Technical Memorandum #6
Additional Alternative Analyses – New Wells

D R A F T
TECHNICAL M E M O R A N D U M NO. 6

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TO: Jay Saberon
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DATE: January 24, 2011

FROM: Stetson Engineers

JOB NO.: 1944-5

RE: **ADDITIONAL ALTERNATIVE ANALYSES FOR CITY OF SOLVANG'S CEQA ENVIRONMENTAL DOCUMENT FOR TIME EXTENSION FOR WATER RIGHTS PERMIT 15878 – NEW WELLS DOWNSTREAM OF ALISAL BRIDGE**

1.0 INTRODUCTION TO NEW ALTERNATIVE

This draft memorandum is prepared for the City of Solvang's Draft Environmental Impact Report (DEIR) in connection with the petition to the State Water Resources Control Board (SWRCB) for extension of time for Permit 15878[1]. Consistent with the City's August 2009 Water System Master Plan Update, the City of Solvang is planning to expand water production from wells along the Santa Ynez River.

Previous work by Stetson Engineers for the Draft EIR included analyses of surface water, water quality, and ground water impacts from increased pumping by the City of Solvang (City) in wells located in the Santa Ynez River alluvium. Four scenarios were analyzed for gross pumping amounts by the City: 600; 1,053; 2,400; and 3,600 acre-feet per year (afy). These scenarios cover a range of possible alternatives up to the maximum amount allowed (3,600 afy) under Permit 15878. These Stetson technical memoranda identified potential impacts to nearby wells, Cachuma Project water supply, and endangered steelhead (Stetson, 2004a, 2004b, 2004c, 2004d, and 2005). In the previous analyses the City's new wells were located upstream of the Solvang Bridge (also sometimes referred to as Alisal or Mission Bridge) which under certain river conditions, primarily during the summer months, created well interference with both the Alisal Ranch wells and the Santa Ynez River Water Conservation District Improvement District No. 1 (ID#1) wells (Stetson, November 2004, and July 2005). In addition, the modeling showed that the concentration of wells just upstream of the Solvang Bridge may result in additional pumping restrictions due to potential impacts to steelhead (Stetson, April 2004).

[1] The DEIR document will also address other items that are included in the City's Water System Master Plan Update (2009).

A new alternative has been developed and analyzed in this memorandum which involves drilling the new wells for the City in a proposed well field centered approximately 1.5 miles downstream from the Solvang Bridge. In this alternative, labeled Alternative GW5 for this study, four new wells will be drilled downstream of Solvang Bridge (Figure 1). Table 1 summarizes the previous alternatives analyzed (Stetson, 2004a, 2004b, 2004c, 2004d, and 2005) in relation to the new alternative analyzed in this memorandum.

TABLE 1
CONDITIONS SIMULATED FOR THE CITY OF SOLVANG EIR ALTERNATIVES

ID	Alternatives	Gross Pumping (afy)	Location of Solvang Wells	Lake Cachuma Surcharge (ft)	Fish Flow Operations
GW1	SWRCB EIR Alt 2 with current Solvang pumping 600 afy	600	u/s Alisal Bridge	0.75	Interim BO/FMP
GW2	SWRCB EIR Alt 3C with Solvang pumping 2400 afy	2,400	u/s Alisal Bridge	3.00	Final BO/FMP
GW3	SWRCB EIR Alt 3C with Solvang pumping 3600 afy	3,600	u/s Alisal Bridge	3.00	Final BO/FMP
GW4	SWRCB EIR Alt 3C with Solvang pumping 1053 afy (baseline)	1,053	u/s Alisal Bridge	3.00	Final BO/FMP
GW5	SWRCB EIR Alt 3C with Solvang pumping 2400 afy	2,400	**d/s Alisal Bridge**	3.00	Final BO/FMP

u/s = upstream of
d/s = downstream of

In this memorandum, Alternative GW5 has been analyzed and compared to the other four alternatives, with specific focus to Alternative GW2. First, a hydraulic analysis of the preliminary pipeline layout was prepared. Next, the Santa Ynez River Hydrology Model was used to assess impacts on Cachuma Project operations, Santa Ynez River flows, groundwater storage in the Above Narrows Riparian Aquifer, and water rights releases. Finally an analysis of impacts to local groundwater was performed for the proposed Alternative GW5 well field downstream of Alisal Bridge.

Alternative GW5 is assumed to pump the same volume, 2400 afy, as Alternative GW2. This annual volume was proposed in the 2002 Water System Master Plan. The difference between Alternative GW2 and GW5 is that in Alternative GW2, all new wells are located upstream of Solvang Bridge and in Alternative GW5 all new wells are located downstream of Solvang Bridge. It should be noted that the proposed annual volume of ground water extracted from the River wells was lowered to 2,003 afy in the 2009 Water System Master Plan Update. In order to allow a comparison with the previous alternative (GW2), this analysis also assumes an annual pumping volume of 2,400 afy. Figure 2 compares the monthly average pumping rates for all of the

alternatives and the new 2009 proposed pumping rates. The 2002 Master Plan includes a monthly pumping distribution closer to the maximum diversion rate of 5 cfs. It should also be noted that in Table 3 of the 2009 Water System Master Plan the practical delivery for the River wells is 1,813 afy, which does not match with Table 7 of the Plan (2,003 afy). The total future demand for Solvang from all sources in Table 3 of the 2009 Plan would be 2,833 afy. The sources include pumping and water from the State Water Project (SWP). The quantity available from the SWP has some uncertainty, so for this analysis, a conservative value of 2,400 afy of pumping is a valid assumption. However, the actual average annual pumping may be lower than this.

The City of Solvang has not determined what percentage of the total Solvang diversions from the Santa Ynez River may be developed downstream of the Solvang Bridge. Solvang cannot make that determination until it begins drilling wells at the proposed downstream site (Figure 1) and performs well tests. For example, Solvang may determine that only a portion of pumping will occur downstream, with the remainder in the vicinity of Solvang Bridge. However, the hydrologic analyses of alternatives GW2 and GW5 will provide a bracket for the expected impacts under the two conditions:

1) GW2 with all new wells located upstream of Solvang Bridge, and

2) GW5 with all new wells located downstream of Solvang Bridge.

2.0 PROJECT DESCRIPTION OF NEW ALTERNATIVE

Stetson Engineers (2010) performed an analysis of developing a new City of Solvang (City) well field downstream of the Alisal Bridge. Two areas were evaluated, Site A and Site B, as shown in Figure 1. The sites were selected based on proximity to the productive stream channel and alluvial deposits. The criteria for site selection were as follows:

- Well yield potential;
- Proximity (downstream) to existing Solvang water system, including hydraulic compatibility with the existing water system;
- Reduced potential flood damage (location outside of active stream channel);
- Water quality;
- Acquisition of land for right-of-way; and
- Construction costs.

The potential for well yield is likely to be higher and the potential impact on nearby wells may be lower in the Site B area compared to the Site A area. This is due to the larger areal extent of highly permeable floodplain and stream channel deposits in the Site B area. For this analysis, it is assumed that the future City well field will be located in the Site B area.

It is anticipated that there will be four new wells drilled in the Site B area. Each is likely to have a capacity of 500 to 1,000 gallons per minute (gpm) or more which should provide sufficient capacity to produce 5.0 cubic feet per second (cfs) should one of the wells in the new well field becomes inoperable. The actual number of wells and their yield will be determined based on the results of drilling and well testing. The existing Solvang Well #3 is assumed to be capable of producing an average of about 330 gpm (0.74 cfs) and Solvang Well #7A can produce about 200 gpm (0.45 cfs) with a combined production of about 500 gpm (1.11 cfs) (City of Solvang, 2009). A combination of the existing and proposed wells will provide water from the River to meet the proposed peak demand of up to 5.0 cfs. Note that the annual average groundwater extraction from the River wells is expected to be about 2.8 cfs, although the full 5 cfs will be needed to meet peak-hour demand (City of Solvang, 2009).

The final location of the new wells will depend on future negotiations with existing land owners and site-specific conditions such as elevation above the flood plain. The proposed four new wells at Site B are expected to be about 70 feet deep based on driller's logs from existing wells in the area. Wells #3 and #7A are presently included in the City's water distribution system. The proposed new wells at Site B will be connected to the existing system via pipelines shown in Figure 3.

The facilities required to connect wells at Site B to the existing Solvang water system include: (1) pipelines; (2) wells, well pumps, and appurtenant electrical controls and power lines; (3) booster pumps; and (4) a chlorination injection station. The pipelines will deliver water from the proposed well field to the water delivery system. For preliminary design purposes, the following factors were taken into account during the selection of a pipeline route:

- Convey the pumped groundwater from the wells to chlorination injection station before entering the existing Solvang water distribution system;
- Connect the new well field to existing pipes that have capacity in order to minimize construction of new pipelines;
- Provide multi-delivery points to the existing system to ensure system reliability and improve fire flow capability; and
- Construct, if possible, along existing roads or right-of-way easements.

The pressures, energy losses (head losses), and velocities were determined for the pipelines. Pipe diameters were designed to have a velocity equal or less than the maximum allowable velocity of four (4) feet per second (fps). The diameter of pipes were calculated in a hydraulic model based on the design flow.

Pipelines would consist of connector pipes, a transmission pipe, and looping pipes, with a total pipe length of 1.68 miles. The connector pipes would connect the proposed wells (labeled as P1B to P4B) to the transmission pipe that runs from west to east, and along Highway 246 to the intersection on 5th Street, as shown on Figure 3. The transmission pipe would range in diameter 10 to 18 inches. Diameter of pipe segments depends on the flow rate. The east end of the transmission pipe will be connected to an existing tee which has the following sizes for distribution lines: 12 to 6 inches. Three other delivery points are connected via small looping pipes to the existing system on Highway 246. They are located at an alley between Hadsten House Inn and Kronberg Inn, Nykobing, and near 1224-1226 Mission Road (Figure 3).

Although the maximum allowable velocities are four (4) fps, the proposed pipelines generally have flow velocities ranging from about 2.5 fps to 3.5 fps to provide allowances for carrying larger flow rates should there be future system expansion. Table 2 summarizes the sizing for the proposed main pipe segments, connector pipes and looping pipes for the proposed wells at Site B. Polyvinyl chloride (PVC) pipe was assumed for the pipeline design.

TABLE 2
SUMMARY OF REQUIRED PIPING

Pipe	Length (feet)
8-inch Connector Pipes	0
8-inch Looping Pipes	140
8-inch Main	0
10-inch Connector Pipes	560
10-inch Main	1,440
12-inch Main	1,320
14-inch Main	660
16-inch Main	2,780
18-nch Main	1,980
Total (feet)	8,880
Total (miles)	1.68

3.0 BASIN DESCRIPTION

Geology

The wells are located in the Santa Ynez River alluvium as shown in the geologic map (Figure 1). The alluvium in the general area consists of: (1) stream channel deposits (Qg); and (2) valley and floodplain deposits (Qa). Outcrops of older alluvium (Qoa) and consolidated essentially non-water bearing rocks bound and underlie the more permeable stream channel, valley, and floodplain deposits. The targeted sources of water are the valley and flood plain deposits (Qa) located on the north bank of the river downstream of Alisal Bridge.

Although the deposits of the active stream channel (Qg) which consist of gravel, sand, and silt are generally the most permeable deposits with the potential for the highest well yields, it is preferred not to locate wells and appurtenant facilities in the active river channel where there is an increased risk of flood damage. However, driller's logs indicated high well yields have been obtained from the generally thicker valley and floodplain deposits (Qa) present in the floodplain deposits between the stream channel and Highway 246 north of the River. These deposits consist of silt, sand, and gravel.

The geology just north of the floodplain deposits includes consolidated shale beneath a relatively thin veneer of older alluvium. Wells in this area yield relatively little water and may not be hydraulically connected to the floodplain and stream channel deposits in the vicinity of Site B.

The stream channel deposits (Qg, Figure 1) of the Santa Ynez River that run from east to west at a location south of Site B range in thickness from about 40 to 70 feet and may be thinnest near the upstream area of Alisal Bridge. The floodplain deposits south of the stream channel deposits near Site B are likely to have lithologic and water bearing characteristics similar to those in the vicinity of Site B. Driller's logs or other lithologic data was not available for that area. The bedrock south of the river near Site B consists of hard fractured shale that is non-water bearing.

Well Yields

The yield from wells near Site B based on drillers logs (short test lengths from 1 to 4 hours) range from about 500 to 1,500 gpm. These yields are generally higher than in the reach immediately upstream of Solvang Bridge (typically about 300 gpm). Farther north, generally north of Highway 246, within the floodplain deposits (Qa, Figure 1), the depth to bedrock is greater and while most drillers logs in this area show relatively coarse material to depths of about 70-80 feet, there is more clay present near the surface and sediments become more fine grained below that depth until weathered bedrock is encountered at about 110 to 130 feet. The weathered bedrock is commonly described as

thick yellow, brown or white clay, which is likely to be weathered Sisquoc or Monterey shale, depending upon location. Yields from wells located north of the highway are generally lower in the floodplain alluvium than those closer to the river based on the limited drillers logs available in that area. Reported yields are in the range of 350 to 450 gpm even though the wells tend to be deeper. There was no well yield information for well logs in the vicinity of Site A, including Solvang Well #3.

Groundwater Levels

Long term groundwater level data are available from two shallow monitoring wells in the vicinity of the proposed Solvang well field. Water levels are measured by the U.S. Bureau of Reclamation (USBR) on a monthly basis. Figure 1 shows the location of these two monitoring wells, and Figure 4 shows the water level measurements for these wells from 1959 to early 2010. Water levels in the Santa Ynez river alluvium in this area declined about 10 to 20 feet from the late 1970s to 1990 due, in part, to scour in the river channel and to the drought of 1988 – 1991. Water levels have recovered somewhat and are more stable recently due to fish water releases from Lake Cachuma.

Aquifer Properties

The floodplain alluvium in the vicinity of the proposed wells at Site B is likely to be unconfined due to its shallow and coarse nature. The hydraulic conductivity of alluvium near Site B is estimated to range from about 200 ft/day to 600 ft/day based on specific capacity data from driller's tests. North of Highway 246, the alluvium has an estimated range of about 80 to 120 ft/day in hydraulic conductivity based on driller's tests. These test data may be considered somewhat rough since driller's tests are not rigorous aquifer tests and the method used to convert a well specific capacity to a transmissivity of hydraulic conductivity has a wide range of uncertainty. However, the method has been used as a rule of thumb by hydrogeologists for decades, in the absence of more detailed aquifer test data. For this study a hydraulic conductivity of 300 ft/day is assumed to represent all of the Santa Ynez River alluvium units. An average saturated thickness of river alluvium in the area of 70 feet was also assumed for the impact analysis.

Farther upstream in the narrow alluvium just upstream and downstream of the Alisal Bridge, the hydraulic conductivity of the stream channel deposits has been estimated at about 500 ft/day based on test data from drillers logs in that area (Stetson Engineers, 2004a)

Sources of Recharge

The stream channel deposits and adjacent floodplain deposits are recharged by seepage from the flows of the Santa Ynez River, as well as flows that reach the River alluvium from nearby

tributaries, with a minor amount contributed by direct precipitation and treated wastewater discharge from the plant on the south side of the river below Alisal Bridge. Site B is also recharged by underflow from the underlying Paso Robles formation and Careaga sand located adjacent to the north side of the Santa Ynez River (Wilson, 1959).

4.0 IMPACT ANALYSIS USING THE SANTA YNEZ RIVER HYDROLOGY MODEL

Surface water hydrologic analyses were performed to determine the impacts for the additional alternative (GW5), as in previous Technical Memoranda, using the Santa Ynez River Hydrology Model (SYRHM). Included in this memorandum are the EIR hydrologic impact analyses for:

- Lake Cachuma Operations
- Cachuma Storage and Elevations
- Santa Ynez River Flows
- Groundwater Storage in the Above Narrows Riparian Aquifer
- Water Rights Releases (WR 89-18)
- Cachuma Project Deliveries

Technical Memorandum No. 2 (Stetson, 2004b) showed that changes to salinity at the Lompoc Narrows would be none to very small due to increased pumping by Solvang, including under the maximum pumping alternative of 3,600 afy (GW3). Accordingly, water quality analyses were not performed for this additional alternative (GW5), with pumpage amount of 2,400 afy.

Please refer to Technical Memorandum No. 1 (Stetson, 2004a) for detailed discussion of the SYRHM model utilized in this analysis. The SYRHM became the basis for numerous hydrologic studies of releases for fish, water quality, and water rights in preparation of the Biological Assessment, National Marine Fisheries Service Biological Opinion (BO), the Lower Santa Ynez River Fish Management Plan, the Settlement Agreement of 2002, the Final EIR/EIS (2003) on the Fish Management Plan and the BO, and the State Board Draft EIR (2003 and 2007). The analyses for the additional City of Solvang river well pumping use the same programming model logic and assumptions as these previous studies. As shown in Table 1, the new alternative for Solvang pumping (GW5) was analyzed under the Final 2000 BO operations for the Cachuma Project (National Marine Fisheries Service, 2000) including a 3.0 foot surcharge. Under Alternatives GW2, GW3, GW4, and GW5, the impacts of increased river well diversions from 1,053 to 3,600 acre-feet per year can be evaluated in the context of similar fish flow operations..

Municipal river well pumping is handled in the SYRHM by using net pumping, which implicitly includes return flows. Table 3 shows the monthly volume of Solvang pumping for the various alternatives in the modeling analyses. As mentioned earlier, the 2009 Water System Master Plan lowered the expected annual volume of ground water to be extracted from the river wells from 2,400 to 2,003 afy. However, this analysis for the new alternative (GW5) is based on the annual

production of 2,400 afy in order to be able to compare with previous modeling results[2]. As such, these analyses are considered conservative.

[2] In addition, the expected total future demand is about 2,800 afy; so, the supply could still be about 2,400 afy from the River wells.

TABLE 3

CITY OF SOLVANG MONTHLY DIVERSIONS FROM SANTA YNEZ RIVER WELLS USED FOR SIMULATION IN SANTA YNEZ RIVER HYDROLOGY MODEL (SYRHM)

		Currently Used in SYRHM [1]				Proposed Water System Master Plan (2002) [2]					Maximum under Permit 15878 [3]				Maximum Amount Used Recently				
		(Alt GW1)				(Alt GW2) and (Alt GW5)					(Alt GW3)				(Alt GW4)				
		Solvang River Wells - 600 acre-feet/year				Solvang River Wells - 2,400 acre-feet/year					Solvang River Wells - 3,600 acre-feet/year				Solvang River Wells - 1,053 acre-feet/year [7]				
		% of Annual Demand	Gross Volume Pumped		Net Volume Pumped[4]	% of Annual Demand[5]	Gross Volume Pumped		Net Volume Pumped[4]	Difference with Current SYRHM Net Pumping[6]	Gross Volume Pumped		Net Volume Pumped[4]	Difference with Current SYRHM Net Pumping[6]	% of Annual Demand[8]	Gross Volume Pumped		Net Volume Pumped[4]	Difference with Current SYRHM Net Pumping[6]
			acre-feet	cfs	acre-feet		acre-feet	cfs	acre-feet	acre-feet	acre-feet	cfs	acre-feet	acre-feet		acre-feet	cfs	acre-feet	acre-feet
31	Jan	3.8	22.8	0.37	15.05	*6.25*	151	2.46	99.66	84.61	305.8	4.97	201.80	186.75	6.25	65.8	1.07	43.44	28.39
28	Feb	3.3	19.8	0.36	13.07	2.9	70	1.26	46.20	33.13	276.2	4.97	182.27	169.20	2.9	30.5	0.55	20.15	7.09
31	Mar	5	30	0.49	19.80	4.9	117	1.90	77.22	57.42	305.8	4.97	201.80	182.00	4.9	51.6	0.84	34.05	14.25
30	Apr	7.5	45	0.76	29.70	7.4	178	2.99	117.48	87.78	295.9	4.97	195.29	165.59	7.85	82.7	1.39	54.56	24.86
31	May	10.8	64.8	1.05	42.77	8.4	202	3.29	133.32	90.55	305.8	4.97	201.80	159.03	9.6	101.1	1.64	66.72	23.95
30	June	13.3	79.8	1.34	52.67	10.8	259	4.35	170.94	118.27	295.9	4.97	195.29	142.62	10.45	110.0	1.85	72.63	19.96
31	Jul	14.9	89.4	1.45	59.00	10.6	253	4.11	166.98	107.98	305.8	4.97	201.80	142.79	10.8	113.7	1.85	75.06	16.05
31	Aug	14.2	85.2	1.39	56.23	12	288	4.68	190.08	133.85	305.8	4.97	201.80	145.57	10.8	113.7	1.85	75.06	18.83
30	Sep	11.7	70.2	1.18	46.33	12.2	293	4.92	193.38	147.05	295.9	4.97	195.29	148.96	10.45	110.0	1.85	72.63	26.29
31	Oct	6.7	40.2	0.65	26.53	8.8	211	3.43	139.26	112.73	305.8	4.97	201.80	175.27	10	105.3	1.71	69.50	42.97
30	Nov	4.6	27.6	0.46	18.22	8.2	196	3.29	129.36	111.14	295.9	4.97	195.29	177.07	8.45	89.0	1.50	58.73	40.51
31	Dec	4.2	25.2	0.41	16.63	*7.55*	182	2.96	120.12	103.49	305.8	4.97	201.80	185.17	7.55	79.5	1.29	52.47	35.84
		100	**600**		396	100	**2,400**		1,584	1,188	**3,600**		2,376	1,980	100	**1,053**		694.98	299

Notes

1) SYRHM includes a total of 2000 acre-feet per year of net river pumping for municipal uses, including City of Solvang, and SYRWCD ID No. 1, and Buellton.

2) Table 7, Water System Master Plan Update, May 2002, p. 15

3) The permit expired in 1990 and the City of Solvang has filed a petition for a time extension with the SWRCB.

4) A return flow of 34% is assumed.

5) January and December monthly pumping reduced by .05 percent from Table 7 (see note #2) to make annual total equal 100 percent

6) The difference with the current net pumping is the component added to the model for increased Solvang river well pumping.

7) Letter from SWRCB to City of Solvang, April 16, 2001

8) Based on 2002 Master Plan monthly percentage adjusted for a maximum diversion of 1.85 cfs and 1,053 afy.

4.1 SYRHM Operational Modeling Results

Alternatives GW2 and GW5 are the focus of this discussion. Both of these alternatives use the same Solvang pumping of 2,400 afy. However, in Alternative GW2, the new wells are all located upstream of Solvang Bridge. In Alternative GW5, the new wells are all located downstream of Solvang Bridge. GW5 will be described in the tables and figures with a "d/s" description which stands for "downstream".

4.1.1 Lake Cachuma Operations

The surface water budget for Lake Cachuma for the new alternative (GW5) is shown in the last column of Table 4 for the hydrologic period water years (WYs) 1918 through1993. Table 4 shows that on average over the hydrologic period, the amount of water passed through at Bradbury Dam, either by spills and leakage, water right releases, or fish releases, is relatively the same (less than 1% variation[3]).

Table 4 shows that the largest difference in Cachuma Project operations for increased Solvang river well pumping scenarios is an increase in water rights releases. The increase in water rights releases from Lake Cachuma with increased Solvang pumping is due to an increase in water production and associated increase in the total dewatered storage levels, which affect the Above Narrows Account. On average, fish flow operations are about the same for increased well pumping by Solvang. This is primarily attributed to the following factors: (1) the primary management reach for fish flows is the Highway 154 reach, located about seven miles upstream of the City of Solvang river wells; (2) the increase in water rights releases conjunctively decreases the flows needed for fish; and (3) the number of spill years with greater than 20,000 acre-feet, which triggers fish flow targets at the Alisal Bridge, is reduced if Solvang pumps 3,600 afy. Both alternatives GW2 and GW5 have similar downstream water rights and fish releases from Lake Cachuma. These total downstream releases (water rights and fish) are slightly less in Alternative GW5 compared with GW2.

[3] Note: The precipitation and evaporation vary for each of the EIR alternatives due to differences in the surface area of the reservoir. Also, Tecolote Tunnel infiltration is not shown on these tables but is considered a component of the Project yield. Tecolote Tunnel infiltration averages about 2,050 acre-feet/year for the period 1918-1993 and 1,620 acre-feet/year during the drought period 1947-1951.

TABLE 4
SURFACE WATER BUDGETS FOR LAKE CACHUMA
AVERAGE ANNUAL VALUES FROM SYRHM, SIMULATION PERIOD 1918-1993 (76 YEARS) [1)]
(ACRE-FEET/YEAR)

Alternative No.	**GW1**	**GW2**	**GW3**	**GW4**	**GW5**
SWRCB EIR Alternative	**Alt 2**	**Alt 3C**	**Alt 3C**	**Alt 3C**	**Alt 3C**
City of Solvang Pumping (afy)	**600**	**2400**	**3600**	**1053**	**2400 (d/s)**
INFLOW					
Runoff	74,171	74,171	74,171	74,171	74,171
Precipitation	3,869	3,922	3,911	3,934	3,925
SWP water [2)]	7,619	7,663	7,663	7,663	7,663
Total Inflow	85,659	85,756	85,745	85,768	85,759
OUTFLOW					
Evaporation	10,876	11,030	11,000	11,066	11,041
Spills/Leakage	36,693	35,198	35,032	35,350	35,227
Project Deliveries (no tunnel) [3)]	23,069	23,017	22,988	23,053	23,045
WR89-18 releases	6,023	6,046	6,273	5,819	6,002
Fish/Habitat releases	1,362	2,707	2,692	2,721	2,686
SWP Exchange [4)]	-2,512	-2,512	-2,512	-2,512	-2,512
SWP Deliveries to South Coast	10,131	10,175	10,175	10,175	10,175
Total Outflow	85,642	85,661	85,648	85,672	85,663
Change in Storage	17	95	97	96	96
MEAN WATER PASSING THROUGH CACHUMA (Spills and Releases)					
Cachuma Spills & Releases	44,078	43,951	43,997	43,890	43,915
Difference from GW4 (AFY)	188	61	107	---	25
Difference from GW4 (%)	0.4%	0.1%	0.2%	----	0.1%
No. of Spill months	82	78	78	78	78
No. of Spill Water Years	26	25	25	25	25
No. of Spill Water Years >20,000 af	16	15	14	15	15

NOTES

1) See Table 1 for description of alternatives; fish releases include rearing and passage flows.

2) Includes SWP deliveries in outlet works and into Lake Cachuma.

3) Does not include Tecolote Tunnel infiltration which averages about 2,050 acre-feet/year

4) Includes SWP exchange with SYRWCD ID No 1.

Figures 5 and 6 show the frequency of releases and spills from Lake Cachuma for all alternatives on different scales of flow. Figure 5 indicates that flow distribution frequencies under the various alternatives in terms of high flows are similar. Figure 6 shows the differences among the alternatives for flows that are less than 50 cfs. Alternatives GW2 and GW5 have similar distribution frequencies for high and low flows.

4.2 Lake Storage and Elevation

The minimum storage level (minimum pool) is set to 12,000 acre-feet, which would occur under the critical drought of WYs 1947 through 1951 for all alternatives. Table 5 summarizes average Lake Cachuma elevation and storage for each alternative. In general, the median elevation, storage, and surface area for all alternatives are very similar, including Alternative GW5.

4.3 Santa Ynez River Flows

Figures 7 through 12 show the frequency of flows at six different locations downstream of Lake Cachuma for the various alternatives based on the results of the SYRHM. Figure 7 shows that the frequency of releases and spills from Cachuma Reservoir are very similar except for Alternative GW1 which uses the interim fish flow operations (Table 1). Figures 8 and 9 illustrate the key differences among the increased Solvang river well pumping scenarios. Figure 8 shows the frequency of flows of the Santa Ynez River at the Highway 154 Bridge, in which Solvang increases in river well pumping result in little change. Figure 9 shows the frequency of flows of the Santa Ynez River at Alisal Bridge, in which the differences in flow between pumping scenarios are more apparent. Figure 9 indicates that Alternative GW5 has higher flows at Alisal Bridge more often than Alternative GW2. The flows at Alisal Bridge under GW5 are very similar to the GW4 (1053 afy Solvang pumping from wells upstream). Figure 10 shows that the difference between surface flows for the different alternatives at Buellton Bridge are very similar to the impacts at Alisal Bridge, except attenuated by the additional tributary and groundwater contributions below Alisal Bridge. Figures 11 and 12 show that the impacts from increased Solvang river pumping attenuates even further downstream near the Salsipuedes Creek confluence and at the Lompoc Narrows. Appendix A contains the monthly flows for the new scenario (GW5) from 1918 through 1993 (912 months).

TABLE 5

MEDIAN MONTHLY AND ANNUAL LAKE CACHUMA STORAGE AND ELEVATIONS
(SIMULATION PERIOD 1918-1993)

Alternative No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping	Surcharge	February Storage	April Storage	July Storage	November Storage	Annual Elevation	February Elevation	August Elevation	November Elevation
		afy	ft	af	af	af	af	ft	ft	ft	ft
GW1	Alt 2	600	0.75	152,394	165,533	146,851	130,484	733.73	737.24	732.24	728.25
GW2	Alt 3C	2400	3.00	154,158	168,457	152,321	135,302	734.25	737.92	734.57	730.31
GW3	Alt 3C	3600	3.00	153,742	168,136	151,843	134,409	733.99	737.76	734.32	729.94
GW4	Alt 3C	1053	3.00	154,462	168,003	153,027	135,997	734.46	738.04	734.93	730.60
GW5	Alt 3C	2400 (d/s)	3.00	154,224	168,212	152,435	135,401	734.22	737.94	734.61	730.35

Table 6 compares the mean annual stream flows at key sites downstream of Lake Cachuma. The mean or average statistic differs from the flow frequency graphs in that average values can be influenced by infrequent, extremely large storm events. For the scenarios of increased Solvang river well pumping, mean annual flows at Highway 154 Bridge are similar for all the alternatives. However, the GW3 Santa Ynez River mean annual flows at the Alisal Bridge and Lompoc Narrows are reduced by 1,122 and 1,054 afy, respectively. The mean annual average flow at Alisal Bridge actually increases slightly by 52 afy in Alternative GW5 in comparison with Alternative GW4. Conversely, Alternative GW2 does show a reduction of -588 afy to the mean annual flow at Alisal Bridge when compared to Alternative GW4. Table 6 shows that moving Solvang's new wells downstream (GW5) can completely mitigate the impacts to flows at Alisal Bridge, which is a management site for endangered steelhead.

Tables 7, 8, and 9 show the median monthly flows at the Highway 154 Bridge to be similar, and the median monthly flows at Alisal Bridge and Lompoc Narrows to be less for the increased Solvang river well pumping scenarios. The median statistic is the same as the 50 percent exceedance and shows a pattern similar to that of the flow frequency graphs (Figures 7 through 12). Table 8 shows that, depending on the month, the median flow at Alisal Bridge is about 0 to 2.5 cfs higher under GW5 compared with GW2.

TABLE 6

MEAN ANNUAL FLOWS AT HIGHWAY 154 BRIDGE, ALISAL BRIDGE, AND LOMPOC NARROWS

(SIMULATED PERIOD 1918-1993)

Alternative No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping	Surcharge	Hwy 154 Bridge	Alisal Bridge	Lompoc Narrows	Increase (decrease) in Mean Annual Flow Compared with Alternative GW4		
							Hwy 154 Bridge	Alisal Bridge	Lompoc Narrows
		afy	ft	afy	afy	Afy	afy	afy	afy
GW1	Alt 2	600	0.75	45,920	49,128	65,863	186	479	681
GW2	Alt 3C	2,400	3.00	45,794	48,061	64,637	60	(-588)	(-545)
GW3	Alt 3C	3,600	3.00	45,842	47,527	64,128	108	(-1,122)	(-1,054)
GW4	Alt 3C	1,053	3.00	45,734	48,649	65,182	---	---	---
GW5	Alt 3C	2400 (d/s)	3.00	45,759	48,701	64,863	25	52	-319

TABLE 7
MEDIAN MONTHLY FLOW OF SANTA YNEZ RIVER AT HIGHWAY 154 BRIDGE IN CFS
(SIMULATION PERIOD 1918-1993)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping	Surcharge	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
GW1	Alt 2	600	0.75	2.5	2.5	2.5	2.5	4.25	5.25	4.75	3.75	4.25	5.5	20.75	14.5
GW2	Alt 3C	2400	3.00	6	5	5	5	7.75	10.25	5	5	5	9.75	18.25	19.75
GW3	Alt 3C	3600	3.00	5	5	5	5	7.5	10.25	5	5	5.75	10	16.75	19.25
GW4	Alt 3C	1053	3.00	6	5	5	5	7.75	10.25	5	5	5	9.75	17.75	20
GW5	Alt 3C	2400 (d/s)	3.00	5.5	5	5	5	7.75	10.25	5	5	5	9.75	23.25	20.75

TABLE 8
MEDIAN MONTHLY FLOW OF SANTA YNEZ RIVER AT ALISAL BRIDGE IN CFS
(SIMULATION PERIOD 1918-1993)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping	Surcharge	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
GW1	Alt 2	600	0.75	0	0	0.25	1.25	5.5	9	6.5	3.75	1.5	3.75	9	6
GW2	Alt 3C	2400	3.00	1.5	0.75	1	2.5	11.5	19	6.5	4.25	2	6.25	7.75	6.75
GW3	Alt 3C	3600	3.00	0.75	0.25	0.75	2	9.75	17.5	5	3.25	1.75	6.75	8	6.5
GW4	Alt 3C	1053	3.00	1.5	1.5	1.5	3.25	13.3	20.75	7.25	4.75	2.5	6	8.5	8.5
GW5	Alt 3C	2400 (d/s)	3.00	1.5	1.25	1.5	3	13.3	20.5	7.25	5	2.5	6.75	10.25	7.75

TABLE 9
MEDIAN MONTHLY FLOW OF SANTA YNEZ RIVER AT LOMPOC NARROWS IN CFS
(SIMULATION PERIOD 1918-1993)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping	Surcharge	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
GW1	Alt 2	600	0.75	0	0	0.75	3	16.3	24	18	3	1.5	1.5	0.5	0
GW2	Alt 3C	2400	3.00	0	0	0.75	4	24.3	32.75	17.8	4.25	1.75	1.75	0.5	0
GW3	Alt 3C	3600	3.00	0	0	0.75	3.75	19	30.75	16.5	3.5	1.5	1.75	0.5	0
GW4	Alt 3C	1053	3.00	0	0	0.75	4.25	25.3	34.5	19	4.75	2	1.5	0.75	0
GW5	Alt 3C	2400 (d/s)	3.00	0	0	0.75	4	24.8	34	18.3	4.5	1.75	1.5	1	0

4.4 Groundwater Storage in the Above Narrows Riparian Aquifer

Figure 13 shows the changes in total dewatered storage in the entire Above Narrows Riparian Aquifer. The Above Narrows Riparian Aquifer recovers to the same levels with the recharge of winter runoff under the various alternatives. The key differences in water levels occur during the droughts. Figure 13 shows that for similar fish release operations (SWRCB Alt 3C) there is more total dewatered storage when Solvang river well pumping increases. For example, Alternative GW3 (3600 afy) results in higher dewatered storage levels in the Above Narrows Aquifer than all other alternatives. Figures 14, 15, and 16 show the effects in total dewatered storage for the three different sub-basins within the Above Narrows Riparian Aquifer, namely the Santa Ynez, Buellton, and Santa Rita sub-basins.

Tables 10 through 13 show statistics on monthly total dewatered storage for the Above Narrows Riparian Aquifer and for the three different sub-basins. For comparison, the last four columns show the difference in dewatered storage relative to Alternative GW4 (1053 afy). Alternative GW5 has similar dewatered storage as Alternative GW2 for the total dewatered storage (Table 10). However, in the Santa Ynez sub-basin, Alternative GW5 has less dewatered storage (more storage) than Alternative GW2 (Table 11). The Santa Ynez sub-basin includes Highway 154 and Alisal Bridge, which are the target sites for fish water releases, so Alternative GW5 would impact flows less in the Santa Ynez sub-basin compared with Alternative GW2, due to Solvang having the location of new wells downstream from the Alisal Bridge. Conversely, Alternative GW5 has more dewatered storage than Alternative GW2 in the Buellton sub-basin (Table 12).

Tables 14 through 16 show the impact of the EIR alternatives on the average groundwater elevations in the Santa Ynez, Buellton, and Santa Rita sub-basins[4]. The most significant change among the EIR alternatives (except for Alternative GW5) occurs in the Santa Ynez sub-basin, with ground water levels decreasing one to eleven feet on average throughout the area. The largest differences occur during droughts. Alternative GW5 has similar water levels as Alternative GW4 in the Santa Ynez sub-basin but levels one to two feet lower in the Buellton sub-basin.

[4] The SYRHM is limited in predicting water level changes (beyond the large groundwater subunits of Santa Ynez, Buellton, and Santa Rita) because it does not take into account aquifer properties. Local well interference is discussed elsewhere in this memorandum.

TABLE 10
STATISTICS ON MONTHLY TOTAL DEWATERED STORAGE FOR ABOVE NARROWS RIPARIAN AQUIFER, 1918-1993 (ACRE-FEET)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping afy	Surcharge ft	Mean	Median	Minimum	Maximum	Increase (decrease) Compared with GW4 Mean	Median	Minimum	Maximum
GW1	Alt 2	600	0.75	10,769	10,517	2,324	32,936	296	298	(9)	1,346
GW2	Alt 3C	2400	3	11,093	10,736	2,386	34,086	620	518	53	2,496
GW3	Alt 3C	3600	3.00	11,714	11,151	2,488	36,430	1,241	933	155	4,840
GW4	Alt 3C	1053	3.00	10,473	10,218	2,333	31,591	----	----	----	----
GW5	Alt 3C	2400 (d/s)	3.00	10,998	10,710	2,471	33,149	525	492	138	1,558

TABLE 11
STATISTICS ON MONTHLY TOTAL DEWATERED STORAGE FOR SANTA YNEZ RIPARIAN SUB-BASIN, 1918-1993 (ACRE-FEET)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping afy	Surcharge ft	Mean	Median	Minimum	Maximum	Increase (decrease) Compared with GW4 Mean	Median	Minimum	Maximum
GW1	Alt 2	600	0.75	1,926	1,769	0	9,048	95	77	(2)	223
GW2	Alt 3C	2400	3	2,243	2,010	110	10,941	411	318	107	2,116
GW3	Alt 3C	3600	3.00	2,695	2,293	169	13,019	863	601	166	4,194
GW4	Alt 3C	1053	3.00	1,832	1,692	2	8,825	----	----	----	----
GW5	Alt 3C	2400 (d/s)	3.00	1,843	1,705	6	8,879	11	13	4	54

TABLE 12
STATISTICS ON MONTHLY TOTAL DEWATERED STORAGE FOR BUELLTON RIPARIAN SUB-BASIN, 1918-1993 (ACRE-FEET)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping afy	Surcharge ft	Mean	Median	Minimum	Maximum	Increase (decrease) Compared with GW4 Mean	Median	Minimum	Maximum
GW1	Alt 2	600	0.75	5,598	5,570	2,160	11,018	78	90	(4)	66
GW2	Alt 3C	2400	3	5,666	5,621	2,182	11,189	146	142	19	236
GW3	Alt 3C	3600	3.00	5,790	5,754	2,224	11,372	270	275	60	420
GW4	Alt 3C	1053	3.00	5,520	5,479	2,164	10,952	----	----	----	----
GW5	Alt 3C	2400 (d/s)	3.00	6,018	5,958	2,309	12,242	497	478	146	1,289

TABLE 13
STATISTICS ON MONTHLY TOTAL DEWATERED STORAGE FOR SANTA RITA RIPARIAN SUB-BASIN, 1918-1993 (ACRE-FEET)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping afy	Surcharge ft	Mean	Median	Minimum	Maximum	Increase (decrease) Compared with GW4 Mean	Median	Minimum	Maximum
GW1	Alt 2	600	0.75	3,244	3,080	0	13,042	123	107	0	985
GW2	Alt 3C	2400	3	3,184	3,018	0	12,284	63	45	0	227
GW3	Alt 3C	3600	3.00	3,229	3,032	0	12,456	108	59	0	399
GW4	Alt 3C	1053	3.00	3,121	2,973	0	12,057	----	----	----	----
GW5	Alt 3C	2400 (d/s)	3.00	3,137	2,993	0	12,252	16	20	0	195

TABLE 14
STATISTICS ON MONTHLY AVERAGE GROUNDWATER LEVEL ELEVATION FOR SANTA YNEZ RIPARIAN SUB-BASIN, 1918-1993 (ACRE-FEET)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping afy	Surcharge ft	Mean	Median	Minimum	Maximum	Increase (decrease) Compared with GW4 Mean	Median	Minimum	Maximum
GW1	Alt 2	600	0.75	459	460	443	464	0	0	(1)	0
GW2	Alt 3C	2400	3	459	459	438	464	(1)	(1)	(5)	0
GW3	Alt 3C	3600	3.00	458	459	432	464	(2)	(1)	(11)	0
GW4	Alt 3C	1053	3.00	460	460	443.4	464	----	----	----	----
GW5	Alt 3C	2400 (d/s)	3.00	460	460	443.2	464	0	0	0	0

TABLE 15
STATISTICS ON MONTHLY AVERAGE GROUNDWATER LEVEL ELEVATION FOR BUELLTON RIPARIAN SUB-BASIN, 1918-1993 (ACRE-FEET)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping afy	Surcharge ft	Mean	Median	Minimum	Maximum	Increase (decrease) Compared with GW4 Mean	Median	Minimum	Maximum
GW1	Alt 2	600	0.75	304	304	295	310	0	0	0	0
GW2	Alt 3C	2400	3	304	304	295	310	0	0	0	0
GW3	Alt 3C	3600	3.00	304	304	294	309	0	0	(1)	0
GW4	Alt 3C	1053	3.00	304	304	295	310	----	----	----	----
GW5	Alt 3C	2400 (d/s)	3.00	303	303	293	309	(1)	(1)	(2)	0

TABLE 16
STATISTICS ON MONTHLY AVERAGE GROUNDWATER LEVEL ELEVATION FOR SANTA RITA RIPARIAN SUB-BASIN, 1918-1993 (ACRE-FEET)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping afy	Surcharge ft	Mean	Median	Minimum	Maximum	Increase (decrease) Compared with GW4 Mean	Median	Minimum	Maximum
GW1	Alt 2	600	0.75	176	176	163	180	0	0	(1)	0
GW2	Alt 3C	2400	3	176	176	164	180	0	0	0	0
GW3	Alt 3C	3600	3.00	176	176	164	180	0	0	(1)	0
GW4	Alt 3C	1053	3.00	176	176	165	180	----	----	----	----
GW5	Alt 3C	2400 (d/s)	3.00	176	176	164	180	0	0	0	0

4.4.1 Water Rights Releases (WR 89-18)

Table 17 shows the impacts to water rights releases for the various alternatives as simulated by the SYRHM for hydrologic period 1918-1993 (76 years). The Above Narrows Account is dependent upon groundwater storage in the Above Narrows Riparian Aquifer because the account cannot be larger than the dewatered storage. Table 17 indicates that WR89-18 releases would be increased as a result of increased pumping by Solvang. For example, the average annual release would increase by about 454 acre-feet under GW3 when compared to GW4. Alternatives GW2 and GW5 have similar impacts on water rights releases.

TABLE 17
IMPACTS TO WATER RIGHTS RELEASES FOR WATER YEARS 1918-1993
(ACRE-FEET/YEAR)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping	Surcharge	WR 89-18 Releases	Increase (decrease) in WR 89-18 Releases with GW4
		afy	ft		
GW1	Alt 2	600	0.75	6,023	204
GW2	Alt 3C	2,400	3.00	6,046	227
GW3	Alt 3C	3,600	3.00	6,273	454
GW4	Alt 3C	1,053	3.00	5,819	----
GW5	Alt 3C	2,400 (d/s)	3.00	6,002	183

4.4.2 Cachuma Project Deliveries

Shortages in water supply from the Cachuma Project during droughts were determined using SYRHM. The historical precipitation at Gibraltar Dam during the drought period from 1947 through 1951 was 35% to 60% below normal. The Cachuma Project members, which consist of the City of Santa Barbara, Goleta Water District (WD), Montecito WD, Carpinteria Valley WD, and Santa Ynez River Water Conservation District, Improvement District No. 1 (SYRWCD ID No.1), all share the shortages. The shortages to water supply during the last three years of this critical drought period (1949-1951) for the various EIR alternatives are shown in Table 18.

TABLE 18
IMPACTS OF SOLVANG ALTERNATIVES ON PROJECT WATER SUPPLY IN CRITICAL DROUGHT PERIOD IN ACRE-FEET
(BASED ON SIMULATION OF 1949-1951 DROUGHT)

Alt No.	Fish Flow Operations/ Surcharge	Solvang River Well Pumping	Surcharge	Shortage in Critical Drought Year (1951) 1)	Shortage as Percentage of Annual Draft 2)	Cumulative Shortage in Critical Drought Period (1949-1951) 3)	Shortage as Percentage of Annual Draft for Three Years
		afy	ft	afy		af	
GW1	Alt 2	600	0.75	9,810	38%	20,130	26%
GW2	Alt 3C	2400	3.00	10,460	41%	21,300	28%
GW3	Alt 3C	3600	3.00	10,640	41%	21,790	28%
GW4	Alt 3C	1053	3.00	10,300	40%	20,910	27%
GW5	Alt 3C	2400 (d/s)	3.00	10,120	39%	20,470	27%

Notes
1) Shortage rounded to nearest 10 acre-feet
2) Annual Draft from Cachuma Project is 25,714 acre-feet
3) Period corresponds with Project water supply year, May 1949 - April 1952.

Cachuma fish flow operations under SWRCB Alternative 3C (Solvang GW2-GW5) will produce substantially greater shortages in the Cachuma Project yield during the critically dry period compared with the SWRCB fish flow operations under Alternative 2 (Solvang GW1). Increases in Solvang pumping will also increase Cachuma Project water shortages during droughts. This is attributed to increases in water rights and fish water releases, which are directly related to the level of dewatered storage in the Santa Ynez River alluvium from which Solvang would be pumping. Table 18 shows that the Alternative GW5 completely mitigates the impacts to the Cachuma Project supply compared to Alternative GW4 by pumping from wells downstream of Solvang Bridge. Upstream of Solvang Bridge has been designated as critical management reach for endangered steelhead (NMFS, 2000); however, downstream of Solvang Bridge has not. Thus, under Alternative GW5 additional releases for fish would not be measured to maintain the habitat upstream of Solvang Bridge.

5.0 LOCAL GROUND WATER IMPACT ANALYSIS FOR ALTERNATIVE GW5

This analysis is for the Alternative GW5 only. Please refer to previous technical memoranda for analysis of other alternatives (Stetson, 2004 c and d and 2005). Stetson evaluated the potential impact of combined pumping from the four proposed wells at Site B at an annual rate of 2,400 afy. The estimated peak pumping rates for the four proposed wells are shown in Figure 2. These rates are slightly higher than the proposed rate in the Master Plan (Solvang, 2009). This is because the method used to evaluate the impacts is based on previous studies by Stetson Engineers (Stetson, 2004 a,b,c,d, and 2005) to determine the impact of groundwater pumping by Solvang. The previous work by Stetson employed a groundwater model. However, the area of existing model does not extend far enough to the west to cover the proposed Site B wells (Figure 1). Analytical methods were used to evaluate the impact of pumping on groundwater levels and depletion from the Santa Ynez River. A Theis (1943) drawdown analysis was employed to evaluate the effect on groundwater levels under Alternative GW5.

The Theis (1943) method can be used to estimate drawdown in an aquifer at any distance from a pumping well or wells. It can simulate the boundaries of an aquifer using image wells. For this analysis, four new wells were assumed to be located in the proposed well field area at Site B with spacing between them of approximately 1,000 feet. Image wells were used to represent the northern and southern boundaries of the river and floodplain alluvium. The monthly total pumping rate for the proposed well field (Figure 2) was divided evenly between the four proposed wells. The monthly average pumping rate per well ranged from about 140 gpm in February to 550 gpm in September. The analysis was simulated for 24 months to determine the potential drawdowns in the vicinity of the proposed wells which may occur over a summer period with no flow in the river, as well as for an extended dry period in which inflows may be less than about five cfs per month for two years.

Pumping by others in this reach of the Santa Ynez River alluvium below the Alisal Bridge was not included in this analysis because: 1) the location and annual or monthly pumping is unknown and difficult to estimate; and 2) drawdown due to pumping is additive due to the principal of superposition such that the drawdown due to the proposed pumping can be added to current water levels experienced by well owners in the area. For example, the calculated drawdowns can be added to those shown in the water level hydrographs in Figure 4, assuming all other pumping and losses (such as phreatophyte evapotranspiration) have not changed significantly.

Tables 19 and 20 show the calculated drawdown due to the proposed pumping of 2,400 afy under Alternative GW5 from the proposed Solvang wells (proposed well field) at various times, distances and directions . The focus is on summer drawdowns because those are expected to occur when water levels in the area are at their lowest, particularly if there is no flow in the river. Calculated

drawdowns toward the northern alluvial boundary range from a maximum of about 7 feet at a distance of 1,000 feet to about 4 feet at a distance of 3,000 feet from the proposed well field in September. This calculation is based on no river or other inflows to the area. In the upstream or downstream (east or west) direction, the calculated drawdown ranges from a maximum of about 4 feet at a distance of 2,000 feet to about 1.0 feet at a distance of 6,000 feet from the proposed well field in September. Again, this calculation is based on no river or other inflows to the area.

TABLE 19
CALCULATED DRAWDOWN NORTH OF THE PROPOSED SOLVANG WELL FIELD
(END OF MONTH DRAWDOWN IN FEET)

	Distance North from Proposed Well Field		
Year 1	1,000 ft	2,000 ft	3,000 ft
March	1.8	1.2	0.9
June	4.4	3.2	2.5
Sept.	6.7	5.2	4.3
Year 2			
March	5.8	5.2	4.8
June	7.5	6.2	5.4
Sept.	9.1	7.6	6.7

TABLE 20
CALCULATED DRAWDOWN UPSTREAM OR DOWNSTREAM (IE. EAST OR WEST) OF PROPOSED SOLVANG WELL FIELD
(END OF MONTH DRAWDOWN IN FEET)

	Distance Up or Down from Proposed Well Field		
Year 1	2,000	4,000 ft	6,000 ft
March	0.8	0.4	0.1
June	2.3	1.1	0.05
Sept.	3.9	2.2	1.2
Year 2			
March	4.4	3.2	2.3
June	5.0	3.5	2.5
Sept.	6.2	4.2	3.0

These calculated drawdowns would be much lower, near zero, within a distance of about 1,000 feet if the Santa Ynez River were flowing.

6.0 SUMMARY AND RECOMMENDATIONS

Analyses of the new alternative with all of Solvang's new Santa Ynez River wells located downstream of Alisal Bridge indicates that development of a well field at this site should be successful. The reported performance of existing wells indicates that the aquifer would be able to meet both monthly average and peak demands of the City of Solvang. The alluvial deposits are thicker and the yields are typically higher in this area compared with upstream of the Alisal Bridge. Therefore, it is anticipated only four new wells would have to be drilled at the proposed well sites downstream compared with six wells upstream of the Alisal Bridge.

The SYRHM indicates locating the wells downstream of Alisal Bridge would also mitigate the impacts to endangered steelhead and impacts to Cachuma Project water supply. This would occur because the Alisal Bridge is used as a target flow site in the Cachuma Project operations under the BO, and locating the new wells about 1.5 mile downstream of the Bridge would mitigate the impacts to river flows upstream of the Alisal Bridge. The Lower Santa Ynez River Fish Management Plan (SYRTAC, 2000) has also indicated that Alisal Bridge is the farthest downstream location from Lake Cachuma in which the endangered steelhead are considered to have good to marginally fair habitat conditions. So, environmental impacts from increased pumping downstream of Alisal Bridge would be less compared to upstream of Alisal Bridge.

Solvang would have sufficient capacity with the proposed wells and existing Wells 3 and 7A to pump the proposed amount from a combination of those wells and have the flexibility to manage local drawdowns. If water levels decline in excess of operational criteria, pumping could likely be shifted to other wells in response to local conditions.

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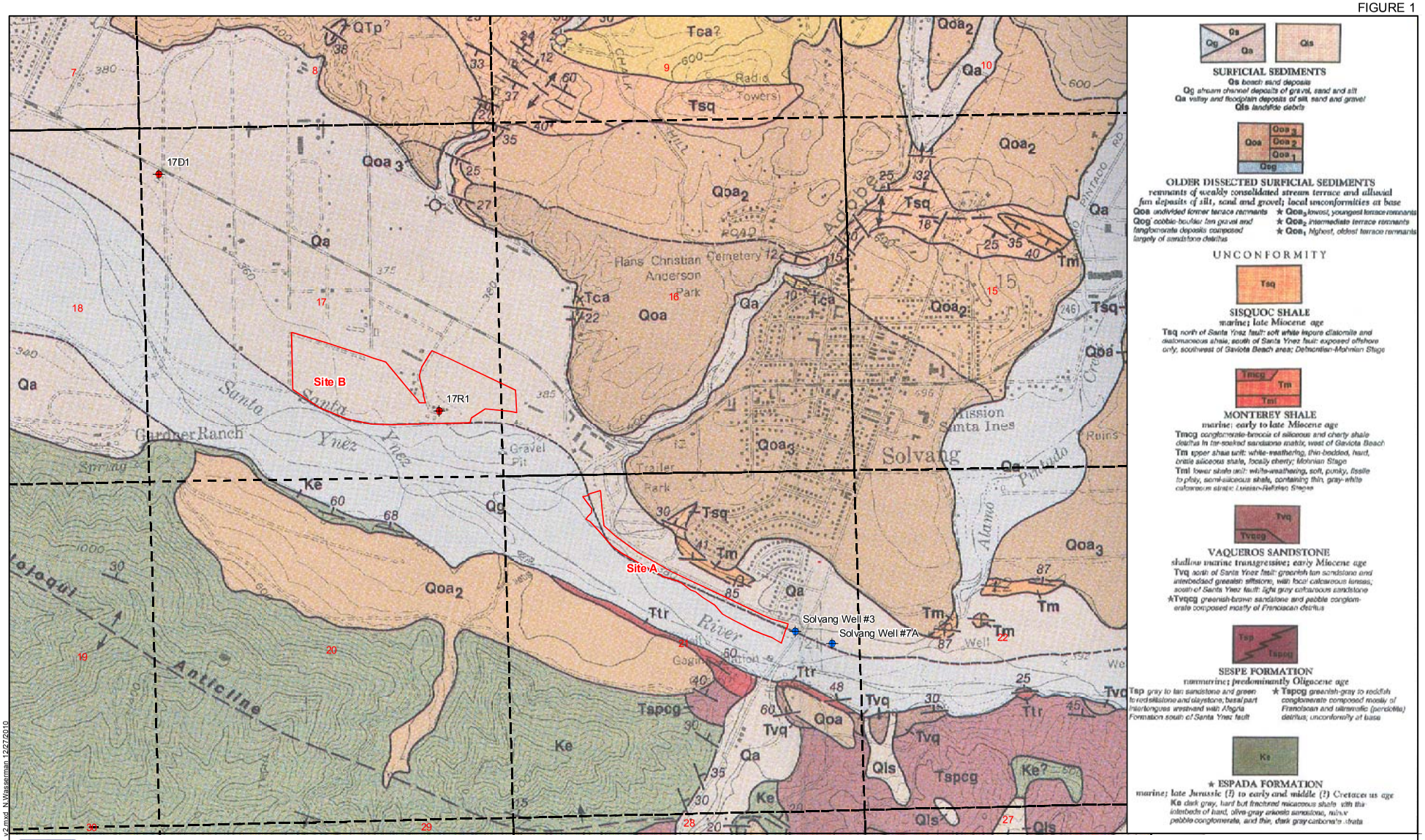
FIGURES

FIGURE 1



BOR Monitoring Well
Existing Solvang Well
Potential Well Field Site
Surveyed PLSS (T.6N R.31W)

STETSON ENGINEERS INC.

GEOLOGIC MAP OF THE AREA OF INVESTIGATION

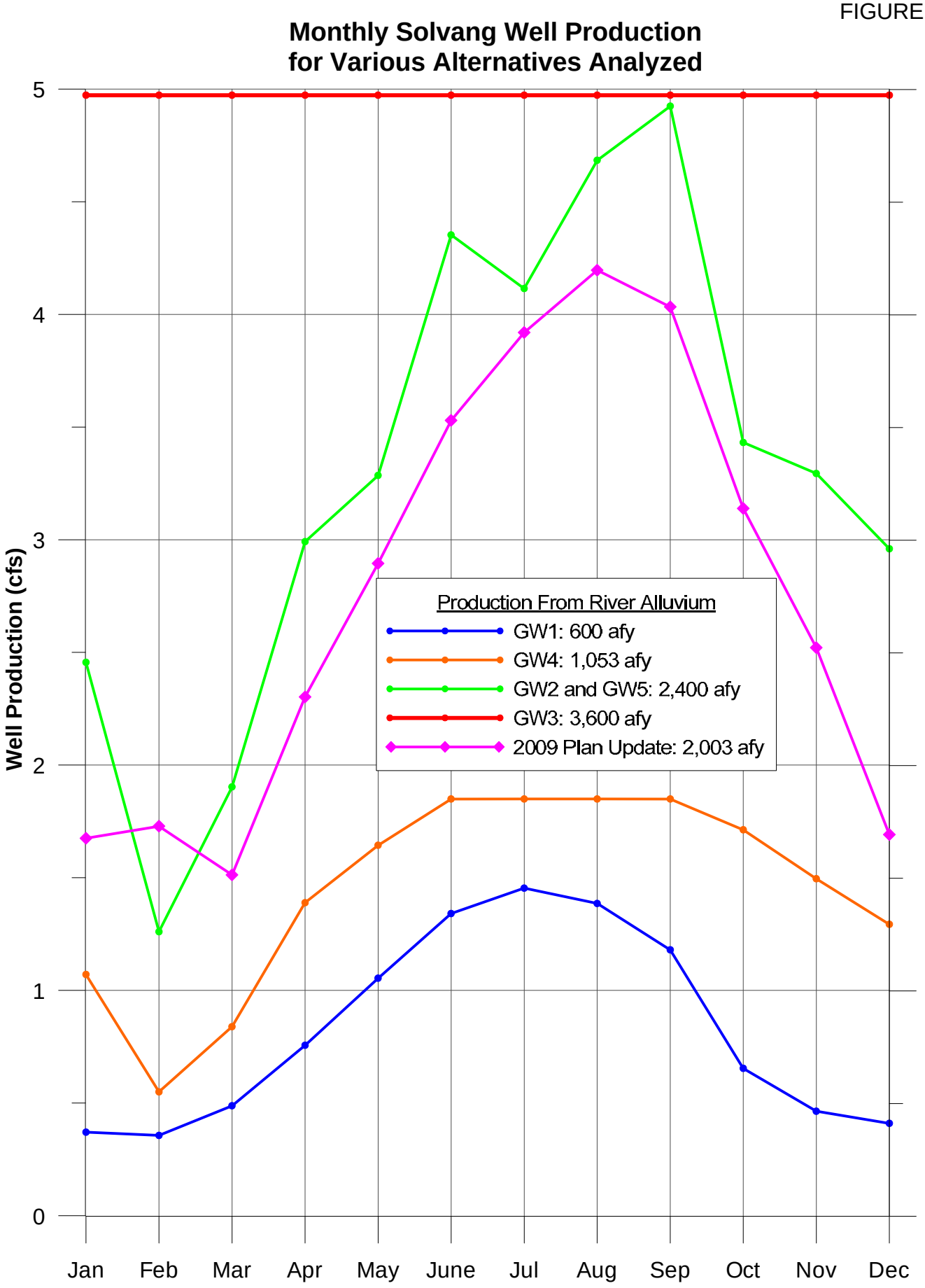
Source: (Dibblee, 1988)

N

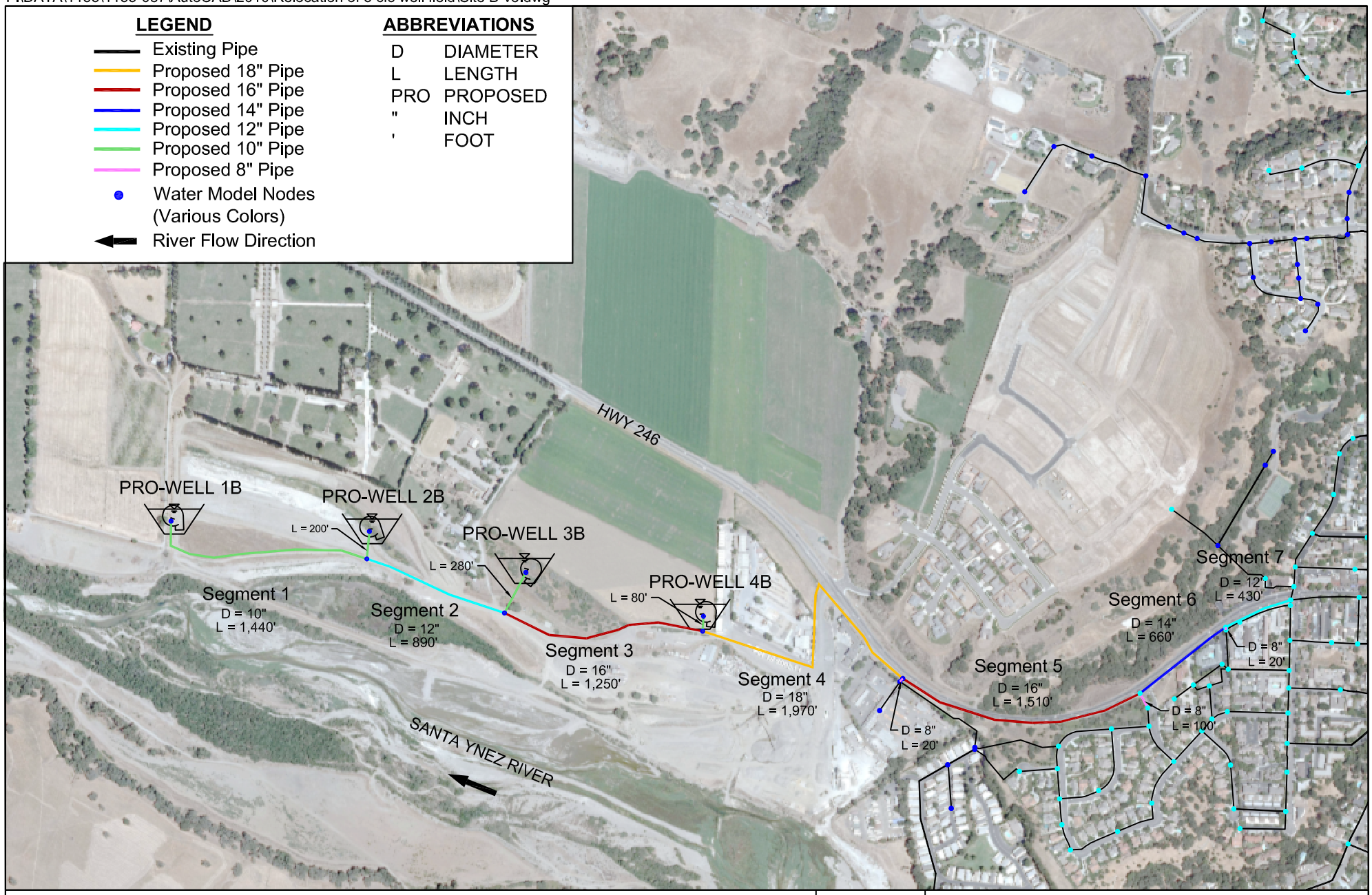
0 1,000 2,000 Feet

J:\jn1155\solvangeology_v2.mxd N.Wasserman 12/27/2010

FIGURE 2


Monthly Solvang Well Production
for Various Alternatives Analyzed
Well Production (cfs)
0
1
2
3
4
5
Jan
Feb
Mar
Apr
May
June
Jul
Aug
Sep
Oct
Nov
Dec
Production From River Alluvium
GW1: 600 afy
GW4: 1,053 afy
GW2 and GW5: 2,400 afy
GW3: 3,600 afy
2009 Plan Update: 2,003 afy

F:\DATA\1155\1155-087\AutoCAD\2010\Relocation of 5 cfs well field\Site B-v3.dwg



N
W E
S

SCALE (Feet)

0 800 1600

STETSON ENGINEERS INC.

PROPOSED NEW WELLS AT SITE B

FIGURE 3

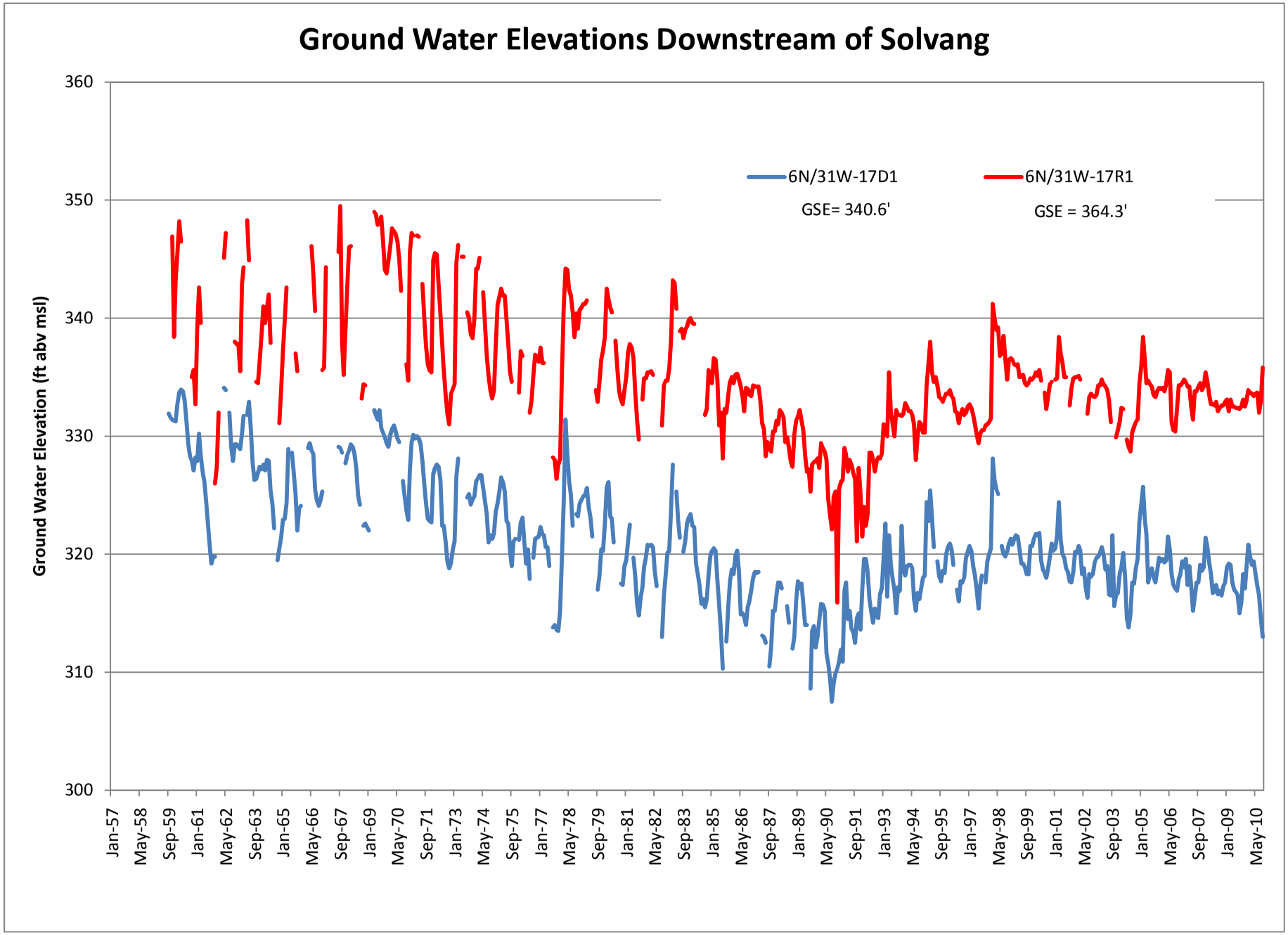

Ground Water Elevations Downstream of Solvang
Ground Water Elevation (ft abv msl)
360
350
340
330
320
310
300
6N/31W-17D1
GSE= 340.6'
6N/31W-17R1
GSE = 364.3'
Jan-57
May-58
Sep-59
Jan-61
May-62
Sep-63
Jan-65
May-66
Sep-67
Jan-69
May-70
Sep-71
Jan-73
May-74
Sep-75
Jan-77
May-78
Sep-79
Jan-81
May-82
Sep-83
Jan-85
May-86
Sep-87
Jan-89
May-90
Sep-91
Jan-93
May-94
Sep-95
Jan-97
May-98
Sep-99
Jan-01
May-02
Sep-03
Jan-05
May-06
Sep-07
Jan-09
May-10

FIGURE 5

FREQUENCY OF SPILLS AND DOWNSTREAM RELEASES
FROM CACHUMA RESERVOIR FOR HIGH FLOWS
(WY 1918-1993)

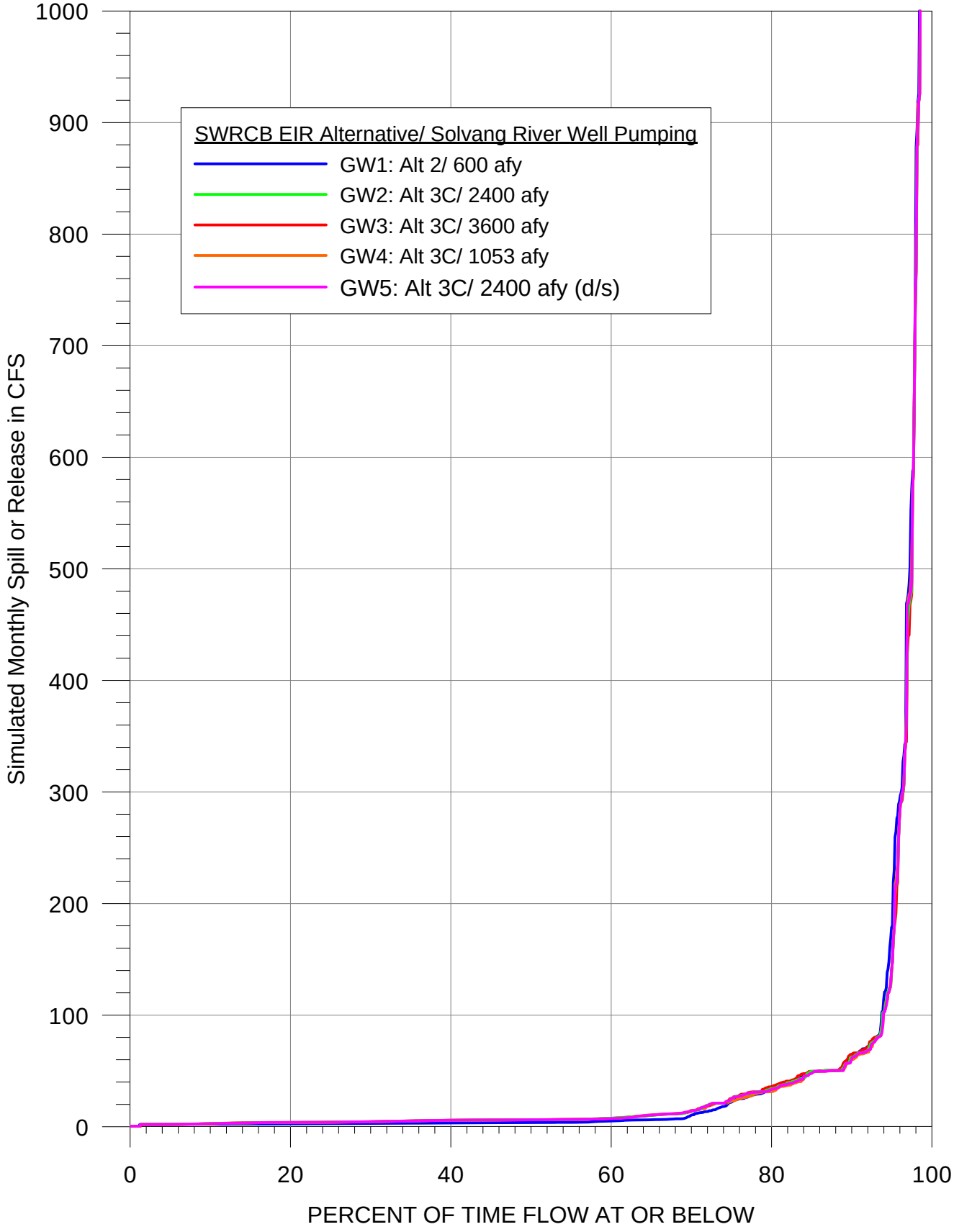


FIGURE 6

FREQUENCY OF SPILLS AND DOWNSTREAM RELEASES
FROM CACHUMA RESERVOIR FOR LOW FLOWS
(WY 1918-1993)

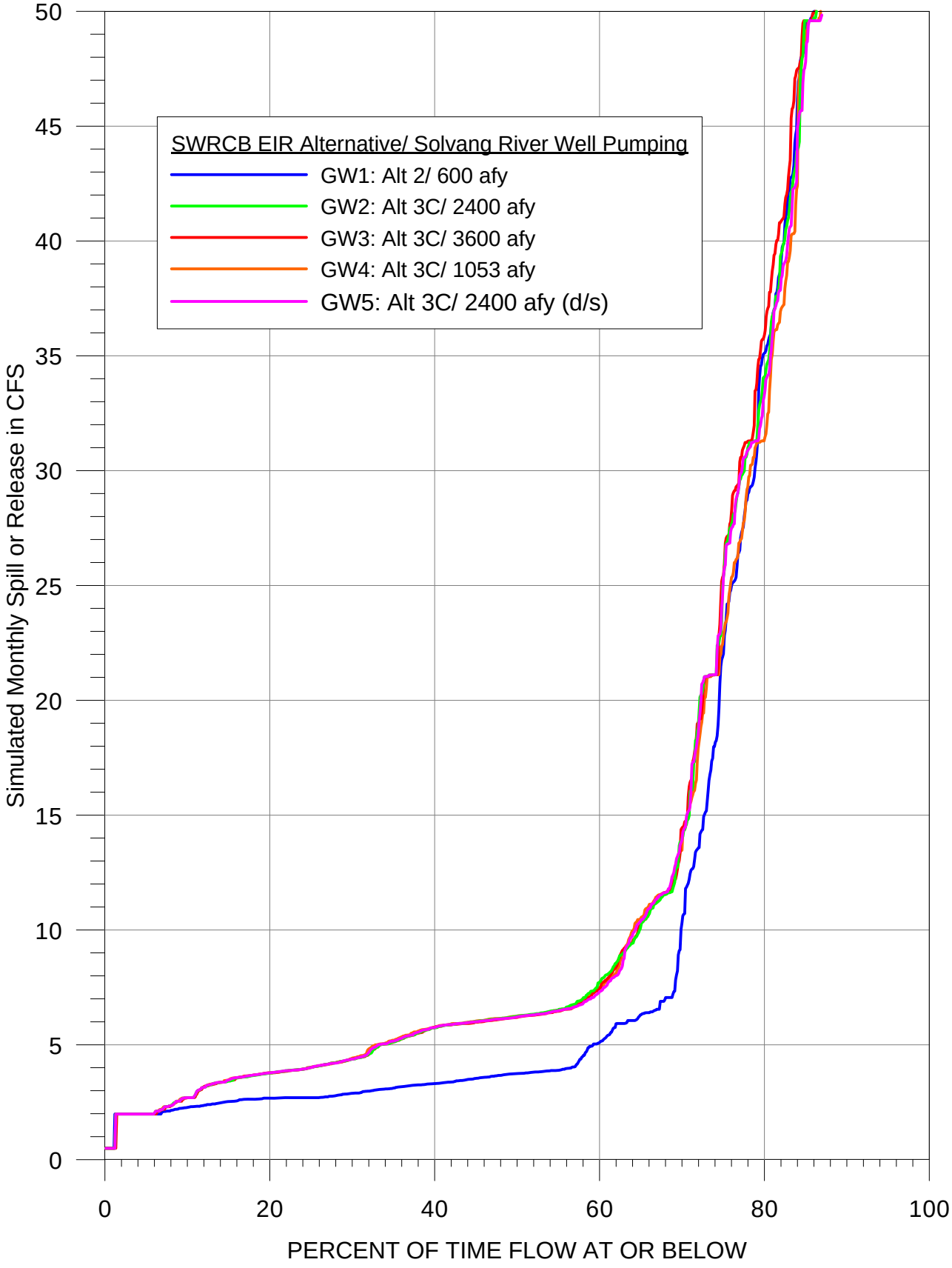


FIGURE 7

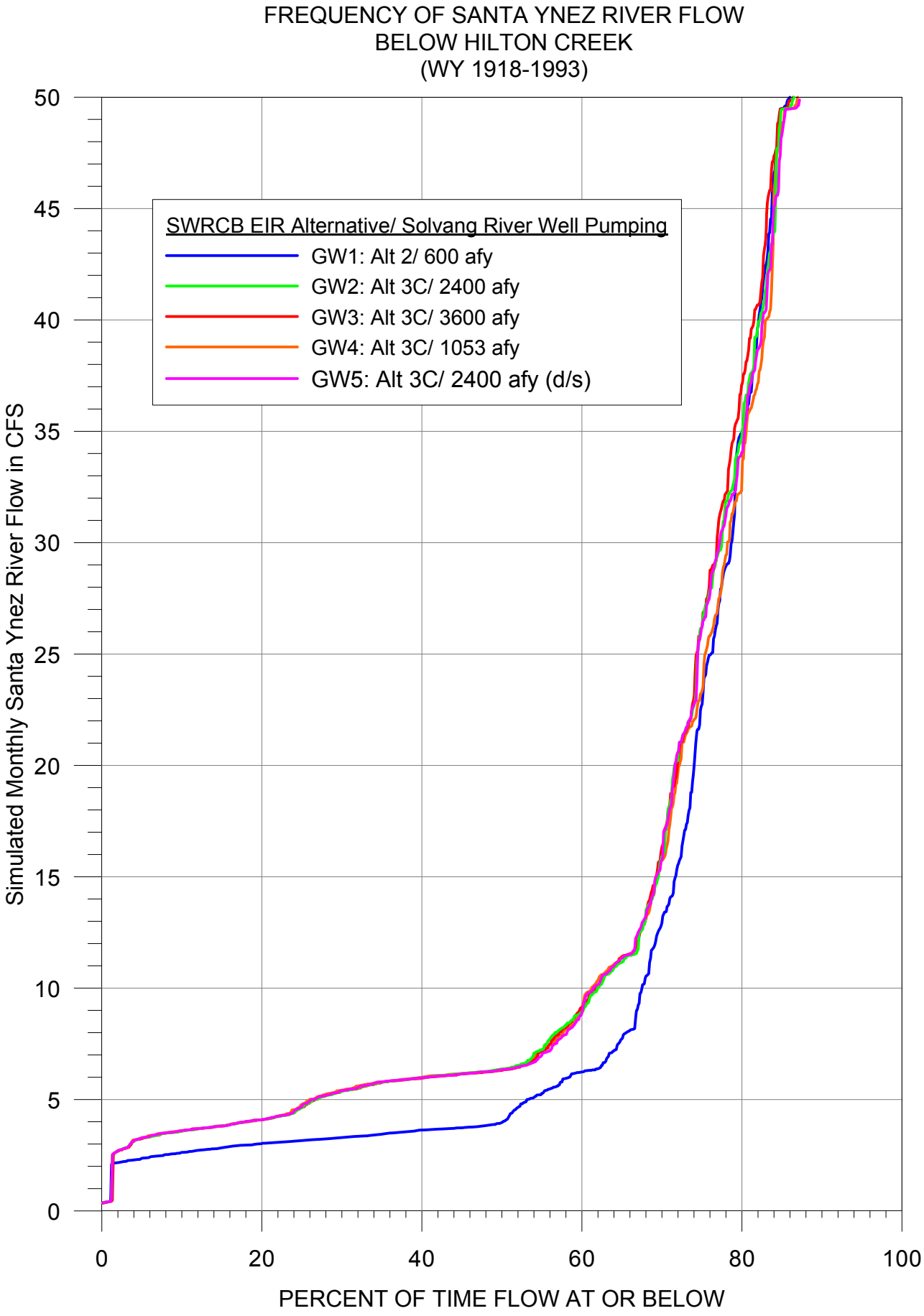

FREQUENCY OF SANTA YNEZ RIVER FLOW
BELOW HILTON CREEK
(WY 1918-1993)
SWRCB EIR Alternative/ Solvang River Well Pumping
GW1: Alt 2/ 600 afy
GW2: Alt 3C/ 2400 afy
GW3: Alt 3C/ 3600 afy
GW4: Alt 3C/ 1053 afy
GW5: Alt 3C/ 2400 afy (d/s)
Simulated Monthly Santa Ynez River Flow in CFS
0
5
10
15
20
25
30
35
40
45
50
0
20
40
60
80
100
PERCENT OF TIME FLOW AT OR BELOW

FIGURE 8

FREQUENCY OF SANTA YNEZ RIVER FLOW
AT 154 BRIDGE
(WY 1918-1993)

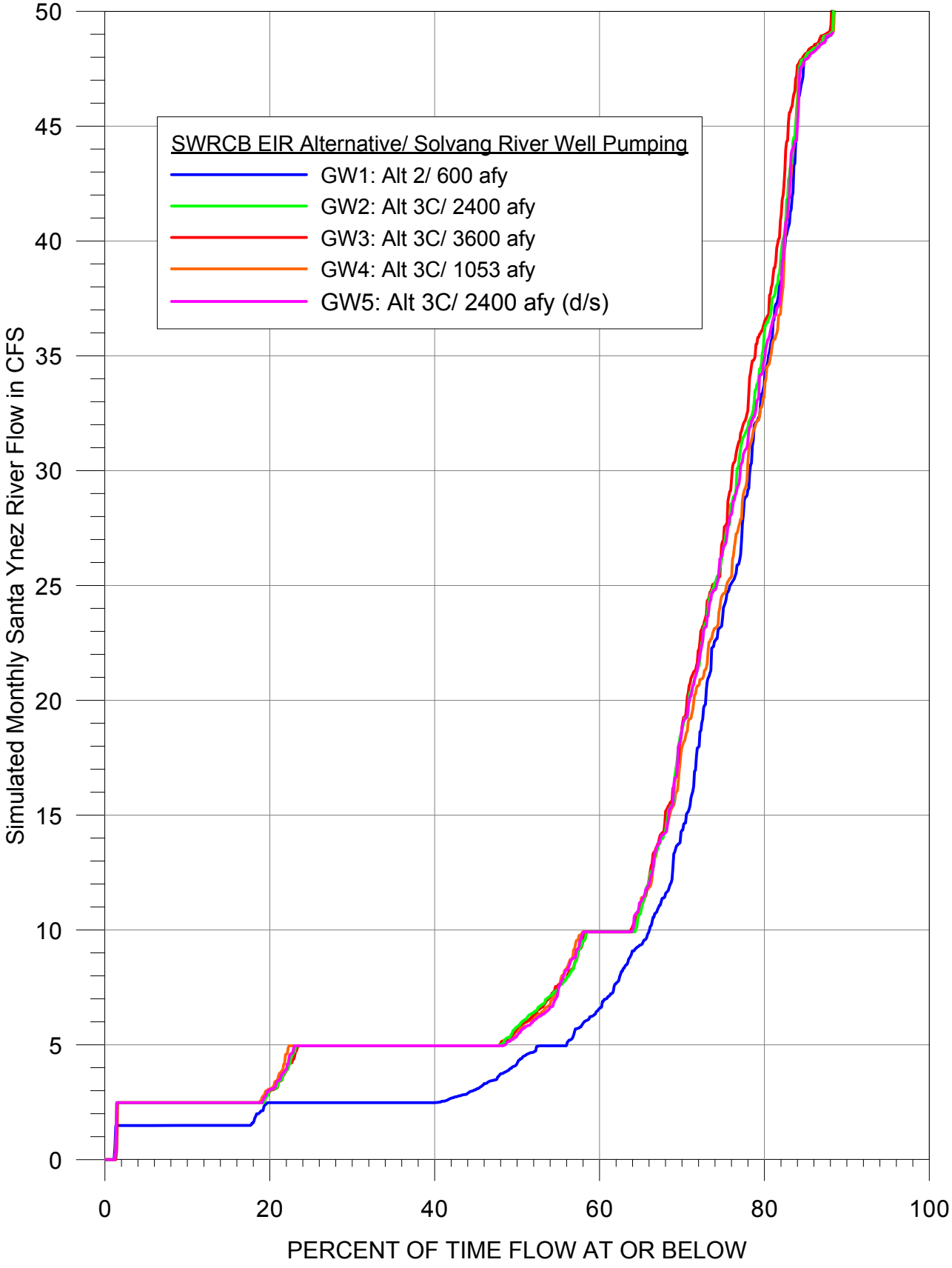


FIGURE 9

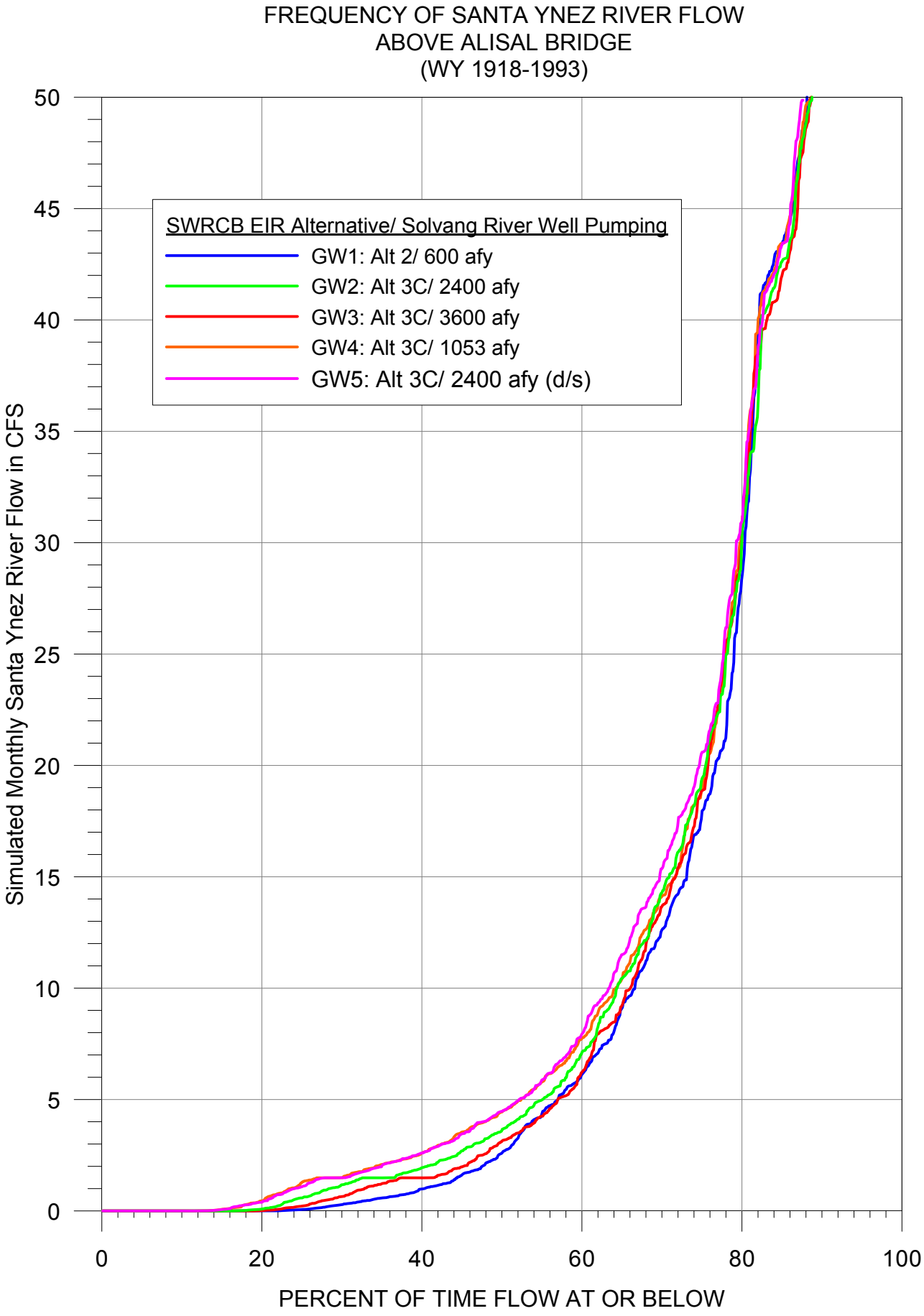

FREQUENCY OF SANTA YNEZ RIVER FLOW
ABOVE ALISAL BRIDGE
(WY 1918-1993)
SWRCB EIR Alternative/ Solvang River Well Pumping
GW1: Alt 2/ 600 afy
GW2: Alt 3C/ 2400 afy
GW3: Alt 3C/ 3600 afy
GW4: Alt 3C/ 1053 afy
GW5: Alt 3C/ 2400 afy (d/s)
Simulated Monthly Santa Ynez River Flow in CFS
0
5
10
15
20
25
30
35
40
45
50
0
20
40
60
80
100
PERCENT OF TIME FLOW AT OR BELOW

FIGURE 10

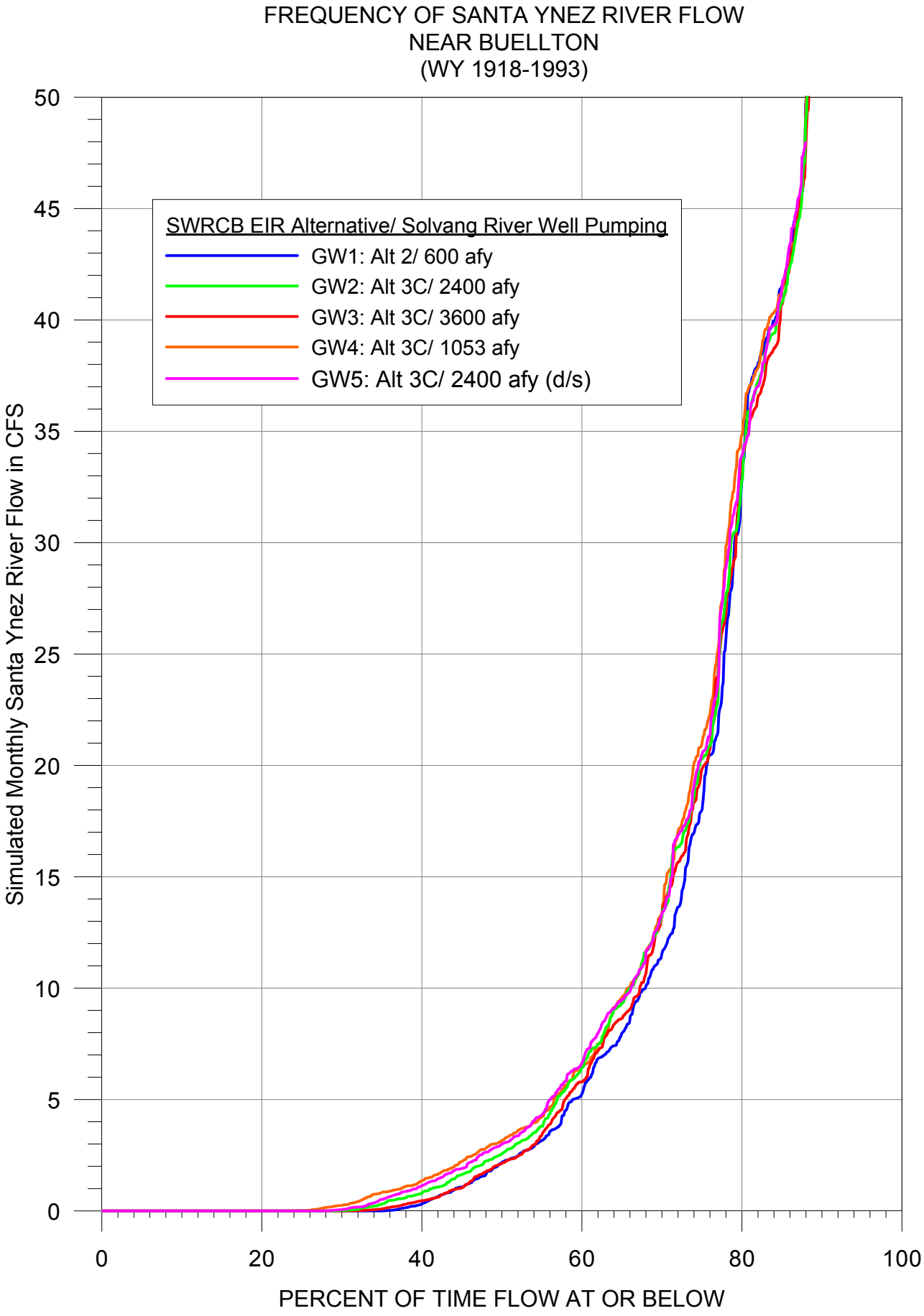

FREQUENCY OF SANTA YNEZ RIVER FLOW
NEAR BUELLTON
(WY 1918-1993)
SWRCB EIR Alternative/ Solvang River Well Pumping
GW1: Alt 2/ 600 afy
GW2: Alt 3C/ 2400 afy
GW3: Alt 3C/ 3600 afy
GW4: Alt 3C/ 1053 afy
GW5: Alt 3C/ 2400 afy (d/s)
Simulated Monthly Santa Ynez River Flow in CFS
0
5
10
15
20
25
30
35
40
45
50
0
20
40
60
80
100
PERCENT OF TIME FLOW AT OR BELOW

FIGURE 11

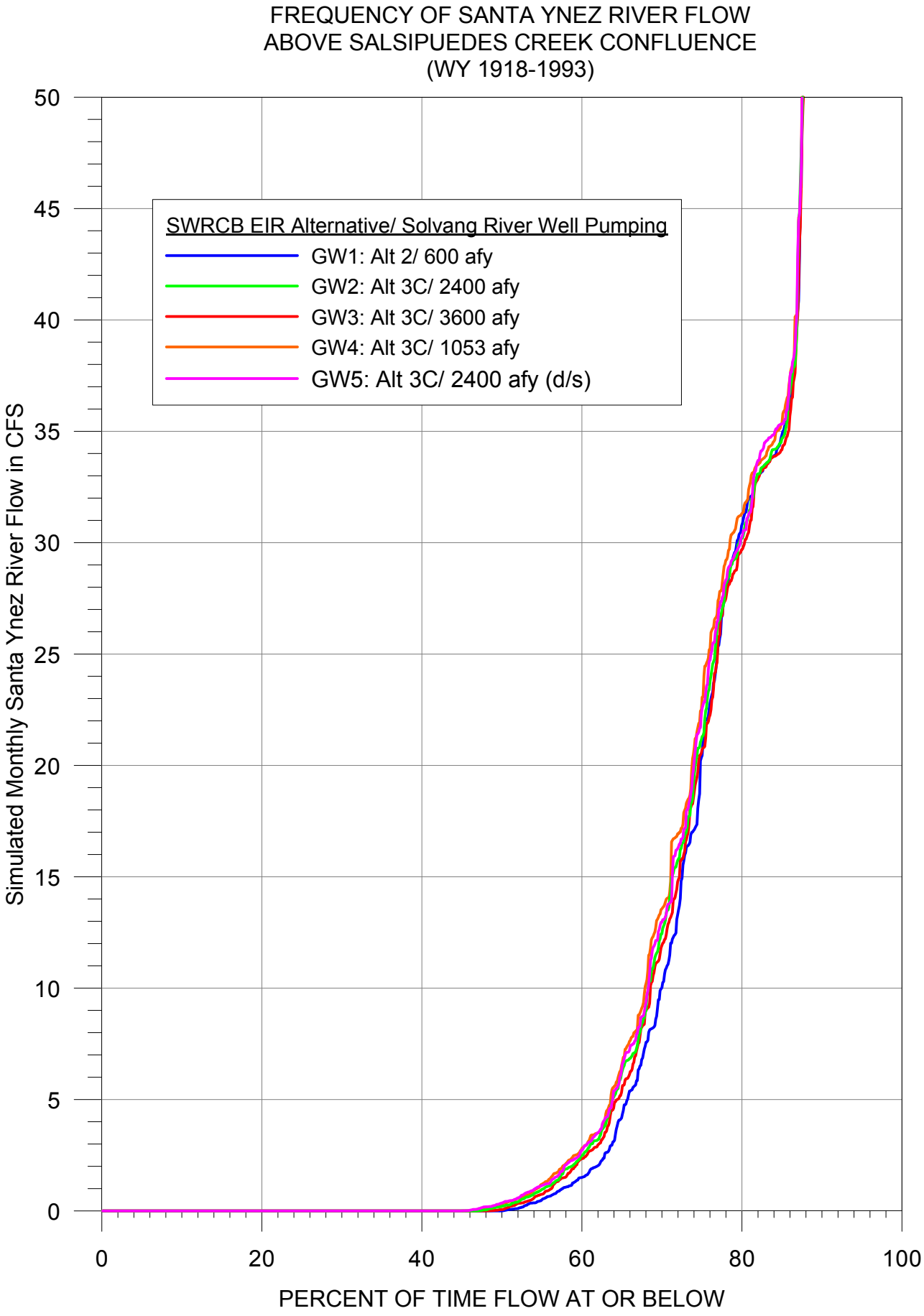

FREQUENCY OF SANTA YNEZ RIVER FLOW
ABOVE SALSIPUEDES CREEK CONFLUENCE
(WY 1918-1993)
SWRCB EIR Alternative/ Solvang River Well Pumping
GW1: Alt 2/ 600 afy
GW2: Alt 3C/ 2400 afy
GW3: Alt 3C/ 3600 afy
GW4: Alt 3C/ 1053 afy
GW5: Alt 3C/ 2400 afy (d/s)
Simulated Monthly Santa Ynez River Flow in CFS
0
5
10
15
20
25
30
35
40
45
50
0
20
40
60
80
100
PERCENT OF TIME FLOW AT OR BELOW

FIGURE 12

FREQUENCY OF SANTA YNEZ RIVER FLOW
AT LOMPOC NARROWS
(WY 1918-1993)

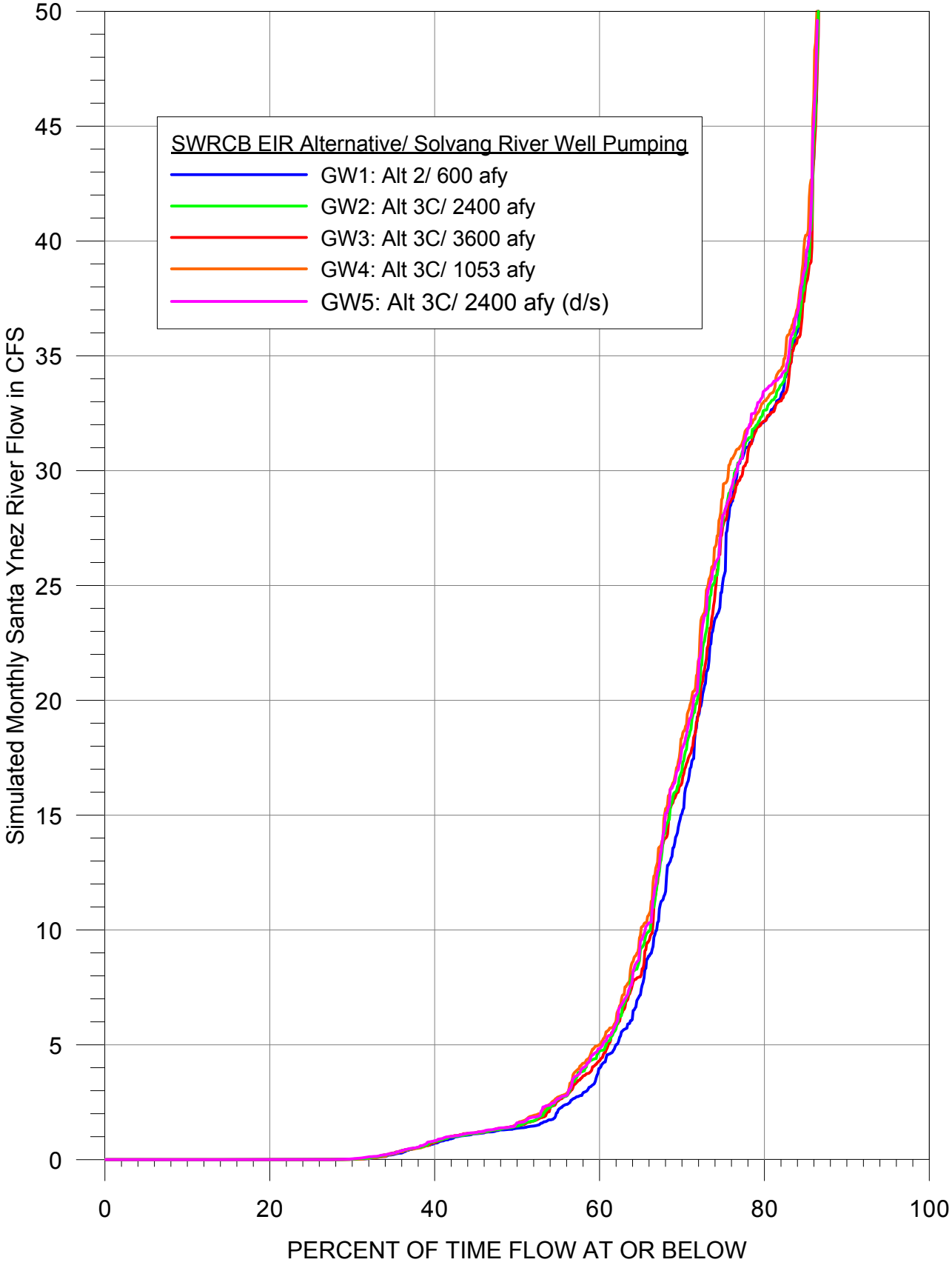


FIGURE 13

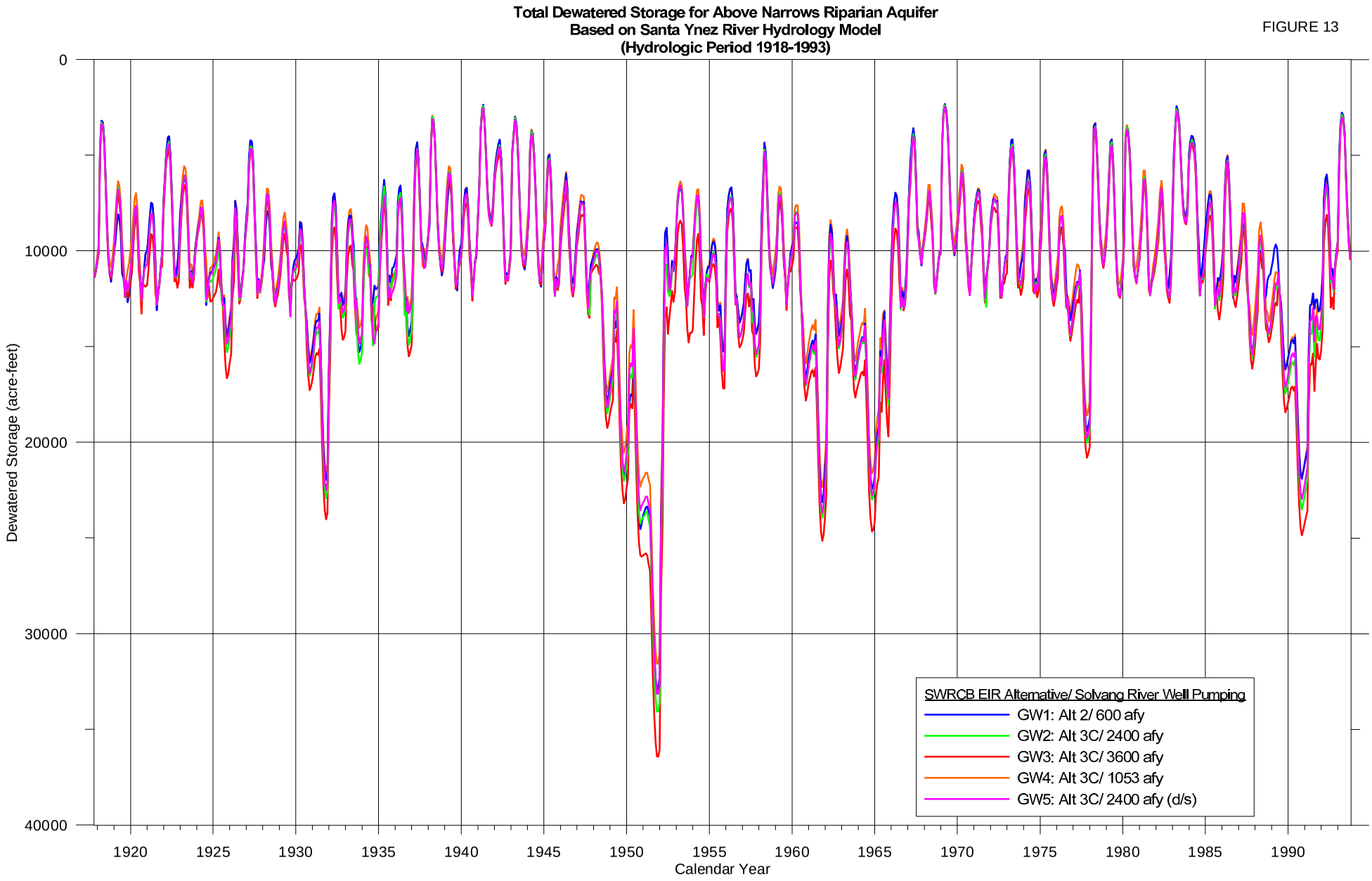

Total Dewatered Storage for Above Narrows Riparian Aquifer
Based on Santa Ynez River Hydrology Model
(Hydrologic Period 1918-1993)
Dewatered Storage (acre-feet)
0
10000
20000
30000
40000
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
Calendar Year
SWRCB EIR Alternative/ Solvang River Well Pumping
GW1: Alt 2/ 600 afy
GW2: Alt 3C/ 2400 afy
GW3: Alt 3C/ 3600 afy
GW4: Alt 3C/ 1053 afy
GW5: Alt 3C/ 2400 afy (d/s)

FIGURE 14

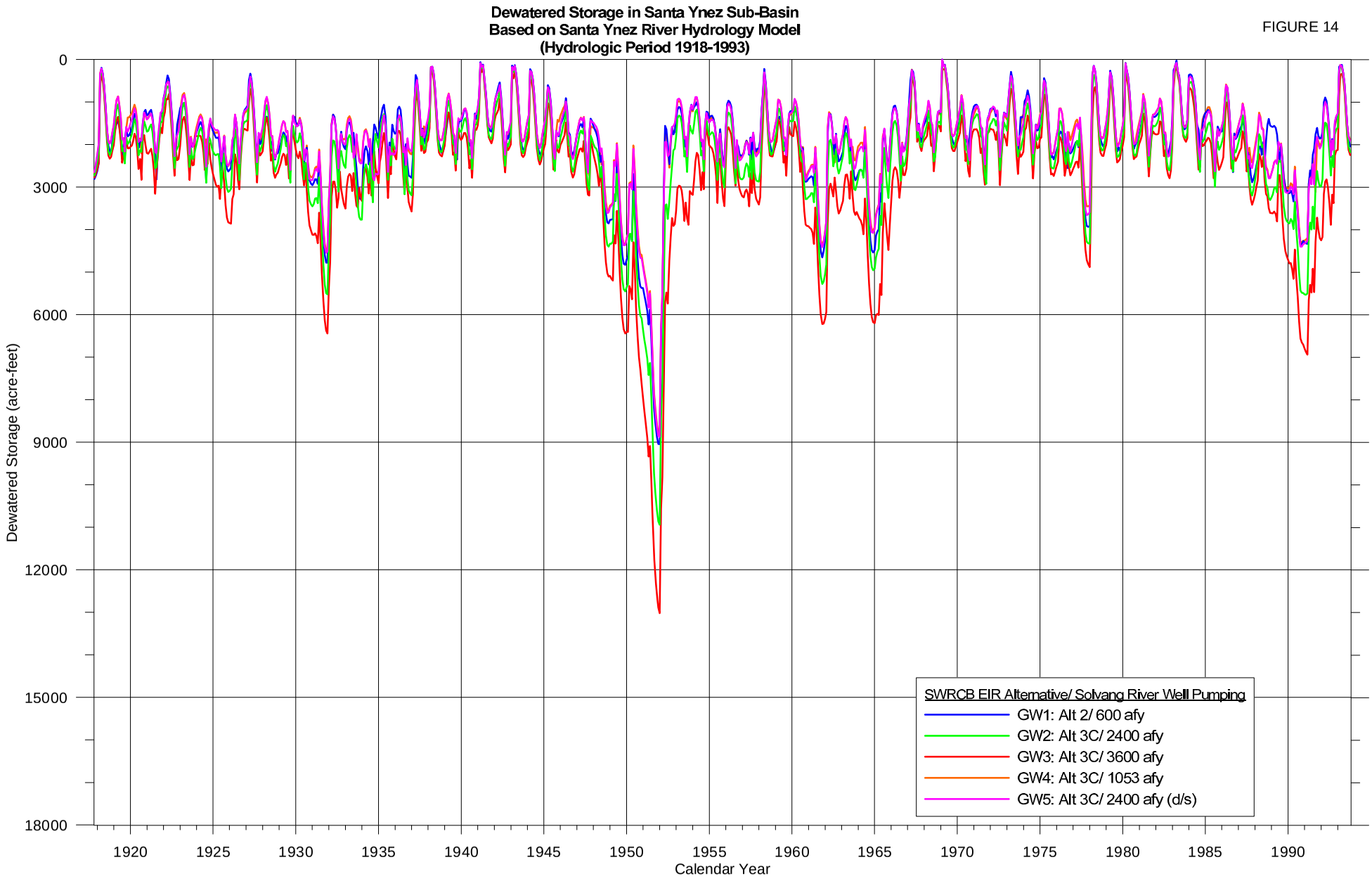

Dewatered Storage in Santa Ynez Sub-Basin
Based on Santa Ynez River Hydrology Model
(Hydrologic Period 1918-1993)
Dewatered Storage (acre-feet)
0
3000
6000
9000
12000
15000
18000
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
Calendar Year
SWRCB EIR Alternative/ Solvang River Well Pumping
GW1: Alt 2/ 600 afy
GW2: Alt 3C/ 2400 afy
GW3: Alt 3C/ 3600 afy
GW4: Alt 3C/ 1053 afy
GW5: Alt 3C/ 2400 afy (d/s)

FIGURE 15

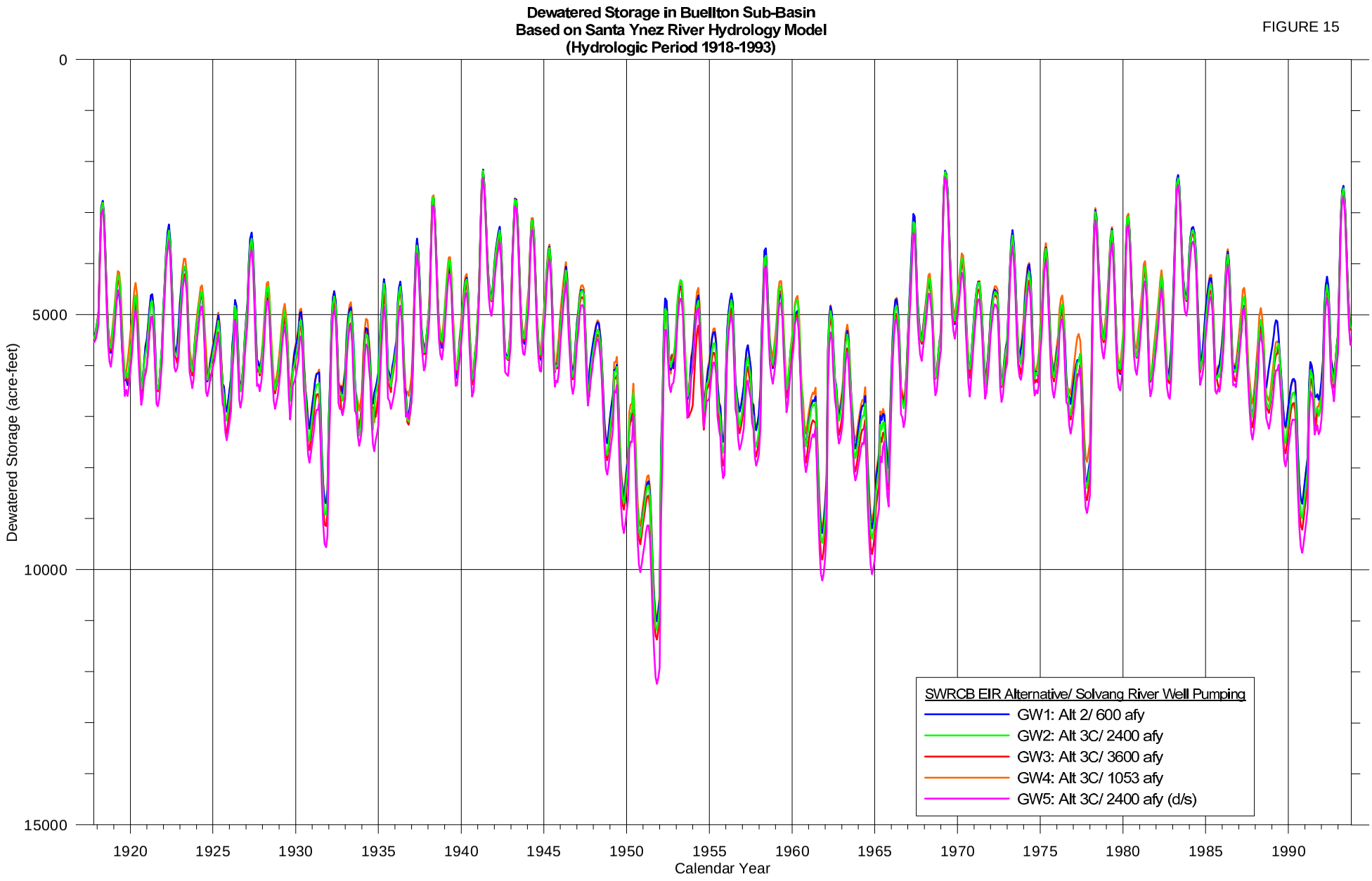
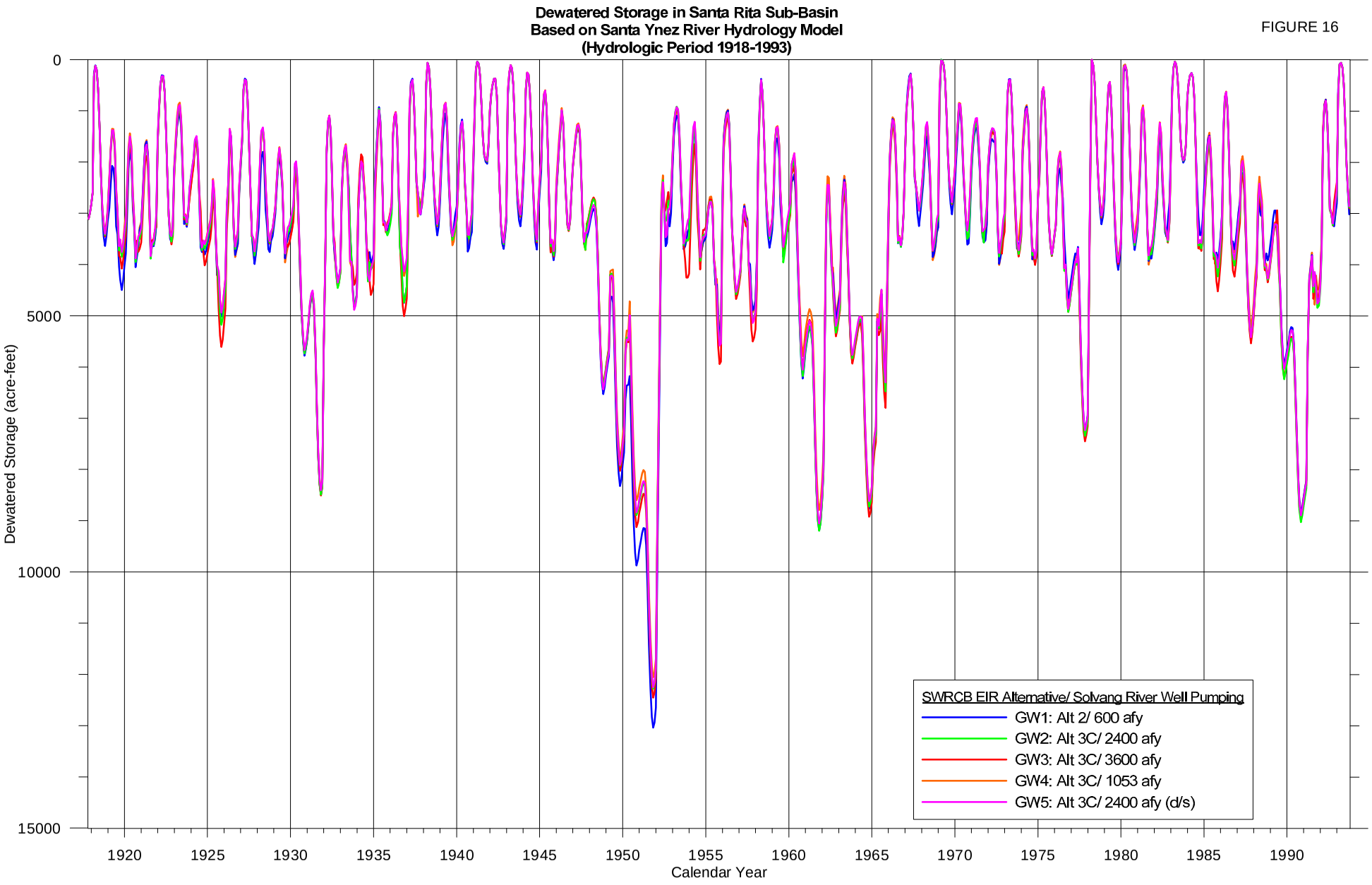

Dewatered Storage in Buellton Sub-Basin
Based on Santa Ynez River Hydrology Model
(Hydrologic Period 1918-1993)
Dewatered Storage (acre-feet)
0
5000
10000
15000
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
Calendar Year
SWRCB EIR Alternative/ Solvang River Well Pumping
GW1: Alt 2/ 600 afy
GW2: Alt 3C/ 2400 afy
GW3: Alt 3C/ 3600 afy
GW4: Alt 3C/ 1053 afy
GW5: Alt 3C/ 2400 afy (d/s)

FIGURE 16


Dewatered Storage in Santa Rita Sub-Basin
Based on Santa Ynez River Hydrology Model
(Hydrologic Period 1918-1993)
Dewatered Storage (acre-feet)
0
5000
10000
15000
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
Calendar Year
SWRCB EIR Alternative/ Solvang River Well Pumping
GW1: Alt 2/ 600 afy
GW2: Alt 3C/ 2400 afy
GW3: Alt 3C/ 3600 afy
GW4: Alt 3C/ 1053 afy
GW5: Alt 3C/ 2400 afy (d/s)

Appendix A

Alternative GW5: SWRCB EIR Alt 3C, Solvang River Well Pumping 2,400 acre-feet/year- wells located downstream of Alisal Bridge

SANTA YNEZ RIVER BELOW HILTON CREEK (acre-feet/month)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	SUM
1918	476	453	433	414	47,567	127,927	17,774	5,003	519	642	687	694	202,591
1919	491	455	367	1,273	1,296	1,294	352	361	375	4,023	910	2,416	13,612
1920	350	361	358	367	280	328	243	355	380	4,147	1,371	2,560	11,099
1921	1,802	403	199	165	162	183	197	207	230	1,064	4,824	2,237	11,673
1922	1,731	858	615	395	1,048	2,625	7,447	554	368	358	384	1,368	17,750
1923	923	376	303	1,300	1,307	1,283	313	345	364	377	4,450	3,037	14,378
1924	3,037	2,061	390	384	375	311	371	377	385	395	2,545	2,178	12,809
1925	1,248	192	205	215	222	208	171	222	230	2,147	2,443	196	7,698
1926	216	226	225	224	270	166	927	259	367	386	2,439	2,399	8,103
1927	1,713	225	171	169	1,581	12,994	4,166	429	333	361	387	2,270	24,800
1928	362	370	367	1,273	1,386	1,337	331	353	364	4,008	3,038	3,026	16,214
1929	3,017	400	393	380	343	310	326	372	3,752	3,002	2,755	3,414	18,465
1930	1,847	188	202	212	217	220	205	219	230	2,059	1,165	208	6,972
1931	226	235	238	239	220	232	229	1,517	266	226	246	259	4,135
1932	265	264	438	250	949	366	248	329	372	395	2,732	1,547	8,154
1933	358	210	219	294	278	356	361	212	224	1,603	2,998	356	7,468
1934	212	225	231	292	193	167	221	228	4,140	2,994	2,993	2,992	14,887
1935	2,992	246	246	307	187	326	449	163	213	236	4,720	2,994	13,079
1936	2,993	228	233	233	632	214	201	203	227	4,150	2,553	2,216	14,082
1937	200	215	223	206	1,221	4,485	16,929	1,097	613	662	3,937	680	30,468
1938	962	786	361	1,273	29,958	187,384	15,924	2,249	595	639	687	697	241,514
1939	478	470	350	1,314	1,331	1,378	274	346	367	3,742	3,037	1,848	14,935
1940	1,605	353	366	325	240	252	317	368	386	3,982	2,728	2,350	13,272
1941	1,644	615	261	588	56,837	193,829	120,510	18,361	2,956	540	600	642	397,382
1942	326	327	565	453	400	856	6,346	487	383	350	385	1,550	12,426
1943	361	355	357	45,519	28,932	66,502	10,302	532	607	649	691	700	155,505
1944	455	430	332	290	19,451	35,996	4,713	518	611	671	693	706	64,866
1945	519	331	354	347	498	6,504	2,626	420	355	393	1,031	2,363	15,740
1946	419	374	250	355	334	305	2,912	380	363	3,780	3,038	3,035	15,544
1947	3,035	343	339	375	347	358	372	3,430	3,037	3,028	3,026	3,001	20,691
1948	1,442	352	365	210	218	224	230	236	1,245	763	230	246	5,760
1949	254	256	254	246	246	1,955	211	1,833	291	218	240	254	6,259
1950	260	261	244	250	1,908	200	215	3,174	194	213	236	251	7,408
1951	259	260	26	25	25	24	24	846	24	23	22	213	1,773
1952	22	22	29	1,561	237	1,588	8,636	788	403	1,212	2,136	4,579	21,211
1953	922	312	359	2,041	277	316	327	369	377	4,045	2,556	2,923	14,824
1954	1,999	1,081	346	677	1,316	328	264	368	372	4,172	2,323	3,421	16,667
1955	1,916	187	200	155	181	200	206	195	231	3,280	2,278	194	9,222
1956	213	225	765	952	243	177	213	165	210	218	2,695	417	6,493
1957	227	223	224	211	159	158	193	205	4,525	1,662	2,308	259	10,354
1958	255	303	221	166	833	1,184	31,151	9,142	504	626	673	744	45,803
1959	479	465	411	331	2,084	274	322	357	369	4,088	2,758	2,851	14,790
1960	1,889	740	358	350	1,912	350	321	367	377	1,237	1,093	212	9,206
1961	228	221	219	233	230	227	228	1,754	315	223	243	257	4,379
1962	262	303	172	168	2,771	644	264	288	362	1,385	2,047	357	9,024
1963	377	388	384	368	320	303	240	328	367	1,934	611	385	6,007
1964	398	396	390	219	220	221	222	1,875	350	215	236	251	4,993
1965	258	260	257	173	229	211	378	199	3,976	3,990	582	377	10,888
1966	217	377	368	431	283	247	351	352	374	396	4,880	2,995	11,270
1967	2,994	2,993	315	756	467	28,488	53,316	20,328	906	659	3,809	2,940	117,971
1968	439	706	363	359	339	1,928	321	365	3,429	379	1,650	2,245	12,523
1969	1,613	805	356	126,692	188,394	78,219	17,924	5,623	510	642	675	692	422,145
1970	449	361	355	312	298	2,217	367	362	378	3,796	3,037	2,049	13,982
1971	2,344	917	247	300	328	342	359	375	3,444	3,038	3,036	2,492	17,222
1972	1,613	899	244	332	343	369	371	3,413	2,279	379	1,982	2,439	14,663
1973	1,738	157	197	667	1,328	13,526	7,653	528	620	677	696	1,107	28,895
1974	593	430	365	586	303	1,766	464	386	367	423	1,658	2,104	9,444
1975	354	364	315	333	2,284	8,524	4,959	494	381	354	384	644	19,390
1976	391	391	386	382	1,946	320	337	362	378	1,046	2,971	405	9,315
1977	376	387	384	380	378	374	377	1,787	751	307	231	248	5,981
1978	256	257	254	694	20,345	145,626	35,260	7,429	499	593	652	685	212,549
1979	388	378	352	312	1,771	21,191	11,015	512	595	663	696	866	38,740
1980	504	477	365	276	70,315	40,857	6,987	817	573	653	696	833	123,353
1981	494	472	410	320	290	2,448	315	318	353	432	1,860	2,340	10,053
1982	1,336	351	358	344	350	1,952	340	313	372	3,859	3,038	3,035	15,650
1983	400	373	374	14,767	57,350	196,391	56,423	29,377	5,102	530	593	648	362,328
1984	292	339	13,406	4,824	1,679	467	382	341	365	391	825	2,339	25,649
1985	793	370	312	360	337	340	363	378	390	405	2,866	1,857	8,770
1986	355	372	369	340	778	7,166	3,981	434	332	371	769	1,790	17,056
1987	367	374	374	359	373	1,949	352	364	374	796	1,032	385	7,098
1988	397	402	394	354	373	1,928	321	356	3,963	2,995	2,993	2,992	17,467
1989	242	247	247	241	226	231	231	1,740	1,146	1,946	332	220	7,048
1990	234	241	243	243	243	238	241	1,361	212	478	310	296	4,343
1991	434	319	249	248	247	711	214	169	5,066	2,995	3,978	1,816	16,446
1992	331	206	200	153	1,036	429	281	281	343	379	4,474	2,758	10,870
1993	2,050	823	344	22,876	113,879	65,394	28,690	6,343	497	607	664	698	242,865
AVG	894	442	486	3,237	8,918	16,854	6,468	1,938	949	1,457	1,810	1,527	44,980
MEDIAN	436	361	345	342	373	401	351	374	377	656	1,654	1,458	14,032

Alternative GW5: SWRCB EIR Alt 3C, Solvang River Well Pumping 2,400 acre-feet/year- wells located downstream of Alisal Bridge

SANTA YNEZ RIVER AT 154 BRIDGE (acre-feet/month)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	SUM
1918	300	300	300	300	49,070	129,261	18,256	5,158	600	600	600	600	205,344
1919	402	374	300	1,161	1,251	1,248	300	300	300	3,810	807	2,183	12,434
1920	300	300	300	300	300	562	300	300	300	3,927	1,206	2,369	10,463
1921	1,675	353	150	150	180	233	150	150	150	851	4,615	2,065	10,722
1922	1,602	792	1,402	813	2,531	3,162	7,599	610	342	300	300	1,150	20,603
1923	822	300	473	1,235	1,281	1,221	300	300	300	300	4,216	2,963	13,710
1924	2,947	1,977	300	300	300	300	300	300	300	300	2,245	2,008	11,578
1925	1,134	150	150	150	150	150	194	150	150	1,858	2,242	150	6,627
1926	150	150	150	150	447	185	2,171	300	300	300	2,160	2,222	8,684
1927	1,588	368	220	209	3,833	13,189	4,327	456	300	300	300	2,002	27,091
1928	300	300	300	1,165	1,493	1,366	300	300	300	3,811	2,963	2,930	15,528
1929	2,914	300	300	300	300	300	300	300	3,555	2,929	2,660	3,088	17,246
1930	1,718	150	150	150	150	325	150	150	150	1,774	1,006	150	6,023
1931	150	150	150	150	150	150	150	1,289	204	150	150	150	2,993
1932	150	150	847	386	2,214	659	300	300	300	300	2,437	1,401	9,444
1933	300	150	150	500	300	300	300	150	150	1,353	2,767	301	6,721
1934	150	150	150	499	252	150	150	150	3,903	2,917	2,892	2,881	14,243
1935	2,878	150	150	525	230	590	921	180	150	150	4,434	2,915	13,272
1936	2,900	150	150	150	1,394	313	278	150	150	3,902	2,473	1,956	13,964
1937	150	150	150	281	2,941	5,907	17,185	1,155	600	600	3,765	600	33,484
1938	856	686	300	1,168	31,345	190,989	16,275	2,225	600	600	600	600	246,243
1939	389	377	300	1,265	1,342	1,474	300	300	300	3,550	2,959	1,621	14,178
1940	1,454	300	300	300	321	300	300	300	300	3,764	2,650	2,094	12,383
1941	1,501	555	426	1,272	61,039	199,720	123,221	18,808	3,050	600	600	600	411,393
1942	300	300	1,101	691	485	1,087	6,423	553	379	300	316	1,332	13,267
1943	300	300	300	46,694	29,583	68,071	10,562	600	600	600	600	600	158,810
1944	370	347	300	300	20,574	36,727	4,857	600	600	600	600	600	66,475
1945	418	300	300	300	884	6,566	2,682	423	300	317	895	2,103	15,488
1946	355	300	300	300	300	360	2,904	353	300	3,595	2,960	2,938	14,966
1947	2,929	300	300	300	300	300	300	3,252	2,969	2,938	2,917	2,671	19,475
1948	1,312	300	300	150	150	150	150	150	1,005	653	150	150	4,620
1949	150	150	150	150	150	1,957	150	1,628	236	150	150	150	5,171
1950	150	150	150	150	1,834	150	150	2,911	155	150	150	150	6,250
1951	150	150	0	0	0	0	0	553	0	0	0	29	882
1952	0	0	0	3,570	277	3,665	8,653	857	384	1,094	1,999	4,457	24,956
1953	864	300	638	2,194	300	300	300	300	300	3,840	2,487	2,662	14,485
1954	1,864	988	300	701	1,308	579	300	300	300	3,952	2,252	3,136	15,981
1955	1,795	150	150	165	150	150	150	150	150	2,943	2,119	150	8,222
1956	150	150	1,750	2,279	402	227	317	188	150	150	2,370	350	8,483
1957	162	150	150	150	167	150	150	150	4,278	1,501	2,140	212	9,360
1958	188	226	150	185	1,946	2,900	33,740	9,514	600	600	600	648	51,296
1959	393	378	331	300	2,300	300	300	300	300	3,881	2,684	2,593	14,061
1960	1,755	678	300	300	1,877	300	300	300	300	1,036	926	150	8,221
1961	150	150	150	150	150	150	150	1,507	252	150	150	150	3,258
1962	150	187	150	173	7,085	1,405	392	300	300	1,197	1,869	300	13,509
1963	300	300	300	300	527	477	300	300	300	1,698	532	300	5,634
1964	300	300	300	150	150	150	150	1,647	295	150	150	150	3,891
1965	150	150	150	183	150	150	719	150	3,649	3,848	531	311	10,141
1966	150	729	713	862	461	300	300	300	300	300	4,620	2,920	11,954
1967	2,905	2,898	530	1,669	768	28,445	53,613	20,668	927	600	3,651	2,877	119,551
1968	360	603	300	300	300	1,872	300	300	3,253	309	1,431	2,069	11,397
1969	1,493	742	300	129,749	192,612	79,716	18,437	5,809	600	600	600	600	431,256
1970	366	300	300	300	300	2,423	334	300	300	3,583	2,959	1,964	13,431
1971	2,070	856	345	300	300	300	300	300	3,252	2,961	2,939	2,206	16,129
1972	1,470	826	352	300	300	300	300	3,247	2,224	300	1,737	2,251	13,607
1973	1,611	150	150	1,528	3,281	14,038	7,856	600	600	600	600	937	31,950
1974	510	353	300	1,162	321	1,838	491	364	300	335	1,430	1,931	9,335
1975	300	300	517	300	2,848	9,749	5,118	577	376	300	300	531	21,216
1976	300	300	300	300	1,919	300	300	300	300	860	2,727	347	8,252
1977	300	300	300	300	300	300	300	1,586	680	237	150	150	4,903
1978	150	150	150	1,520	23,695	149,484	36,346	7,670	600	600	600	600	221,565
1979	322	311	300	498	2,148	21,578	11,342	600	600	600	600	753	39,653
1980	413	388	300	404	72,435	42,109	7,154	934	600	600	600	721	126,659
1981	403	383	329	300	300	3,205	397	300	300	342	1,617	2,163	10,039
1982	1,220	300	300	300	300	1,947	595	300	300	3,665	2,965	2,941	15,133
1983	300	300	645	16,392	59,587	198,954	57,878	30,184	5,336	600	600	600	371,376
1984	300	300	13,444	4,929	1,735	503	383	300	300	310	693	2,066	25,261
1985	712	300	300	300	300	300	300	300	300	300	2,534	1,699	7,645
1986	300	300	300	300	1,767	8,027	4,013	466	300	300	650	1,551	18,274
1987	300	300	300	300	300	1,929	300	300	300	676	833	300	6,138
1988	300	300	300	300	300	1,893	300	300	3,786	2,925	2,898	2,882	16,483
1989	150	150	150	150	150	150	150	1,500	1,009	1,779	271	150	5,759
1990	150	150	150	150	150	150	150	1,113	150	371	209	187	3,080
1991	302	207	150	150	150	1,583	304	150	4,818	2,922	3,681	1,693	16,109
1992	280	150	150	150	2,470	834	431	300	300	300	4,231	2,683	12,280
1993	1,826	750	300	23,923	116,164	66,786	29,261	6,557	600	600	600	600	247,968
AVG	798	376	494	3,419	9,467	17,333	6,646	1,926	889	1,344	1,675	1,390	45,759
MEDIAN	339	300	300	300	425	625	300	300	300	600	1,431	1,241	13,558

Alternative GW5: SWRCB EIR Alt 3C, Solvang River Well Pumping 2,400 acre-feet/year- wells located downstream of Alisal Bridge

SANTA YNEZ RIVER ABOVE ALISAL BRIDGE (acre-feet/month)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	SUM
1918	9	12	27	57	55,454	134,056	20,047	5,769	850	433	282	245	217,241
1919	90	107	101	821	1,130	1,148	186	170	116	3,100	408	1,246	8,622
1920	90	81	114	114	361	1,291	517	210	117	3,189	559	1,498	8,141
1921	1,076	164	23	117	240	402	88	62	5	269	3,695	1,267	7,409
1922	1,005	530	3,582	2,201	7,910	5,206	8,318	849	279	128	44	398	30,450
1923	415	62	822	1,069	1,246	1,105	306	215	151	89	3,313	2,625	11,418
1924	2,577	1,674	77	100	130	292	161	136	95	45	1,181	1,203	7,672
1925	612	16	12	11	11	50	262	28	6	955	1,339	0	3,301
1926	0	0	1	1	780	189	6,126	441	146	72	1,137	1,372	10,265
1927	992	687	320	341	12,579	14,235	4,921	566	210	116	33	984	35,986
1928	60	65	93	820	1,840	1,489	243	186	142	3,126	2,631	2,524	13,219
1929	2,494	24	50	88	200	298	259	144	2,964	2,634	2,268	1,824	13,245
1930	1,071	20	15	13	18	660	60	28	1	896	357	0	3,138
1931	0	0	0	0	4	0	0	484	2	0	0	0	490
1932	0	0	1,584	533	6,925	1,641	471	252	127	42	1,321	696	13,591
1933	62	0	0	1,045	360	196	182	32	3	584	1,739	59	4,262
1934	0	0	0	957	376	124	21	5	3,175	2,591	2,456	2,403	12,107
1935	2,402	0	0	1,025	323	1,430	2,536	299	40	0	3,374	2,545	13,974
1936	2,500	0	0	0	3,856	651	565	67	7	3,091	2,124	951	13,813
1937	0	0	0	431	9,032	11,218	18,240	1,363	557	375	3,047	276	44,539
1938	447	345	129	876	36,651	205,639	17,604	2,180	650	466	290	246	265,523
1939	90	90	146	1,130	1,415	1,869	408	217	142	2,909	2,630	779	11,825
1940	808	107	109	240	586	481	320	177	105	3,047	2,318	1,119	9,417
1941	860	319	826	3,416	74,755	222,390	133,830	20,129	3,280	714	508	394	461,421
1942	170	184	2,212	1,248	701	1,667	6,802	745	350	145	90	535	14,849
1943	62	97	120	52,082	31,744	74,491	11,404	811	585	422	282	242	172,342
1944	90	90	175	304	24,783	39,172	5,361	878	574	367	269	215	72,278
1945	90	173	137	174	2,395	7,120	3,011	477	150	90	412	1,108	15,336
1946	102	61	468	173	255	595	3,115	314	140	2,945	2,629	2,533	13,331
1947	2,510	162	184	119	185	181	155	2,793	2,743	2,613	2,493	1,461	15,600
1948	703	103	105	17	16	16	12	3	405	270	0	0	1,651
1949	0	0	0	0	0	1,440	0	774	21	0	0	0	2,235
1950	0	0	1	0	1,089	1	0	1,672	0	0	0	0	2,764
1951	0	0	0	0	0	0	0	2	0	0	0	0	2
1952	0	0	0	11,177	315	9,481	8,440	872	209	496	1,188	3,698	35,876
1953	553	176	1,084	2,616	400	310	275	157	114	3,131	2,170	1,585	12,571
1954	1,201	590	150	839	1,326	1,230	498	164	142	3,215	1,935	1,950	13,240
1955	1,163	22	17	142	86	64	53	78	0	1,834	1,303	0	4,761
1956	0	0	3,446	5,263	776	375	623	307	46	20	1,253	69	12,177
1957	0	0	0	2	103	111	57	35	3,451	823	1,306	15	5,903
1958	0	0	0	157	4,741	8,250	43,852	10,791	889	470	306	275	69,732
1959	90	90	90	198	2,917	398	270	188	137	3,171	2,356	1,538	11,443
1960	1,112	425	128	168	1,746	189	256	153	108	427	294	0	5,007
1961	0	6	6	0	0	0	0	620	20	0	0	0	651
1962	0	0	14	35	19,361	3,259	760	332	131	576	1,070	56	25,593
1963	27	22	40	86	772	721	375	223	133	929	191	12	3,531
1964	1	3	14	0	0	0	0	894	78	0	0	0	990
1965	0	0	0	44	2	2	1,250	9	2,235	2,870	234	33	6,680
1966	0	1,026	1,214	1,879	818	471	224	206	135	48	3,595	2,559	12,175
1967	2,512	2,524	1,267	4,366	2,113	29,047	54,788	22,297	995	380	3,016	2,588	125,893
1968	90	260	119	149	228	1,820	287	154	2,760	90	643	1,242	7,841
1969	916	488	136	144,193	212,067	86,536	20,137	6,536	893	453	328	264	472,949
1970	90	105	133	283	357	3,369	291	169	119	2,905	2,630	1,619	12,070
1971	1,086	605	648	315	243	240	197	143	2,734	2,677	2,551	1,153	12,592
1972	823	529	712	240	222	163	159	2,849	2,042	68	841	1,379	10,028
1973	1,010	89	23	3,714	9,996	15,808	8,580	859	540	343	253	306	41,520
1974	182	90	101	2,679	409	2,089	604	342	143	90	629	1,127	8,485
1975	81	76	802	206	4,235	12,980	5,632	855	340	132	44	135	25,520
1976	18	23	44	68	1,758	240	215	159	99	297	1,710	91	4,721
1977	32	28	44	66	86	111	109	1,031	417	23	0	0	1,948
1978	0	0	0	2,988	33,695	163,805	40,026	8,507	932	576	373	273	251,175
1979	90	90	134	945	3,239	22,845	12,507	885	592	373	249	315	42,263
1980	90	90	96	731	80,561	46,283	7,795	1,378	697	417	258	303	138,700
1981	90	90	90	215	341	5,463	681	288	179	90	754	1,325	9,605
1982	690	116	126	182	191	2,091	1,575	332	129	3,017	2,647	2,547	13,642
1983	16	85	1,659	20,928	66,382	210,879	63,129	33,429	6,119	742	558	390	404,317
1984	273	162	13,462	5,285	1,982	696	447	239	151	90	267	1,074	24,128
1985	371	75	209	149	214	225	183	134	92	38	1,380	953	4,024
1986	75	63	93	174	4,321	10,145	4,158	568	210	87	243	674	20,812
1987	53	54	76	131	117	1,820	179	146	108	307	194	16	3,204
1988	4	5	21	106	91	1,868	250	156	3,208	2,634	2,497	2,423	13,263
1989	0	0	0	0	4	0	0	699	447	1,015	27	0	2,192
1990	0	0	0	0	0	0	0	268	0	4	0	0	272
1991	0	0	0	0	0	3,520	546	65	3,805	2,518	2,236	929	13,618
1992	49	0	14	131	7,321	2,229	1,094	448	234	98	3,321	2,348	17,287
1993	979	450	157	27,900	124,226	72,479	31,672	7,433	979	558	355	242	267,430
AVG	463	179	497	4,056	11,383	19,110	7,338	1,946	723	970	1,164	872	48,701
MEDIAN	90	70	93	190	736	1,261	427	303	150	420	636	466	12,374

Alternative GW5: SWRCB EIR Alt 3C, Solvang River Well Pumping 2,400 acre-feet/year- wells located downstream of Alisal Bridge

SANTA YNEZ RIVER NEAR BUELLTON (acre-feet/month)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	SUM
1918	0	0	0	0	64,490	135,672	21,897	6,576	1,250	387	160	113	230,546
1919	0	4	25	597	1,045	1,088	77	82	24	2,668	175	673	6,457
1920	0	0	12	5	495	1,857	855	186	26	2,711	177	845	7,169
1921	528	10	0	109	353	672	73	38	0	31	3,033	654	5,502
1922	468	254	6,519	4,044	13,185	7,554	9,242	1,173	276	65	0	100	42,878
1923	178	0	1,373	1,033	1,288	1,006	342	170	81	11	2,787	2,365	10,635
1924	2,305	1,460	0	10	31	383	87	45	11	0	628	634	5,594
1925	205	0	0	0	0	18	440	0	0	469	717	0	1,849
1926	0	0	0	0	1,397	286	9,438	706	89	2	569	734	13,221
1927	459	1,053	458	534	21,286	14,789	5,633	714	173	53	0	488	45,639
1928	0	0	1	550	2,034	1,638	202	105	51	2,681	2,378	2,238	11,878
1929	2,196	0	0	2	191	392	305	73	2,560	2,408	1,997	1,062	11,186
1930	505	0	0	0	0	1,161	18	0	0	408	21	0	2,113
1931	0	0	0	0	0	0	0	85	0	0	0	0	85
1932	0	0	2,878	1,046	9,782	3,089	727	300	43	0	706	219	18,791
1933	0	0	0	1,891	518	158	130	0	0	200	1,024	0	3,921
1934	0	0	0	1,737	545	166	0	0	2,676	2,329	2,135	2,055	11,643
1935	2,048	0	0	1,956	577	2,347	4,276	515	14	0	2,753	2,252	16,740
1936	2,196	0	0	0	6,473	1,186	819	46	0	2,597	1,867	380	15,565
1937	0	0	0	756	16,946	17,199	19,632	1,627	585	276	2,632	98	59,750
1938	203	138	45	656	43,937	215,141	19,224	2,101	796	480	167	105	282,993
1939	0	0	113	1,198	1,656	2,466	568	175	54	2,529	2,401	330	11,490
1940	353	0	2	246	1,010	783	413	117	18	2,616	2,082	564	8,205
1941	378	109	1,385	6,355	85,274	241,945	141,820	21,816	3,663	995	613	388	504,743
1942	188	213	3,858	2,089	1,023	2,481	7,377	1,013	393	92	23	185	18,934
1943	0	5	22	56,748	34,223	79,956	12,380	1,090	657	374	160	101	185,716
1944	4	3	159	435	28,528	41,557	5,941	1,249	632	261	132	52	78,952
1945	0	197	91	152	4,427	7,570	3,461	574	77	11	189	585	17,334
1946	0	0	814	132	301	640	3,585	333	59	2,553	2,398	2,266	13,080
1947	2,231	187	212	56	170	152	82	2,469	2,578	2,409	2,235	813	13,593
1948	255	0	0	0	0	0	0	0	117	67	0	0	440
1949	0	0	0	0	0	1,433	0	310	0	0	0	0	1,743
1950	0	0	0	0	806	0	0	852	0	0	0	0	1,659
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	18,904	608	18,313	9,390	1,199	132	254	759	3,081	52,640
1953	315	99	1,745	3,304	549	351	228	53	19	2,670	1,916	871	12,119
1954	591	175	8	904	1,354	2,063	764	55	48	2,721	1,685	1,140	11,507
1955	540	0	0	55	33	11	1	58	0	1,089	613	0	2,399
1956	0	0	5,874	8,108	1,236	556	901	509	0	0	638	0	17,822
1957	0	0	0	0	91	136	34	10	2,864	343	643	0	4,121
1958	0	0	0	153	8,579	15,394	55,422	12,218	1,291	386	157	103	93,703
1959	0	0	0	172	3,933	549	211	94	60	2,703	2,105	853	10,680
1960	538	166	2	37	1,604	68	202	45	9	111	5	0	2,787
1961	0	0	0	0	0	0	0	114	0	0	0	0	114
1962	0	0	0	0	33,934	5,793	1,252	385	30	227	523	0	42,145
1963	0	0	0	0	1,063	1,018	465	173	40	430	4	0	3,192
1964	0	0	0	0	0	0	0	268	0	0	0	0	268
1965	0	0	0	0	0	0	1,771	0	1,223	1,852	12	0	4,858
1966	0	1,415	1,888	3,257	1,290	712	127	149	54	0	2,902	2,244	14,038
1967	2,176	2,200	2,305	8,125	3,371	29,332	55,116	23,553	996	244	2,745	2,405	132,567
1968	0	79	40	82	240	1,925	321	53	2,431	2	267	672	6,114
1969	423	231	10	161,436	230,150	94,886	21,387	7,331	1,254	370	217	145	517,839
1970	5	63	79	402	546	4,464	231	71	30	2,529	2,403	1,393	12,216
1971	538	399	824	389	226	180	114	44	2,400	2,484	2,302	586	10,486
1972	349	258	1,144	225	186	65	65	2,537	1,908	0	373	757	7,866
1973	481	35	0	5,994	18,484	17,447	9,438	1,030	472	203	98	48	53,729
1974	21	0	7	4,854	569	2,509	775	372	60	2	235	574	9,979
1975	0	0	1,224	153	6,243	17,438	6,243	1,218	294	51	0	3	32,867
1976	0	0	0	0	1,762	215	158	59	9	41	1,032	0	3,277
1977	0	0	0	0	0	0	0	557	185	0	0	0	742
1978	0	0	0	4,793	47,498	181,506	44,650	9,555	1,277	661	343	131	290,413
1979	6	9	76	1,692	4,903	24,678	13,895	1,242	593	244	89	103	47,531
1980	0	0	0	1,263	91,268	51,376	8,535	1,794	770	311	112	113	155,542
1981	0	0	0	216	492	8,739	1,074	327	138	2	324	731	12,042
1982	257	0	6	80	115	2,339	2,863	379	34	2,625	2,412	2,277	13,387
1983	0	32	2,889	27,550	75,154	218,100	66,992	36,316	7,246	1,046	721	385	436,429
1984	440	145	14,093	5,655	2,239	911	463	161	60	10	87	562	24,825
1985	137	0	183	69	195	205	119	39	10	0	795	443	2,196
1986	0	0	0	113	7,796	13,169	4,320	592	183	10	70	254	26,507
1987	0	0	0	27	10	1,804	82	43	15	118	0	0	2,099
1988	0	0	0	21	0	2,044	251	52	2,772	2,403	2,214	2,107	11,865
1989	0	0	0	0	0	0	0	305	136	514	0	0	955
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	6,450	1,066	115	3,165	2,227	1,345	333	14,702
1992	0	0	0	162	13,875	4,111	1,930	664	262	14	2,757	2,081	25,857
1993	442	194	38	33,408	134,187	78,999	34,694	8,270	1,334	575	312	102	292,555
AVG	289	120	663	4,920	13,629	20,956	8,087	2,060	667	778	887	589	53,645
MEDIAN	0	0	0	157	1,016	1,535	516	284	79	249	358	236	11,960

Alternative GW5: SWRCB EIR Alt 3C, Solvang River Well Pumping 2,400 acre-feet/year- wells located downstream of Alisal Bridge

SANTA YNEZ RIVER ABOVE SALSIPUEDES CREEK CONFLUENCE (acre-feet/month)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	SUM
1918	0	0	0	0	73,502	135,459	23,962	7,735	1,768	334	22	0	242,781
1919	0	0	0	256	793	981	9	27	0	2,100	0	66	4,232
1920	0	0	0	0	448	1,880	1,145	186	0	2,107	0	107	5,873
1921	7	0	0	28	342	840	65	29	0	0	2,064	49	3,423
1922	1	2	8,820	5,959	17,687	10,075	10,546	1,717	364	31	0	0	55,202
1923	0	0	1,470	913	1,294	979	451	192	54	0	2,065	2,007	9,424
1924	1,934	1,182	0	0	0	414	38	0	0	0	55	43	3,665
1925	0	0	0	0	0	0	461	0	0	11	48	0	520
1926	0	0	0	0	1,544	254	10,793	997	67	0	44	84	13,783
1927	1	1,133	502	715	29,089	15,185	6,672	1,015	206	15	0	12	54,545
1928	0	0	0	186	1,774	1,667	190	62	0	2,137	2,039	1,847	9,903
1929	1,795	0	0	0	135	430	329	30	2,137	2,137	1,635	242	8,870
1930	12	0	0	0	0	1,514	0	0	0	4	0	0	1,530
1931	0	0	0	0	0	0	0	0	0	0	0	0	0
1932	0	0	3,525	1,010	10,088	4,644	989	403	0	0	97	0	20,757
1933	0	0	0	2,325	566	124	94	0	0	0	200	0	3,310
1934	0	0	0	2,039	526	178	0	0	2,124	2,009	1,707	1,581	10,166
1935	1,573	0	0	2,593	784	3,022	5,761	834	20	0	1,996	1,883	18,466
1936	1,811	0	0	0	8,281	1,787	998	70	0	2,055	1,543	0	16,546
1937	0	0	0	833	24,786	23,030	21,508	2,124	735	202	2,104	0	75,322
1938	0	0	0	381	51,588	221,297	21,327	2,200	1,087	529	36	0	298,446
1939	0	0	11	1,108	1,829	3,130	791	198	10	2,087	2,094	0	11,259
1940	0	0	0	144	1,300	1,036	527	99	0	2,086	1,764	35	6,992
1941	0	0	1,655	9,138	89,112	258,175	147,294	23,789	4,122	1,273	644	305	535,507
1942	137	169	4,763	2,760	1,313	3,165	8,110	1,382	480	40	0	0	22,320
1943	0	0	0	59,759	37,278	85,000	13,706	1,495	826	333	32	0	198,430
1944	0	0	43	431	30,584	44,015	6,805	1,783	784	177	7	0	84,628
1945	0	86	4	72	6,497	7,910	4,196	806	67	0	0	31	19,670
1946	0	0	962	65	327	436	4,204	430	20	2,101	2,092	1,898	12,534
1947	1,849	136	188	15	147	143	51	2,219	2,435	2,174	1,891	140	11,387
1948	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	0	0	0	0	0	719	0	0	0	0	0	0	719
1950	0	0	0	0	106	0	0	0	0	0	0	0	106
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	26,393	159	26,701	9,800	1,493	28	26	246	2,263	67,108
1953	85	4	1,910	3,911	775	482	212	12	0	2,175	1,600	165	11,331
1954	46	0	0	792	1,295	2,689	1,117	5	0	2,149	1,365	279	9,736
1955	12	0	0	0	0	0	0	17	0	249	0	0	278
1956	0	0	6,367	8,540	1,603	758	1,090	798	0	0	88	0	19,245
1957	0	0	0	0	0	69	0	0	2,134	0	23	0	2,227
1958	0	0	0	14	11,170	22,326	67,277	14,142	1,850	276	11	0	117,066
1959	0	0	0	55	4,589	680	126	27	14	2,133	1,771	140	9,534
1960	18	0	0	0	1,197	0	93	0	0	0	0	0	1,307
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	46,379	6,682	1,374	280	0	0	0	0	54,715
1963	0	0	0	0	587	735	295	52	0	0	0	0	1,669
1964	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	964	0	60	498	0	0	1,522
1966	0	706	1,713	4,135	1,541	963	50	124	18	0	2,035	1,848	13,134
1967	1,752	1,800	3,329	11,725	4,722	29,917	55,772	25,069	1,039	131	2,346	2,149	139,751
1968	0	0	0	9	223	2,027	402	4	2,117	0	0	62	4,843
1969	0	0	0	181,127	249,668	105,317	22,290	8,285	1,655	265	74	11	568,691
1970	0	0	1	455	735	5,506	208	28	0	2,100	2,107	1,093	12,231
1971	35	152	764	454	215	137	72	3	2,109	2,278	1,979	53	8,249
1972	0	7	1,426	212	173	18	25	2,306	1,804	0	0	91	6,061
1973	4	0	0	6,846	26,907	18,694	10,655	1,248	431	92	0	0	64,878
1974	0	0	0	6,261	686	2,838	984	463	21	0	0	11	11,264
1975	0	0	1,041	51	7,554	21,060	7,033	1,738	235	0	0	0	38,713
1976	0	0	0	0	1,431	132	74	0	0	0	178	0	1,814
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	4,740	60,267	200,456	49,971	10,974	1,671	725	255	0	329,059
1979	0	0	0	2,128	6,295	26,459	15,746	1,751	598	107	0	0	53,084
1980	0	0	0	1,407	101,742	57,315	9,636	2,312	840	183	0	0	173,436
1981	0	0	0	74	499	11,531	1,520	423	128	0	0	59	14,233
1982	0	0	0	0	5	2,397	4,210	451	0	2,142	2,091	1,897	13,192
1983	0	0	3,882	33,192	83,915	223,596	69,572	39,025	8,638	1,350	836	326	464,332
1984	530	75	14,511	6,231	2,708	1,310	556	148	26	0	0	24	26,120
1985	0	0	26	0	109	143	70	0	0	0	115	0	462
1986	0	0	0	0	10,082	15,301	4,655	615	217	0	0	0	30,871
1987	0	0	0	0	0	1,383	0	0	0	0	0	0	1,383
1988	0	0	0	0	0	1,825	164	0	2,136	2,072	1,791	1,637	9,626
1989	0	0	0	0	0	0	0	0	0	2	0	0	2
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	8,662	1,224	74	2,278	1,835	344	0	14,418
1992	0	0	0	78	20,185	6,207	3,029	1,010	368	0	2,067	1,747	34,692
1993	11	0	0	39,093	145,369	86,808	38,697	9,277	1,700	541	222	0	321,719
AVG	153	72	749	5,640	15,586	22,613	8,816	2,263	650	596	602	318	58,057
MEDIAN	0	0	0	68	788	1,591	673	136	21	20	34	0	11,297

Alternative GW5: SWRCB EIR Alt 3C, Solvang River Well Pumping 2,400 acre-feet/year- wells located downstream of Alisal Bridge

SANTA YNEZ RIVER AT LOMPOC NARROWS (acre-feet/month)

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	SUM
1918	0	0	0	54	79,363	144,098	25,653	8,280	2,179	512	97	69	260,307
1919	63	64	70	312	978	1,165	5	112	0	1,994	0	12	4,775
1920	49	50	58	61	694	2,825	1,559	276	84	2,024	0	41	7,720
1921	0	0	0	139	579	1,227	148	108	27	51	1,928	15	4,221
1922	0	0	12,079	7,485	22,236	11,991	11,402	1,937	460	117	0	0	67,707
1923	0	0	2,398	1,111	1,580	1,065	590	284	142	78	1,965	1,965	11,179
1924	1,886	1,143	74	77	78	687	128	84	80	0	9	0	4,245
1925	0	0	0	0	0	21	718	55	54	0	0	0	848
1926	0	0	8	17	2,352	619	15,446	1,410	160	81	12	29	20,136
1927	0	1,697	856	991	35,174	16,613	7,318	1,222	298	97	0	0	64,265
1928	0	37	45	214	2,445	2,078	280	149	82	2,054	1,995	1,792	11,172
1929	1,739	0	60	74	219	624	521	113	2,071	2,100	1,583	155	9,259
1930	0	0	0	0	37	1,937	81	73	0	0	0	0	2,129
1931	0	0	0	1	67	23	39	0	0	0	0	0	130
1932	0	0	5,150	1,434	16,298	5,631	1,420	602	89	29	47	0	30,698
1933	0	0	0	3,001	929	212	187	83	0	0	99	0	4,511
1934	0	0	0	2,791	931	358	80	30	2,040	1,968	1,648	1,515	11,360
1935	1,505	0	0	3,437	1,179	4,050	7,404	1,041	113	30	1,892	1,839	22,492
1936	1,761	0	0	56	10,608	2,306	1,441	167	37	1,981	1,501	0	19,857
1937	0	0	0	1,157	30,039	27,623	22,798	2,343	832	283	2,027	0	87,103
1938	0	0	57	412	56,317	235,204	22,622	2,301	1,191	614	112	71	318,900
1939	0	0	161	1,340	2,218	3,709	1,093	292	99	2,023	2,052	0	12,989
1940	0	0	0	248	1,671	1,434	743	185	33	2,002	1,720	3	8,039
1941	0	0	2,396	11,729	108,386	277,044	156,947	25,479	4,837	1,772	1,024	580	590,193
1942	414	447	8,165	4,440	2,223	4,993	9,237	1,894	774	222	167	55	33,033
1943	66	157	165	62,644	39,236	88,941	14,668	1,912	1,027	516	110	73	209,515
1944	70	70	307	804	34,728	46,544	7,446	2,206	984	261	84	0	93,504
1945	16	236	167	242	7,337	8,514	4,427	912	63	0	0	0	21,913
1946	0	0	1,021	129	405	1,222	4,495	525	108	2,036	2,051	1,845	13,836
1947	1,794	292	368	98	330	256	140	2,173	2,410	2,133	1,834	71	11,900
1948	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	0	0	0	0	0	1,811	0	0	0	0	0	0	1,811
1950	0	0	0	0	472	1	0	0	0	0	0	0	473
1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	0	0	0	32,930	421	35,398	10,094	1,526	84	9	162	2,059	82,683
1953	143	254	3,833	4,977	976	595	362	48	31	2,077	1,555	93	14,945
1954	6	0	0	865	1,574	4,083	1,321	1	77	2,043	1,319	190	11,479
1955	0	0	0	281	150	70	87	87	1	142	0	0	819
1956	0	0	12,484	15,698	2,706	1,265	1,831	1,098	87	78	39	1	35,286
1957	0	3	4	52	347	239	87	74	2,028	1	1	0	2,834
1958	1	0	0	241	16,458	29,242	75,740	15,025	2,264	453	99	69	139,591
1959	64	62	66	221	5,936	976	327	115	98	2,047	1,727	79	11,717
1960	0	0	8	60	1,714	87	400	78	0	0	0	0	2,347
1961	0	46	84	1	3	8	0	0	0	0	0	0	142
1962	1	0	113	435	64,999	10,426	1,996	575	100	67	0	0	78,712
1963	0	0	30	48	2,326	2,337	1,163	431	177	60	0	0	6,572
1964	1	1	2	3	5	6	8	0	0	0	0	0	25
1965	0	0	0	337	24	84	2,428	78	59	397	1	0	3,408
1966	1	3,340	4,105	6,465	2,923	1,485	223	312	104	26	1,910	1,800	22,692
1967	1,699	1,746	3,790	15,645	5,183	30,331	56,690	25,530	1,231	115	2,265	2,113	146,340
1968	0	20	69	82	292	2,183	498	0	2,051	0	1	4	5,200
1969	0	0	0	189,246	258,027	108,107	24,125	8,922	2,063	428	149	84	591,150
1970	70	74	168	625	917	6,249	300	23	0	2,008	2,062	1,047	13,544
1971	2	103	1,085	626	407	226	169	0	2,039	2,239	1,927	12	8,834
1972	0	0	1,588	277	245	8	17	2,231	1,779	0	0	15	6,161
1973	0	111	1	10,928	33,721	21,457	11,507	1,551	617	170	25	0	80,088
1974	11	10	54	8,869	992	3,746	1,387	659	110	30	12	0	15,880
1975	9	9	2,497	227	10,978	27,821	7,968	2,157	523	97	73	21	52,378
1976	60	60	64	68	1,965	328	273	85	0	0	85	0	2,990
1977	0	0	1	33	41	62	0	32	0	0	0	0	169
1978	0	0	0	9,031	75,461	212,389	54,021	11,931	2,077	1,005	424	86	366,424
1979	143	160	169	3,197	8,431	29,131	16,730	2,169	886	198	25	18	61,258
1980	14	13	69	2,039	110,395	61,497	10,383	2,730	1,132	342	27	21	188,663
1981	17	16	61	327	763	15,187	2,031	623	219	31	12	13	19,303
1982	0	7	47	142	71	2,554	4,853	545	37	2,073	2,052	1,846	14,228
1983	0	62	4,215	41,802	93,545	233,551	74,792	40,948	9,495	1,850	1,120	504	501,883
1984	810	353	15,884	6,760	3,030	1,528	758	245	66	0	0	0	29,433
1985	0	3	325	71	269	320	147	0	0	0	30	0	1,166
1986	0	0	27	100	14,819	20,833	5,074	913	311	0	0	0	42,077
1987	6	7	47	141	64	2,095	84	33	0	0	0	0	2,477
1988	0	0	16	111	50	1,812	257	78	2,058	2,031	1,735	1,573	9,721
1989	0	0	5	8	3	2	1	0	0	0	0	0	18
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	12,481	1,085	8	1,978	1,634	112	0	17,298
1992	0	0	6	74	24,697	7,548	3,363	1,213	458	79	1,966	1,703	41,108
1993	0	0	139	42,483	152,920	90,067	39,878	9,816	2,006	721	295	0	338,326
AVG	163	140	1,114	6,579	17,855	24,640	9,625	2,476	744	624	594	309	64,863
MEDIAN	0	0	51	245	1,377	2,087	1,089	280	102	97	60	2	13,266