

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name MC LEAN & WILLIAMS INC
Person, Firm or Corporation

878 EL CENTRO AVENUE	NAPA	CA	94558
Address	City	State	Zip

Signed *electronic signature received*	05/13/2020	396352
C-57 Licensed Water Well Contractor	Date Signed	C-57 License Number

Attachments

Well Location Map.pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N					W

Latitude Deg/Min/Sec Longitude Deg/Min/Sec

TRS:

APN:

Well 2

Well Drilling & Pump Service
878 El Centro Ave. Napa Ca, 94558
Office 707-255-6450
Fax 707-255-6489
Licenses #396352

SINCE 1949

WELL INSPECTION REPORT FOR

Attn: Cliff Lede Vineyards C/O Allison Cellini **Date of test:** October 16-22, 2018
Upon your request, we have checked the well and/or pressure system at
1319 Duhig Rd. – Sonapa Well #2 located on A.P. # 047-380-002
Our findings are as follows:

WELL INFORMATION

Casing Size: 8" Steel
Static Water Level: 118.95' from top of casing
Well Depth: 420' (*McLean & Williams Record) **Draw down during test:** 168.19'
Total water draw down in feet from static water level at end of flow test 49.24'
How tested: Open Discharge with existing pumping equipment
Well yield after test: 150 GPM @ 168.19' pumping level after 6 days of cycled pumping
Well Comments: Well records available from McLean & Williams Inc. are incomplete and are to be used for reference only.

WELL EQUIPMENT INFORMATION

Pump Make: Goulds **HP** 20 **Pump Setting:** 168'
Type: Submersible **Voltage:** 460 Volt **Pipe Size:** 4" Galvanized
Pump Model: 275H20 **Phase:** 3 **Wire Size:** #6-3 w/ ground flat jacket
Comments: Well equipped with a 1" PVC sounding tube set to a depth of 200'. Well is manually started to discharge water into a nearby pond. Discharge plumbing piped with 4" McCrometer saddle meter.

WELL TEST INFORMATION

Date	Time			Static			Flow Rate	
10/16/2018	11:29:16	0:00:00	0	118.952	0	0	0	12.22604
10/16/2018	11:34:16	0:05:00	5	148.401	0	0	132.8333	12.69684
10/16/2018	11:39:16	0:10:00	10	149.013	0	0	128.5667	13.34211
10/16/2018	11:44:16	0:15:00	15	148.997	0	0	127.7667	13.98207
10/16/2018	11:49:16	0:20:00	20	149.255	0	0	127.6	14.61897
10/16/2018	11:54:16	0:25:00	25	149.367	0	0	127.5	15.25644
10/16/2018	11:59:16	0:30:00	30	149.545	0	0	127.8	15.89461

Well 3 DWR

Page 1 of ____

Owner's Well No. ____

Date Work Began 7/29/97 Ended 7/31/97

Local Permit Agency NAPA COUNTY Denvironmental Halth Dept

Permit No. Receipt # 45165 Permit Date 7/7/97

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 509484

4/9

DWR USE ONLY — DO NOT FILL IN

05N05W26H M

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	14	Brown sand and gravel
14	23	Brown sand and multi-colored rock
23	122	Multi-colored ash and multi-colored rock
122	218	Gray and black volcanics

TOTAL DEPTH OF BORING 218 (Feet)

TOTAL DEPTH OF COMPLETED WELL 218 (Feet)

WELL OWNER

WELL LOCATION

Address SAME

City NAPA

County NAPA

APN Book 047 Page 380 Parcel 005

or Township ___ Range ___ Section ___

or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH

NORTH / WEST / EAST / SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

X Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD AIR ROTARY FLUID n/a

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 140 (Ft.) & DATE MEASURED 7/31/97

ESTIMATED YIELD* 50+ (GPM) & TEST TYPE Air

TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN Air (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	20	11								
20	218	7 7/8								
+2	218		X				PVC/480	5"	CL200	
158	178									.032
198	218									.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE / SIZE)
0	20	X			
20	218			X	Fine Pea

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME WEEKS DRILLING AND PUMP COMPANY by Ward Thompson (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS P.O. Box 176 CITY Sebastopol STATE CA ZIP 95473

Signed Ward Thompson (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 8/1/97 C-57 LICENSE NUMBER 177681

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

98

Well 4

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

25 ?
36 .

Do not fill in

No. 181394

Notice of Intent No.
Permit No. or Date 342-89

State Well No.
Other Well No 05N05W25

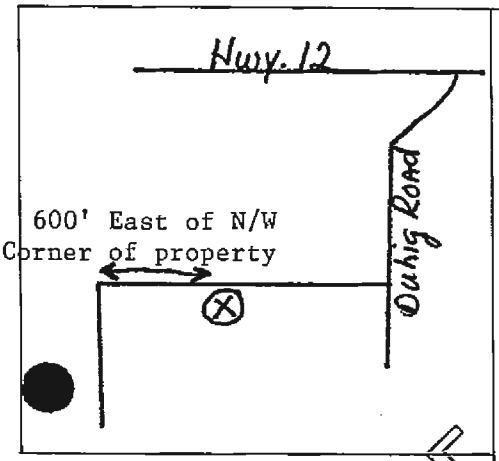
(2) LOCATION OF WELL (See instructions):

County Napa Owner's Well Number 89-1

Well address if different from above Duhig Road

Township 5N Range 5W Section Rinconde

Distance from cities, roads, railroads, fences, etc. Los Carneros



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well X Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☐
Irrigation XX
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:

Rotary ☐ Reverse X
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes X No ☐ Size Birdseye
Diameter of bore 19
Packed from 40 to 600 ft.

(7) CASING INSTALLED:

Steel X Plastic ☐ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen Full & Standard Flow

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	295	10"	.025	295	325	.090
325	390	10"	.025	390	435	.090
590	600	8"	.025	435	550	.090
				550	590	.090

(9) WELL SEAL:

Was surface sanitary seal provided? Yes X No ☐ If yes, to depth 40 ft.
Were strata sealed against pollution? Yes ☐ No X Interval ft.
Method of sealing Concrete grout

(10) WATER LEVELS:

Depth of first water, if known – ft.
Standing level after well completion 65' above ground level ft.

(11) WELL TESTS:

Was well test made? Yes X No ☐ If yes, by whom? Layne
Type of test Pump X Bailer ☐ Air lift ☐
Depth to water at start of test 65 ft. At end of test 260 ft
Discharge 250 gal/min after 48 hours Water temperature –
Chemical analysis made? Yes ☐ No X If yes, by whom?
Was electric log made? Yes X No ☐ If yes, attach copy to this report

(12) WELL LOG:

Total depth 610 ft. Depth of completed well 600 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	10	BRown clay w/sand
10	20	Gravel w/sand
20	23	Brown clay w/small gravel
23	28	Hard sticky brown clay
28	50	Brown clay w/sand & small gravel
50	71	Sand & gravel w/clay
71	74	Brittle rock/shale w/little clay
74	85	Gravel to ½", sand w/shale
85	90	Coarse gravel, sand & little clay
90	105	Sand & gravel
105	121	Sand & small gravel w/red clay
121	127	Sand & gravel w/gray clay
127	130	Sand & small gravel w/brown clay
130	156	Coarse sand w/little small gravel & brown clay
156	171	Coarse & fine gray sand
171	210	Brown sand w/small gravel
210	227	Brown sand w/medium gravel & clay
227	230	Brown clay w/sand & small gravel
230	242	Brown sand & medium gravel w/brown clay
242	275	Reddish sand w/small gravel & little clay
275	283	Reddish brown sand w/med. gravel & little clay
283	288	Reddish brown snad w/med. cemented gravels
288	300	Fine to coarse sand & small gravel w/little clay
300	317	Fine to coarse sand & small gravel
317	320	Fine to coarse sand w/small gravel & hard shale lenses
320	327	Fine to coarse sand & small gravel
327	333	Coarse sand
333	337	Sand w/shale lenses
337	348	Blue snad & small to med. gravel
348	369	Blue shale w/small gravel
369	406	Blue shale w/sand & gravel & little clay

Work started 6-13 19 89 Completed 6-23-89 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Kenneth W Starke (Well Driller)

NAME Layne-Western Company, Inc. (Person, firm, or corporation) (Typed or printed)

Address P.O. Box 1326

City Woodland, CA 95695 Zip

License No. 510011 Date of this report 8-28-89

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 4, cont.

CONTINUED FROM #181394

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 181394

Notice of Intent No.

Permit No. or Date

State Well No.

Other Well No.

(2) LOCATION OF WELL (See instructions):

County Owner's Well Number 89-1

Well address if different from above

Township Range Section

Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:

Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☐ No ☐ Size

Diameter of bore

Packed from ft. to ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.

Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.

Method of sealing

(10) WATER LEVELS:

Depth of first water, if known ft.

Standing level after well completion ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☐ If yes, by whom?

Type of test Pump ☐ Bailer ☐ Air lift ☐

Depth to water at start of test ft. At end of test ft

Discharge gal/min after hours Water temperature

Chemical analysis made? Yes ☐ No ☐ If yes, by whom?

Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG:

Total depth ft. Depth of completed well ft.

from ft.	to	ft.	Formation (Describe by color, character, size or material)
406	-	418	Very hard blue shale w/sand & gravel
	-		& little clay
418	-	421	Sand stringers
421	-	440	Hard blue shale w/sand & gravel
440	-	560	Medium sand & small gravel
560	-	595	Medium sand w/small gravel
	-		chattering streaks of hard
	-		drilling.
595	-	610	Sand w/small gravel and hard shale

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME Layne-Western Company, Inc. (Person, firm, or corporation) (Typed or printed)

Address P.O. Box 1326

City Woodland, CA 95695 Zip

License No. 510011 Date of this report 8-28-89

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 5

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

047 120 002

Do not fill in

No. 103433

Notice of Intent No.

Permit No. or Date

State Well No.

Other Well No. 05N05W25

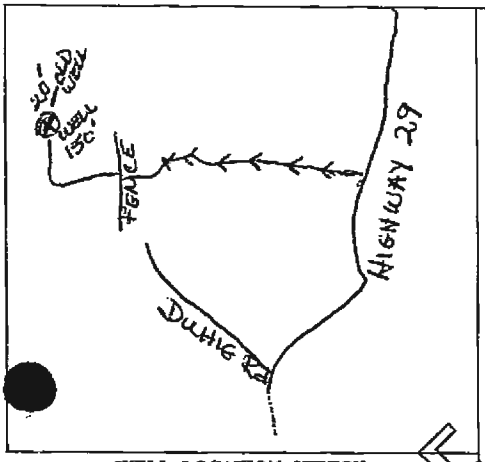
(2) LOCATION OF WELL (See instructions):

County Napa Owner's Well Number 47-120-02

Well address if different from above

Township 05N Range 05W Section

Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:

Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size 3/4
Diameter of bore 12½
Packed from 57 ft. to 550 ft.

(7) CASING INSTALLED:

Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen machine

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	450	8"	188	450	550	1/8x3

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 57 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing grout

(10) WATER LEVELS:

Depth of first water, if known 475 ft.
Standing level after well completion 10 ft.

(11) WELL TESTS:

Was well test made? Yes ☒ No ☐ If yes, by whom? driller
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ft. At end of test ft.
Discharge 300 gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG:

Total depth 550 ft. Depth of completed well 550 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	25	Topsoil & blue shale -soft
25	50	Hard & soft blue shale
50	100	Brown rock soft
100	125	Brown rock stringers-green; red
125	200	Brown & black rock-med hard
200	225	Tuffa & stringers brown clay soft
225	250	Green & black rock stringers brown clay
250	325	Brown green & black rock med hard
325	400	green, black brown stringers red
400	475	black & brown rock med hard
475	550	green black & red rock-med hard

Work started 4/1 19 80 Completed 4/9/ 19 80

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME Doshier-Gregson Drilling, Inc
(Person, firm, or corporation) (Typed or printed)

Address 5365 Napa-Vallejo Hwy

City Vallejo, Ca Zip 94590

License No. 294001 Date of this report 4/10/80

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 6

DWR

Page ___ of ___

Owner's Well No. ___

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 0938187

DWR USE ONLY — DO NOT FILL IN

05N05W18

STATE WELL NO./STATION NO.

LATITUDE ___ LONGITUDE ___

APN/TRS/OTHER ___

Date Work Began 05/11/2007, Ended 05/15/2007

Local Permit Agency Napa County

Permit No. E07-00260 Permit Date 05/10/2007

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID Mud & air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	7	Top Soil
7	210	Brown Clay
210	225	Brown & Red Sand & Dark Brown Clay
225	245	Brown Clay & Soft Sandstone with Gravel
245	270	Brown Clay
270	320	Sand, Gravel with Brown Clay
320	340	Green Sandy Clay
340	350	White Clay
350	360	Brown Clay & Gravel

TOTAL DEPTH OF BORING 360 (Feet)

TOTAL DEPTH OF COMPLETED WELL 340 (Feet)

WELL LOCATION

Address 1240 Duhig Road

City Napa

County Napa

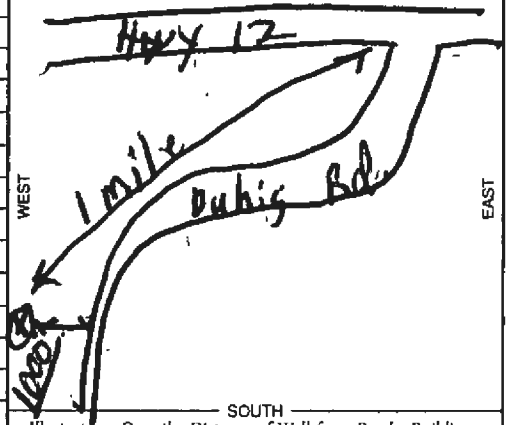
APN Book 047 Page 070 Parcel 007-000

Township ___ Range ___ Section ___

Lat ___ DEG. ___ MIN. ___ SEC. N

Long ___ DEG. ___ MIN. ___ SEC. W

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

USES (✓)

WATER SUPPLY

✓ Domestic ___ Public

✓ Irrigation ___ Industrial

___ MONITORING

___ TEST WELL

___ CATHODIC PROTECTION

___ HEAT EXCHANGE

___ DIRECT PUSH

___ INJECTION

___ VAPOR EXTRACTION

___ SPARGING

___ REMEDIATION

___ OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 170 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 150 (Ft.) & DATE MEASURED 5-15-07

ESTIMATED YIELD * 45 (GPM) & TEST TYPE Air Lift

TEST LENGTH 16 (Hrs.) TOTAL DRAWDOWN 4K (Ft.) GPM at

* *May not be representative of a well's long-term yield.* day of test

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	56	14	✓				Plastic	5	F480	
56	200	8 3/4	✓				"	"	"	
200	340	8 3/4		✓			"	"	"	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	56	✓			
56	340			Pea Gravel	

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Pulliam Well Exploration (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 5110 Highway 128 CITY Napa STATE CA ZIP 94558

Signed Tom Pulliam C-57 LICENSED WATER WELL CONTRACTOR

DATE SIGNED 6-7-07

C-57 LICENSE NUMBER 808-508

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

OSP 03 78636

Well 7

ORIGINAL

File with DWR

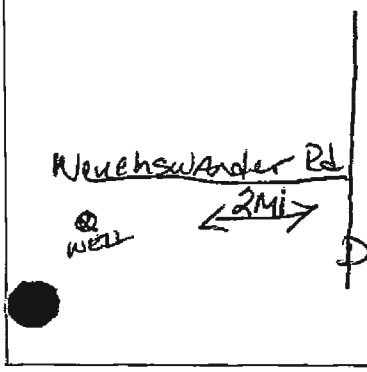
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 103199

Notice of Intent No. [redacted]
Permit No. or Date

State Well No.
Other Well No. 05N05W25K

(2) LOCATION OF WELL (See instructions):
County Napa Owner's Well Number 47-120-08
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [X]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Stock [ ]
Municipal [ ]
Other [ ]

(5) EQUIPMENT:
Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [ ] No [X] Size
Diameter of bore 12 1/4
Packed from to ft.

(7) CASING INSTALLED:
Steel [ ] Plastic [X] Concrete [ ]

From ft.	To ft.	Dia. in.	Gage or Wall
0	80	6	.250

(8) PERFORATIONS:
Type of perforation or size of screen machine

From ft.	To ft.	Slot size
80	500	1/8 x 3

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 20 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ft.
Method of sealing grout

(10) WATER LEVELS:
Depth of first water, if known 297 ft.
Standing level after well completion 0 ft.

(11) WELL TESTS:
Was well test made? Yes [X] No [ ] If yes, by whom? Driller
Type of test Pump [ ] Bailer [X] Air lift [ ]
Depth to water at start of test 0 ft. At end of test 120 ft
Discharge 10 gal/min after hours Water temperature
[redacted]cal analysis made? Yes [ ] No [X] If yes, by whom?
Was electric log made? Yes [ ] No [X] If yes, attach copy to this report

(12) WELL LOG: Total depth 500 ft. Depth of completed well 500 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	1	Adobe
1	261	Brown sticky clay
261	297	Clay gravel imb
297	321	Tuffa
321	344	Black granular rock
344	368	Brown granular rock
368	391	Black granular rock
391	422	Blue granular rock (soft str
422	433	Brown tuffa hard strs
433	444	Black red & green gran rock
444	446	soft dark gray rock(sandy)
446	453	Dark brown granular rock
453	466	Soft dark brown rock(sandy)
466	475	Granular black rock(soft gray str)
475	500	Soft brown rock sandy

Work started 6/22 19 78 Completed 6/30 19 78

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED [signature] (Well Driller)
NAME Doshier-Gregson Drilling, Inc (Person, firm, or corporation) (Typed or printed)
Address 5365 Napa-Vallejo Hwy
City Vallejo, Ca Zip 94558
License No. 294001 Date of this report 7/11/78

DWR 188 (REV. 7-75) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 8

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

25K

Do not fill in

No. 151101

[redacted] of Intent No.
[redacted] Permit No. or Date

State Well No.
Other Well No. 05N05W25K

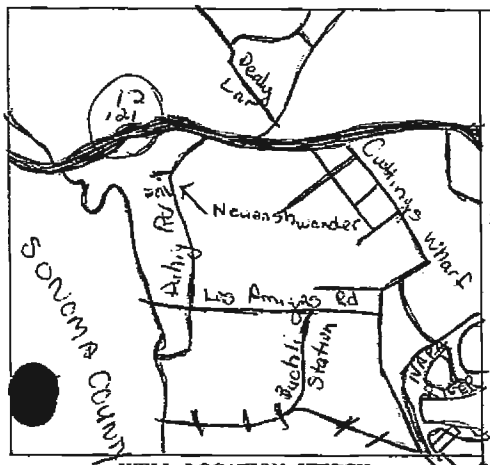
(2) LOCATION OF WELL (See instructions) APN #47-120-14

County Napa Owner's Well Number

Well address if different from above Same

Township 05N Range 05W Section 25K

Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [X]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Stock [ ]
Municipal [ ]
Other [ ]

(5) EQUIPMENT:
Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [X] No [ ] Size Pea
Diameter of bore 8 3/4"
Packed from 28 ft. to 510 ft.

(7) CASING INSTALLED:
Steel [ ] Plastic [X] Concrete [ ]

From ft.	To ft.	Dia. in.	Gage or Wall
0	510	6	160

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
50	510	Factory

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [ ] No [X] If yes, to depth 28 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ft.
Method of sealing Concrete

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 8' ft.

(11) WELL TESTS:
Was well test made? Yes [X] No [ ] If yes, by whom? Driller
Type of test Pump [ ] Bailer [ ] Air lift [X]
Depth to water at start of test 8 ft. At end of test 350 ft
Discharge 4 ½ gal/min after 3½ hours Water temperature
Chemical analysis made? Yes [ ] No [X] If yes, by whom?
Was electric log made? Yes [ ] No [X] If yes, attach copy to this report

(12) WELL LOG: Total depth 510 ft. Depth of completed well 510 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5	Top soil.
5	10	Rock inbeded brown clay.
10	85	Brown clay.
85	90	Sand and blue clay.
90	95	Blue clay.
95	145	Brown clay.
145	150	Sand and brown clay.
150	190	Brown clay.
190	195	Brown clay and sand.
195	205	Sand, small gravels, few smooth.
205	215	Blue clay.
215	240	Brown clay.
240	275	Blue clay, sand, gravels.
275	280	Sand, granulor black, red and brown.
280	300	Blue clay.
300	410	Blue clay, sand and black and blue rock.
410	415	Hard black rock.
415	430	Black rock (soft) with blue clay stringers.
430	510	Blue clay, multi, color rock (hard).

Work started 6-24-86 19 Completed 6-24-86 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME 878 El Centro Ave. (Person, firm, or corporation) (Typed or printed)
Address 878 El Centro Ave.
City Napa, CA Zip 94558
License No. 396352 Date of this report 2-12-87

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 9

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY 25K
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 121600

State Well No.
Other Well No. 5N/5W-25

[redacted] e of Intent No.
[redacted] Permit No. or Date

(
A
C

(12) **WELL LOG:** Total depth 540 ft. Depth of completed well 540 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	1	Surface soil.
1	6	Thin layer cemented rock & gravel.
6	94	Hard sandy, sticky clay.
94	118	Clay & layers of clay cemented gravel & rock.
118	291	Hard sandy clay.
291	314	Clay, with layers of clay cemented gravel & rock.
314	341	Clay cmented rock & gravel.
341	540	Rock & gravel very little clay.

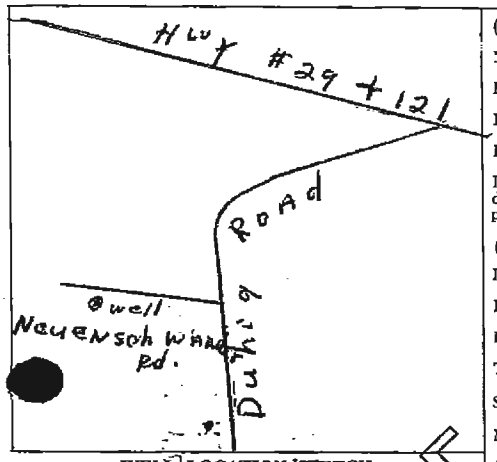
(2) **LOCATION OF WELL** (See instructions) A.P. #47-120-14

County Napa Owner's Well Number Neuenschwander

Well address if different from above

Township T.5.N. Range R.5.W. Section 25K

Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) **TYPE OF WORK:**
New Well XX Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) **PROPOSED USE:**
Domestic XX
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) **EQUIPMENT:**
Rotary XX Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) **GRAVEL PACK:**
Yes XX No ☐ Size Pea
Diameter of bore 12"
Packed from 23 to 540 ft.

(7) **CASING INSTALLED:**
Steel ☐ Plastic XX Concrete ☐

(8) **PERFORATIONS:**
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	540	6	160	60	540	STD

(9) **WELL SEAL:**
Was surface sanitary seal provided? Yes XX No ☐ If yes, to depth 23 ft.
Were strata sealed against pollution? Yes ☐ No XX Interval ft.
Method of sealing concrete

Work started 8-16- 19 79 Completed 9-18 19 79

(10) **WATER LEVELS:**
Depth of first water, if known ft.
Standing level after well completion Ground level ft.

(11) **WELL TESTS:**
Was well test made? Yes XX No ☐ If yes, by whom? Driller
Type of test Pump XX Bailer ☐ Air lift ☐
Depth to water at start of test 0 ft. At end of test 250 ft
Discharge 30 gal/min after 7 hours Water temperature
[redacted] cal analysis made? Yes ☐ No XX If yes, by whom?
Was electric log made? Yes ☐ No XX If yes, attach copy to this report

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED C. W. Williams Jr. (Well Driller)

NAME McLean & Williams Inc. (Person, firm, or corporation) (Typed or printed)

Address 878 El Centro Ave.

City Napa, CA Zip 94558

License No. 365829 Date of this report 9/18/79

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 10

Water Code Sec. 13752

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In
No 72863
State Well No.
Other Well No. 05N05W25J

(2) LOCATION OF WELL:
County Napa Owner's number, if any 1289
Township, Range, and Section
Distance from cities, roads, railroads, etc.

(3) TYPE OF WORK *(check)*:
New Well [X] Deepening [ ] Reconditioning [ ] Destroying [ ]
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE *(check)*:
Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) EQUIPMENT:
Rotary [X]
Cable [ ]
Other [ ]

(6) CASING INSTALLED:
STEEL: OTHER:
SINGLE [X] DOUBLE [ ]

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	505'	6"	12 Ga.			

If gravel packed

Size of shoe or well ring: None
Size of gravel:
Describe joint Butt Weld

(7) PERFORATIONS OR SCREEN:
Type of perforation or name of screen Machine Perf.

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
200	505'	20	3	1/8 X 3"

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes [X] No [ ] To what depth 20' ft.
Were any strata sealed against pollution? Yes [ ] No [X] If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing Neat Cement

(9) WATER LEVELS:
Depth at which water was first found, if known 365' ft.
Standing level before perforating, if known 236' ft.
Standing level after perforating and developing 236' ft.

(10) WELL TESTS: Tested by bailing.
Was pump test made? Yes [ ] No [ ] If yes, by whom? Drillers
Yield: 2 gal./min. with 234' ft. drawdown after 5½ hrs.
Temperature of water Was a chemical analysis made? Yes [ ] No [X]
Was electric log made of well? Yes [ ] No [X] If yes, attach copy

(11) WELL LOG:
Total depth 505' ft. Depth of completed well 505' ft.
Formation: *Describe by color, character, size of material, and structure*

ft. to	ft.	
0	4	Top Soil
4	365	Brown Clay
365	427	Blue Clay
427	505	Blue Clay w/Hard Stgrs.

Work started May 15 19 72 Completed May 19 19 72

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Doshier-Gregson, Inc.
(Person, firm, or corporation) (Typed or printed)
Address 5365 Napa-Vallejo Highway
Vallejo, Calif. 94590
[SIGNED] (Well Driller)
License No. 258826 Dated June 1, 19 72

SKETCH LOCATION OF WELL ON REVERSE SIDE

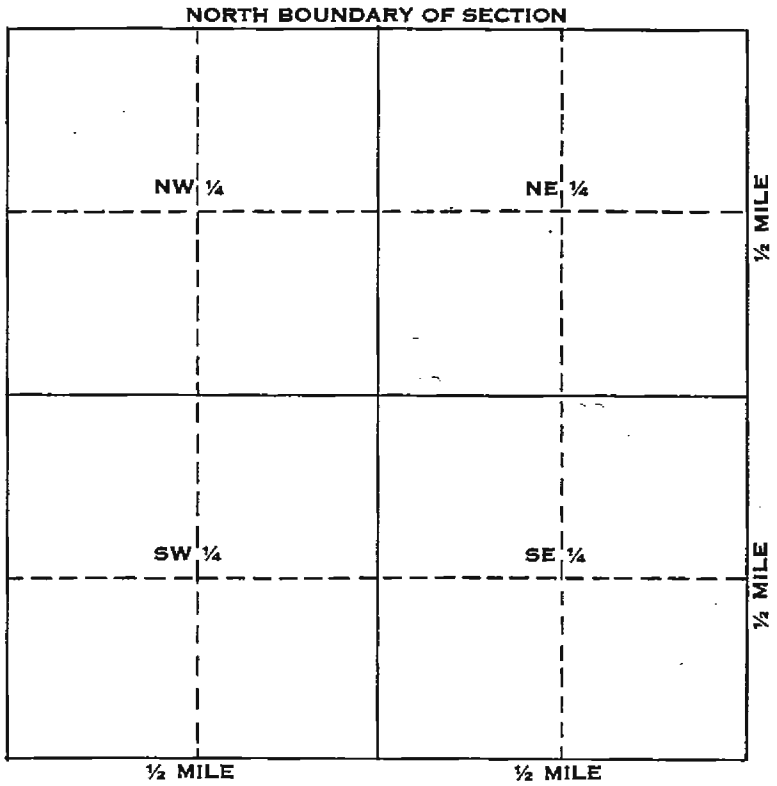
CONFIDENTIAL LOG
Water Code Sec. 13752

DWR 188 (REV. 9-68)
25179-953 9-68 50M TRIP AD OSP

Well 10, cont.

72863

WELL LOCATION SKETCH

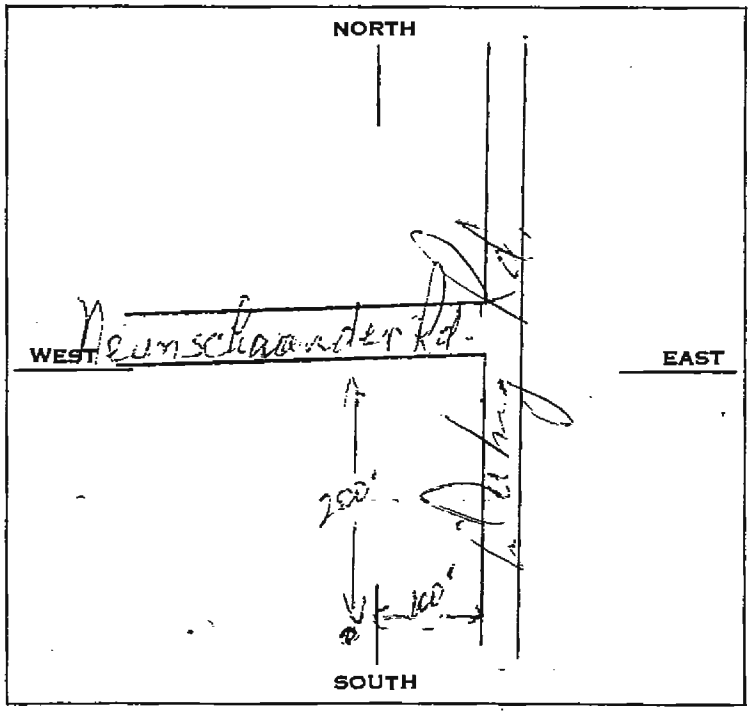


Township _____ N/S

Range _____ E/W

Section No. _____

A. Location of well in sectionized areas.
Sketch roads, railroads, streams, or other features as necessary.



B. Location of well in areas not sectionized.
Sketch roads, railroads, streams, or other features as necessary.
Indicate distances.

Well 11

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

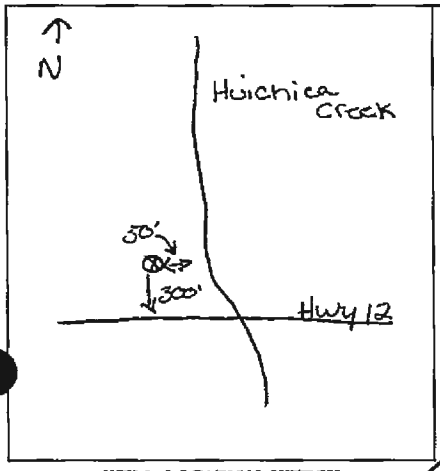
Do not fill in
No. 323623

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. _____
Other Well No. 05N05W25C

(2) LOCATION OF WELL (See instructions):

County Napa Owner's Well Number 1-89
Well address if different from above Hwy 12, Carneros
Township 5N Range 5W Section _____
Distance from cities, roads, railroads, fences, etc. _____



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:

Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size # 3 mix
Diameter of bore 20"
Packed from 0 ft. to 670 ft.

(7) CASING INSTALLED:

Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	290	10	.250
350	380	10	.250
650	670	10	.250

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Slot size
290	350	060 full flow
380	530	060 full flow
530	590	060 std flow
590	650	060 full flow

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval _____ ft.
Method of sealing grout

(10) WATER LEVELS:

Depth of first water, if known + 41' ft.
Standing level after well completion _____ ft.

(11) WELL TESTS:

Was well test made? Yes ☒ No ☐ If yes, by whom? Layne
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test + 41 ft. At end of test _____ ft.
Discharge 225 gal/min after 3 hours Water temperature _____
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? _____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG:

Total depth _____ ft. Completed depth _____ ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	7	Top soil
7	13	blue silty clay
13	30	decomposed volcanic rock
30	35	solid rock
35	85	sticky clay, yellow
85	160	1/2 & 1/2 yellow & dark grey clay w/ thin sand stringers
160	210	3/4 gray clay 1/4 yellow clay
210	245	sandy gray clay w/ streaks of black sand
245	257	gray clay
257	311	black sand
311	392	multi color brocken rock
392	700	same with clay lenses

Work started 10-4- 19 89 Completed 10-9 19 89

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Signed _____ (Well Driller)
NAME Layne-Western Company, Inc. (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1326
City Woodland ZIP 95695
License No. 510011 Date of this report 6-12-90

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

Well 12

State of California

Well Completion Report

Form DWR 188 Submitted 9/14/2019

WCR2019-013107

Owner's Well Number

Date Work Began 04/22/2019 Date Work Ended 04/30/2019

Local Permit Agency Napa County Planning Building and Environmental Services

Secondary Permit Agency Permit Number E19-00022 Permit Date 01/11/2019

Well Owner (must remain confidential pursuant to Water Code 13752)

Name SIM PEYRON

Mailing Address 1935 EVERIDGE CT

City WALNUT CREEK State CA Zip 94596

Planned Use and Activity

Activity New Well

Planned Use Water Supply Domestic

Well Location

Address 5425 SONOMA HWY

City NAPA Zip 94558 County Napa

Latitude 38 Deg. 15 Min. 15.8626 Sec. N Longitude -122 Deg. 21 Min. 46.261 Sec. W

Dec. Lat. 38.2544063 Dec. Long. -122.3628503

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 047-380-008-000

Township 05 N

Range 05 W

Section 25

Baseline Meridian Mount Diablo

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite

Total Depth of Boring 410 Feet

Total Depth of Completed Well 400 Feet

Water Level and Yield of Completed Well

Depth to first water 1 (Feet below surface)

Depth to Static Water Level 1 (Feet) Date Measured 04/29/2019

Estimated Yield* 30 (GPM) Test Type Air Lift

Test Length 4 (Hours) Total Drawdown 350 (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	30	TOP SOIL MIXED WITH BROWN CLAY
30	80	GRAY CLAY
80	100	40% COARSE MULTICOLORED SAND. 60% CLAY
100	140	60% GRAY CLAY. 40% COARSE MULTI COLORED SAND WITH BLACK ROCK
140	180	SANDSTONE MIXED WITH COARSE AND FINE SAND AND ROCKS
180	240	60% CLAY MIXED WITH COARSE GRAY SANDSTONE
240	325	BROWN CLAY MIXED WITH REDDISH GREEN VOLCANIC STONE
325	380	RED & BLACK VOLCANIC ROCK WITH COARSE SAND
380	410	BROWN CLAY

Well 12 Cont.

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	80	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	80	120	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	
1	120	140	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	140	180	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	
1	180	200	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	200	240	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	
1	240	260	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	260	300	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	
1	300	320	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	320	360	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	
1	360	380	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	380	410	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	53	Cement	Other Cement		6 SACK CEMENT
53	410	Filter Pack	Other Gravel Pack	3/8" Pea Gravel	

Other Observations:
ARTESIAN WELL

Well 12 Cont.

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (Inches)
0	53	14
53	410	11

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: MC LEAN & WILLIAMS INC
Person, Firm or Corporation

Address	City	State	Zip
878 EL CENTRO AVENUE	NAPA	CA	94558

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 09/14/2019 (Date Signed) | 396352 (C-57 License Number)

Attachments

CCF09142019.pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N					W

Latitude Deg/Min/Sec | Longitude Deg/Min/Sec

TRS:

APN:

Well 13

State of California

Well Completion Report

Form DWR 188 Submitted 10/3/2022

WCR2022-011493

Owner's Well Number: Winery S1 | Date Work Began: 07/26/2022 | Date Work Ended: 09/14/2022

Local Permit Agency: Napa County Planning Building and Environmental Services

Secondary Permit Agency: | Permit Number: E21-00769 | Permit Date: 06/23/2022

Well Owner (must remain confidential pursuant to Water Code 13752)

[redacted]

Planned Use and Activity

Activity: New Well

Planned Use: Water Supply Public

Well Location

Address: 1240 Duhig RD

City: Napa | Zip: 94559 | County: Napa

Latitude: 38 Deg. 15 Min. 12.6432 Sec. N | Longitude: -122 Deg. 21 Min. 44.5679 Sec. W

Dec. Lat.: 38.253512 | Dec. Long.: -122.36238

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 047-070-007-000

Township: 05 N

Range: 05 W

Section: 25

Baseline Meridian: Mount Diablo

Ground Surface Elevation:

Elevation Accuracy:

Elevation Determination Method:

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Direct Rotary | Drilling Fluid: Bentonite

Total Depth of Boring: 690 Feet

Total Depth of Completed Well: 540 Feet

Water Level and Yield of Completed Well

Depth to first water: 200 (Feet below surface)

Depth to Static Water Level: 0 (Feet) | Date Measured: 08/11/2022

Estimated Yield*: 100 (GPM) | Test Type: Air Lift

Test Length: (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	6	Soil
6	130	Tan clay
130	190	Sand and gravel with hard ledges
190	200	Grey clay
200	265	Sand and gravel with hard ledges
265	467	Really hard black volcanic rock
467	528	Fractured black and red volcanic rock
528	690	Light grey ash

RECEIVED

OCT 05 2022

Napa County Planning, Building & Environmental Services

Well 13 Cont.

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	25	Conductor or Fill Pipe	Other	N/A	0.375	16			Steel
2	0	200	Blank	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625			
2	200	340	Screen	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625	Milled Slots	0.06	
2	340	400	Blank	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625			
2	400	500	Screen	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625	Milled Slots	0.06	
2	500	540	Blank	PVC	OD: 8.625 in. | SDR: 17 | Thickness: 0.508 in.	0.508	8.625			

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	25	Cement	Portland Cement/Neat Cement		Conductor Seal
0	55	Bentonite	Non Hydrated Bentonite		Sanitary Seal
55	355	Filter Pack	Other Gravel Pack		#6 sand
355	365	Bentonite	Non Hydrated Bentonite		Deep Seal
365	540	Filter Pack	Other Gravel Pack		#6 sand
540	690	Other Fill	See description.		Native Fill

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	25	22
25	270	14.25
270	540	12.25
540	690	8.75

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: WEEKS DRILLING AND PUMP CO
Person, Firm or Corporation

PO BOX 176 | SEBASTOPOL | CA | 94573-
Address | City | State | Zip

Signed: *electronic signature received* | 10/03/2022 | 177681
C-57 Licensed Water Well Contractor | Date Signed | C-57 License Number

Attachments

Approved Permit E21-00769 - 1240 Duhig Rd, Napa.pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

W — Longitude Deg/Min/Sec

TRS:

APN:

Well 13 Cont.

MICHAEL S. MALONE Consulting Geologist 1247 Jean Dr. Sebastopol, CA (707) 829-5511	Job No: NA21-418 Date: April 10, 2021 Appr: MSMalone	Proposed Exploratory Borehole Location (DC 1) Domaine Carneros 1240 Duhig Rd., Napa, Calif.	PLATE 4

Well 14

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0300185

Page 1 of 1

Owner's Well Number 1

Date Work Began 01/12/2016 Date Work Ended 1/20/2016

Local Permit Agency Planning Building & Environmental

Permit Number E15-00959 Permit Date 12/9/15

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Air Drilling Drilling Fluid Air

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	90	Large tufa brown rock
90	130	Black rock
130	250	Black and red volcanics 60gpm

RECEIVED

FEB 17 2016

Napa County Planning, Building & Environmental Services

Final Inspection on 54' Seal By Peter Ex 2/11/16 2:30 PM

Total Depth of Boring 250 Feet

Total Depth of Completed Well 250 Feet

Well Owner

Name Hhudsonia LLC

Mailing Address 5398 Sonoma Hwy

City Napa State CA Zip 94558

Well Location

Address 5398 sonoma HWY

City Napa County Napa

Latitude ___ Deg ___ Min ___ Sec N Longitude ___ Deg ___ Min ___ Sec W

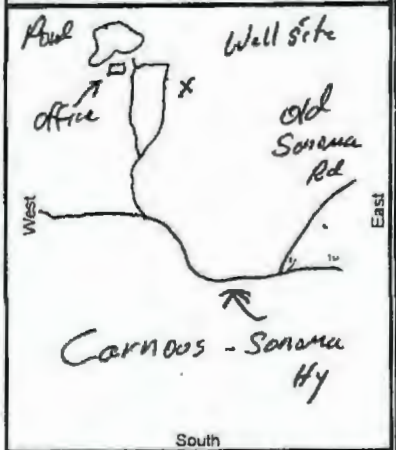
Datum ___ Decimal Lat. ___ Decimal Long. ___

APN Book 047 Page 070 Parcel 016

Township ___ Range ___ Section ___

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply
☑ Domestic ☑ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 80 (Feet below surface)

Depth to Static Water Level 150 (Feet) Date Measured 02/11/2016

Estimated Yield * 60 (GPM) Test Type Air Lift

Test Length 2.0 (Hours) Total Drawdown 0 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	60	12	Blank	PVC Sch. 80		5		
60	140	8 3/4	Blank	PVC Sch. 80		5		
140	250	8 3/4	Screen	PVC Sch. 80		5	Milled Slots	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Bentonite	seal
50	250	Filter Pack	pea gravel

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name D. Bess Pump & well (Person, Firm or Corporation)

1115 mt. george ave (Address) napa (City) CA (State) 94558 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 2/10/16 (Date Signed) 487027 (C-57 License Number)

DWR 188 REV 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

APPENDIX B

WATER RIGHT FOR HELLER RESERVOIR

(ACCESSED VIA EWRIMS)

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS

License for Diversion and Use of Water

APPLICATION 27796 PERMIT 19184 LICENSE **12577**

THIS IS TO CERTIFY, *That* **Fred Heller and Mary Heller**
115 Sansome Street, Suite 1000
San Francisco, CA 94104

have *made proof as of* **October 23, 1989** *(the date of inspection) to the satisfaction of the State Water Resources Control Board of a right to the use of the water of* **an Unnamed Stream in Napa County**

tributary to **Huichica Creek thence Hudeman Slough thence Second Napa Slough thence Sonoma Creek thence San Pablo Bay**

for the purpose of **Irrigation, Recreational, and Fire Protection uses**

under Permit **19184** *of the Board and that the right to the use of this water has been perfected in accordance with the laws of California, the Regulations of the Board and the permit terms; that the priority of this right dates from* **July 13, 1983** *and that the amount of water to which this right is entitled and hereby confirmed is limited to the amount actually beneficially used for the stated purposes and shall not exceed* **forty (40) acre-feet per annum to be collected from November 1 of each year to May 15 of the succeeding year. The maximum withdrawal in any one year shall not exceed 35.5 acre-feet.**

This license does not authorize collection of water to storage outside of the specified season to offset evaporation and seepage losses or for any other purpose. *(0000005)*

THE POINT OF DIVERSION OF SUCH WATER IS LOCATED:

South 2,600 feet and West 4,000 feet from NE corner of projected Section 25, T5N, R5W, MDB&M, being within NW¼ of SW¼ of said Section 25.

A DESCRIPTION OF THE LANDS OR THE PLACE WHERE SUCH WATER IS PUT TO BENEFICIAL USE IS AS FOLLOWS:

Recreational and fire protection uses at reservoir within NW¼ of SW¼ of projected Section 25, T5N, R5W, MDB&M, and irrigation as follows:

25 acres within SW¼ of NW¼ of projected Section 25, T5N, R5W, MDB&M
5 acres within SE¼ of NW¼ of projected Section 25, T5N, R5W, MDB&M
15 acres within NW¼ of SW¼ of projected Section 25, T5N, R5W, MDB&M
11 acres within NE¼ of SW¼ of projected Section 25, T5N, R5W, MDB&M

56 acres total, as shown on map on file with State Water Resources Control Board.

Licensee shall, when required by the State Water Resources Control Board, install and maintain an outlet pipe of adequate capacity in his dam as near as practicable to the bottom of the natural stream channel, or provide other means satisfactory to the State Water Resources Control Board, in order that water entering the reservoir which is not authorized for appropriation under this license may be released. Licensee shall submit plans and specifications of the outlet pipe or other alternative to the Chief of the Division of Water Rights for approval within 6 months of the date upon which the Board issues notice that an outlet is required. Licensee shall furnish evidence which substantiates that an outlet or alternative has been installed in the dam. Evidence shall include photographs showing completed works or certification by a registered Civil or Agricultural Engineer. (0050044)

This license is conditioned upon full compliance with Sections 1601, 1603, and/or Section 6100 of the Fish and Game Code. (0000063)

Licensee shall allow representatives of Buena Vista Winery, Inc. to inspect the reservoir at mutually agreeable times. (9990300)

Licensee shall allow representatives of the State Water Resources Control Board and other parties as may be authorized from time to time by said Board, reasonable access to project works to determine compliance with the terms of this license.

The quantity of water diverted under this license is subject to modification by the Board if, after notice to the licensee and an opportunity for hearing, the Board finds that such modification is necessary to meet water quality objectives in water quality control plans which have been or hereafter may be established or modified pursuant to Division 7 of the Water Code. No action will be taken pursuant to this paragraph unless the Board finds that (1) adequate waste discharge requirements have been prescribed and are in effect with respect to all waste discharges which have any substantial effect upon water quality in the area involved, and (2) the water quality objectives cannot be achieved solely through the control of waste discharges.

Pursuant to California Water Code Sections 100 and 275 and the common law public trust doctrine, all rights and privileges under this license, including method of diversion, method of use, and quantity of water diverted, are subject to the continuing authority of the Board in accordance with law and in the interest of the public welfare to protect public trust uses and to prevent waste, unreasonable use, unreasonable method of use or unreasonable method of diversion of said water.

This continuing authority of the Board may be exercised by imposing specific requirements over and above those contained in this license with a view to eliminating waste of water and to meeting the reasonable water requirements of licensee without unreasonable draft on the source. Licensee may be required to implement a water conservation plan, features of which may include but not necessarily be limited to: (1) reusing or reclaiming the water allocated; (2) using water reclaimed by another entity instead of all or part of the water allocated; (3) restricting diversions so as to eliminate agricultural tailwater or to reduce return flow; (4) suppressing evaporation losses from water surfaces; (5) controlling phreatophytic growth; and (6) installing, maintaining, and operating efficient water measuring devices to assure compliance with the quantity limitations of this license and to determine accurately water use as against reasonable water requirements for the authorized project. No action will be taken pursuant to this paragraph unless the Board determines, after notice to affected parties and opportunity for hearing, that such specific requirements are physically and financially feasible and are appropriate to the particular situation.

The continuing authority of the Board also may be exercised by imposing further limitations on the diversion and use of water by the licensee in order to protect public trust uses. No action will be taken pursuant to this paragraph unless the Board determines, after notice to affected parties and opportunity for hearing, that such action is consistent with California Constitution Article X, Sec. 2; is consistent with the public interest and is necessary to preserve or restore the uses protected by the public trust.

Reports shall be filed promptly by licensee on appropriate forms which will be provided for the purpose from time to time by the Board.

The right hereby confirmed to the diversion and use of water is restricted to the point or points of diversion herein specified and to the lands or place of use herein described.

This license is granted and licensee accepts all rights herein confirmed subject to the following provisions of the Water Code:

Section 1625. Each license shall be in such form and contain such terms as may be prescribed by the Board.

Section 1626. All licenses shall be under the terms and conditions of this division (of the Water Code).

Section 1627. A license shall be effective for such time as the water actually appropriated under it is used for a useful and beneficial purpose in conformity with this division (of the Water Code) but no longer.

Section 1628. Every license shall include the enumeration of conditions therein which in substance shall include all of the provisions of this article and the statement that any appropriator of water to whom a license is issued takes the license subject to the conditions therein expressed.

Section 1629. Every licensee, if he accepts a license does so under the conditions precedent that no value whatsoever in excess of the actual amount paid to the State therefor shall at any time be assigned to or claimed for any license granted or issued under the provisions of this division (of the Water Code), or for any rights granted or acquired under the provisions of this division (of the Water Code), in respect to the regulation by any competent public authority of the services or the price of the services to be rendered by any licensee or by the holder of any rights granted or acquired under the provisions of this division (of the Water Code) or in respect to any valuation for purposes of sale to or purchase, whether through condemnation proceedings or otherwise, by the State or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the State, of the rights and property of any licensee, or the possessor of any rights granted, issued, or acquired under the provisions of this division (of the Water Code).

Section 1630. At any time after the expiration of twenty years after the granting of a license, the State or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the State shall have the right to purchase the works and property occupied and used under the license and the works built or constructed for the enjoyment of the rights granted under the license.

Section 1631. In the event that the State, or any city, city and county, municipal water district, irrigation district, lighting district, or political subdivision of the State so desiring to purchase and the owner of the works and property cannot agree upon the purchase price, the price shall be determined in such manner as is now or may hereafter be provided by law for determining the value of property taken in eminent domain proceedings.

Dated: APRIL 06 1990

STATE WATER RESOURCES CONTROL BOARD

Roger Rumm

for Chief, Division of Water Rights

APPENDIX C

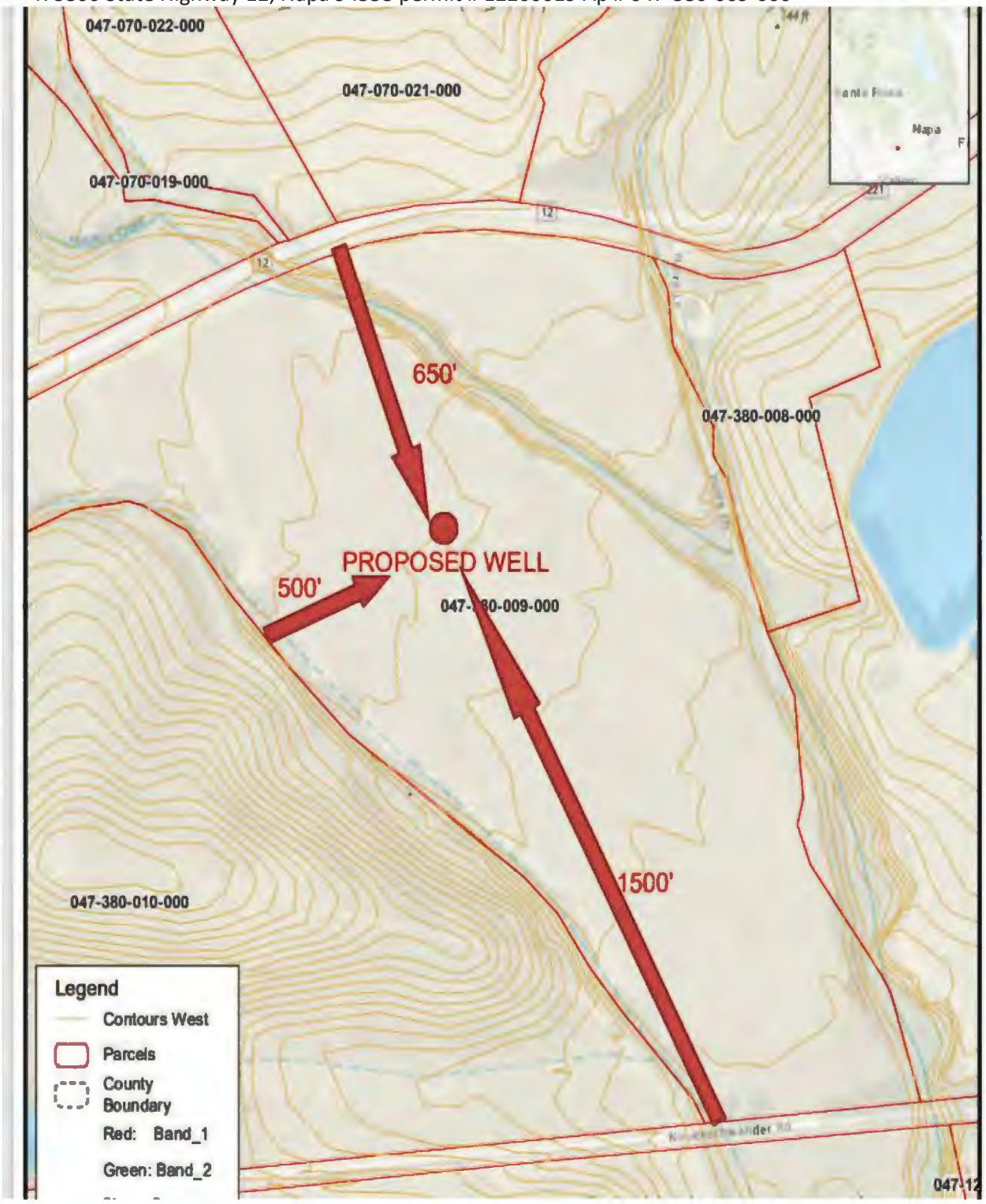
WELL PERMIT APPLICATION MAP

McLEAN & WILLIAMS
SINCE 1949

Well Drilling & Pump Service
878 El Centro Ave. Napa Ca, 94558
Office 707-255-6450
Fax 707-255-6489
Contractor License #396352

June 1, 2022

473800 State Highway 12, Napa 94558 permit # E2200019 Ap # 047-380-009-000



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APPENDIX D

NAPA COUNTY GROUNDWATER RECHARGE ANALYSIS

Napa County Groundwater Recharge Analysis

Introduction

Developing accurate estimates of the spatial and temporal distribution of groundwater recharge is a key component of sustainable groundwater management. Efforts to quantify recharge are inherently difficult owing to the wide variability of factors controlling hydrologic processes, the wide range of available tools/methods for estimating recharge, and the difficulty in assessing the accuracy of estimates because direct measurement of recharge rates is, for the most part, infeasible (Healy 2010, Seiler and Gat 2007).

Numerical modeling is a common approach for developing recharge estimates. Soil-water-balance modeling is one category of numerical models particularly well-suited for estimating recharge across large areas with modest data requirements. This study describes an application of the U.S. Geological Survey's (USGS) Soil Water Balance Model (SWB) (Westenbroek et al. 2010) to develop spatial and temporal distributions of groundwater recharge across Napa County. This model operates on a daily timestep and calculates surface runoff based on the Natural Resources Conservation Service (NRCS) curve number method and potential evapotranspiration based on the Hargreaves-Samani methods (Hargreaves and Samani 1985). Actual evapotranspiration (AET) and recharge are calculated using a modified Thornthwaite-Mather soil-water-balance approach (Westenbroek et al. 2010).

It is important to note that the SWB model focuses on surface and soil-zone processes and does not simulate the groundwater system or track groundwater storage over time. The model also does not simulate surface water/groundwater interaction or baseflow; thus, the runoff estimates represent only the surface runoff component of streamflow resulting from rainstorms and the recharge estimates represent only the infiltration recharge component (also referred to as diffuse recharge) of total recharge (stream-channel recharge is not simulated).

This modeling work and summary report has been prepared by O'Connor Environmental, Inc., for it's private use in relation to Water Availability Analyses (WAA) prepared on behalf of private clients for projects using groundwater in "hillside" areas of Napa County as required by Napa Planning, Building & Environmental Services. The modeling to-date is complete in its current form but remains subject to revision; it is considered a working draft with information suitable for use to support WAA projects. Parties interested in obtaining more information regarding the modeling or who may wish to offer comments should contact O'Connor Environmental, Inc.

Model Development

The model was developed using a 30-meter (98.4 ft) resolution rectangular grid. Water budget calculations were made on a daily time step. Key spatial inputs included a flow direction map developed from the USGS 1 arc-second resolution Digital Elevation Model (DEM), a land cover map derived from the U.S. Forest Service (USFS) CALVEG dataset that was supplemented by a database of agricultural areas maintained by the County of Napa (Figure 1), a distribution of Hydrologic Soil Groups (A through D classification from lowest to highest runoff potential; Figure 2), and a distribution of Available Water Capacity (AWC) developed from the NRCS Soil Survey Geographic Database (SSURGO) (Figure 3).

A series of model parameters were assigned for each land cover type/soil group combination including an infiltration rate, a curve number, dormant and growing season interception storage values, and a rooting depth (Table 1).

Infiltration rates for hydrologic soil groups A through D were applied based on Cronshey et al. (1986) (Table 2) along with default soil-moisture-retention relationships based on Thornthwaite and Mather (1957) (Figure 4). Curve numbers were assigned based on standard NRCS methods. Interception storage values and rooting depths were assigned based on literature values and from previous modeling experience including a SWB model covering Sonoma County and calibrated using runoff volumes from several stream gages (OEI 2017).

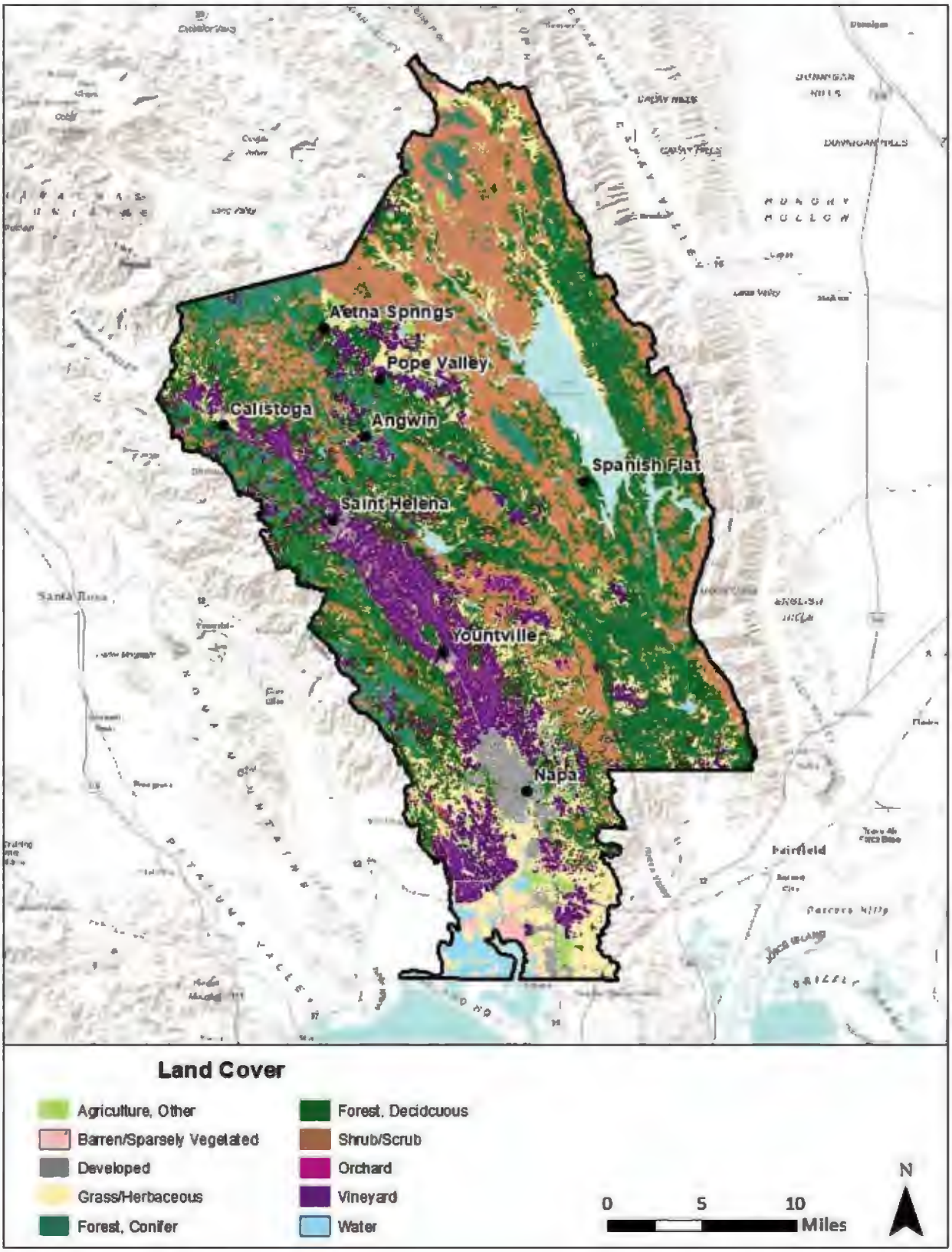

Figure 1: Land cover distribution used in the Napa County SWB model.

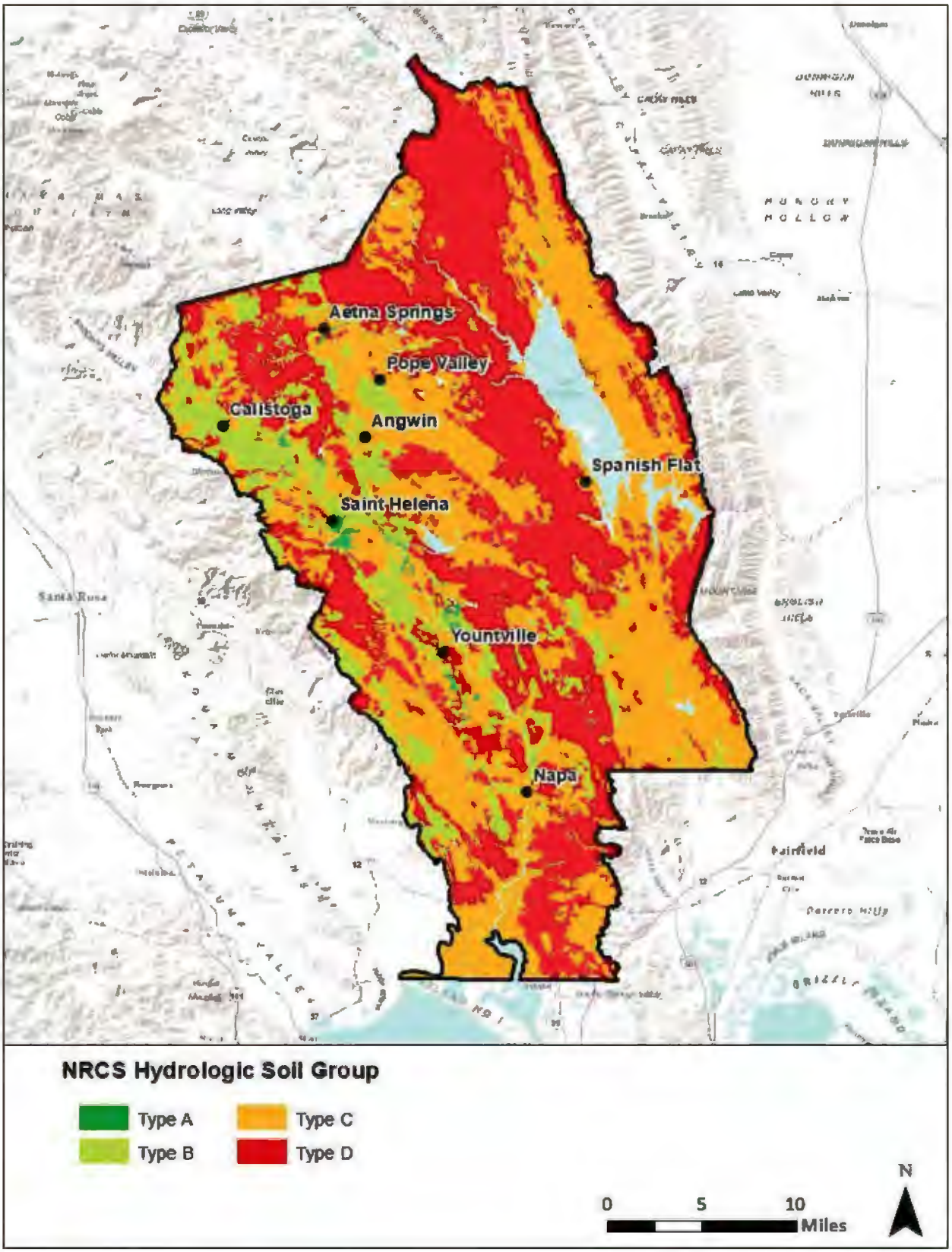

Figure 2: Hydrologic soil group distribution used in the Napa County SWB model.

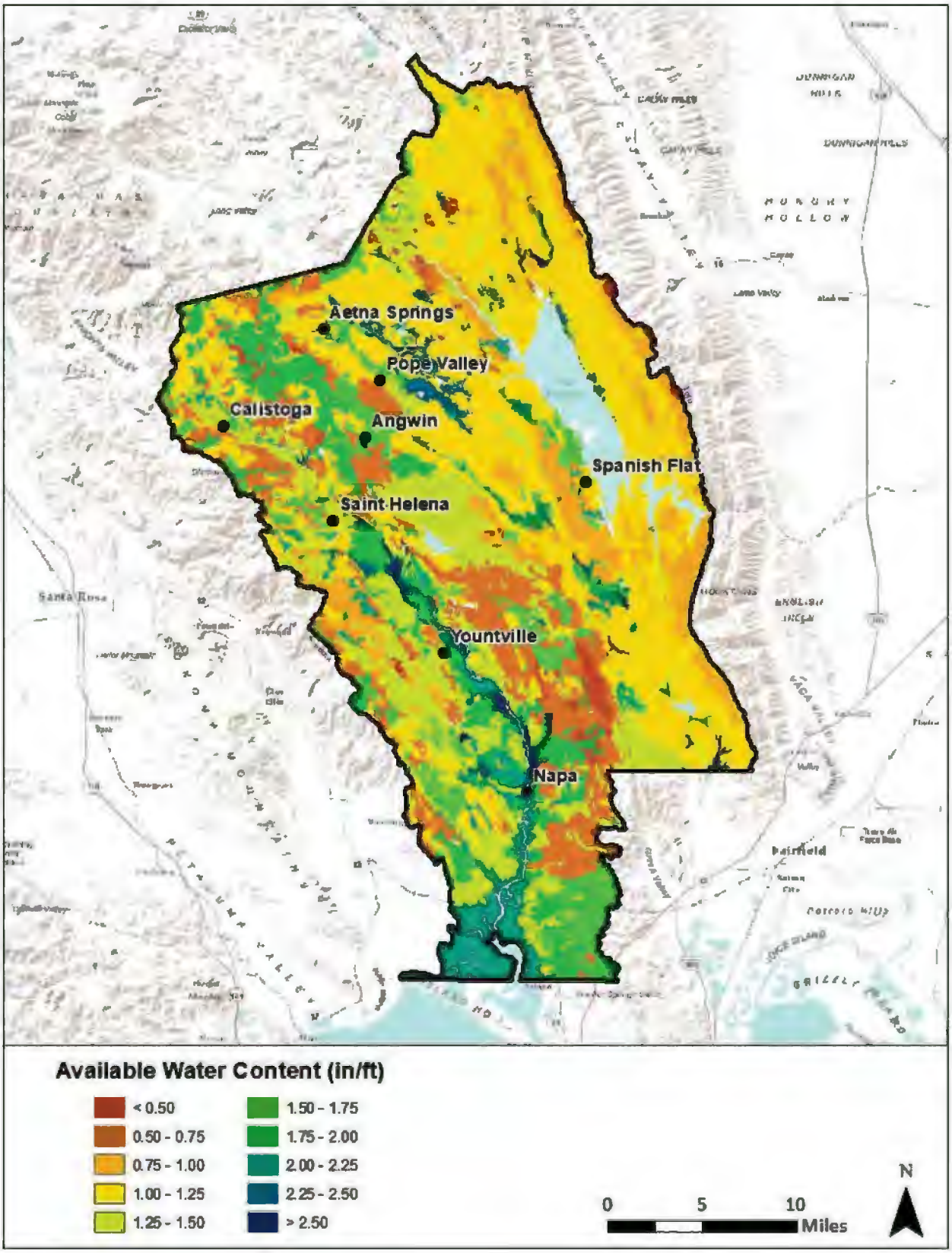

Figure 3: Available water capacity distribution used in the Napa County SWB model.

Table 1: Soil and land cover properties used in the Napa County SWB model.

Land Cover	Interception Storage Values ()		Curve Number by NRCS Soil Type ()				Rooting Depth by NRCS Soil Type (ft)			
	Growing Season	Dormant Season	Type A	Type B	Type C	Type D	Type A	Type B	Type C	Type D
Agriculture, Other	0.080	0.040	38	61	75	81	2.0	1.9	1.8	1.7
Barren	0.000	0.000	77	86	91	94	0.0	0.0	0.0	0.0
Developed	0.005	0.002	61	75	83	87	2.3	2.1	2.0	1.8
Grassland/Herbaceous	0.005	0.004	30	58	71	78	1.3	1.1	1.0	1.0
Forest, Coniferous	0.050	0.050	30	55	70	77	5.9	5.1	4.9	4.7
Forest, Deciduous	0.050	0.020	30	55	70	77	5.9	5.1	4.9	4.7
Shrub/Scrub	0.080	0.015	30	48	65	73	3.2	2.8	2.7	2.6
Orchard	0.050	0.015	38	61	75	81	3.2	2.8	2.7	2.6
Vineyard	0.080	0.015	38	61	75	81	2.2	2.1	2.0	1.9
Water	0.000	0.000	100	100	100	100	0.0	0.0	0.0	0.0

Table 2: Infiltration rates for NRCS hydrologic soil groups (Cronshey et al. 1986).

Soil Group	Infiltration Rate (in/hr)
A	> 0.3
B	0.15 - 0.3
C	0.05 - 0.15
D	<0.05

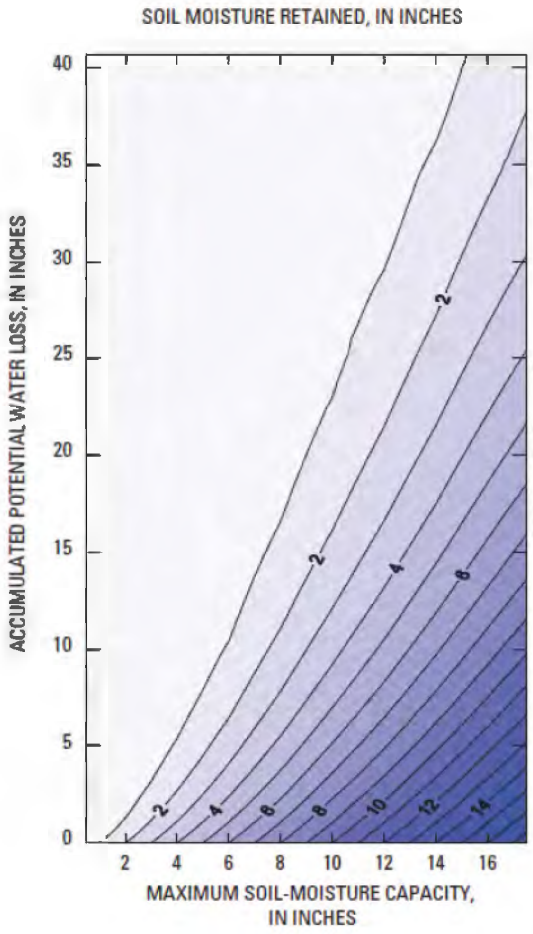

Figure 4: Soil-moisture-retention table (Thornthwaite and Mather 1957).

The SWB model utilizes daily precipitation and mean daily temperature data derived from climate stations. To account for the spatial variability of these parameters, daily precipitation and mean daily temperature were input as gridded (spatially-distributed) time-series. The gridded precipitation time-series was created using data from 15 weather stations in Napa County, and the gridded mean temperature time-series was created using data from 8 stations (Table 3). These stations were selected based on completeness of the records and to provide station data representative of the range of climates experienced in the county. Data was obtained from the California Data Exchange Center (CDEC), the National Climatic Data Center (NCDC), and from Napa One Rain.

To create the gridded time-series, the model domain was divided into discrete areas represented by individual weather stations (Figures 5 and 6). This delineation was based on climate variations described by existing gridded mean annual (1981-2010) precipitation and temperature data (PRISM 2010) and local knowledge of climatic variations across the county.

For the precipitation time-series, each area representing a weather station was subdivided into four to twenty-three zones based on 1-inch average annual precipitation contours. Within each zone the raw station data was multiplied by a unique scaling factor. This scaling factor was calculated as the ratio of average annual precipitation within a zone to average annual precipitation at the representative rain gage. In certain locations, typically near the boundary of areas represented by gages located on the valley bottom and at higher elevations, this scaling was unable to smoothly resolve differences in annual and event precipitation totals. To more accurately estimate precipitation near these boundaries, precipitation records from the two gages in question were averaged using weights calculated proportionally to the difference between PRISM mean annual precipitation at a rain gage and within a selected zone. The resulting gridded time-series is comprised of 220 individual time-series based on the scaled station data from 15 stations.

The assignment of temperature stations was based on the understanding that the spatial variability of temperatures across Napa County is relatively homogenous, with elevation being the primary variable. Temperature records were classified either as Mountain, Valley Bottom, or East County and applied within areas the PRISM datasets described as being similar. To smooth the transition from Mountain zones to Valley Bottom and East County zones, Hillside zones were created where the temperature records of the two nearest gages were averaged.

Missing and suspect data was encountered in the raw precipitation and temperature data from the weather stations used by the model. Values that were significantly outside the typical range, and where similar observations were not found at nearby stations, were removed from the datasets. These and missing values were filled using scaled data from other nearby stations. Precipitation data used for gap filling was scaled using the ratio of the 1981 to 2010 mean annual precipitation (PRISM 2010) between the two stations. Temperature data was scaled using the ratio of the 1981 to 2010 mean monthly minimum and maximum temperatures (PRISM 2010) between the two stations.

The current analysis focuses on Water Year 2010 (October 1, 2009 – September 30, 2010) and Water Year 2014 (October 1, 2013 – September 30, 2014). These years were selected because they represent periods with data available from most weather stations in the county and where most stations reported annual precipitation totals close to the long-term average (WY 2010) and significantly below the long term average (WY 2014). Based on a comparison between station data and PRISM average precipitation depths during Water Year 2010, rainfall averaged 101% of long-term average conditions and ranged from 78% at Lake Hennessey to 111% at the Napa County Airport. In Water Year 2014, rainfall averaged 55% of long-term average conditions and ranged from 41% at Lake Hennessey to 73% at the Napa State Hospital (Table 3).

Table 3: Weather stations used in the Napa County SWB model. See Figures 7- 9 for associated timeseries.

Station	Data Used	1981 - 2010 Mean Annual Precip (in)	WY 2010		WY 2014	
			Precip (in)	% Avg	Precip (in)	% Avg
Angwin[1]	Precip & Temp	42.54	44.64	105%	25.04	59%
Atlas Peak[1]	Precip & Temp	41.76	39.04	93%	20.08	48%
Berryessa[1]	Precip & Temp	28.97	28.16	97%	13.97	48%
Calistoga[2]	Precip	39.41	41.75	106%	18.18	46%
Knoxville Creek[1]	Temp Only	-	-	-	-	-
Lake Hennessey[3]	Precip Only	34.09	26.52	78%	13.92	41%
Mt. George[3]	Precip Only	31.15	29.64	95%	18.24	59%
Mt. Veeder[3]	Precip Only	44.81	46.44	104%	28.6	64%
Napa County Airport[2]	Precip & Temp	21.14	23.56	111%	9.87	47%
Napa River at Yountville Cross Rd[3]	Precip Only	31.86	32.72	103%	14.93	47%
Napa State Hospital[2]	Precip & Temp	26.81	28.85	108%	19.66	73%
Petrified Forest[3]	Precip Only	42.39	46.6	110%	22.84	54%
Redwood Creek At Mt. Veeder Road[3]	Precip Only	34.71	37.36	108%	23.48	68%
Saint Helena[2]	Precip & Temp	37.43	39.11	104%	19.11	51%
Saint Helena 4WSW[1]	Precip & Temp	45.44	47.88	105%	28.88	64%
Sugarloaf Peak[3]	Precip Only	32.20	26.16	81%	17.12	53%

1 – Data accessed from California Data Exchange Center (CDEC)
2 – Data accessed from National Climate Data Center (NCDC)
3 – Data access from Napa One Rain

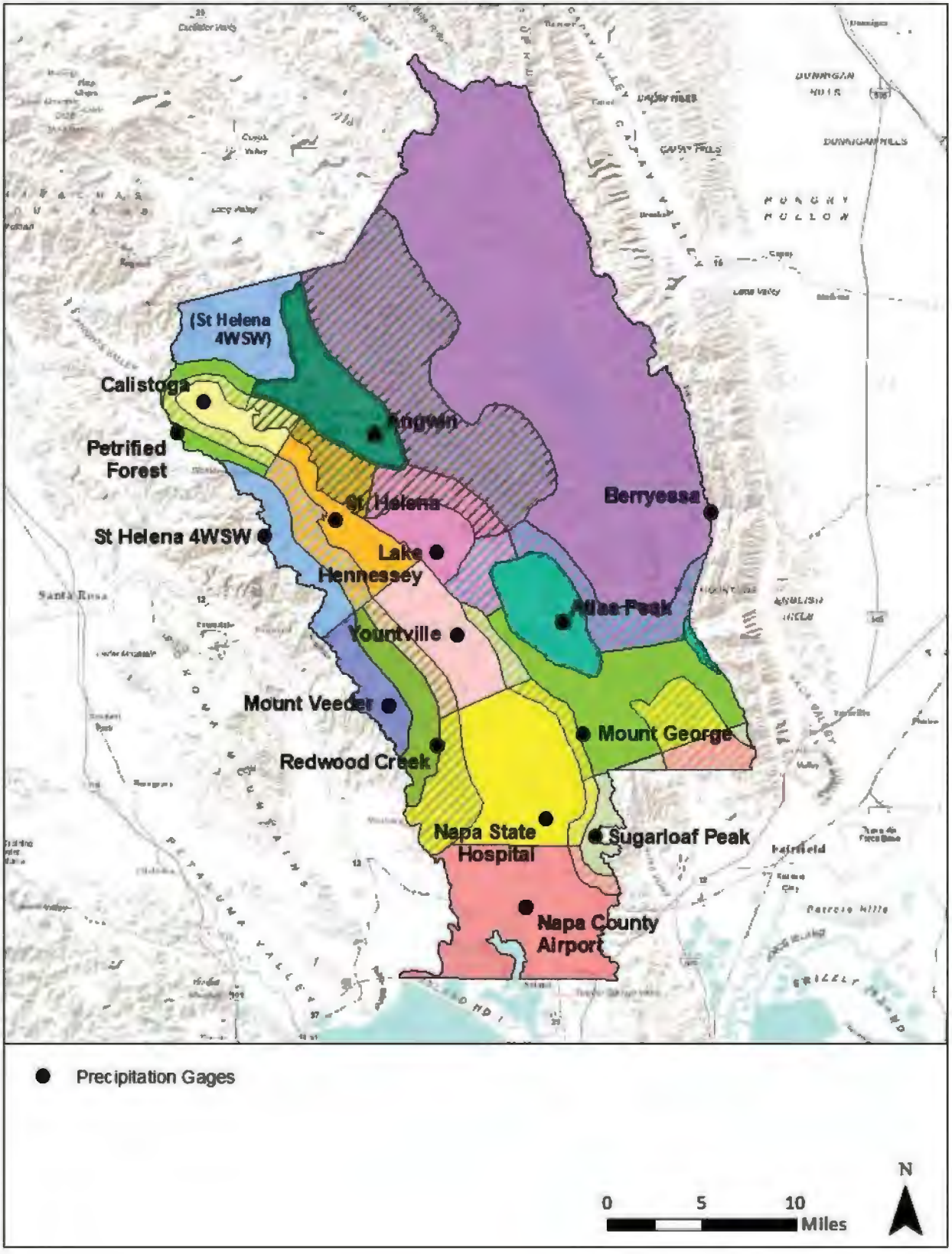

Figure 5: Precipitation zones used in the Napa County SWB model. Hatching indicates areas where two precipitation records were averaged across a zone.

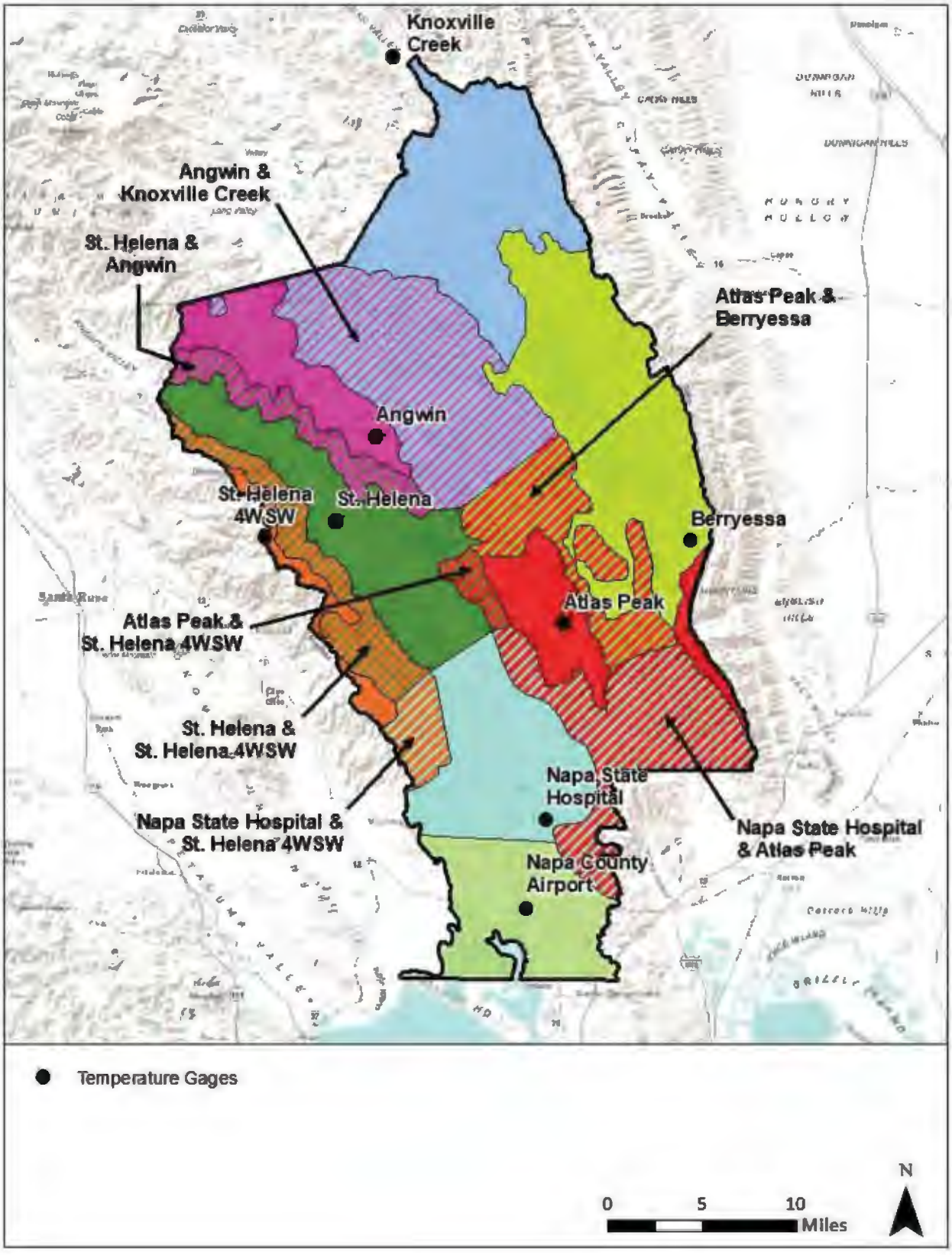

Figure 6: Temperature zones used in the Napa County SWB model. Hatching indicates areas where two temperature records were averaged across a zone.

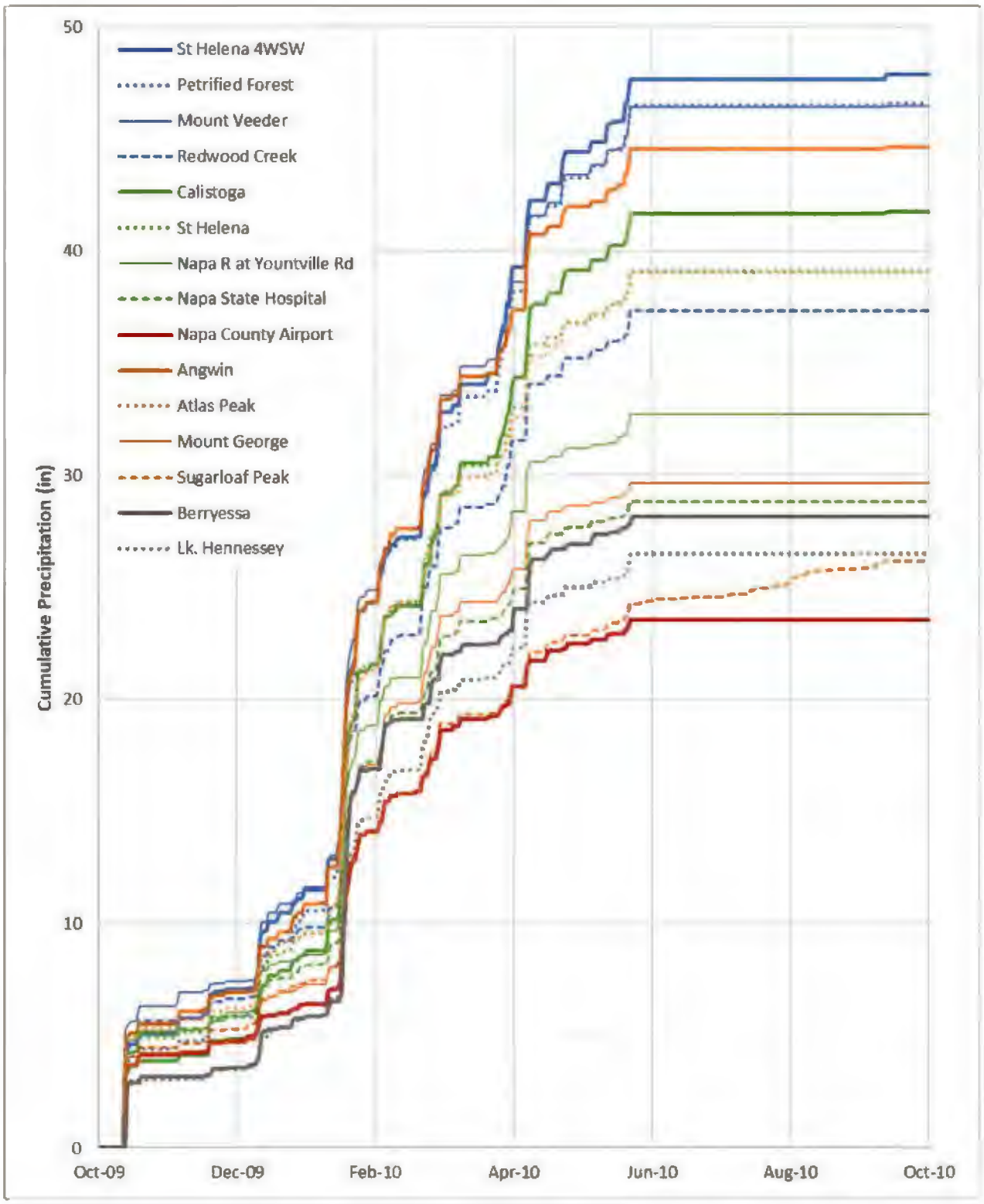

Figure 7a: Daily precipitation data used in the Napa County SWB model for WY 2010.

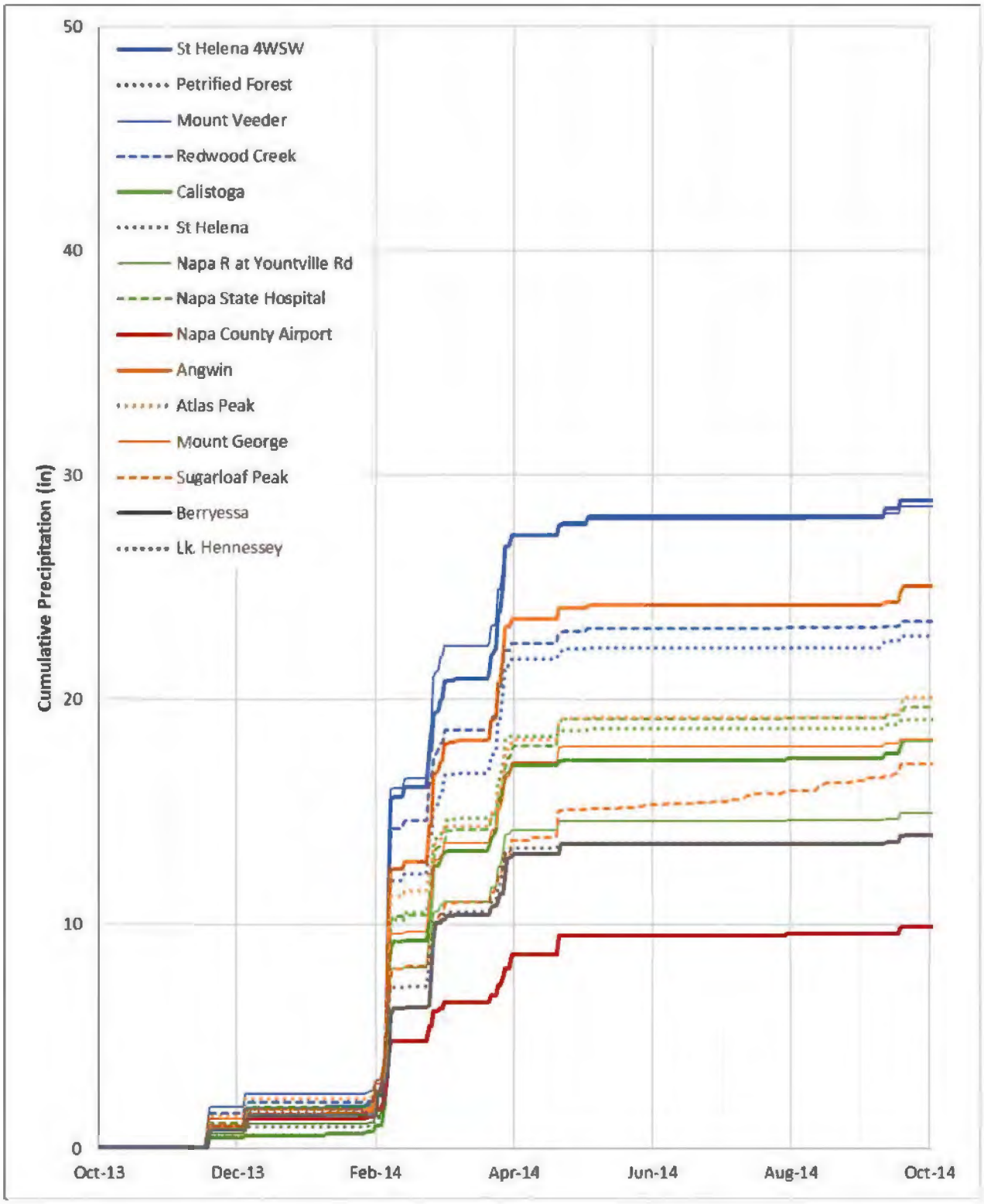

Figure 7b: Daily precipitation data used in the Napa County SWB model for WY 2014.

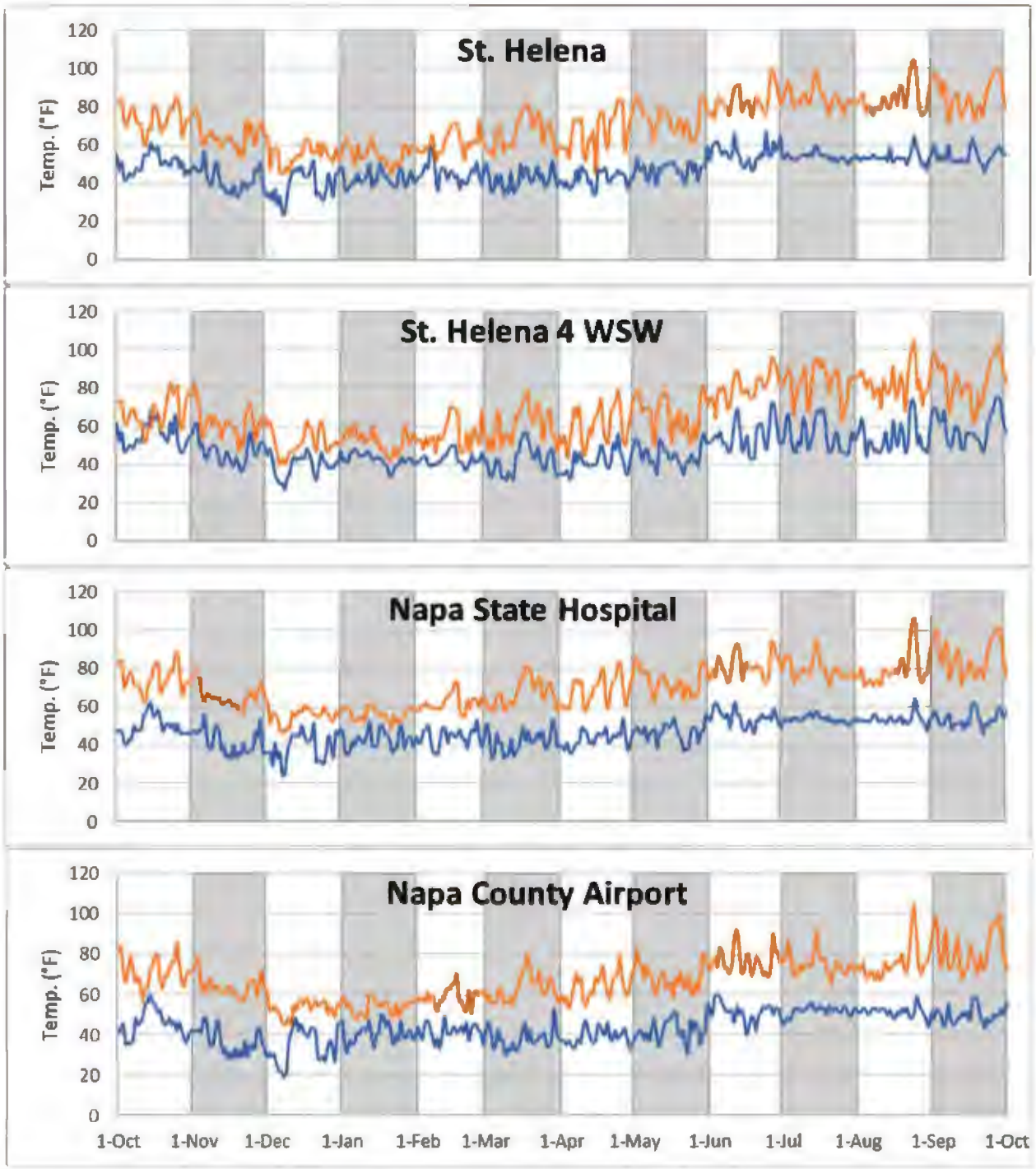

Figure 8: Daily minimum and maximum temperature data used in the Sonoma County SWB model for WY 2010.

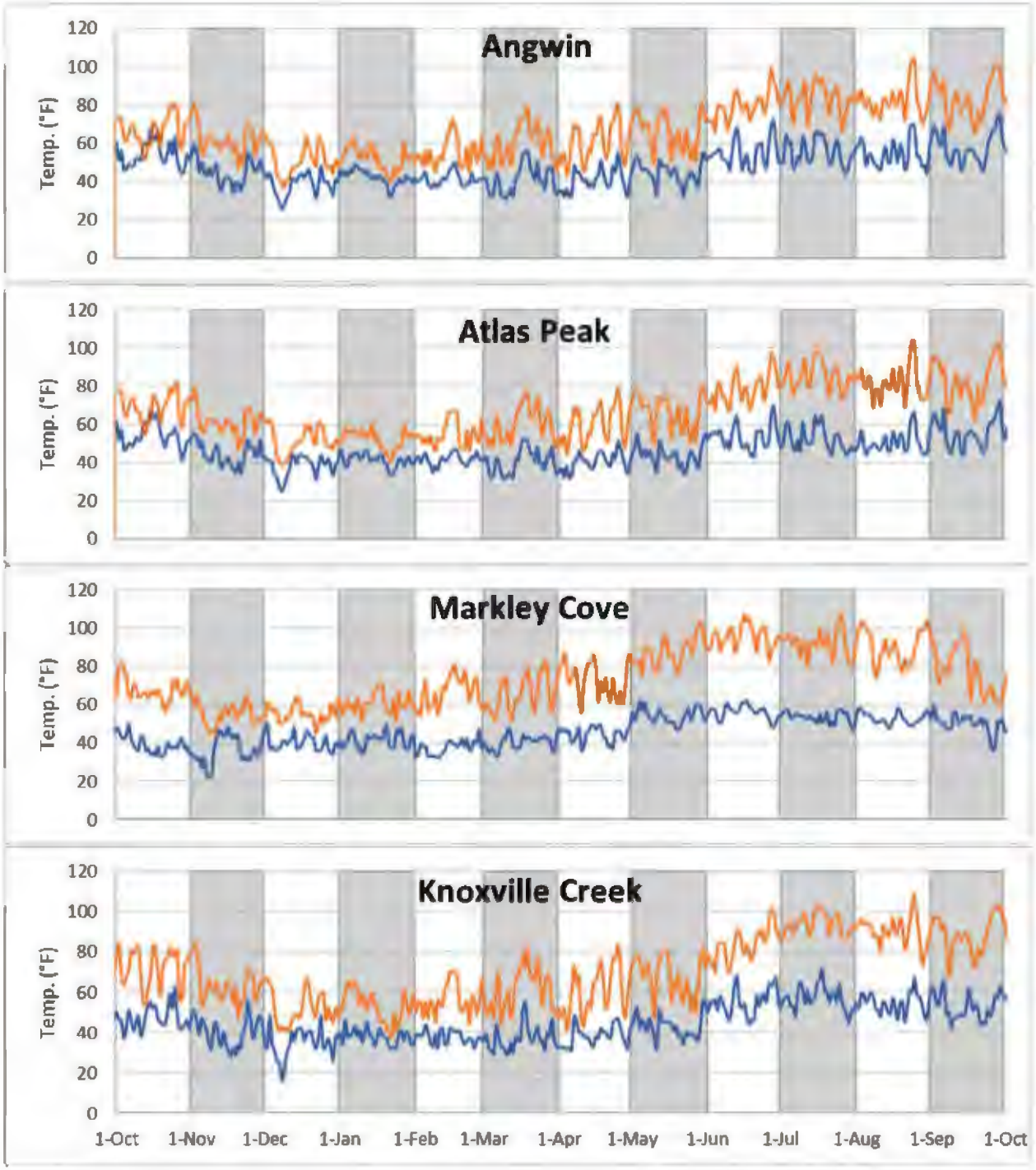

Figure 8 – cont.

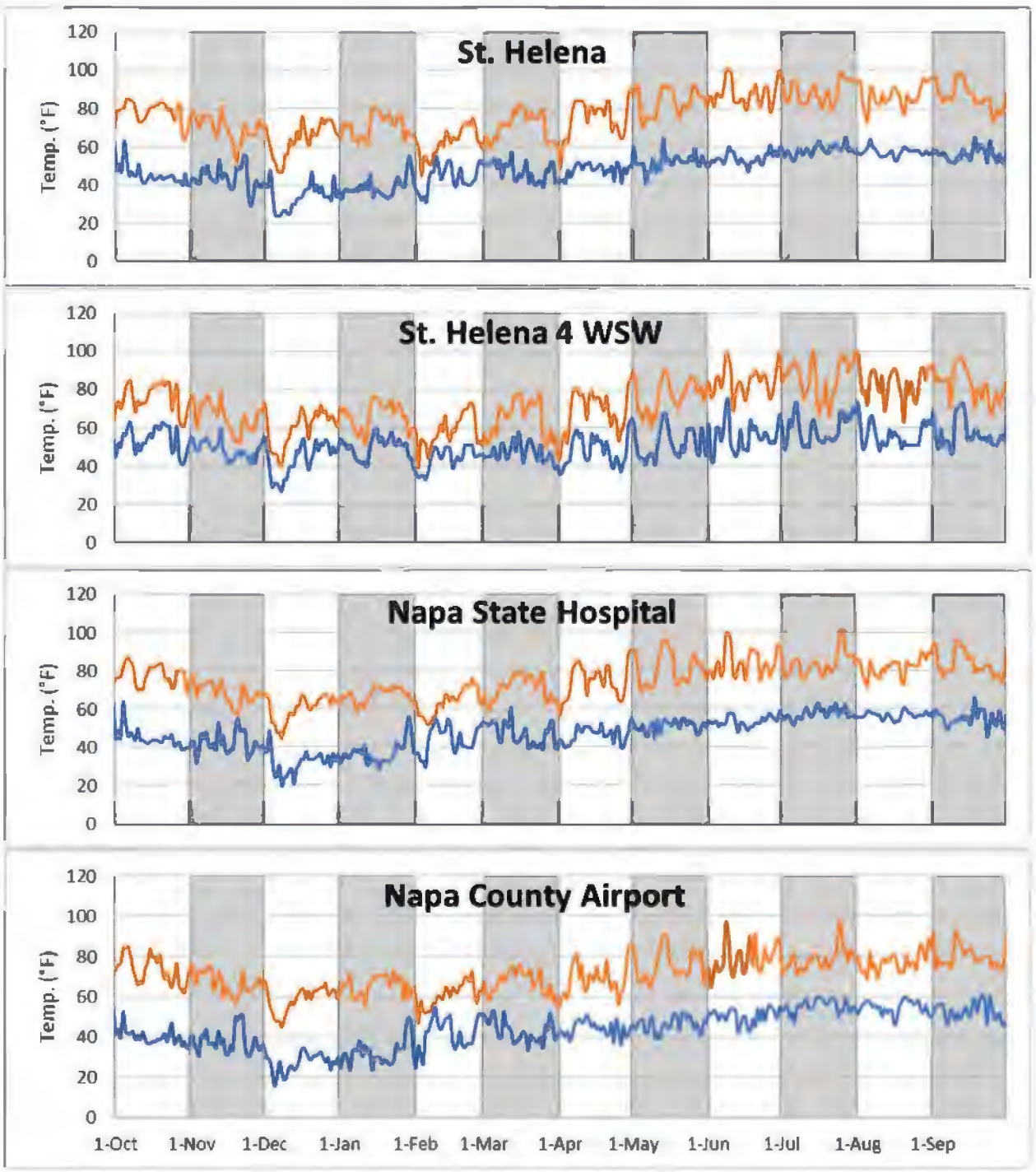

Figure 9: Daily minimum and maximum temperature data used in the Sonoma County SWB model for WY 2010.

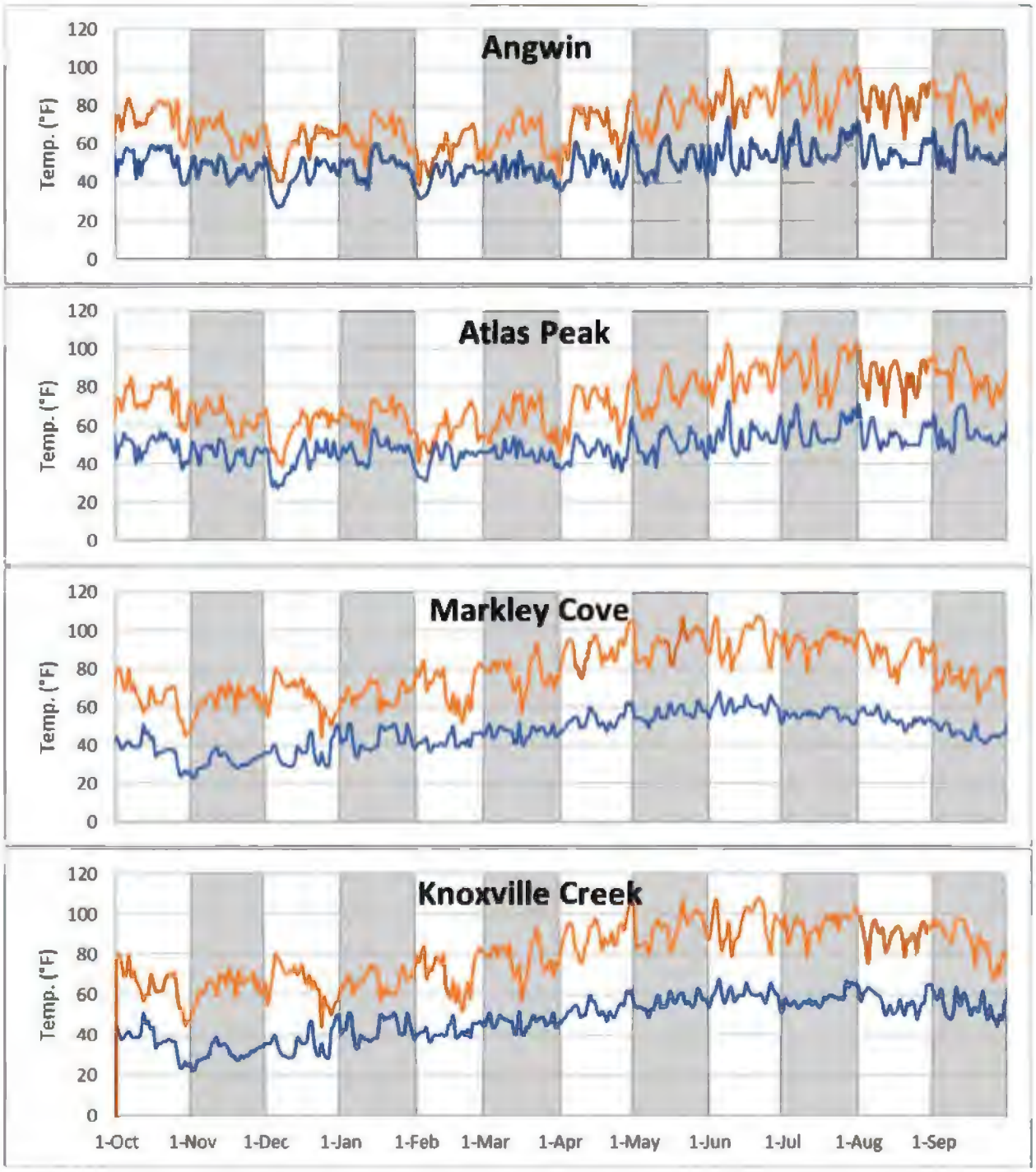

Figure 9 – cont.

Model Calibration

Available data are insufficient to calibrate the Water Year 2010 and 2014 SWB simulations; however, the land cover and soil properties used in the model were obtained from a previously prepared and calibrated SWB model of Sonoma County (OEI 2017). The Sonoma County model was calibrated against total monthly runoff volumes derived using baseflow separation of streamflow data for five watersheds within Sonoma County. Gages were selected because they represented relatively small watersheds (1.2 – 14.3 mi^2) without significant urbanization, diversions, groundwater abstraction, reservoir impoundments, or large alluvial bodies where significant exchanges between surface water and groundwater may be expected. These attributes are desirable because the hydrographs can more readily be separated into surface runoff and baseflow components and the surface runoff pattern is more directly comparable to the SWB simulated surface runoff which does not account for water use, reservoir operations, or surface water/groundwater exchange.

SWB utilizes a simplified routing scheme whereby surface runoff is routed to downslope cells or out of the model domain on the same day in which it originates as rainfall, thus it is not capable of accurately estimating streamflow over short time periods. The use of the total monthly surface runoff volumes provided a means of calibrating the Sonoma County SWB model to measured surface runoff data within the limitations of the model's approach to simulating surface runoff.

The SWB model of Sonoma County reproduced seasonal variations in surface runoff in all five calibration watersheds. Monthly Mean Errors (ME) ranged from -0.2 to 0.4 inches with a mean value of 0.1 inches. Annual surface runoff totals ranged from an under-prediction of approximately 10% at Franchini Creek to an over-prediction of approximately 19% at Buckeye Creek, with a mean over-prediction of approximately 6% across the five watersheds. These results indicate that the SWB model was able to reproduce monthly surface runoff volumes with a reasonable degree of accuracy and that the model tends to over-predict surface runoff somewhat, suggesting that the model may generate a low-range estimate of recharge.

Although the climate in Napa County is slightly drier than in Sonoma County, the vegetation, soils, and geology are similar and parameters calibrated using data from Sonoma County should be applicable to Napa County. Calibration of the Napa County SWB model was not performed due to a lack of publicly-available contemporary discharge records in suitable watersheds. Contemporary discharge records exist for USGS gaging stations located along the Napa River near St. Helena and Napa, but the watersheds above these gages are large and contain significant groundwater abstraction, reservoir impoundments, and alluvial bodies. USGS gages on smaller watersheds in Napa County have been inactive since 1983 or earlier. Discharge records exist through Napa One Rain for several streams gaged by the Napa County Resource Conservation District (RCD) but the RCD has cautioned against use of these discharge records for calibration purposes due to incomplete rating curve development.

Estimates of groundwater recharge are also available from an earlier model prepared by Luhdorff and Scalmanini Engineers and MBK Engineers (LSCE 2013). This report provided estimates of average annual recharge as a percentage of average annual precipitation for nine watersheds in Napa County. Averaged across the same nine watersheds, the SWB model predicts significantly higher rates of recharge than the model prepared by LSCE, which predicts slightly lower AET but significantly more runoff (Table 4). Differences in methodology between these two models complicate direct comparisons. The LSCE model calculated infiltration into the soil as the difference between monthly precipitation and discharge volumes within each watershed. Discharge volumes were calculated from USGS stream gages and included both direct runoff and baseflow from groundwater. Inclusion of baseflow with direct runoff in these calculations may inappropriately reduce the estimated volume of water infiltrated into the soil and available for recharge.

Table 4: Comparison of results from SWB model and Luhdorff and Scalmanini model.

USGS Gage	HUC	Mean Precip, 2010 (in)	Mean AET, 2010 (% Precip)		Mean Runoff, 2010 (% Precip)		Mean Recharge, 2010 (% Precip)	
			SWB	LSCE	SWB	LSCE	SWB	LSCE
Conn Ck nr Oakville	11456500	34.8	59%	53%	21%	25%	21%	21%
Dry Ck nr Napa	11457000	41.5	56%	50%	18%	43%	25%	6%
Milliken Ck nr Napa	11458100	32.3	52%	41%	20%	51%	28%	8%
Napa Ck at Napa	11458300	36.6	61%	43%	16%	46%	23%	11%
Napa R nr Napa	11458000	39.5	56%	48%	20%	35%	24%	17%
Napa R nr St Helena	11456000	47.9	46%	45%	23%	42%	30%	14%
Redwood Ck nr Napa	11458200	39.6	53%	49%	26%	40%	22%	10%
Tulucay Ck nr Napa	11458300	27.0	64%	49%	16%	47%	20%	5%

Model Results

The principal elements of the annual water budget simulated with the Napa County SWB model for Water Years 2010 and 2014 are presented in map form in Figures 10 - 19 and in tabular form for 27 major watershed areas in Napa County (Tables 5 - 8). The watersheds are based on USGS HUC-12 watersheds and are named for the stream which comprises the largest proportion of the area; in many cases the areas consist of multiple tributary streams (Figure 20).

In Water Year 2010 (representing "average" hydrologic conditions) precipitation varied from 21.8 inches in the Ledgewood Creek watershed to 53.3 inches in the Saint Helena Creek watershed (Figure 10, Table 5). Actual evapotranspiration (AET) ranged from 13.4 inches in the Jackson Creek watershed to 25.2 inches in the Saint Helena Creek watershed (Figure 11). Surface runoff ranged from 3.4 inches in the Ledgewood Creek watershed to 13.5 inches in the Saint Helena Creek watershed (Figure 12). Recharge ranged from 3.3 inches in the Ledgewood Creek watershed to 14.4 inches in the Saint Helena watershed. (Figure 13). Small decreases in soil moisture storage (up to 1.8 inches) occurred in most watersheds, with changes in most

watersheds being less than an inch (Figure 14). Note that the San Pablo Bay estuaries have been excluded from these comparisons.

Expressed as a percentage of the annual precipitation, AET ranged from 77% in the Ledgewood Creek watershed to 45% in the Jackson Creek watershed (Table 6). Surface runoff ranged from 15% of precipitation in the Ledgewood Creek watershed to 42% in the Jackson Creek watershed. Recharge ranged from 10% of the precipitation in the Jackson Creek watershed to 27% in the Saint Helena watershed.

In Water Year 2014 (representing "dry" hydrologic conditions during the second year of an extreme three-year drought) precipitation varied from 10.1 inches in the American Canyon Creek watershed to 32.2 inches in the Saint Helena Creek watershed (Figure 15, Table 7). Actual evapotranspiration (AET) ranged from 10.3 inches in the Jackson Creek watershed to 17.8 inches in the Saint Helena Creek watershed (Figure 16). Surface runoff ranged from 0.7 inches in the American Canyon Creek watershed to 13.2 inches in the Saint Helena Creek watershed (Figure 17). Recharge ranged from 0.6 inches in the Wragg Canyon watershed to 4.1 inches in the Saint Helena watershed. (Figure 18). Large decreases in soil moisture storage of between 2.3 and 4.3 inches were also simulated (Figure 19).

Expressed as a percentage of the annual precipitation, AET ranged from 55% in the Saint Helena Creek watershed to 121% in the Jackson Creek watershed (Table 8). These very large AET rates caused significant decreases in soil moisture. Decreases in soil moisture ranged from 9% of precipitation in the Saint Helena watershed to 36% in the American Canyon Creek watershed. Surface runoff ranged from 7% of precipitation in the American Canyon Creek watershed to 41% in the Saint Helena Watershed. Recharge ranged from 18% in the Milliken Creek Watershed to 5% in the Jackson Creek and Wragg Canyon watersheds.

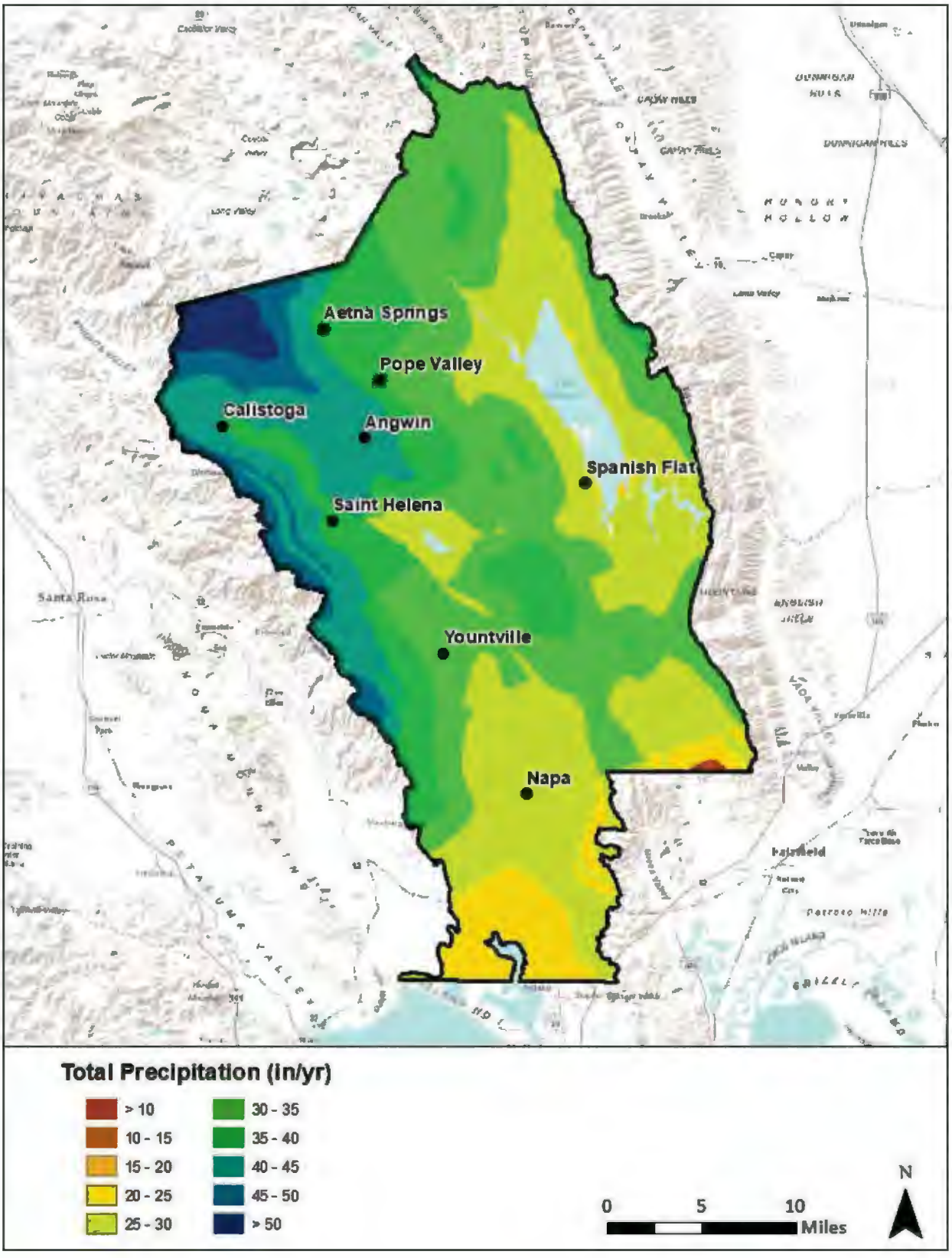

Figure 10: Water Year 2010 precipitation simulated with the Napa County SWB model.

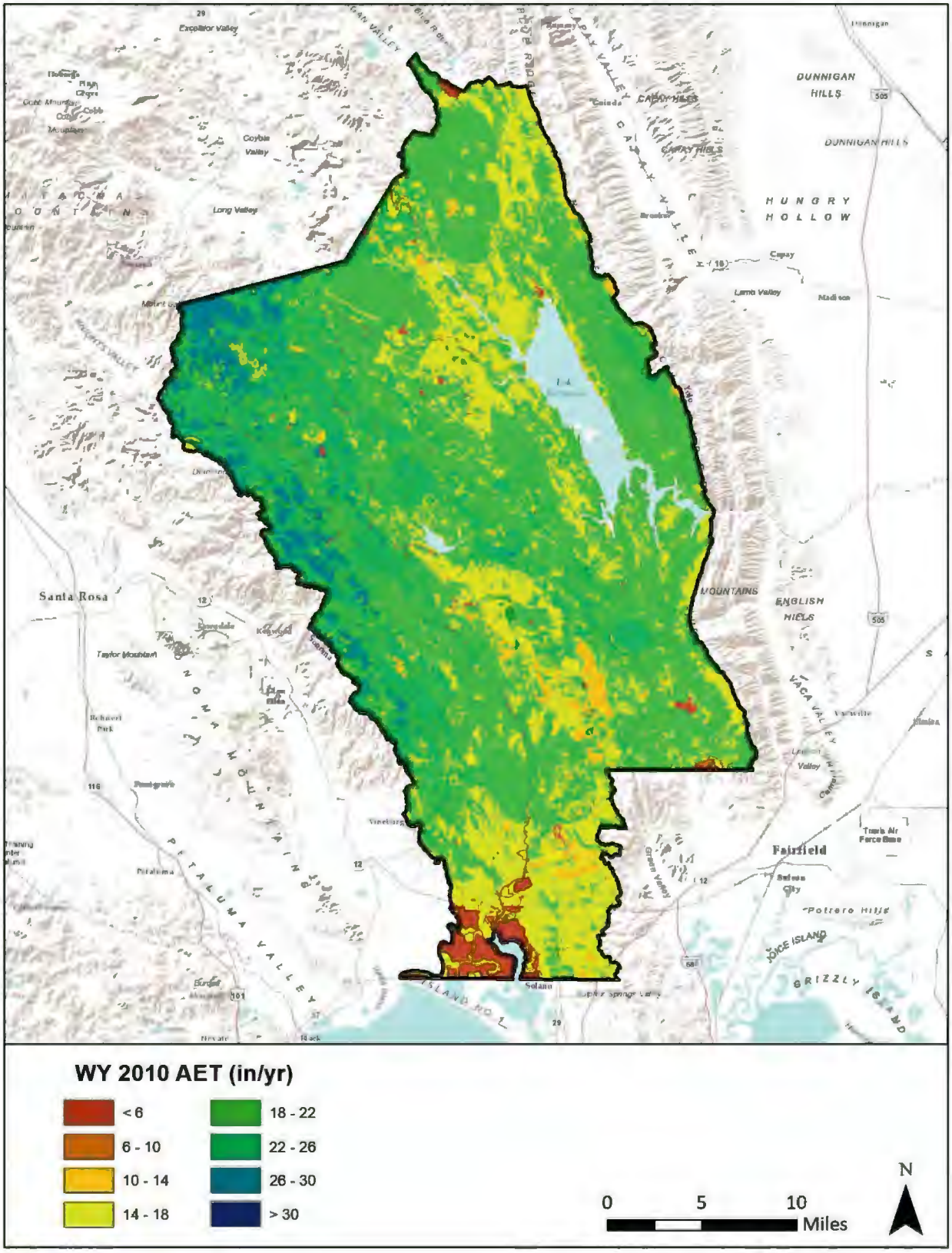

Figure 11: Water Year 2010 AET simulated with the Napa County SWB model.

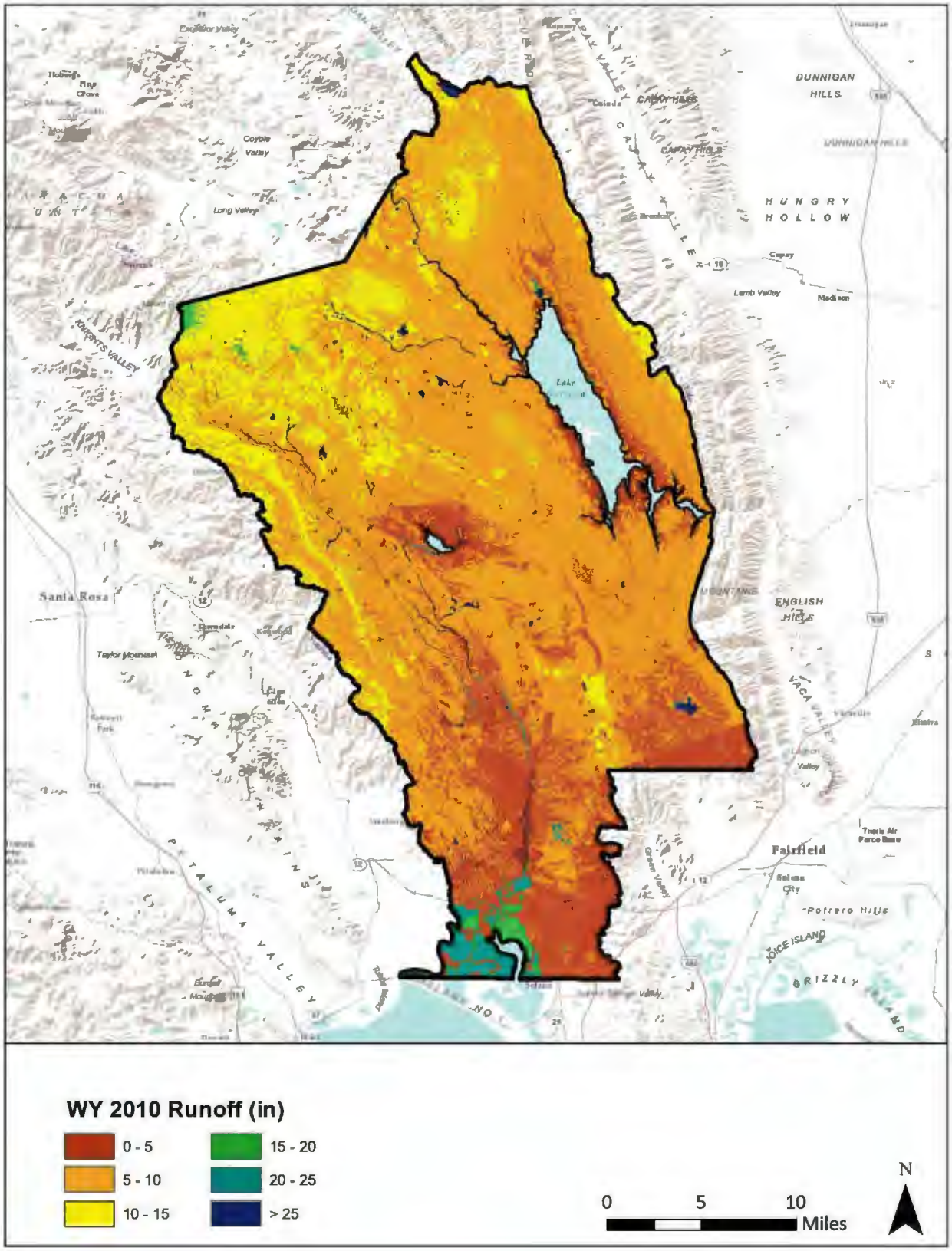

Figure 12: Water Year 2010 runoff simulated with the Napa County SWB model.

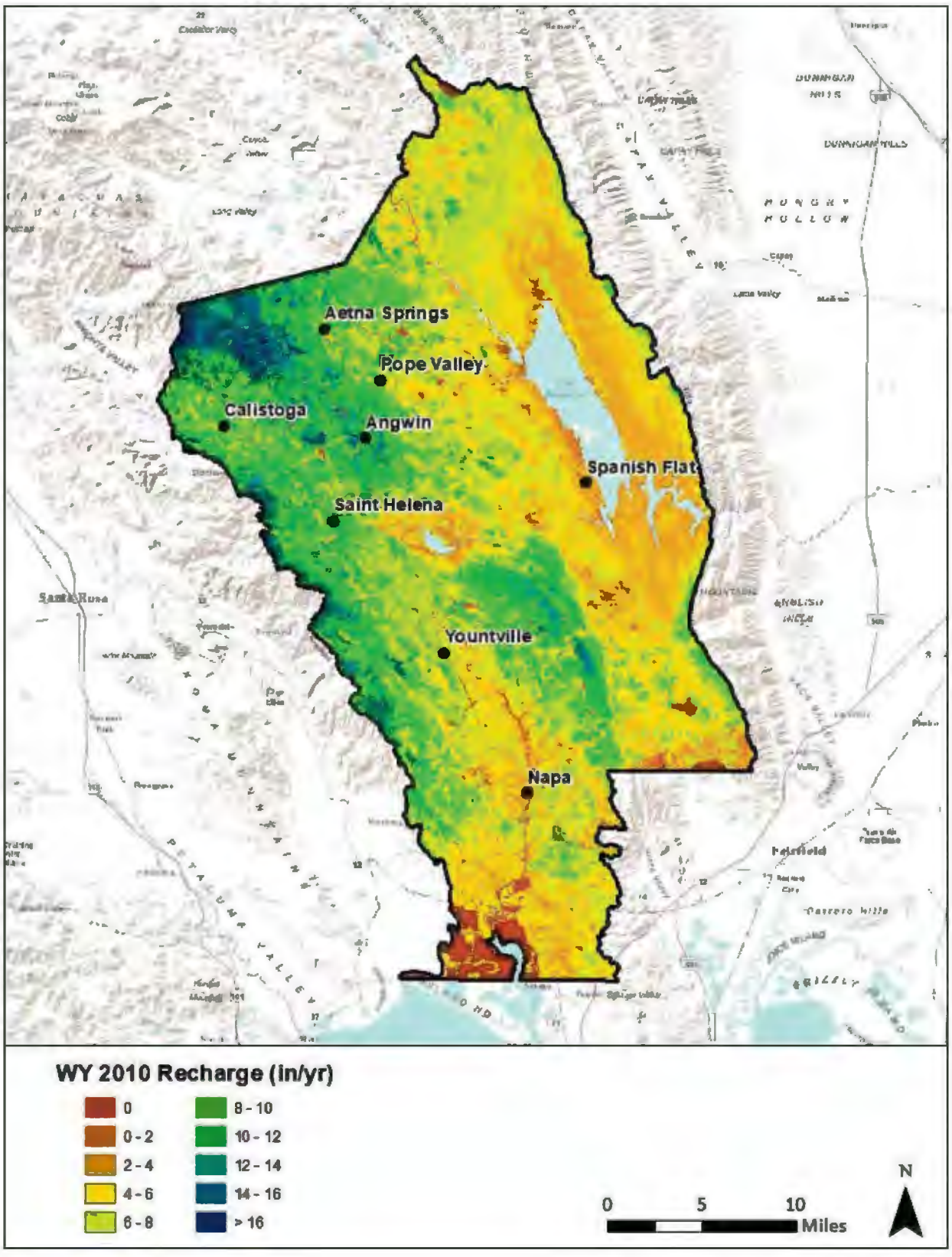

Figure 13: Water Year 2010 recharge simulated with the Napa County SWB model.

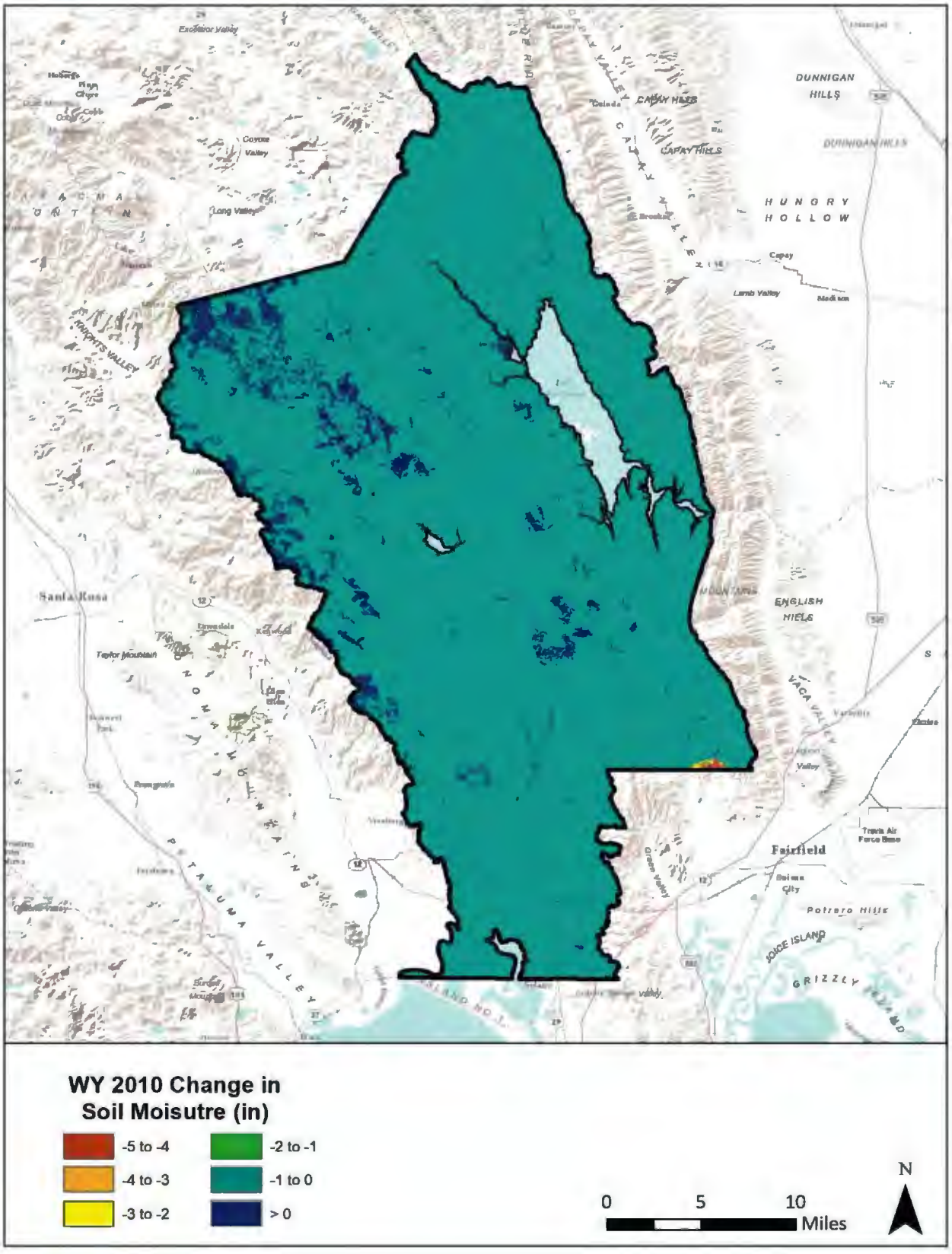

Figure 14: Water Year 2010 change in soil moisture content simulated with the Napa County SWB model.

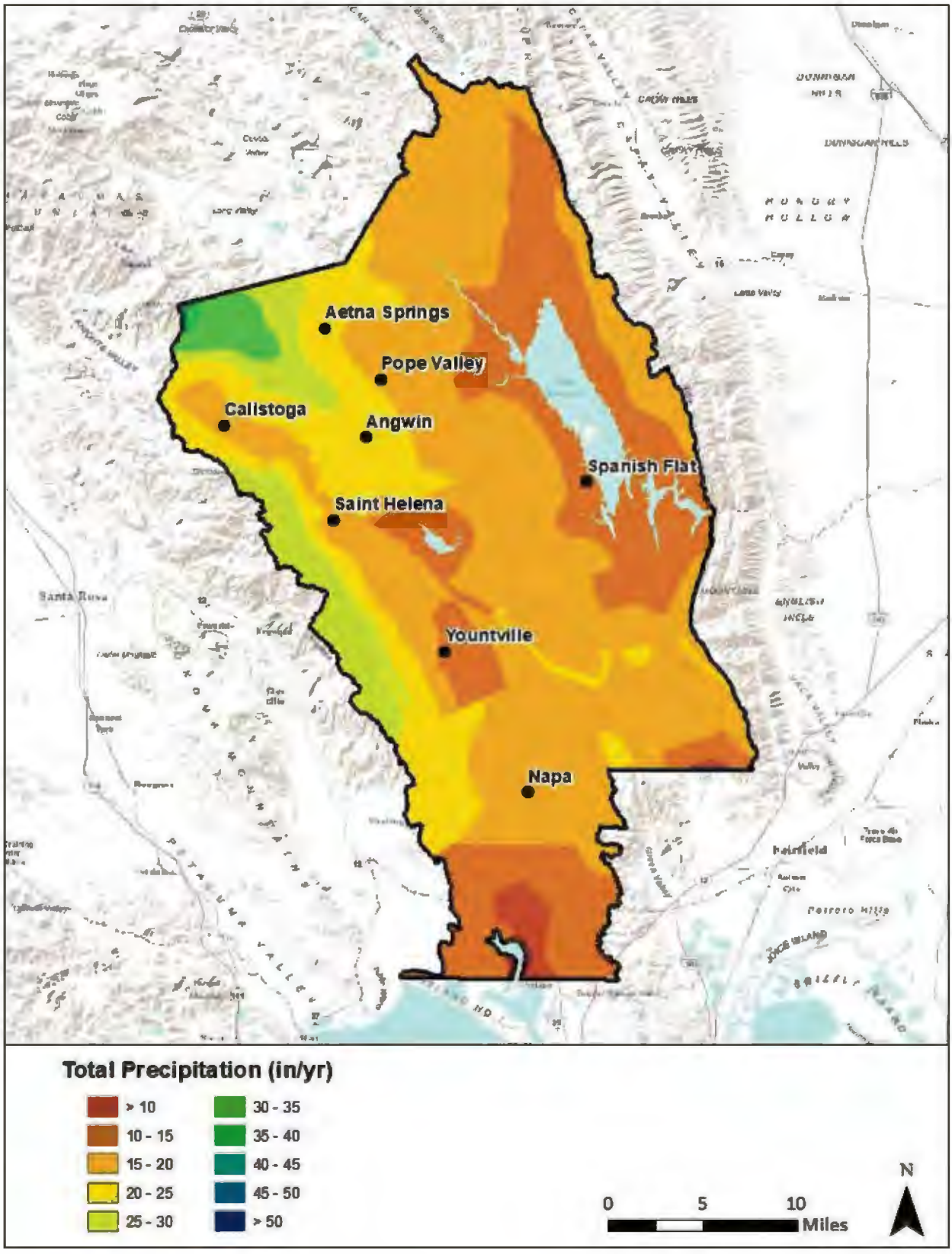

Figure 15: Water Year 2014 precipitation simulated with the Napa County SWB model.

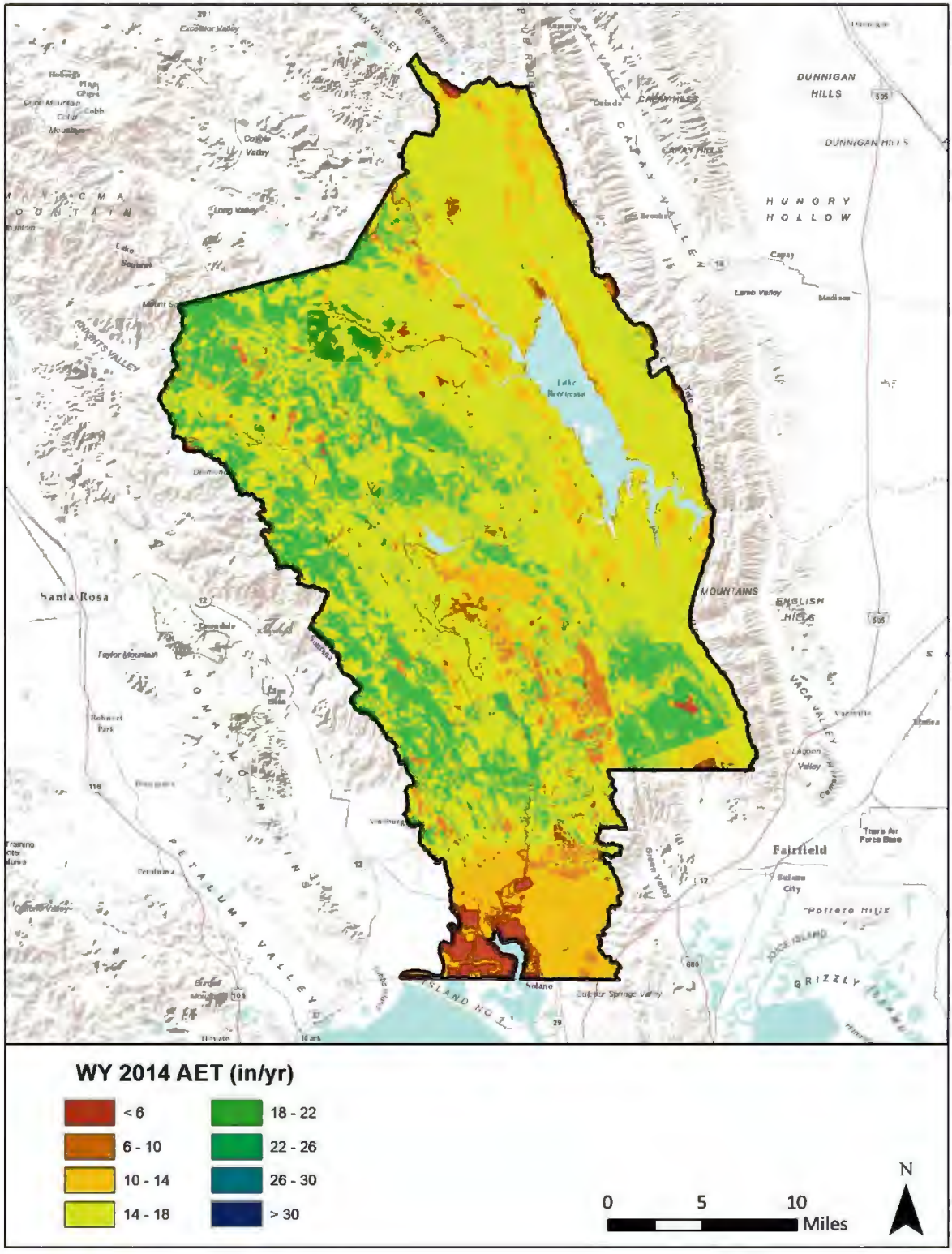

Figure 16: Water Year 2014 AET simulated with the Napa County SWB model.

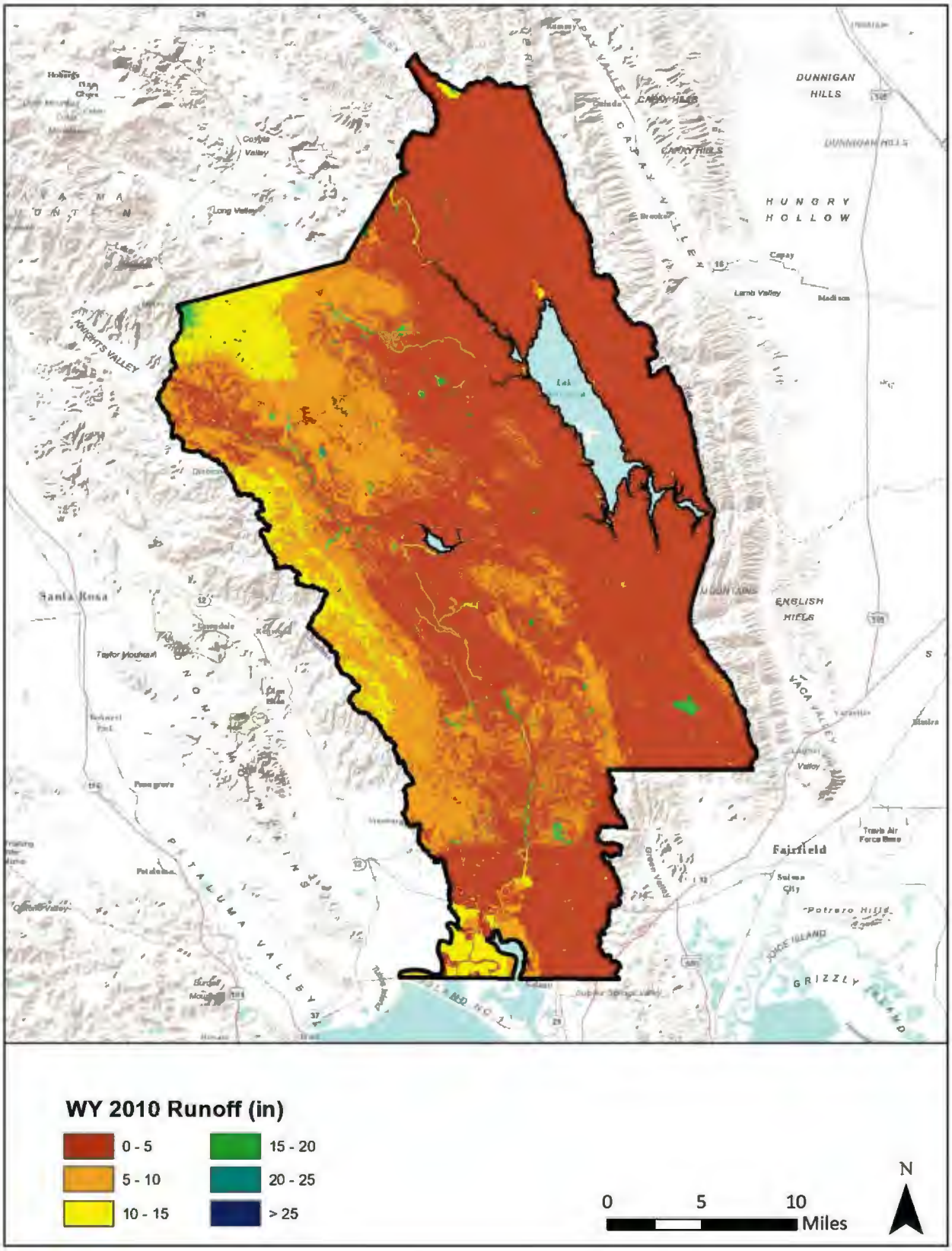

Figure 17: Water Year 2014 recharge simulated with the Napa County SWB model.

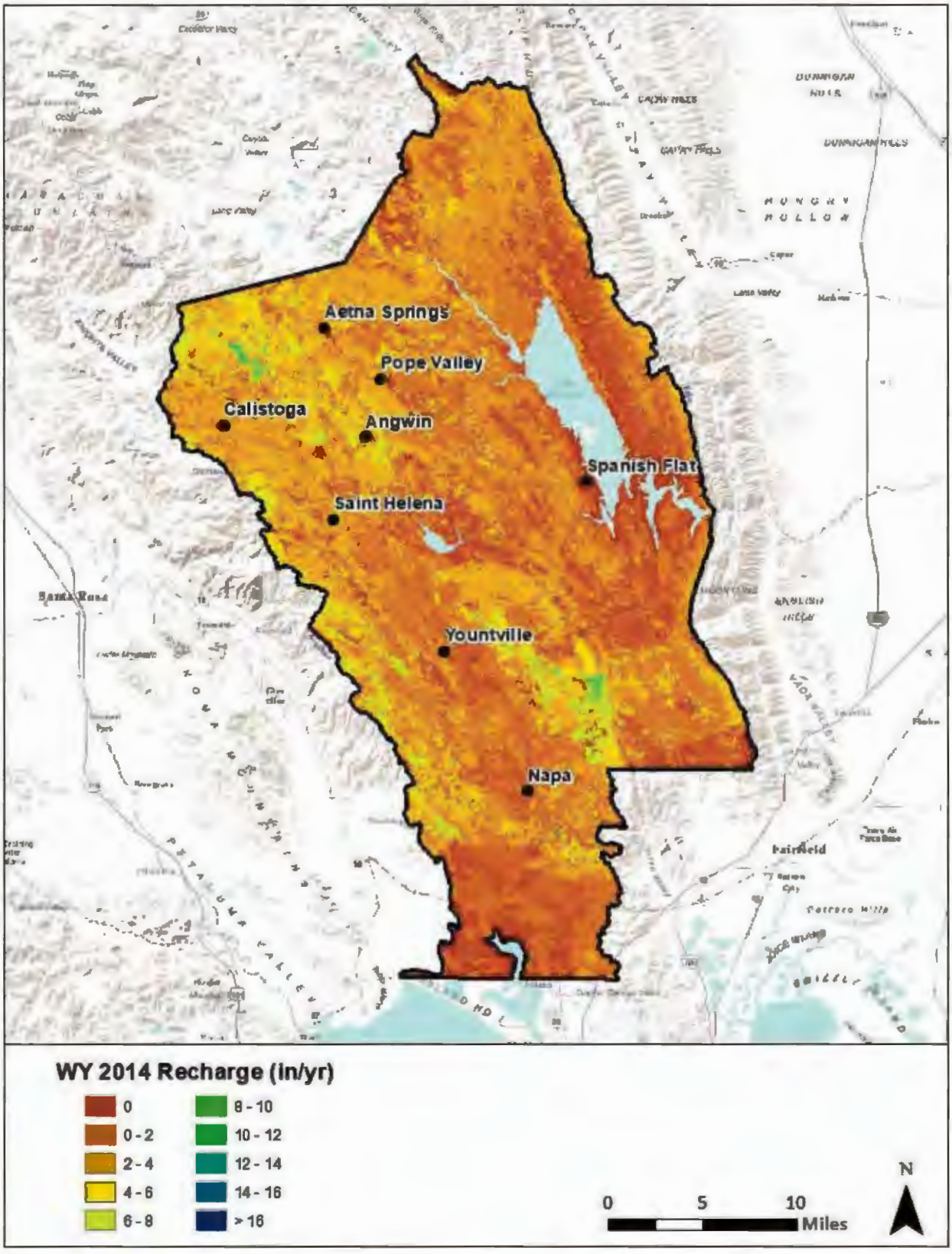

Figure 18: Water Year 2014 recharge simulated with the Napa County SWB model.

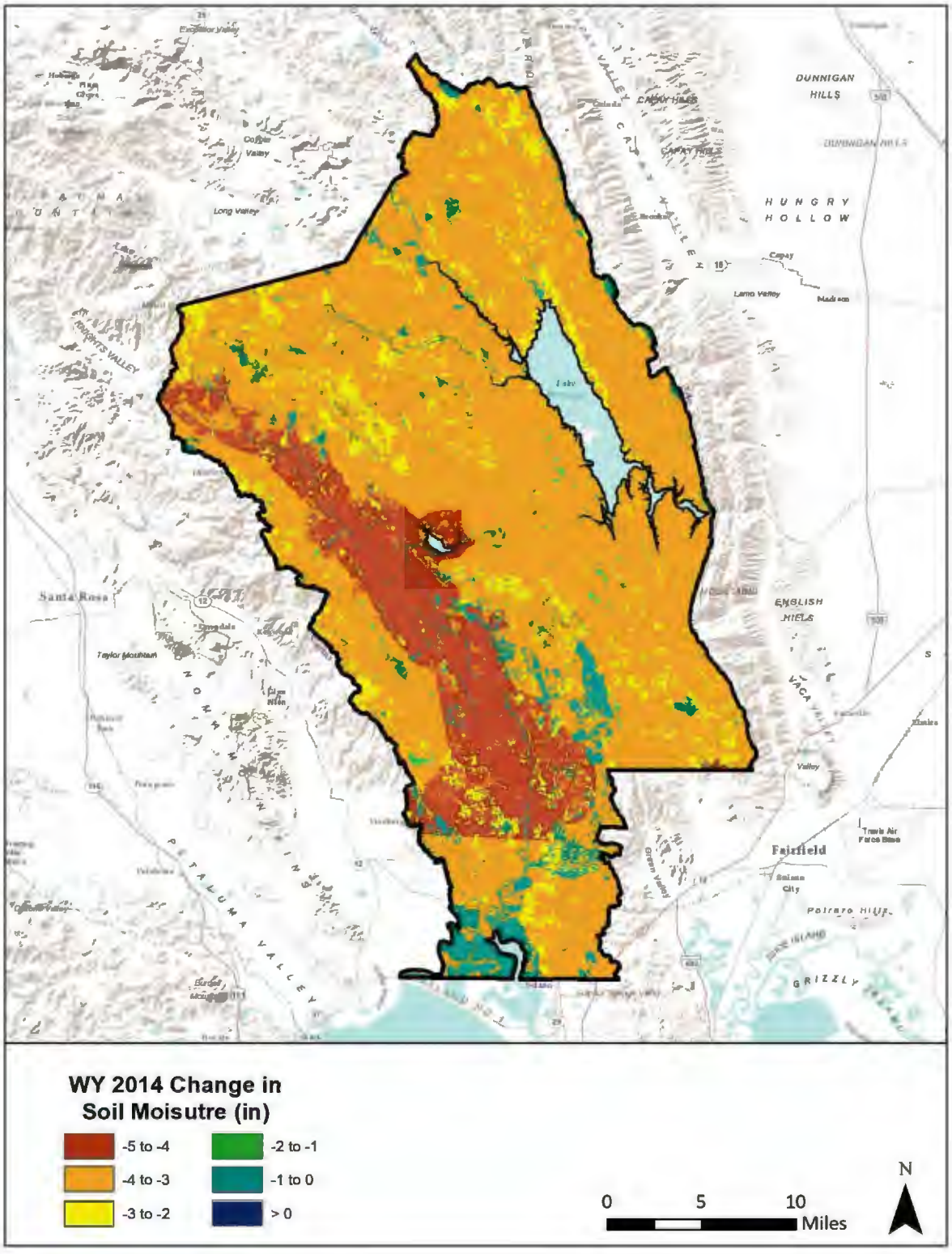

Figure 19: Water Year 2014 change in soil moisture content simulated with the Napa County SWB model.

Table 5: Simulated precipitation and recharge values averaged across HUC-12 watersheds in Napa County for Water Year 2010 expressed as depths. See Figure 20 for watershed locations.

Name	Drainage Area (mi^2)	Precipitation (in)	AET (in)	Surface Runoff (in)	Recharge (in)	Soil Moisture Change (in)
American Canyon Creek	10.8	24.1	16.3	3.7	4.7	-0.6
Bucksnort Creek	1.9	47.9	24.5	12.1	11.1	0.1
Butts Creek-Putah Creek	49.9	33.0	17.4	9.7	6.2	-0.7
Capell Creek	43.0	31.1	19.1	7.4	5.0	-0.6
Carneros Creek	29.7	28.0	18.6	5.2	5.5	-0.6
Chiles Creek	32.0	34.6	21.1	7.1	6.8	-0.5
Dry Creek	28.8	37.0	22.2	7.2	8.4	-0.5
Hunting Creek	12.0	33.7	19.0	9.7	5.7	-0.8
Jackson Creek-Putah Creek	54.5	29.9	13.4	12.6	3.0	-0.5
Lake Curry-Suisun Creek	16.4	30.7	18.9	6.5	5.9	-0.6
Lake Hennessey-Conn Creek	20.0	35.1	19.6	8.5	7.3	-0.4
Ledgewood Creek	6.4	21.8	16.9	3.4	3.3	-1.8
Lower Eticuera Creek	44.0	30.0	17.7	8.1	4.7	-0.7
Lower Napa River	45.0	31.7	19.9	5.6	6.7	-0.6
Lower Pope Creek	31.8	33.9	18.0	9.7	6.5	-0.6
Maxwell Creek	35.1	34.7	19.6	8.7	6.9	-0.6
Middle Napa River	60.3	39.9	22.8	8.5	9.2	-0.5
Milliken Creek	29.7	30.9	16.9	6.6	7.9	-0.6
Rector Creek-Conn Creek	22.3	32.8	18.0	7.1	8.2	-0.7
Saint Helena Creek	7.7	53.3	25.2	13.5	14.4	0.1
San Pablo Bay Estuaries	19.5	23.9	8.1	13.8	2.3	-0.3
Tulucay Creek	34.2	26.1	16.7	4.6	5.4	-0.7
Upper Eticuera Creek	25.6	31.2	17.2	8.6	6.1	-0.8
Upper Napa River	44.6	44.7	23.6	10.6	10.8	-0.4
Upper Pope Creek	21.7	44.5	22.7	10.5	11.5	-0.3
Wooden Valley & Suisun Creeks	23.3	29.0	19.0	5.1	5.5	-0.6
Wragg Canyon-Putah Creek	34.2	28.3	16.3	8.6	3.3	-0.6

Table 6: Simulated precipitation and recharge values averaged across HUC-12 watersheds in Napa County for Water Year 2010 expressed as a percentage of precipitation. See Figure 20 for watershed locations.

Name	Drainage Area (mi^2)	Precipitation (in)	AET (%)	Surface Runoff (%)	Recharge (%)	Soil Moisture Change (%)
American Canyon Creek	10.8	24.1	67%	15%	19%	-3%
Bucksnort Creek	1.9	47.9	51%	25%	23%	0%
Butts Creek-Putah Creek	49.9	33.0	53%	29%	19%	-2%
Capell Creek	43.0	31.2	61%	24%	16%	-2%
Carneros Creek	29.7	29.7	66%	19%	20%	-2%
Chiles Creek	32.0	34.6	61%	21%	20%	-1%
Dry Creek	28.8	37.8	60%	20%	23%	-1%
Hunting Creek	12.0	33.7	56%	29%	17%	-2%
Jackson Creek-Putah Creek	54.5	29.7	45%	42%	10%	-2%
Lake Curry-Suisun Creek	16.4	30.7	61%	21%	19%	-2%
Lake Hennessey-Conn Creek	20.0	36.0	56%	24%	21%	-1%
Ledgewood Creek	6.4	21.8	77%	15%	15%	-8%
Lower Eticuera Creek	44.0	30.0	59%	27%	16%	-2%
Lower Napa River	45.0	31.7	63%	18%	21%	-2%
Lower Pope Creek	31.8	33.9	53%	29%	19%	-2%
Maxwell Creek	35.1	34.7	56%	25%	20%	-2%
Middle Napa River	60.3	40.4	57%	21%	23%	-1%
Milliken Creek	29.7	30.9	55%	21%	26%	-2%
Rector Creek-Conn Creek	22.3	32.8	55%	22%	25%	-2%
Saint Helena Creek	7.7	53.3	47%	25%	27%	0%
San Pablo Bay Estuaries	19.5	23.9	34%	58%	10%	-1%
Tulucay Creek	34.2	26.1	64%	18%	21%	-3%
Upper Eticuera Creek	25.6	31.2	55%	28%	19%	-3%
Upper Napa River	44.6	44.7	53%	24%	24%	-1%
Upper Pope Creek	21.7	44.5	51%	23%	26%	-1%
Wooden Valley & Suisun Creeks	23.3	29.0	65%	18%	19%	-2%
Wragg Canyon-Putah Creek	34.2	28.3	58%	31%	12%	-2%

Table 7: Simulated precipitation and recharge values averaged across HUC-12 watersheds in Napa County for Water Year 2014 expressed as depths. See Figure 20 for watershed locations.

Name	Drainage Area (mi^2)	Precipitation (in)	AET (in)	Surface Runoff (in)	Recharge (in)	Soil Moisture Change (in)
American Canyon Creek	10.8	10.1	12.3	0.7	0.7	-3.6
Bucksnort Creek	1.9	28.8	17.6	11.5	2.6	-3.0
Butts Creek-Putah Creek	49.9	16.9	14.2	3.9	1.9	-3.2
Capell Creek	43.0	15.8	14.8	3.1	1.1	-3.1
Carneros Creek	29.7	15.0	14.7	4.6	2.0	-3.7
Chiles Creek	32.0	18.3	16.5	3.7	1.5	-3.3
Dry Creek	28.8	21.5	16.5	6.8	2.5	-3.7
Hunting Creek	12.0	16.7	15.4	3.1	1.6	-3.4
Jackson Creek-Putah Creek	54.5	14.9	10.3	6.1	0.7	-2.3
Lake Curry-Suisun Creek	16.4	18.4	16.1	3.7	1.9	-3.4
Lake Hennessey-Conn Creek	20.0	19.1	14.8	5.7	2.2	-3.2
Ledgewood Creek	6.4	12.2	13.9	1.7	0.8	-4.3
Lower Eticuera Creek	44.0	14.9	14.0	2.6	1.3	-3.1
Lower Napa River	45.0	19.4	15.9	5.0	2.2	-3.6
Lower Pope Creek	31.8	17.8	14.5	4.5	2.0	-3.2
Maxwell Creek	35.1	18.3	15.9	3.8	2.0	-3.3
Middle Napa River	60.3	21.3	16.5	6.6	2.5	-3.7
Milliken Creek	29.7	18.7	13.7	4.5	3.4	-2.9
Rector Creek-Conn Creek	22.3	16.5	13.6	4.0	2.3	-3.4
Saint Helena Creek	7.7	32.2	17.8	13.2	4.1	-3.0
San Pablo Bay Estuaries	19.5	10.4	6.0	5.6	0.5	-1.6
Tulucay Creek	34.2	14.6	13.5	2.6	1.7	-3.3
Upper Eticuera Creek	25.6	15.5	14.1	2.5	2.1	-3.2
Upper Napa River	44.6	22.9	16.2	6.9	3.3	-3.5
Upper Pope Creek	21.7	25.6	16.8	8.5	3.5	-3.2
Wooden Valley & Suisun Creeks	23.3	17.9	16.4	3.1	2.0	-3.5
Wragg Canyon-Putah Creek	34.2	14.1	12.6	3.6	0.6	-2.8

Table 8: Simulated precipitation and recharge values averaged across HUC-12 watersheds in Napa County for Water Year 2014 expressed as a percentage of precipitation. See Figure 20 for watershed locations.

Name	Drainage Area (mi^2)	Precipitation (in)	AET (%)	Surface Runoff (%)	Recharge (%)	Soil Moisture Change (%)
American Canyon Creek	10.8	10.1	121%	7%	7%	-36%
Bucksnort Creek	1.9	28.8	61%	40%	9%	-10%
Butts Creek-Putah Creek	49.9	16.8	84%	23%	11%	-19%
Capell Creek	43.0	15.8	94%	20%	7%	-20%
Carneros Creek	29.7	17.6	98%	30%	13%	-25%
Chiles Creek	32.0	18.4	90%	20%	8%	-18%
Dry Creek	28.8	22.1	77%	32%	12%	-17%
Hunting Creek	12.0	16.7	92%	18%	10%	-20%
Jackson Creek-Putah Creek	54.5	14.7	69%	41%	5%	-16%
Lake Curry-Suisun Creek	16.4	18.4	88%	20%	10%	-19%
Lake Hennessey-Conn Creek	20.0	19.6	78%	30%	12%	-17%
Ledgewood Creek	6.4	12.2	114%	14%	7%	-35%
Lower Eticuera Creek	44.0	14.9	94%	18%	9%	-21%
Lower Napa River	45.0	19.4	82%	26%	11%	-19%
Lower Pope Creek	31.8	17.8	81%	25%	11%	-18%
Maxwell Creek	35.1	18.3	87%	21%	11%	-18%
Middle Napa River	60.3	21.8	77%	31%	12%	-18%
Milliken Creek	29.7	18.7	74%	24%	18%	-16%
Rector Creek-Conn Creek	22.3	16.5	83%	24%	14%	-21%
Saint Helena Creek	7.7	32.2	55%	41%	13%	-9%
San Pablo Bay Estuaries	19.5	10.4	58%	53%	4%	-16%
Tulucay Creek	34.2	14.6	93%	18%	12%	-23%
Upper Eticuera Creek	25.6	15.5	91%	16%	14%	-21%
Upper Napa River	44.6	22.9	71%	30%	14%	-15%
Upper Pope Creek	21.7	25.6	66%	33%	14%	-12%
Wooden Valley & Suisun Creeks	23.3	17.9	91%	17%	11%	-20%
Wragg Canyon-Putah Creek	34.2	14.1	90%	26%	5%	-20%

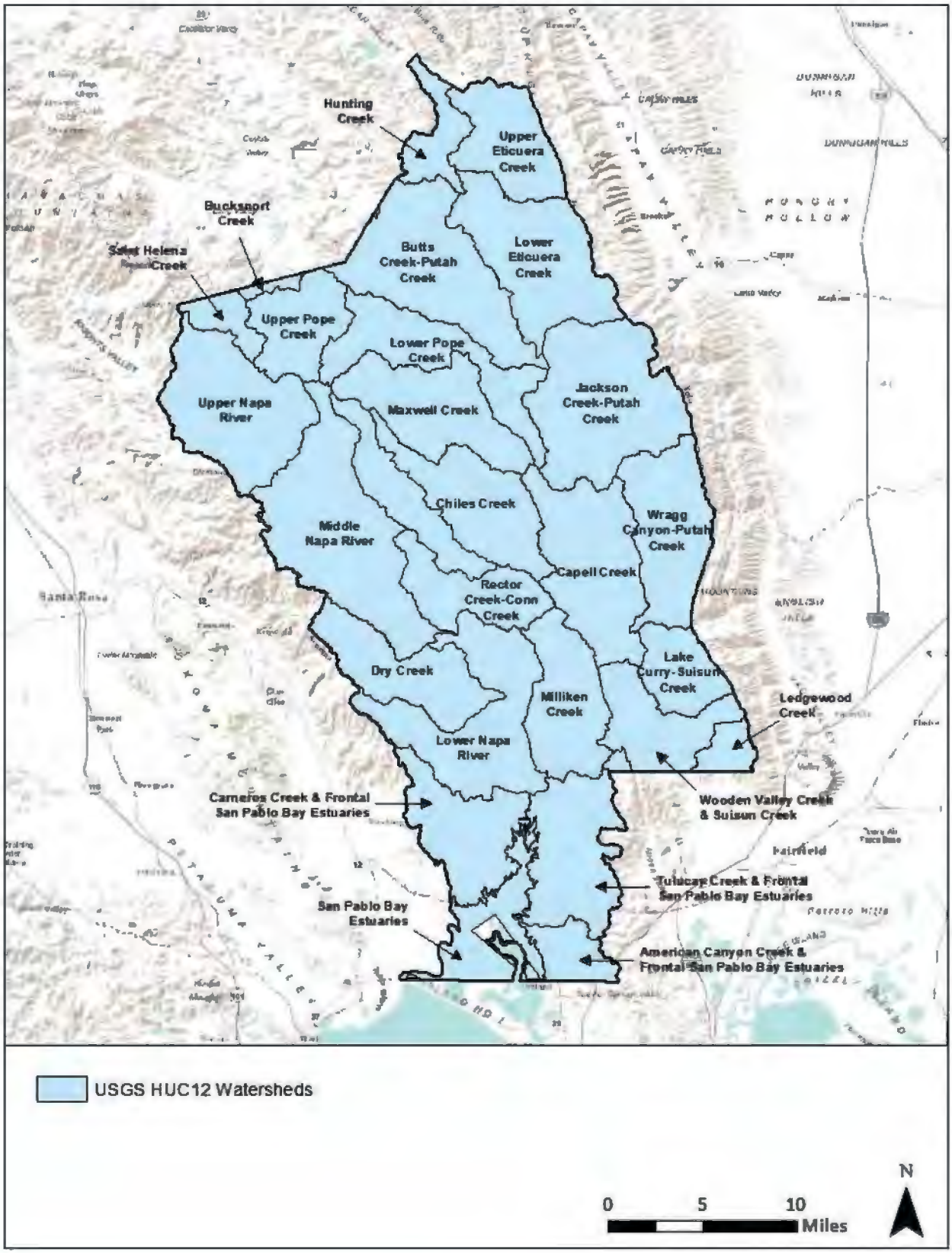

Figure 20: Major watersheds areas used to summarize water budget information in Tables 5 - 8.

Discussion and Conclusion

Numerous previous modeling studies have estimated water budget components in several larger watershed areas in Sonoma and Napa Counties including the Santa Rosa Plain, the Green Valley and Dutch Bill Creek watersheds, and the Sonoma Valley (Farrar et. al., 2006; Kobor and O'Connor, 2016; Woolfenden and Hevesi, 2014). Comparisons to these water budgets are useful for evaluating the SWB results, but one would not expect precise agreement owing to significant variations in climate, land cover, soil types, underlying hydrogeologic conditions, and different spatial scales of modeling studies. These regional analyses estimate that average annual recharge varies from 7% to 19% of the annual precipitation. The equivalent county-wide value from this study is slightly higher at 20%.

Water budgets for the Napa River and selected sub-basins were also estimated in a previous study by Luhdorff and Scalmanini Engineers and MBK Engineers (LSCE 2013). The LSCE study estimated that, as a percentage of annual precipitation, AET comprised slightly less, runoff significantly more, and recharge substantially less of the typical annual water budget. LSCE (2013) calculated infiltration of precipitation based on the difference between total monthly streamflow at selected gaging stations and total monthly precipitation for the gages' drainage area. Streamflow volumes include both direct runoff (overland flow and interflow) and baseflow from groundwater. Inclusion of baseflow with direct runoff in these calculations may inappropriately reduce the estimated volume of water infiltrated into the soil and available for recharge; the LSCE approach therefore tends to underestimate groundwater recharge. Additionally, many of the gauging stations used for the analysis are located in reaches that may be significantly influenced by upstream reservoir releases, surface water diversions, groundwater abstraction, and/or surface water groundwater exchanges, further complicating the interpretation of the LSCE (2013) runoff rates and the interrelated calculations of AET and recharge rates. In contrast, the SWB model presented here is based on calibrated parameter values developed for a similar model in Sonoma County which was calibrated to gauges specifically selected to minimize the effects of reservoir releases, water use, or significant surface water/groundwater interaction, and after separating and removing the baseflow component of streamflow.

The recharge estimates presented here arguably represent the best available county-wide estimates produced at a fine spatial resolution using a consistent and objective data-driven approach. This analysis focused on two Water Years, 2010 and 2014, which represent average and drought conditions respectively. Input parameters were determined based on literature values and values calibrated through prior modeling experience in Sonoma County.

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July 9, 2025

TO: Kelli Cahill, Planner III
Planning, Building, & Environmental Services
Napa County
1195 Third Street, Suite 210
Napa, CA 94559

FROM:

Matthew O'Connor, PhD, CEG #2449 Exp. 10-31-25

SUBJECT: Addendum to Water Availability Analysis (WAA) for Nights in White Satin, LLC, APN 047-380-009 & -010

This document updates and revises specific elements of the WAA for the subject project dated January 30, 2023. Kelli Cahill alerted us via e-mail dated July 3, 2025, regarding minor inconsistencies and misinterpretations regarding water use estimates for the project; three specific issues are described in the reproduction of the substance of the July 3 e-mail below:

1. Table 6 on page 14 I believe has an error. This shows an increase in irrigation but no changes for winery or employee/guests in the proposed condition.

Table 6: Estimated groundwater demand within the project recharge area in the existing and proposed condition.

Water Demand Component	Existing Condition (acre-ft/yr)	Proposed Condition (acre-ft/yr)
Project Parcel	**21.63**	**22.50**
Irrigation	21.63	22.50
Winery	0.00	0.00
Employees & Guests	0.00	0.00
Neighboring Parcels	**292.56**	**292.56**
Residential	5.70	5.70
Irrigation + Frost Protection	284.2	284.2
Winery	2.12	2.12
Employees & Guests	0.53	0.53
Total	**314.19**	**315.06**

2. Table 7 on page 15 I don't believe is accurately calculating the future water demand.
    a. This winery proposes 150/day or 600/week which is 31,200 guests @ 3gal/guest.
    b. The 2300 listed as guests is the 10 events @ 50 guests and 5 per month @ 30 guests. These should be calculated at the event rate. Total event numbers for the winery are 2900 @ 15gal unless the smaller events use off-site catering. If that's the case that needs to be addressed in this table.

3. In the Tier 2 please address whether there are any known springs within 1500' of project wells.

Following are the corrections and supplemental information addressing these three items.

Table 6 correctly reported Project Parcel groundwater use for the proposed condition (updates per item 2 notwithstanding), but reported the total use as Irrigation Use, including proposed Winery Use and Employee/Guest Use. The corrected version of Table 6 is provided below. Note that Project Parcel use for proposed conditions in Table 6 have also been updated per item 2 pertaining to guest and visitor use.

Table 6: Estimated groundwater demand within the project recharge area in the existing and proposed condition.

	Existing Condition (acre-ft/yr)	Proposed Condition (acre-ft/yr)
Project Parcel	**21.63**	**22.88**
Irrigation Use	21.63	18.93
Winery Use	0.00	2.58
Employee/Guest Use	0.00	1.37
Neighboring Parcels	**292.56**	**292.56**
Residential Use	5.70	5.70
Irrigation Use	284.2	284.2
Winery Use	2.12	2.12
Employee/Guest Use	0.53	0.53
Total	**314.19**	**315.44**

Table 7 has been revised reflecting the corrected attributions of visitor and guest use to the two different visitation type water use duties. These corrections increased total water use by a total of 0.38 ac-ft per year. As can be seen in Table 6 above, the previously calculated water use for proposed conditions of 22.50 ac-ft per year increases to 22.88 ac-ft per year. The revised Table 7 follows. The small increase in proposed project water use resulting from corrections to Table 7 also affects Table 9; the corrected version of Table 9 is provided below.

Table 7: Estimated proposed water demand from the project parcel.

	# of Units	Use per Unit	Annual Water Use (AF/yr)
Irrigation & Frost Protection		**Irrigation Sub-total**	**41.35**
Sonapa (APN 047-380-009)	35.7 Acres	0.5 AF/acre/yr	17.85
North Hills (APN 047-380-010)	47 Acres	0.5 AF/acre/yr	23.50
Winery Use		**Winery, Guest & Empl. Sub-tota**	**3.95**
Process Water	120,000 gal.	2.15 AF/100,000 gal.	2.58
Guest & Employee Use			
Tasting Room Visitations	31200 Guests	3 gal./Guest	0.29
Events w/ On-Site Catering	2900 Guests	15 gal./Guest	0.13
Full-Time Employees	25 Employees	15 gal./shift @ 250 shifts/yr	0.29
Part-Time Employees	10 Employees	15 gal./shift @ 125 shifts/yr	0.06
Domestic & Landscaping	120,000 gal.	0.50 AF/100,000 gal.	0.60
Surface Water & Precipitation Capture & Diversion			**(36.22)**
Evaporative Losses from Reservoirs, Replaced with Groundwater			**13.80**
Total Groundwater Use			**22.88**

Table 9: Comparison of proposed water use to average annual groundwater recharge for the project recharge area and for the project parcel.

Domain	Total Groundwateer Demand (ac-ft/yr)	Average Water Year (2010)			Dry Water Year (2014)			Average 10-Year (2012-2021)		
		Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge	Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge	Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge
Project Recharge Area	315.1	573.5	258.5	55%	176.3	-138.7	179%	289.3	-25.8	109%
Project Parcel	22.9	65.5	42.6	35%	20.1	-2.8	114%	33.0	10.1	69%

Regarding the Tier 2 issue (item 3 in the July 3 e-mail), we did not identify any springs within 1,500 feet of project wells. In general, the hydrogeologic investigation conducted for this WAA did not suggest that springs would be expected in the vicinity of the project. A significant review of State Water Rights in the vicinity of the project did not reveal any Water Rights claims associated with springs. US Geological Survey topographic maps do not identify any springs within at least a 1-mile radius of the project parcels.