Table 21 Central Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
3-1	SOQUEL VALLEY	2,500	C	1,421	665	6	6	16	482	270-990
3-2	PAJARO VALLEY	76,800	A	2,000	500	185	185	149	580-910	300-30,000
3-3	GILROY-HOLLISTER VALLEY									
3-3.01	LLAGAS AREA	55,600	C	-	-	-	-	95	-	-
3-3.02	BOLSA AREA	21,000	A	-	400	11	<11	3	-	400-1800
3-3.03	HOLLISTER AREA	32,700	A	-	400	42	<42	35	-	400-1600
3-3.04	SAN JUAN BAUTISTA AREA	74,300	A	-	400	37	<37	40	-	460-1700
3-4	SALINAS VALLEY									
3-4.01	180/400 FOOT AQUIFER	84,400	A	-	-	166	218	82	478	223-1,013
3-4.02	EAST SIDE AQUIFER	57,500	A	-	-	74	67	53	450	168-977
3-4.04	FOREBAY AQUIFER	94,100	A	-	-	89	91	35	624	300-1,100
3-4.05	UPPER VALLEY AQUIFER	98,200	A	4,000	-	36	37	17	443	140-3,700
3-4.06	PASO ROBLES AREA	597,000	A	3,300	-	183	-	58	614	165-3,868
3-4.08	SEASIDE AREA	25,900	B	3,500	1,000		7	24	400	200-900
3-4.09	LANGLEY AREA	15,400	B	1,570	450	-	-	52	-	52-348
3-4.10	CORRAL DE TIERRA AREA	22,300	C	948	450	-	3	26	-	355-679
3-5	CHOLAME VALLEY	39,800	C	3,000	1,000	1	-	1	-	-
3-6	LOCKWOOD VALLEY	59,900	C	1,500	100	-	-	9	-	-
3-7	CARMEL VALLEY	5,160	C	1,000	600	50	23	12	260-670	220-1,200
3-8	LOS OSOS VALLEY	6,990	A	700	230	-	-	10	354	78-33,700
3-9	SAN LUIS OBISPO VALLEY	12,700	A	600	300	-	-	11	583	278-1,949
3-12	SANTA MARIA RIVER VALLEY	184,000	A	2,500	1,000	286	10	108	598	139-1,200
3-13	CUYAMA VALLEY	147,000	A	4,400	1,100	17	2	8	-	206-3,905
3-14	SAN ANTONIO CREEK VALLEY	81,800	A	-	400	30	-	9	415	129-8,040
3-15	SANTA YNEZ RIVER VALLEY	204,000	A	1,300	750	163	21	76	507	400-700
3-16	GOLETA	9,210	A	800	500	49	11	17	755	617-929
3-17	SANTA BARBARA	6,160	A	625	560	75	36	5	-	217-385
3-18	CARPINTERIA	8,120	A	500	300	41	41	4	557	317-1,780
3-19	CARRIZO PLAIN	173,000	C	1,000	500	-	-	1	-	-
3-20	ANO NUEVO AREA	2,032	C	-	-	-	-	2	-	-
3-21	SANTA CRUZ PURISIMA FORMATION	40,200	C	200	20	-	-	39	440	380-560
3-22	SANTA ANA VALLEY	2,720	C	130	-	-	-	-	-	-
3-23	UPPER SANTA ANA VALLEY	1,430	C	-	-	-	-	-	-	-
3-24	QUIEN SABE VALLEY	4,710	C	122	122	-	-	-	-	-
3-25	TRES PINOS VALLEY	3,390	C	1,225	-	-	-	3	-	-
3-26	WEST SANTA CRUZ TERRACE	7,870	C	550	200	-	-	7	480	378-684
3-27	SCOTTS VALLEY	774	C	410	100-900	26	7	7	360	100-980
3-28	SAN BENITO RIVER VALLEY	24,200	C	2,000	-	-	-	3	-	-
3-29	DRY LAKE VALLEY	1,420	C	-	-	-	-	-	-	-
3-30	BITTER WATER VALLEY	32,200	C	-	-	-	-	-	-	-
3-31	HERNANDEZ VALLEY	2,860	C	160	58	-	-	-	-	-

Table 21 Central Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
3-32	PEACH TREE VALLEY	9,790	C	117	84	-	-	-	-	-
3-33	SAN CARPOFORO VALLEY	200	C	-	-	-	-	-	-	217-385
3-34	ARROYO DE LA CRUZ VALLEY	750	C	-	-	-	-	-	-	211-381
3-35	SAN SIMEON VALLEY	620	A	170	100	-	-	4	413	46-2,210
3-36	SANTA ROSA VALLEY	4,480	A	708	400	-	-	2	-	298-2,637
3-37	VILLA VALLEY	980	C	-	-	-	-	-	-	260-1,635
3-38	CAYUCOS VALLEY	530	C	166	100	-	-	-	-	815-916
3-39	OLD VALLEY	750	C	335	200	-	-	-	-	346-2,462
3-40	TORO VALLEY	721	C	500	0	-	-	-	-	458-732
3-41	MORRO VALLEY	1,200	C	442	300	-	-	6	1150	469-5,100
3-42	CHORRO VALLEY	3,200	C	700	200	-	-	6	656	60-3,606
3-43	RINCONADA VALLEY	2,580	C	0	0	-	-	-	-	-
3-44	POZO VALLEY	6,840	C	230	100	-	-	5	-	287-676
3-45	HUASNA VALLEY	4,700	C	0	0	-	-	-	-	-
3-46	RAFAEL VALLEY	2,990	C	0	0	-	-	-	-	-
3-47	BIG SPRING AREA	7,320	C	0	0	-	-	-	-	-
3-49	MONTECITO	6,270	A	1,000	750	88	2	4	700	600-1,100
3-50	FELTON AREA	1,160	C	825	244	6	-	2	-	69-400
3-51	MAJORS CREEK	364	C	50	38	-	-	-	-	-
3-52	NEEDLE ROCK POINT	480	C	450	320	-	-	-	-	-
3-53	FOOTHILL	3,120	A	-	-	-	8	7	828	554-1,118

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

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South Coast Hydrologic Region

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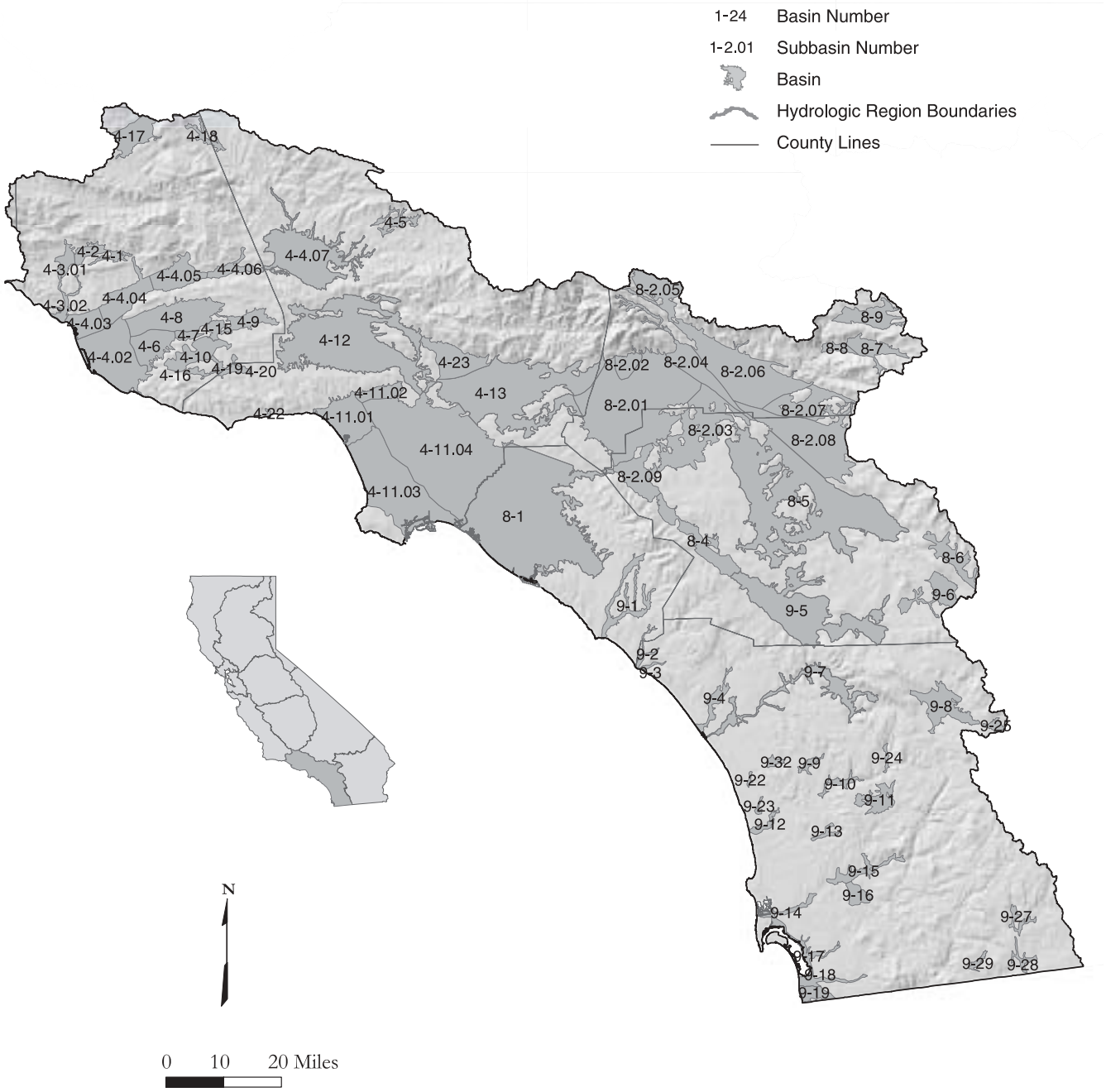

Figure 31 South Coast Hydrologic Region

Basins and Subbasins of the South Coast Hydrologic Region

Basin/subbasin	Basin name
4-1	Upper Ojai Valley
4-2	Ojai Valley
4-3	Ventura River Valley
4-3.01	Upper Ventura River
4-3.02	Lower Ventura River
4-4	Santa Clara River Valley
4-4.02	Oxnard
4-4.03	Mound
4-4.04	Santa Paula
4-4.05	Fillmore
4-4.06	Piru
4-4.07	Santa Clara River Valley East
4-5	Acton Valley
4-6	Pleasant Valley
4-7	Arroyo Santa Rosa Valley
4-8	Las Posas Valley
4-9	Simi Valley
4-10	Conejo Valley
4-11	Coastal Plain of Los Angeles
4-11.01	Santa Monica
4-11.02	Hollywood
4-11.03	West Coast
4-11.04	Central
4-12	San Fernando Valley
4-13	San Gabriel Valley
4-15	Tierre Rejada
4-16	Hidden Valley
4-17	Lockwood Valley
4-18	Hungry Valley
4-19	Thousand Oaks Area
4-20	Russell Valley
4-22	Malibu Valley
4-23	Raymond
8-1	Coastal Plain of Orange County
8-2	Upper Santa Ana Valley
8-2.01	Chino
8-2.02	Cucamonga
8-2.03	Riverside-Arlington
8-2.04	Rialto-Colton
8-2.05	Cajon
8-2.06	Bunker Hill
8-2.07	Yucaipa
8-2.08	San Timoteo
8-2.09	Temescal
8-4	Elsinore
8-5	San Jacinto
8-6	Hemet Lake Valley
8-7	Big Meadows Valley
8-8	Seven Oaks Valley
8-9	Bear Valley
9-1	San Juan Valley
9-2	San Mateo Valley
9-3	San Onofre Valley
9-4	Santa Margarita Valley
9-5	Temecula Valley
9-6	Coahuila Valley
9-7	San Luis Rey Valley
9-8	Warner Valley
9-9	Escondido Valley
9-10	San Pasqual Valley
9-11	Santa Maria Valley
9-12	San Dieguito Creek
9-13	Poway Valley
9-14	Mission Valley
9-15	San Diego River Valley
9-16	El Cajon Valley
9-17	Sweetwater Valley
9-18	Otay Valley
9-19	Tijuana Basin
9-22	Batiquitos Lagoon Valley
9-23	San Elijo Valley
9-24	Pamo Valley
9-25	Ranchita Town Area
9-27	Cottonwood Valley
9-28	Campo Valley
9-29	Potrero Valley
9-32	San Marcos Area

Description of the Region

The South Coast HR covers approximately 6.78 million acres (10,600 square miles) of the southern California watershed that drains to the Pacific Ocean (Figure 31). The HR is bounded on the west by the Pacific Ocean and the watershed divide near the Ventura-Santa Barbara County line. The northern boundary corresponds to the crest of the Transverse Ranges through the San Gabriel and San Bernardino mountains. The eastern boundary lies along the crest of the San Jacinto Mountains and low-lying hills of the Peninsular Range that form a drainage boundary with the Colorado River HR. The southern boundary is the international boundary with the Republic of Mexico. Significant geographic features include the coastal plain, the central Transverse Ranges, the Peninsular Ranges, and the San Fernando, San Gabriel, Santa Ana River, and Santa Clara River valleys.

The South Coast HR includes all of Orange County, most of San Diego and Los Angeles Counties, parts of Riverside, San Bernardino, and Ventura counties, and a small amount of Kern and Santa Barbara Counties. This HR is divided into Los Angeles, Santa Ana and San Diego subregions, RWQCBs 4, 8, and 9 respectively. Groundwater basins are numbered according to these subregions. Basin numbers in the Los Angeles subregion are preceded by a 4, in Santa Ana by an 8, and in San Diego by a 9. The Los Angeles subregion contains the Ventura, Santa Clara, Los Angeles, and San Gabriel River drainages, Santa Ana encompasses the Santa Ana River drainage, and San Diego includes the Santa Maria River, San Luis Rey River and the San Diego River and other drainage systems.

According to 2000 census data, about 17 million people live within the boundaries of the South Coast HR, approximately 50 percent of the population of California. Because this HR amounts to only about 7 percent of the surface area of the State, this has the highest population density of any HR in California (DWR 1998). Major population centers include the metropolitan areas surrounding Ventura, Los Angeles, San Diego, San Bernardino, and Riverside.

The South Coast HR has 56 delineated groundwater basins. Twenty-one basins are in subregion 4 (Los Angeles), eight basins in subregion 8 (Santa Ana), and 27 basins in subregion 9 (San Diego).

The Los Angeles subregion overlies 21 groundwater basins and encompasses most of Ventura and Los Angeles counties. Within this subregion, the Ventura River Valley, Santa Clara River Valley, and Coastal Plain of Los Angeles basins are divided into subbasins. The basins in the Los Angeles subregion underlie 1.01 million acres (1,580 square miles) or about 40 percent of the total surface area of the subregion.

The Santa Ana subregion overlies eight groundwater basins and encompasses most of Orange County and parts of Los Angeles, San Bernardino, and Riverside counties. The Upper Santa Ana Valley Groundwater Basin is divided into nine subbasins. Groundwater basins underlie 979,000 acres (1,520 square miles) or about 54 percent of the Santa Ana subregion.

The San Diego subregion overlies 27 groundwater basins, encompasses most of San Diego County, and includes parts of Orange and Riverside counties. Groundwater basins underlie about 277,000 acres (433 square miles) or about 11 percent of the surface of the San Diego subregion.

Overall, groundwater basins underlie about 2.27 million acres (3,530 square miles) or about 33 percent of the South Coast HR.

Groundwater Development

Groundwater has been used in the South Coast HR for well over 100 years. High demand and use of groundwater in Southern California has given rise to many disputes over management and pumping rights, with the resolution of these cases playing a large role in the establishment and clarification of water rights law in California. Raymond Groundwater Basin, located in this HR, was the first adjudicated basin in the State. Of the 16 adjudicated basins in California, 11 are in the South Coast HR. Groundwater provides about 23 percent of water demand in normal years and about 29 percent in drought years (DWR 1998).

Groundwater is found in unconfined alluvial aquifers in most of the basins of the San Diego subregion and the inland basins of the Santa Ana and Los Angeles subregions. In some larger basins, typified by those underlying the coastal plain, groundwater occurs in multiple aquifers separated by aquitards that create confined groundwater conditions. Basins range in depth from tens or hundreds of feet in smaller basins, to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this HR depending on aquifer characteristics and well location, size, and use. Some aquifers are capable of yielding thousands of gallons per minute to municipal wells.

Conjunctive Use

Conjunctive use of surface water and groundwater is a long-standing practice in the region. At present, much of the potable water used in Southern California is imported from the Colorado River and from sources in the eastern Sierra and Northern California. Several reservoirs are operated primarily for the purpose of storing surface water for domestic and irrigation use, but groundwater basins are also recharged from the outflow of some reservoirs. The concept is to maintain streamflow over a longer period of time than would occur without regulated flow and thus provide for increased recharge of groundwater basins. Most of the larger basins in this HR are highly managed, with many conjunctive use projects being developed to optimize water supply.

Coastal basins in this HR are prone to intrusion of seawater. Seawater intrusion barriers are maintained along the Los Angeles and Orange County sections of the coastal plain. In Orange County, recycled water is injected into the ground to form a mound of groundwater between the coast and the main groundwater basin. In Los Angeles County, imported and recycled water is injected to maintain a seawater intrusion barrier.

Groundwater Quality

Groundwater in basins of the Los Angeles subregion is mainly calcium sulfate and calcium bicarbonate in character. Nitrate content is elevated in some parts of the subregion. Volatile organic compounds (VOCs) have created groundwater impairments in some of the industrialized portions of the region. The San Gabriel Valley and San Fernando Valley groundwater basins both have multiple sites of contamination from VOCs. The main constituents in the contamination plumes are trichloroethylene (TCE) and tetrachloroethylene (PCE). Some of the locations have been declared federal Superfund sites. Contamination plumes containing high concentrations of TCE and PCE also occur in the Bunker Hill Subbasin of the Upper Santa Ana Valley Groundwater Basin. Some of these plumes are also designated as Superfund sites. Perchlorate is emerging as an important contaminant in several areas in the South Coast HR.

Groundwater in basins of the Santa Ana subregion is primarily calcium and sodium bicarbonate in character. Local impairments from excess nitrate or VOCs have been recognized. Groundwater and surface water in the Chino Subbasin of the Santa Ana River Valley Groundwater Basin have elevated nitrate concentrations, partly derived from a large dairy industry in that area. In Orange County, water from the Santa Ana River provides a large part of the groundwater replenishment. Wetlands maintained along the Santa Ana River near the boundary of the Upper Santa Ana River and Orange County Groundwater Basins provide effective removal of nitrate from surface water, while maintaining critical habitat for endangered species.

Groundwater in basins of the San Diego subregion has mainly calcium and sodium cations and bicarbonate and sulfate anions. Local impairments by nitrate, sulfate, and TDS are found. Camp Pendleton Marine Base, in the northwestern part of this subregion, is on the EPA National Priorities List for soil and groundwater contamination by many constituents.

Water Quality in Public Supply Wells

From 1994 through 2000, 2,342 public supply water wells were sampled in 47 of the 73 basins and subbasins in the South Coast HR. Analyzed samples indicate that 1,360 wells, or 58 percent, met the state primary MCLs for drinking water. Nine-hundred-eighty-two wells, or 42 percent, have constituents that exceed one or more MCL. Figure 32 shows the percentages of each contaminant group that exceeded MCLs in the 982 wells.

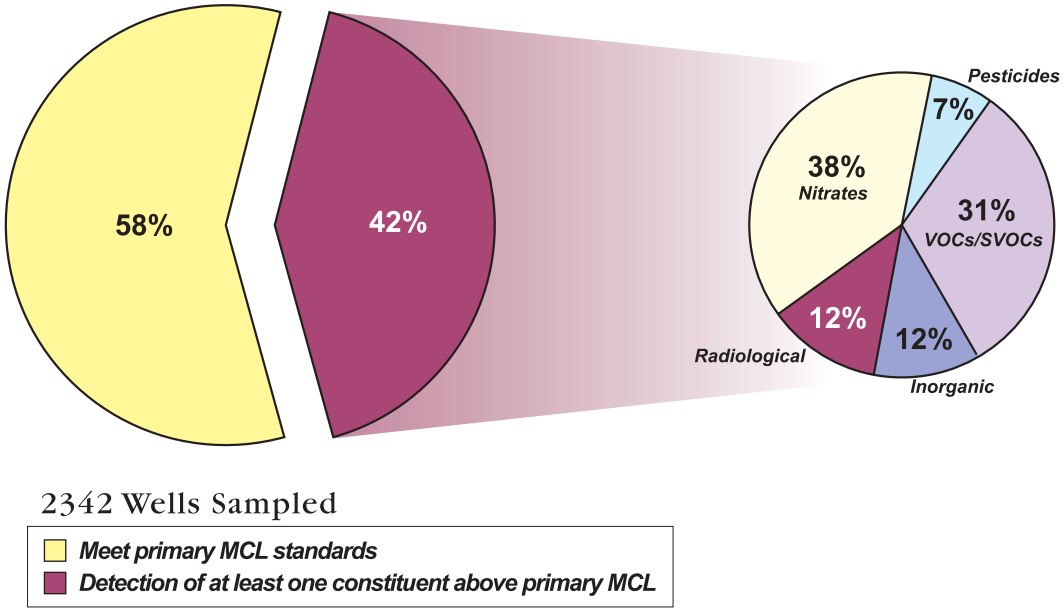

Figure 32 MCL exceedances in public supply wells in the South Coast Hydrologic Region

Table 22 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Changes from Bulletin 118-80

Several modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report (Table 23). The Cajalco Valley (8-3), Jamul Valley (9-20), Las Pulgas Valley (9-21), Pine Valley (9-26), and Tecate Valley (9-30) Groundwater Basins have been deleted in this report because they have thin deposits of alluvium and well completion reports indicate that groundwater production is from underlying fractured bedrock. The Conejo Tierra Rejada Volcanic (4-21) is a volcanic aquifer and was not assigned a basin number in this bulletin. This is considered to be groundwater source area as discussed in Chapter 6.

Table 22 Most frequently occurring contaminants by contaminant group in the South Coast Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 56	Thallium – 13	Aluminum – 12
Inorganics – Secondary	Iron – 337	Manganese – 335	TDS – 36
Radiological	Gross Alpha – 104	Uranium – 40	Radium 226 – 9 Radium 228 – 9
Nitrates	Nitrate (as NO_3) – 364	Nitrate + Nitrite – 179	Nitrate Nitrogen (NO_3-N) – 14
Pesticides	DBCP – 61	Di(2-Ethylhexyl)phthalate –5	Heptachlor – 2 EDB – 2
VOCs/SVOCs	TCE – 196	PCE – 152	1,2 Dichloroethane – 89

DBCP = Dibromochloropropane
EDB = Ethylene Dibromide
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds

The Ventura River Valley (4-3), Santa Clara River Valley (4-4), Coastal Plain of Los Angeles (4-11), and Upper Santa Ana Valley (8-2) Groundwater Basins have been divided into subbasins in this report. The extent of the San Jacinto Groundwater Basin (8-5) has been decreased because completion of Diamond Valley Reservoir has inundated the valley. Paloma Valley has been removed because well logs indicate groundwater production is solely from fractured bedrock. The Raymond Groundwater Basin (4-23) is presented as an individual basin instead of being incorporated into the San Gabriel Valley Groundwater Basin (4-13) because it is bounded by physical barriers and has been managed as a separate and individual groundwater basin for many decades. In Bulletin 118-75, groundwater basins in two different subregions were designated the Upper Santa Ana Valley Groundwater Basin (4-14 and 8-2). To alleviate this confusion, basin 4-14 has been divided, with parts of the basin incorporated into the neighboring San Gabriel Valley Groundwater Basin (4-13) and the Chino subbasin of the Upper Santa Ana Valley Groundwater Basin (8-2.01). The San Marcos Area Groundwater Basin (9-32) in central San Diego County is presented as a new basin in this report.

Table 23 Modifications since Bulletin 118-80 of groundwater basins and subbasins in South Coast Hydrologic Region

Basin/subbasin name	Number	Old number
Upper Ventura River	4-3.01	4-3
Lower Ventura River	4-3.02	4-3
Oxnard	4-4.02	4-4
Mound	4-4.03	4-4
Santa Paula	4-4.04	4-4
Fillmore	4-4.05	4-4
Piru	4-4.06	4-4
Santa Clara River Valley East	4-4.07	4-4
Santa Monica	4-11.01	4-11
Hollywood	4-11.02	4-11
West Coast	4-11.03	4-11
Central	4-11.04	4-11
Upper Santa Ana Valley	Incorporated into 8-2.01 and 4-13	4-14
Conejo-Tierra Rejada Volcanic	deleted	4-21
Raymond	4-23	4-13
Chino	8-2.01	8-2
Cucamonga	8-2.02	8-2
Riverside-Arlington	8-2.03	8-2
Rialto-Colton	8-2.04	8-2
Cajon	8-2.05	8-2
Bunker Hill	8-2.06	8-2
Yucaipa	8-2.07	8-2
San Timoteo	8-2.08	8-2
Temescal	8-2.09	8-2
Cajalco Valley	deleted	8-3
Tijuana Basin	9-19	
Jamul Valley	deleted	9-20
Las Pulgas Valley	deleted	9-21
Batiquitos Lagoon Valley	9-22	
San Elijo Valley	9-23	
Pamo Valley	9-24	
Ranchita Town Area	9-25	
Pine Valley	deleted	9-26
Cottonwood Valley	9-27	
Campo Valley	9-28	
Potrero Valley	9-29	
Tecate Valley	deleted	9-30
San Marcos Area	9-32	Not previously identified

Table 24 South Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
4-1	UPPER OJAI VALLEY	3,800	A	200	50	4	-	1	707	438-1,249
4-2	OJAI VALLEY	6,830	A	600	383	24	-	22	640	450-1,140
4-3	VENTURA RIVER VALLEY									
4-3.01	UPPER VENTURA RIVER	7,410	C	-	600	17	-	18	706	500-1,240
4-3.02	LOWER VENTURA RIVER	5,300	A	-	20	-	-	2	-	760-3,000
4-4	SANTA CLARA RIVER VALLEY									
4-4.02	OXNARD	58,000	A	1,600	-	127	127	69	1,102	160-1,800
4-4.03	MOUND	14,800	A	-	700	11	11	4	1,644	1,498-1,908
4-4.04	SANTA PAULA	22,800	A	-	700	60	50	10	1,198	470-3,010
4-4.05	FILLMORE	20,800	A	2,100	700	23	-	10	1,100	800-2,400
4-4.06	PIRU	8,900	A	-	800	19	-	3	1,300	608-2,400
4-4.07	SANTA CLARA RIVER VALLEY EAST	66,200	C	-	-	-	-	62	-	-
4-5	ACTON VALLEY	8,270	A	1,000	140	-	-	7	-	-
4-6	PLEASANT VALLEY	21,600	A	-	1,000	9	-	12	1,110	597-3,490
4-7	ARROYO SANTA ROSA VALLEY	3,740	A	1,200	950	6	-	7	1,006	670-1,200
4-8	LAS POSAS VALLEY	42,200	A	750	-	-	-	24	742	338-1,700
4-9	SIMI VALLEY	12,100	A	-	394	13	-	1	-	1,580
4-10	CONEJO VALLEY	28,900	A	1,000	100	-	-	3	631	335-2,064
4-11	COASTAL PLAIN OF LOS ANGELES									
4-11.01	SANTA MONICA	32,100	C	4,700	-	-	-	12	916	729-1,156
4-11.02	HOLLYWOOD	10,500	A	-	-	5	5	1	-	526
4-11.03	WEST COAST	91,300	A	1,300	-	67	58	33	456	-
4-11.04	CENTRAL	177,000	A	11,000	1,730	302	64	294	453	200-2,500
4-12	SAN FERNANDO VALLEY	145,000	A	3,240	1,220	1398	2385	126	499	176-1,16
4-13	SAN GABRIEL VALLEY	154,000	A	4,850	1,000	67	296	259	367	90-4,288
4-15	TIERRA REJADA	4,390	A	1,200	172	4	1	-	-	619-930
4-16	HIDDEN VALLEY	2,210	C	-	-	-	-	1	453	289-743
4-17	LOCKWOOD VALLEY	21,800	A	350	25	-	-	1	-	-
4-18	HUNGRY VALLEY	5,310	C	-	28	-	-	-	<350	-
4-19	THOUSAND OAKS AREA	3,110	C	-	39	2	-	-	1,410	1,200-2,300
4-20	RUSSELL VALLEY	3,100	A	-	25	-	-	-	-	-
4-22	MALIBU VALLEY	613	C	1,060	1,030	-	-	-	-	-
4-23	RAYMOND	26,200	A	3,620	1,880	88	-	70	346	138-780
8-1	COASTAL PLAIN OF ORANGE COUNTY	224,000	A	4,500	2,500	521	411	240	475	232-661
8-2	UPPER SANTA ANA VALLEY									
8-2.01	CHINO	154,000	A	1,500	1,000	12	8	187	484	200-600
8-2.02	CUCAMONGA	9,530	C	4,400	2,115	1	1	21	-	-
8-2.03	RIVERSIDE-ARLINGTON	58,600	A	-	-	11	3	43	-	370-756
8-2.04	RIALTO-COLTON	30,100	A	5,000	545	50	5	41	337	
8-2.05	CAJON	23,200	C	200	60	-	-	5	-	-
8-2.06	BUNKER HILL	89,600	A	5,000	1,245	398	169	204	-	150-550
8-2.07	YUCAIPA	25,300	A	2,800	206	19	3	45	334	-

Table 24 South Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
8-2.08	SAN TIMOTEO	73,100	A	-	-	67	12	36	-	-
8-2.09	TEMESCAL	23,500	C	-	-	2	2	20	753	373-950
8-4	ELSINORE	25,700	C	5,400	-	1	1	18	-	
8-5	SAN JACINTO	188,000	C	-	-	150	115	56	463	160-12,000
8-6	HEMET LAKE VALLEY	16,700	C	820	196	-	-	9	-	-
8-7	BIG MEADOWS VALLEY	14,200	C	120	34	-	-	8	-	-
8-8	SEVEN OAKS VALLEY	4,080	C	-	-	-	-	1	-	-
8-9	BEAR VALLEY	19,600	A	1,000	500	57	57	52	-	-
9-1	SAN JUAN VALLEY	16,700	C	1,000	-	-	-	8	760	430-12,880
9-2	SAN MATEO VALLEY	2,990	A	-	-	-	-	5	586	490-770
9-3	SAN ONOFRE VALLEY	1,250	A	-	-	-	-	2	-	600-1,500
9-4	SANTA MARGARITA VALLEY	626	A	1,980	-	4	-	-	-	337-9,030
9-5	TEMECULA VALLEY	87,800	C	1,750	-	140	4	67	476	220-1,500
9-6	COAHUILA VALLEY	18,200	C	500	-	2	-	1	-	304-969
9-7	SAN LUIS REY VALLEY	37,000	C	2,000	500	-	-	28	1,258	530-7,060
9-8	WARNER VALLEY	24,000	C	1,800	800	-	-	4	-	263
9-9	ESCONDIDO VALLEY	2,890	C	190	50	-	-	1	-	250-5,000
9-10	SAN PASQUAL VALLEY	4,540	C	1,700	1,000	-	-	2	-	500-1,550
9-11	SANTA MARIA VALLEY	12,300	A	500	36	3	-	2	1,000	324-1,680
9-12	SAN DIEGUITO CREEK	3,560	A	1,800	700	-	-	-	-	2,000
9-13	POWAY VALLEY	2,470	C	200	100	-	-	1	-	610-1,500
9-14	MISSION VALLEY	7,350	C	-	1,000	-	-	-	-	-
9-15	SAN DIEGO RIVER VALLEY	9,890	C	2,000	-	-	-	5	-	260-2,870
9-16	EL CAJON VALLEY	7,160	C	300	50	1	-	2,340		
9-17	SWEETWATER VALLEY	5,920	C	1,500	300	7	7	9	2,114	300-50,000
9-18	OTAY VALLEY	6,830	C	1,000	185	-	-	-	-	500->2,000
9-19	TIJUANA BASIN	7,410	A	2,000	350	-	-	-	-	380-3,620
9-22	BATIQUITOS LAGOON VALLEY	741	C	-	-	-	-	-	1,280	788-2,362
9-23	SAN ELIJO VALLEY	883	C	1,800	-	-	-	-	-	1,170-5,090
9-24	PAMO VALLEY	1,500	C	-	-	-	-	-	369	279-455
9-25	RANCHITA TOWN AREA	3,130	C	125	22	-	-	-	-	283-305
9-27	COTTONWOOD VALLEY	3,850	C	-	-	-	-	1	-	-
9-28	CAMPO VALLEY	3,550	C	-	<40	-	-	4	-	800
9-29	POTRERO VALLEY	2,020	C	-	-	-	-	4	-	-
9-32	SAN MARCOS VALLEY	2,130	C	60	-	-	-	-	-	500-700

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

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Sacramento River Hydrologic Region

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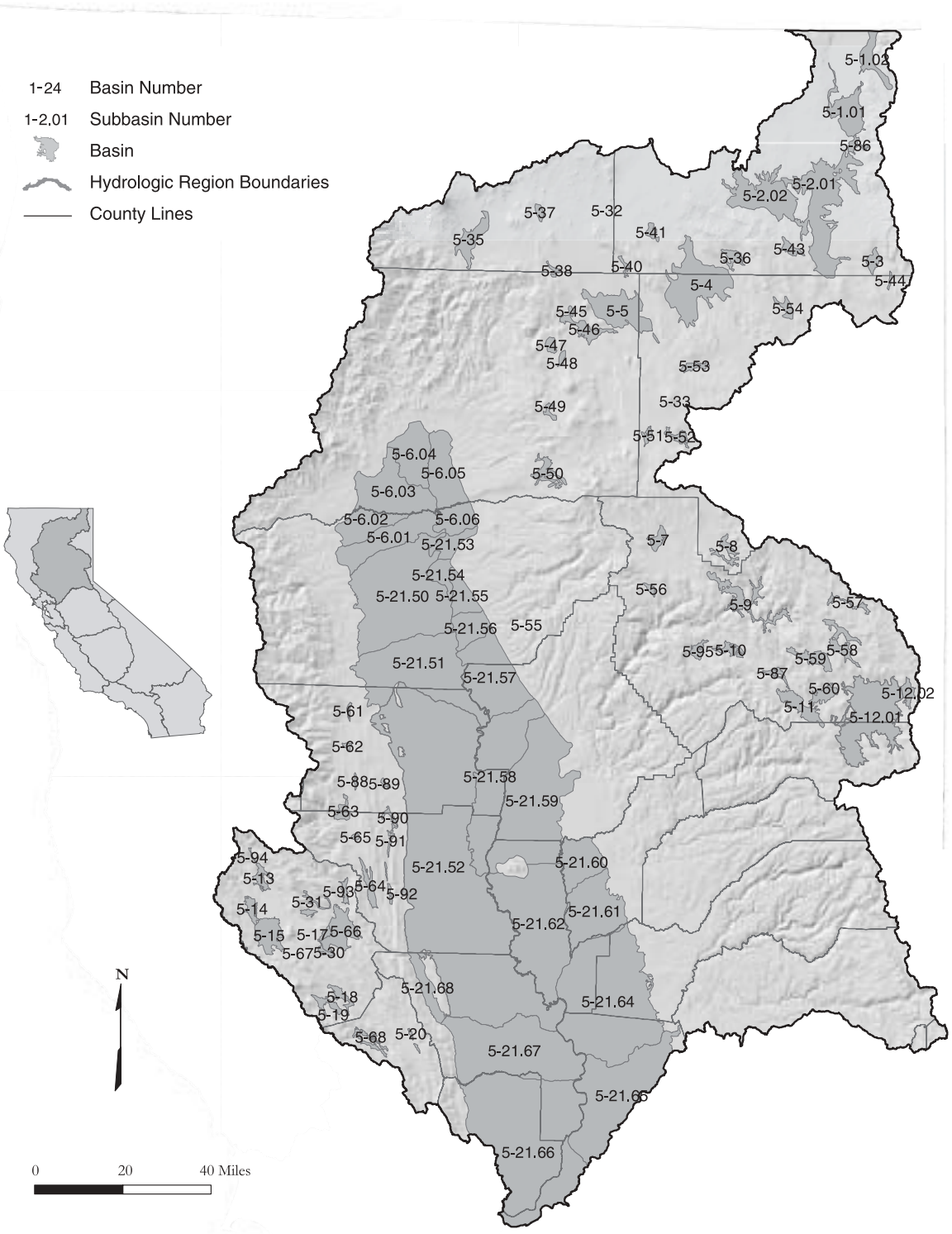

Figure 33 Sacramento River Hydrologic Region

Basins and Subbasins of the Sacramento River Hydrologic Region

Basin/subbasins	Basin name
5-1	Goose Lake Valley
5-1.01	Lower Goose Lake Valley
5-1.02	Fandango Valley
5-2	Alturas Area
5-2.01	South Fork Pitt River
5-2.02	Warm Springs Valley
5-3	Jess Valley
5-4	Big Valley
5-5	Fall River Valley
5-6	Redding Area
5-6.01	Bowman
5-6.02	Rosewood
5-6.03	Anderson
5-6.04	Enterprise
5-6.05	Millville
5-6.06	South Battle Creek
5-7	Lake Almanor Valley
5-8	Mountain Meadows Valley
5-9	Indian Valley
5-10	American Valley
5-11	Mohawk Valley
5-12	Sierra Valley
5-12.01	Sierra Valley
5-12.02	Chilcoot
5-13	Upper Lake Valley
5-14	Scotts Valley
5-15	Big Valley
5-16	High Valley
5-17	Burns Valley
5-18	Coyote Valley
5-19	Collayomi Valley
5-20	Berryessa Valley
5-21	Sacramento Valley
5-21.50	Red Bluff
5-21.51	Corning
5-21.52	Colusa
5-21.53	Bend
5-21.54	Antelope
5-21.55	Dye Creek
5-21.56	Los Molinos
5-21.57	Vina
5-21.58	West Butte
5-21.59	East Butte
5-21.60	North Yuba
5-21.61	South Yuba
5-21.62	Sutter
5-21.64	North American
5-21.65	South American
5-21.66	Solano
5-21.67	Yolo
5-21.68	Capay Valley

Basin/subbasins	Basin name
5-30	Lower Lake Valley
5-31	Long Valley
5-35	Mccloud Area
5-36	Round Valley
5-37	Toad Well Area
5-38	Pondosa Town Area
5-40	Hot Springs Valley
5-41	Egg Lake Valley
5-43	Rock Prairie Valley
5-44	Long Valley
5-45	Cayton Valley
5-46	Lake Britton Area
5-47	Goose Valley
5-48	Burney Creek Valley
5-49	Dry Burney Creek Valley
5-50	North Fork Battle Creek
5-51	Butte Creek Valley
5-52	Gray Valley
5-53	Dixie Valley
5-54	Ash Valley
5-56	Yellow Creek Valley
5-57	Last Chance Creek Valley
5-58	Clover Valley
5-59	Grizzly Valley
5-60	Humbug Valley
5-61	Chrome Town Area
5-62	Elk Creek Area
5-63	Stonyford Town Area
5-64	Bear Valley
5-65	Little Indian Valley
5-66	Clear Lake Cache Formation
5-68	Pope Valley
5-86	Joseph Creek
5-87	Middle Fork Feather River
5-88	Stony Gorge Reservoir
5-89	Squaw Flat
5-90	Funks Creek
5-91	Antelope Creek
5-92	Blanchard Valley
5-93	North Fork Cache Creek
5-94	Middle Creek
5-95	Meadow Valley

Description of the Region

The Sacramento River HR covers approximately 17.4 million acres (27,200 square miles). The region includes all or large portions of Modoc, Siskiyou, Lassen, Shasta, Tehama, Glenn, Plumas, Butte, Colusa, Sutter, Yuba, Sierra, Nevada, Placer, Sacramento, El Dorado, Yolo, Solano, Lake, and Napa counties (Figure 33). Small areas of Alpine and Amador counties are also within the region. Geographically, the region extends south from the Modoc Plateau and Cascade Range at the Oregon border, to the Sacramento-San Joaquin Delta. The Sacramento Valley, which forms the core of the region, is bounded to the east by the crest of the Sierra Nevada and southern Cascades and to the west by the crest of the Coast Range and Klamath Mountains. Other significant features include Mount Shasta and Lassen Peak in the southern Cascades, Sutter Buttes in the south central portion of the valley, and the Sacramento River, which is the longest river system in the State of California with major tributaries the Pit, Feather, Yuba, Bear and American rivers. The region corresponds approximately to the northern half of RWQCB 5. The Sacramento metropolitan area and surrounding communities form the major population center of the region. With the exception of Redding, cities and towns to the north, while steadily increasing in size, are more rural than urban in nature, being based in major agricultural areas. The 1995 population of the entire region was 2.372 million.

The climate in the northern, high desert plateau area of the region is characterized by cold snowy winters with only moderate precipitation and hot dry summers. This area depends on adequate snowpack to provide runoff for summer supply. Annual precipitation ranges from 10 to 20 inches. Other mountainous areas in the northern and eastern portions of the region have cold wet winters with large amounts of snow, which typically provide abundant runoff for summer supplies. Annual precipitation ranges from 40 to more than 80 inches. Summers are generally mild in these areas. The Coast Range and southern Klamath Mountains receive copious amounts of precipitation, but most of the runoff flows to the coast in the North Coastal drainage. Sacramento Valley comprises the remainder of the region. At a much lower elevation than the rest of the region, the valley has mild winters with moderate precipitation. Annual precipitation varies from about 35 inches in Redding to about 18 inches in Sacramento. Summers in the valley are hot and dry.

Most of the mountainous portions of the region are heavily forested and sparsely populated. Three major national forests (Mendocino, Trinity, and Shasta) make up the majority of lands in the Coast Range, southern Klamath Mountains, and the southern Cascades; these forests and the region's rivers and lakes provide abundant recreational opportunities. In the few mountain valleys with arable land, alfalfa, grain and pasture are the predominant crops. In the foothill areas of the region, particularly adjacent to urban centers, suburban to rural housing development is occurring along major highway corridors. This development is leading to urban sprawl and is replacing the former agricultural production on those lands. In the Sacramento Valley, agriculture is the largest industry. Truck, field, orchard, and rice crops are grown on approximately 2.1 million acres. Rice represents about 23 percent of the total irrigated acreage.

The Sacramento River HR is the main water supply for much of California's urban and agricultural areas. Annual runoff in the HR averages about 22.4 maf, which is nearly one-third of the State's total natural runoff. Major water supplies in the region are provided through surface storage reservoirs. The two largest surface water projects in the region are USBR's Shasta Lake (Central Valley Project) on the upper Sacramento River and Lake Oroville (DWR's State Water Project) on the Feather River. In all, there are more than 40 major surface water reservoirs in the region. Municipal, industrial, and agricultural supplies to the region are about 8 maf, with groundwater providing about 2.5 maf of that total. Much of the remainder of the runoff goes to dedicated natural flows, which support various environmental requirements, including in-stream fishery flows and flushing flows in the Delta.

Groundwater Development

Groundwater provides about 31 percent of the water supply for urban and agricultural uses in the region, and has been developed in both the alluvial basins and the hard rock uplands and mountains. There are 88 basins/subbasins delineated in the region. These basins underlie 5.053 million acres (7,900 square miles), about 29 percent of the entire region. The reliability of the groundwater supply varies greatly. The Sacramento Valley is recognized as one of the foremost groundwater basins in the State, and wells developed in the sediments of the valley provide excellent supply to irrigation, municipal, and domestic uses. Many of the mountain valleys of the region also provide significant groundwater supplies to multiple uses.

Geologically, the Sacramento Valley is a large trough filled with sediments having variable permeabilities; as a result, wells developed in areas with coarser aquifer materials will produce larger amounts of water than wells developed in fine aquifer materials. In general, well yields are good and range from one-hundred to several thousand gallons per minute. Because surface water supplies have been so abundant in the valley, groundwater development for agriculture primarily supplement the surface supply. With the changing environmental laws and requirements, this balance is shifting to a greater reliance on groundwater, and conjunctive use of both supplies is occurring to a greater extent throughout the valley, particularly in drought years. Groundwater provides all or a portion of municipal supply in many valley towns and cities. Redding, Anderson, Chico, Marysville, Sacramento, Olivehurst, Wheatland, Willows, and Williams rely to differing degrees on groundwater. Red Bluff, Corning, Woodland, Davis, and Dixon are completely dependent on groundwater. Domestic use of groundwater varies, but in general, rural unincorporated areas rely completely on groundwater.

In the mountain valleys and basins with arable land, groundwater has been developed to supplement surface water supplies. Most of the rivers and streams of the area have adjudicated water rights that go back to the early 1900s, and diversion of surface water has historically supported agriculture. Droughts and increased competition for supply have led to significant development of groundwater for irrigation. In some basins, the fractured volcanic rock underlying the alluvial fill is the major aquifer for the area. In the rural mountain areas of the region, domestic supplies come almost entirely from groundwater. Although a few mountain communities are supplied in part by surface water, most rely on groundwater. These groundwater supplies are generally quite reliable in areas that have sufficient aquifer storage or where surface water replenishes supply throughout the year. In areas that depend on sustained runoff, water levels can be significantly depleted in drought years and many old, shallow wells can be dewatered. During 2001, an extreme drought year on the Modoc Plateau, many well owners experienced problems with water supply.

Groundwater development in the fractured rocks of the foothills of the southern Cascades and Sierra Nevada is fraught with uncertainty. Groundwater supplies from fractured rock sources are highly variable in terms of water quantity and water quality and are an uncertain source for large-scale residential development. Originally, foothill development relied on water supply from springs and river diversions with flumes and ditches for conveyance that date back to gold mining era operations. Current development is primarily based on individual private wells, and as pressures for larger scale development increase, questions about the reliability of supply need to be addressed. Many existing foothill communities have considerable experience with dry or drought year shortages. In Butte County residents in Cohasset, Forest Ranch, and Magalia have had to rely on water brought up the ridges in tanker trucks. The suggested answer has been the development of regional water supply projects. Unfortunately, the area's development pattern of small, geographically dispersed population centers does not lend itself to the kind of financial base necessary to support such projects.

Groundwater Quality

Groundwater quality in the Sacramento River HR is generally excellent. However, there are areas with local groundwater problems. Natural water quality impairments occur at the north end of the Sacramento Valley in the Redding subbasin, and along the margins of the valley and around the Sutter Buttes, where Cretaceous-age marine sedimentary rocks containing brackish to saline water are near the surface. Water from the older underlying sediments mixes with the fresh water in the younger alluvial aquifer and degrades the quality. Wells constructed in these areas typically have high TDS. Other local natural impairments are moderate levels of hydrogen sulfide in groundwater in the volcanic and geothermal areas in the western portion of the region. In the Sierra foothills, there is potential for encountering uranium and radon-bearing rock or sulfide mineral deposits containing heavy metals. Human-induced impairments are generally associated with individual septic system development in shallow unconfined portions of aquifers or in fractured hard rock areas where insufficient soil depths are available to properly leach effluent before it reaches the local groundwater supply.

Water Quality in Public Supply Wells

From 1994 through 2000, 1,356 public supply water wells were sampled in 51 of the 88 basins and subbasins in the Sacramento River HR. Samples analyzed indicate that 1,282 wells, or 95 percent, met the state primary MCLs for drinking water. Seventy-four wells, or 5 percent, have constituents that exceed one or more MCL. Figure 34 shows the percentages of each contaminant group that exceeded MCLs in the 74 wells.

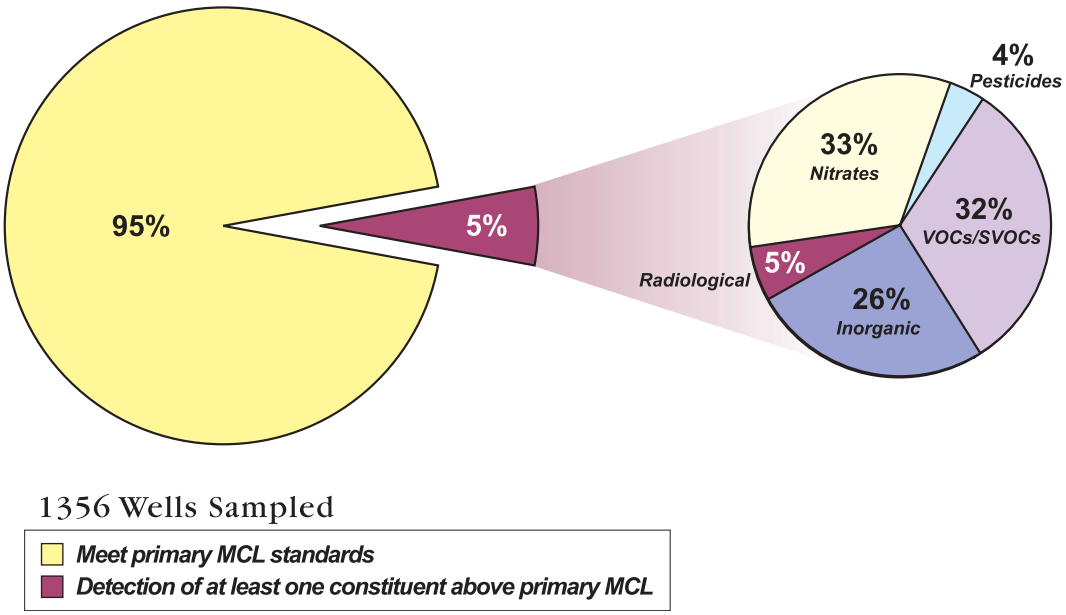

Figure 34 MCL exceedances in public supply wells in the Sacramento River Hydrologic Region

Table 25 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 25 Most frequently occurring contaminants by contaminant group in the Sacramento River Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Cadmium – 4	Chromium (Total) – 3	3 tied at 2
Inorganics – Secondary	Manganese – 221	Iron – 166	Specific Conductance – 3
Radiological	Gross Alpha – 4		
Nitrates	Nitrate (as NO_3) – 22	Nitrate + Nitrite – 5	Nitrate Nitrogen (NO_3-N) – 2
Pesticides	Di(2-Ethylhexyl)phthalate – 4		
VOCs/SVOCs	PCE – 11	TCE – 7	Benzene – 4

PCE = Tetrachloroethylene
TCE = Trichloroethylene
VOC = Volatile Organic Compounds
SVOC = Semivolatile Organic Compound

Changes from Bulletin 118-80

Some modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report. These are listed in Table 26.

Table 26 Modifications since Bulletin 118-80 of groundwater basins and subbasins in Sacramento River Hydrologic Region

Basin name	New number	Old number
Fandango Valley	5-1.02	5-39
Bucher Swamp Valley	deleted	5-42
Modoc Plateau Recent Volcanic Areas	deleted	5-32
Modoc Plateau Pleistocene Volcanic Areas	deleted	5-33
Mount Shasta Area	deleted	5-34
Sacramento Valley Eastside Tuscan Formation Highlands	deleted	5-55
Clear Lake Pleistocene Volcanics	deleted	5-67

No additional basins were assigned to the Sacramento River HR in this revision. However, four basins have been divided into subbasins. Goose Lake Valley Groundwater Basin (5-1) has been subdivided into two subbasins, Fandango Valley (5-39) was modified to be a subbasin of Goose Lake Valley. Redding Area Groundwater Basin has been subdivided into six subbasins, Sierra Valley Groundwater Basin has been subdivided into two subbasins, and the Sacramento Valley Groundwater Basin has been subdivided into 18 subbasins.

There are several deletions of groundwater basins from Bulletin 118-80. Bucher Swamp Valley Basin (5-42) was deleted due to a thin veneer of alluvium over rock. Modoc Plateau Recent Volcanic Areas (5-32), Modoc Plateau Pleistocene Volcanic Areas (5-33), Mount Shasta Area (5-34), Sacramento Valley Eastside Tuscan Formation Highlands (5-55), and Clear Lake Pleistocene Volcanics (5-67) are volcanic aquifers and were not assigned basin numbers in this bulletin. These are considered to be groundwater source areas as discussed in Chapter 6.

Table 27 Sacramento River Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-1	GOOSE LAKE VALLEY									
5-1.01	LOWER GOOSE LAKE	36,000	B	-	400	9	9	-	183	68 - 528
5-1.02	FANDANGO VALLEY	18,500	B	2,000	-	3	-	-	-	-
5-2	ALTURAS AREA								357	180 - 800
5-2.01	SOUTH FORK PITT RIVER	114,000	B	5,000	1,075	9	-	8	-	-
5-2.02	WARM SPRINGS VALLEY	68,000	B	400	314	3	-	11	-	-
5-3	JESS VALLEY	6,700	B		3,000	-	-	-	-	-
5-4	BIG VALLEY	92,000	B	4,000	880	19	9	10	260	141 - 633
5-5	FALL RIVER VALLEY	54,800	B	1,500	266	16	7	3	174	115 - 232
5-6	REDDING AREA									
5-6.01	BOWMAN	85,330	B	2,000	589	8	2	13	-	70 - 247
5-6.02	ROSEWOOD	45,320	B	-	-	4	-	-	-	118 - 218
5-6.03	ANDERSON	98,500	B	1,800	46	11	10	69	194	109-320
5-6.04	ENTERPRISE	60,900	B	700	266	11	3	43	-	160 - 210
5-6.05	MILLVILLE	67,900	B	500	254	6	5	4	140	-
5-6.06	SOUTH BATTLE CREEK	32,300	B	-	-	0	0	0	360	-
5-7	LAKE ALMANOR VALLEY	7,150	B	-	-	10	4	4	105	53 - 260
5-8	MOUNTAIN MEADOWS VALLEY	8,150	B	-	-	-	-	-	-	-
5-9	INDIAN VALLEY	29,400	B	-	-	-	4	9	-	-
5-10	AMERICAN VALLEY	6,800	B	40	40		4	11	-	-
5-11	MOHAWK VALLEY	19,000	B	-	500	1	2	15	248	210 - 285
5-12	SIERRA VALLEY									
5-12.01	SIERRA VALLEY	117,700	B	1,500	640	34	15	9	312	110 - 1,620
5-12.02	CHILCOOT	7,550	B	-	-	15	-	8	-	-
5-13	UPPER LAKE VALLEY	7,260	B	900	302	12	3	6	-	-
5-14	SCOTTS VALLEY	7,320	B	1,200	171	9	1	9	158	140 - 175
5-15	BIG VALLEY	24,210	B	1,470	475	49	11	7	535	270 - 790
5-16	HIGH VALLEY	2,360	B	100	37	5	2	-	598	480 - 745
5-17	BURNS VALLEY	2,900	B	-	30	1	5	-	335	280 - 455
5-18	COYOTE VALLEY	6,530	B	800	446	6	3	3	288	175 - 390
5-19	COLLAYOMI VALLEY	6,500	B	1,000	121	10	4	3	202	150 - 255
5-20	BERRYESSA VALLEY	1,400	C	-	-	0	-	0	-	-
5-21	SACRAMENTO VALLEY									
5-21.50	RED BLUFF	266,750	B	1,200	363	30	10	56	207	120 - 500
5-21.51	CORNING	205,640	B	3,500	977	29	7	30	286	130 - 490
5-21.52	COLUSA	918,380	B	5,600	984	98	30	134	391	120 - 1,220
5-21.53	BEND	20,770	B	-	275	0	3	9		334-360
5-21.54	ANTELOPE	18,710	B	800	575	4	5	22	296	-
5-21.55	DYE CREEK	27,730	B	3,300	890	8	1	3	240	159 - 396
5-21.56	LOS MOLINOS	33,170	B	1,000	500	3	3	9	217	
5-21.57	VINA	125,640	B	3,850	1,212	23	5	69	285	48 - 543
5-21.58	WEST BUTTE	181,600	B	4,000	1,833	32	8	36	293	130 - 676

Table 27 Sacramento River Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-21.59	EAST BUTTE	265,390	B	4,500	1,019	43	4	44	235	122 - 570
5-21.60	NORTH YUBA	100,400	C	4,000	-	21	-	32	-	-
5-21.61	SOUTH YUBA	107,000	C	4,000	1,650	56	-	6	-	-
5-21.62	SUTTER	234,000	C	-	-	34	-	115	-	-
5-21.64	NORTH AMERICAN	351,000	A	-	800	121	-	339	300	150 - 1,000
5-21.65	SOUTH AMERICAN	248,000	C	-	-	105	-	247	221	24-581
5-21.66	SOLANO	425,000	C	-	-	123	23	136	427	150 - 880
5-21.67	YOLO	226,000	B	4,000+	1,000	127	20	185	880	480 - 2,060
5-21.68	CAPAY VALLEY	25,000	C	-	-	11	-	3	-	-
5-30	LOWER LAKE VALLEY	2,400	B	100	37		3	5	568	290 - 1,230
5-31	LONG VALLEY	2,600	B	100	63	-	-	-	-	-
5-35	MCCLOUD AREA	21,320	B	-	380	-	-	1	-	-
5-36	ROUND VALLEY	7,270	B	2,000	800	2				148 - 633
5-37	TOAD WELL AREA	3,360	B	-	-	-	-	-	-	-
5-38	PONDOSA TOWN AREA	2,080	B	-	-	-	-	-	-	-
5-40	HOT SPRINGS VALLEY	2,400	B	-	-	-	-	-	-	-
5-41	EGG LAKE VALLEY	4,100	B	-	20	-	-	-	-	-
5-43	ROCK PRAIRIE VALLEY	5,740	B	-	-	-	-	-	-	-
5-44	LONG VALLEY	1,090	B	-	-	-	-	-	-	-
5-45	CAYTON VALLEY	1,300	B	-	400	-	-	-	-	-
5-46	LAKE BRITTON AREA	14,060	B	-	-	-	-	2	-	-
5-47	GOOSE VALLEY	4,210	B	-	-	-	-	-	-	-
5-48	BURNEY CREEK VALLEY	2,350	B	-	-	-	-	2	-	-
5-49	DRY BURNEY CREEK VALLEY	3,070	B	-	-	-	-	-	-	-
5-50	NORTH FORK BATTLE CREEK VALLEY	12,760	B	-	-	-	-	3	-	-
5-51	BUTTE CREEK VALLEY	3,230	B	-	-	-	-	-	-	-
5-52	GRAYS VALLEY	5,440	B	-	-	-	-	-	-	-
5-53	DIXIE VALLEY	4,870	B	-	-	-	-	-	-	-
5-54	ASH VALLEY	6,010	B	3,000	2,200	-	-	-	-	-
5-56	YELLOW CREEK VALLEY	2,310	B	-	-	-	-	-	-	-
5-57	LAST CHANCE CREEK VALLEY	4,660	B	-	-	-	-	-	-	-
5-58	CLOVER VALLEY	16,780	B	-	-	-	-	-	-	-
5-59	GRIZZLY VALLEY	13,400	B	-	-	-	-	1	-	-
5-60	HUMBUG VALLEY	9,980	B	-	-	-	-	8	-	-
5-61	CHROME TOWN AREA	1,410	B	-	-	-	-	-	-	-
5-62	ELK CREEK AREA	1,440	B	-	-	-	-	-	-	-
5-63	STONYFORD TOWN AREA	6,440	B	-	-	-	-	-	-	-
5-64	BEAR VALLEY	9,100	B	-	-	-	-	-	-	-
5-65	LITTLE INDIAN VALLEY	1,270	B	-	-	-	-	-	-	-
5-66	CLEAR LAKE CACHE FORMATION	30,000	B	245	52		-	4	-	-
5-68	POPE VALLEY	7,180	C	-	-	-	-	1	-	-
5-86	JOSEPH CREEK	4,450	B	-	-	-	-		-	-

Table 27 Sacramento River Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-87	MIDDLE FORK FEATHER RIVER	4,340	B	-	-	-	-	2	-	-
5-88	STONY GORGE RESERVOIR	1,070	B	-	-	-	-	-	-	-
5-89	SQUAW FLAT	1,300	C	-	-	-	-	-	-	-
5-90	FUNKS CREEK	3,000	C	-	-	-	-	-	-	-
5-91	ANTELOPE CREEK	2,040	B	-	-	-	-	-	-	-
5-92	BLANCHARD VALLEY	2,200	B	-	-	-	-	-	-	-
5-93	NORTH FORK CACHE CREEK	3,470	C	-	-	-	-	-	-	-
5-94	MIDDLE CREEK	700	B	-	75	-	-	1	-	-
5-95	MEADOW VALLEY	5,730	B	-	-	-	-	1	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

San Joaquin River Hydrologic Region

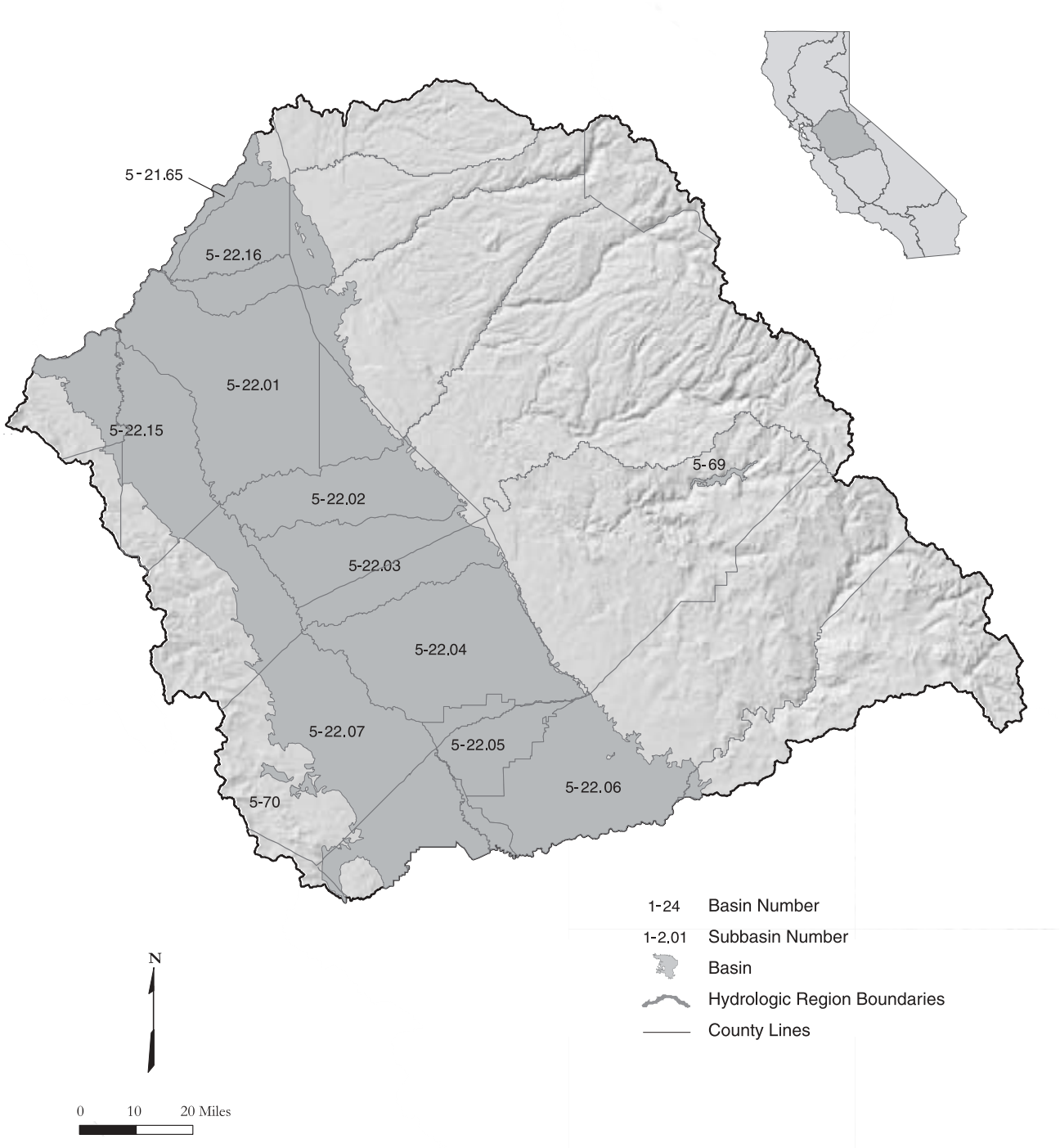

Figure 35 San Joaquin River Hydrologic Region

Basins and Subbasins of the San Joaquin River Hydrologic Region

Basin/subbasin	Basin name
5-22	San Joaquin Valley
5-22.01	Eastern San Joaquin
5-22.02	Modesto
5-22.03	Turlock
5-22.04	Merced
5-22.05	Chowchilla
5-22.06	Madera
5-22.07	Delta-Mendota
5-22.15	Tracy
5-22.16	Cosumnes
5-69	Yosemite Valley
5-70	Los Banos Creek Valley

Description of the Region

The San Joaquin River HR covers approximately 9.7 million acres (15,200 square miles) and includes all of Calaveras, Tuolumne, Mariposa, Madera, San Joaquin, and Stanislaus counties, most of Merced and Amador counties, and parts of Alpine, Fresno, Alameda, Contra Costa, Sacramento, El Dorado, and San Benito counties (Figure 35). The region corresponds to a portion near the middle of RWQCB 5. Significant geographic features include the northern half of the San Joaquin Valley, the southern part of the Sacramento-San Joaquin Delta, the Sierra Nevada and Diablo Range. The region is home to about 1.6 million people (DWR 1998). Major population centers include Merced, Modesto, and Stockton. The Merced area is entirely dependent on groundwater for its supply, as will be the new University of California at Merced campus.

Groundwater Development

The region contains two entire groundwater basins and part of the San Joaquin Valley Groundwater Basin, which continues south into the Tulare Lake HR. The San Joaquin Valley Groundwater Basin is divided into nine subbasins in this region. The basins underlie 3.73 million acres (5,830 square miles) or about 38 percent of the entire HR area.

The region is heavily groundwater reliant. Within the region groundwater accounts for about 30 percent of the annual supply used for agricultural and urban purposes. Groundwater use in the region accounts for about 18 percent of statewide groundwater use for agricultural and urban needs. Groundwater use in the region accounts for 5 percent of the State's overall supply from all sources for agricultural and urban uses (DWR 1998).

The aquifers are generally quite thick in the San Joaquin Valley subbasins, with groundwater wells commonly extending to depths of up to 800 feet. Aquifers include unconsolidated alluvium and consolidated rocks with unconfined and confined groundwater conditions. Typical well yields in the San Joaquin Valley range from 300 to 2,000 gpm with yields of 5,000 gpm possible. The region's only significant basin located outside of San Joaquin Valley is Yosemite Valley. Yosemite Valley Basin supplies water to Yosemite National Park and has substantial well yields.

Conjunctive Use

Since near the beginning of the region's agricultural development, groundwater has been used conjunctively with surface water to meet water needs. Groundwater was and is used when and where surface water is unable to fully meet demands either in time or area. For several decades, this situation was more of an incidental conjunctive use than a formal one. Historical groundwater use has resulted in some land subsidence in the southwest portion of the region.

Groundwater Quality

In general, groundwater quality throughout the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are TDS, nitrate, boron, chloride, and organic compounds. The Yosemite Valley Groundwater Basin has exceptionally high quality groundwater.

Areas of high TDS content are primarily along the west side of the San Joaquin Valley and in the trough of the valley. The high TDS content of west-side groundwater is due to recharge of streamflow originating from marine sediments in the Coast Range. High TDS content in the trough of the valley is the result of concentration of salts due to evaporation and poor drainage. Nitrates may occur naturally or as a result of disposal of human and animal waste products and fertilizer. Boron and chloride are likely a result of concentration from evaporation near the valley trough. Organic contaminants can be broken into two categories, agricultural and industrial. Agricultural pesticides and herbicides have been detected in groundwater throughout the region, but primarily along the east side of the San Joaquin Valley where soil permeability is higher and depth to groundwater is shallower. The most notable agricultural contaminant is dibromochloropropane (DBCP), a now-banned soil fumigant and known carcinogen once used extensively on grapes and cotton. Industrial organic contaminants include TCE, dichloroethylene (DCE), and other solvents. They are found in groundwater near airports, industrial areas, and landfills.

Water Quality in Public Supply Wells

From 1994 through 2000, 689 public supply water wells were sampled in 10 of the 11 basins and subbasins in the San Joaquin River HR. Samples analyzed indicate that 523 wells, or 76 percent, met the state primary MCLs for drinking water. One-hundred-sixty-six wells, or 24 percent, have constituents that exceed one or more MCL. Figure 36 shows the percentages of each contaminant group that exceeded MCLs in the 166 wells.

Table 28 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Changes from Bulletin 118-80

The subbasins of the San Joaquin Valley, which were delineated as part of the 118-80 update, are given their first numeric designation in this report. Additionally, the Cosumnes Subbasin has been added to the subbasins within the San Joaquin River HR. It is worth noting that the southern portion of the South American Subbasin of the Sacramento Valley Groundwater Basin is also included as part of this HR. The subbasin names and numbers within the region are listed in Table 29.

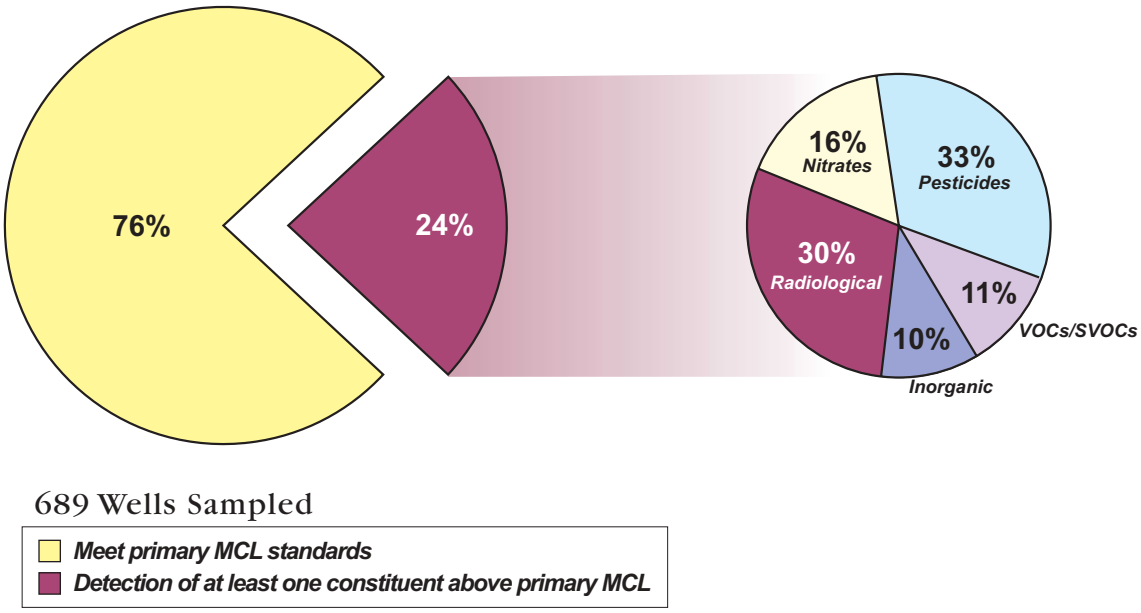

Figure 36 MCL exceedances in public supply wells in the San Joaquin River Hydrologic Region

Table 28 Most frequently occurring contaminants by contaminant group in the San Joaquin River Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Aluminum – 4	Arsenic – 4	4 tied at 2 exceedances
Inorganics – Secondary	Manganese – 123	Iron – 102	TDS – 9
Radiological	Uranium – 33	Gross Alpha – 26	Radium 228 – 6
Nitrates	Nitrate (as NO_3) – 23	Nitrate + Nitrite – 6	Nitrate Nitrogen (NO_3-N) – 3
Pesticides	DBCP – 44	Di(2-Ethylhexyl)phthalate – 11	EDB – 6
VOCs	PCE – 8	Dichloromethane – 3	TCE – 3

DBCP = Dibromochloropropane
EDB = Ethylenedibromide
PCE = Tetrachloroethylene
TCE = Trichloroethylene
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound

Table 29 Modifications since Bulletin 118-80 of groundwater basins and subbasins in San Joaquin Hydrologic Region

Subbasin name	New number	Old number
Eastern San Joaquin	5-22.01	5-22
Modesto	5-22.02	5-22
Turlock	5-22.03	5-22
Merced	5-22.04	5-22
Chowchilla	5-22.05	5-22
Madera	5-22.06	5-22
Delta-Mendota	5-22.07	5-22
Tracy	5-22.15	5-22
Cosumnes	5-22.16	5-22

Table 30 San Joaquin River Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-22	SAN JOAQUIN VALLEY									
5-22.01	EASTERN SAN JOAQUIN	707,000	A	1,500	-	345	69	540	310	30 - 1,632
5-22.02	MODESTO	247,000	B	4,500	1000-2000	230	15	209	60-500	200-8300
5-22.03	TURLOCK	347,000	B	4,500	1000-2000	307	0	163	200-500	100-8300
5-22.04	MERCED	491,000	B	4,450	1500-1900	378	0	142	200-400	100-3600
5-22.05	CHOWCHILLA	159,000	B	4,750	750-2000	203	0	28	200-500	120-6400
5-22.06	MADERA	394,000	B	4,750	750-2000	378	0	127	200-400	100-6400
5-22.07	DELTA-MENDOTA	747,000	B	5,000	800-2000	816	0	120	770	210-86,000
5-22.15	TRACY	345,000	C	3,000	500-3,000	18	14	183	1,190	210-7,800
5-22.16	COSUMNES	281,000	A	1,500	-	75	13	72	218	140-438
5-69	YOSEMITE VALLEY	7,500	C	1,200	900	0	0	3	54	43-73
5-70	LOS BANOS CREEK VALLEY	4,840	C	-	-	0	0	0	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

Tulare Lake Hydrologic Region

Figure 37 Tulare Lake Hydrologic Region

Basins and Subbasins of Tulare Lake Hydrologic Region

Basin/subbasin	Basin name
5-22	San Joaquin Valley
5-22.08	Kings
5-22.09	Westside
5-22.10	Pleasant Valley
5-22.11	Kaweah
5-22.12	Tulare Lake
5-22.13	Tule
5-22.14	Kern County
5-23	Panoche Valley
5-25	Kern River Valley
5-26	Walker Basin Creek Valley
5-27	Cummings Valley
5-28	Tehachapi Valley West
5-29	Castaic Lake Valley
5-71	Vallecitos Creek Valley
5-80	Brite Valley
5-82	Cuddy Canyon Valley
5-83	Cuddy Ranch Area
5-84	Cuddy Valley
5-85	Mil Potrero Area

Description of the Region

The Tulare Lake HR covers approximately 10.9 million acres (17,000 square miles) and includes all of Kings and Tulare counties and most of Fresno and Kern counties (Figure 37). The region corresponds to approximately the southern one-third of RWQCB 5. Significant geographic features include the southern half of the San Joaquin Valley, the Temblor Range to the west, the Tehachapi Mountains to the south, and the southern Sierra Nevada to the east. The region is home to more than 1.7 million people as of 1995 (DWR, 1998). Major population centers include Fresno, Bakersfield, and Visalia. The cities of Fresno and Visalia are entirely dependent on groundwater for their supply, with Fresno being the second largest city in the United States reliant solely on groundwater.

Groundwater Development

The region has 12 distinct groundwater basins and 7 subbasins of the San Joaquin Valley Groundwater Basin, which crosses north into the San Joaquin River HR. These basins underlie approximately 5.33 million acres (8,330 square miles) or 49 percent of the entire HR area.

Groundwater has historically been important to both urban and agricultural uses, accounting for 41 percent of the region's total annual supply and 35 percent of all groundwater use in the State. Groundwater use in the region represents about 10 percent of the State's overall supply for agricultural and urban uses (DWR 1998).

The aquifers are generally quite thick in the San Joaquin Valley subbasins with groundwater wells commonly exceeding 1,000 feet in depth. The maximum thickness of freshwater-bearing deposits (4,400 feet) occurs at the southern end of the San Joaquin Valley. Typical well yields in the San Joaquin Valley range from 300 gpm to 2,000 gpm with yields of 4,000 gpm possible. The smaller basins in the mountains surrounding the San Joaquin Valley have thinner aquifers and generally lower well yields averaging less than 500 gpm.

The cities of Fresno, Bakersfield, and Visalia have groundwater recharge programs to ensure that groundwater will continue to be a viable water supply in the future. Extensive groundwater recharge programs are also in place in the south valley where water districts have recharged several million acre-feet for future use and transfer through water banking programs.

The extensive use of groundwater in the San Joaquin Valley has historically caused subsidence of the land surface primarily along the west side and south end of the valley.

Groundwater Quality

In general, groundwater quality throughout the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are high TDS, nitrate, arsenic, and organic compounds.

The areas of high TDS content are primarily along the west side of the San Joaquin Valley and in the trough of the valley. High TDS content of west-side water is due to recharge of stream flow originating from marine sediments in the Coast Range. High TDS content in the trough of the valley is the result of concentration of salts because of evaporation and poor drainage. In the central and west-side portions of the valley, where the Corcoran Clay confining layer exists, water quality is generally better beneath the clay than above it. Nitrates may occur naturally or as a result of disposal of human and animal waste products and fertilizer. Areas of high nitrate concentrations are known to exist near the town of Shafter and other isolated areas in the San Joaquin Valley. High levels of arsenic occur locally and appear to be associated with lakebed areas. Elevated arsenic levels have been reported in the Tulare Lake, Kern Lake and Buena Vista Lake bed areas. Organic contaminants can be broken into two categories, agricultural and industrial. Agricultural pesticides and herbicides have been detected throughout the valley, but primarily along the east side where soil permeability is higher and depth to groundwater is shallower. The most notable agricultural contaminant is DBCP, a now-banned soil fumigant and known carcinogen once used extensively on grapes. Industrial organic contaminants include TCE, DCE, and other solvents. They are found in groundwater near airports, industrial areas, and landfills.

Water Quality in Public Supply Wells

From 1994 through 2000, 1,476 public supply water wells were sampled in 14 of the 19 groundwater basins and subbasins in the Tulare Lake HR. Evaluation of analyzed samples shows that 1,049 of the wells, or 71 percent, met the state primary MCLs for drinking water. Four-hundred-twenty-seven wells, or 29 percent, exceeded one or more MCL. Figure 38 shows the percentages of each contaminant group that exceeded MCLs in the 427 wells.

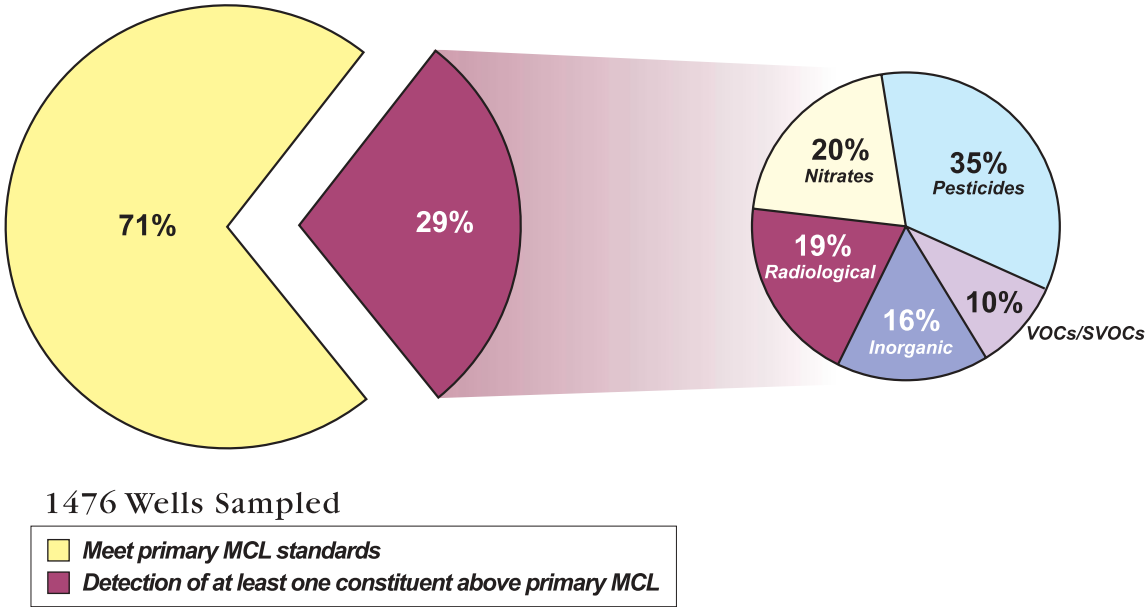

Figure 38 MCL exceedances by contaminant group in public supply wells in the Tulare Lake Hydrologic Region

Table 31 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 31 Most frequently occurring contaminants by contaminant group in the Tulare Lake Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics - Primary	Fluoride – 32	Arsenic – 16	Aluminum – 13
Inorganics - Secondary	Iron – 155	Manganese – 82	TDS – 9
Radiological	Gross Alpha – 74	Uranium – 24	Radium 228 – 8
Nitrates	Nitrate(as NO_3) – 83	Nitrate + Nitrite – 14	Nitrite(as N) – 3
Pesticides	DBCP – 130	EDB – 24	Di(2-Ethylhexyl)phthalate – 7
VOCs/SVOCs	TCE – 17	PCE – 16	Benzene – 6 MTBE – 6

DBCP = Dibromochloropropane
EDB = Ethylenedibromide
TCE = Trichloroethylene
PCE = Tetrachloroehylene
VOC = Volatile organic compound
SVOC = Semivolatile organic compound

Changes from Bulletin 118-80

There are no newly defined basins since Bulletin 118-80. However, the subbasins of the San Joaquin Valley, which were delineated as part of the 118-80 update, are given their first numeric designation in this report (Table 32).

Table 32 Modifications since Bulletin 118-80 of groundwater basins and subbasins in Tulare Lake Hydrologic Region

Subbasin name	New number	Old number
Kings	5-22.08	5-22
Westside	5-22.09	5-22
Pleasant Valley	5-22.10	5-22
Kaweah	5-22.11	5-22
Tulare Lake	5-22.12	5-22
Tule	5-22.13	5-22
Kern County	5-22.14	5-22
Squaw Valley	deleted	5-24
Cedar Grove Area	deleted	5-72
Three Rivers Area	deleted	5-73
Springville Area	deleted	5-74
Templeton Mountain Area	deleted	5-75
Manache Meadow Area	deleted	5-76
Sacator Canyon Valley	deleted	5-77
Rockhouse Meadows Valley	deleted	5-78
Inns Valley	deleted	5-79
Bear Valley	deleted	5-81

Several basins have been deleted from the Bulletin 118-80 report. In Squaw Valley (5-24) all 118 wells are completed in hard rock. Cedar Grove Area (5-72) is a narrow river valley in Kings Canyon National Park with no wells. Three Rivers Area (5-73) has a thin alluvial terrace deposit but 128 of 130 wells are completed in hard rock. Springville Area (5-74) is this strip of alluvium adjacent to Tule River and all wells are completed in hard rock. Templeton Mountain Area (5-75), Manache Meadow Area (5-76), and Sacator Canyon Valley (5-77) are all at the crest of mountains with no wells. Rockhouse Meadows Valley (5-78) is in wilderness with no wells. Inns Valley (5-79) and Bear Valley (5-81) both have all wells completed in hard rock.

Table 33 Tulare Lake Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-22	SAN JOAQUIN VALLEY									
5-22.08	KINGS	976,000	C	3,000	500-1,500	909	-	722	200-700	40-2000
5-22.09	WESTSIDE	640,000	C	2,000	1,100	960	-	50	520	220-35,000
5-22.10	PLEASANT VALLEY	146,000	B	3,300	-	151	-	2	1,500	1000-3000
5-22.11	KAWEAH	446,000	B	2,500	1,000-2,000	568	-	270	189	35-580
5-22.12	TULARE LAKE	524,000	B	3,000	300-1,000	241	-	86	200-600	200-40,000
5-22.13	TULE	467,000	B	3,000	-	459	-	150	256	200-30,000
5-22.14	KERN COUNTY	1,950,000	A	4,000	1,200-1,500	2,258	249	476	400-450	150-5000
5-23	PANOCHE VALLEY	33,100	C	-	-	48	-	-	1,300	394-3530
5-25	KERN RIVER VALLEY	74,000	C	3,650	350	-	-	92	378	253-480
5-26	WALKER BASIN CREEK VALLEY	7,670	C	650	-	-	-	1	-	-
5-27	CUMMINGS VALLEY	10,000	A	150	56	51	-	15	344	-
5-28	TEHACHAPI VALLEY WEST	14,800	A	1,500	454	64	-	19	315	280-365
5-29	CASTAC LAKE VALLEY	3,600	C	400	375	-	-	3	583	570-605
5-71	VALLECITOS CREEK VALLEY	15,100	C	-	-	-	-	0	-	-
5-80	BRITE VALLEY	3,170	A	500	50	-	-	-	-	-
5-82	CUDDY CANYON VALLEY	3,300	C	500	400	-	-	3	693	695
5-83	CUDDY RANCH AREA	4,200	C	300	180	-	-	4	550	480-645
5-84	CUDDY VALLEY	3,500	A	160	135	3	-	3	407	325-645
5-85	MIL POTRERO AREA	2,300	C	3,200	240	7	-	7	460	372-657

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

North Lahontan Hydrologic Region

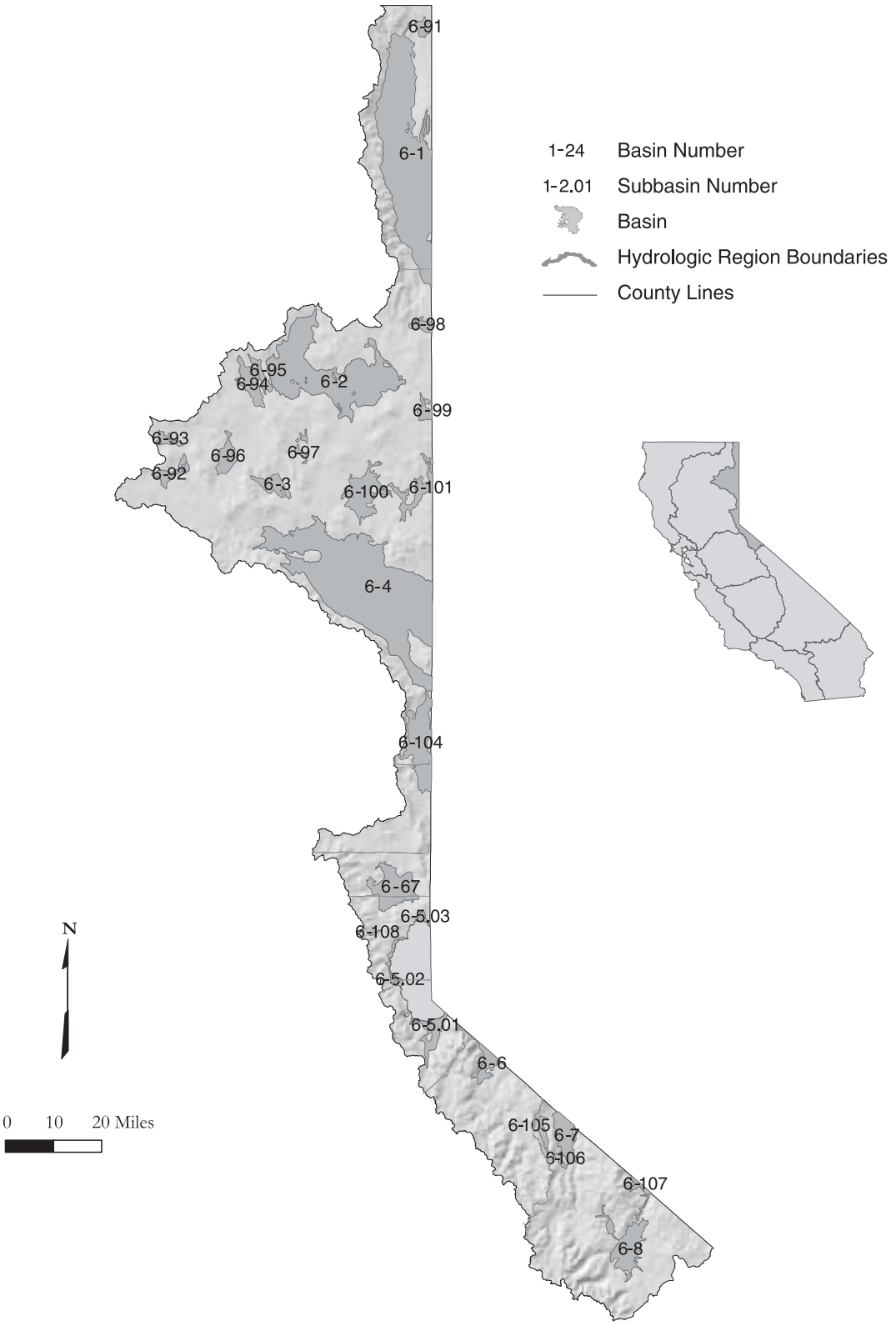

Figure 39 North Lahontan Hydrologic Region

Basins and Subbasins of the North Lahontan Hydrologic Region

Basin/subbasin	Basin name
6-1	Surprise Valley
6-2	Madeline Plains
6-3	Willow Creek Valley
6-4	Honey Lake Valley
6-5	Tahoe Valley
6-5.01	Tahoe Valley South
6-5.02	Tahoe Valley West
6-5.03	Tahoe Valley North
6-6	Carson Valley
6-7	Antelope Valley
6-8	Bridgeport Valley
6-67	Martis (Truckee) Valley
6-91	Cow Head Lake Valley
6-92	Pine Creek Valley
6-93	Harvey Valley
6-94	Grasshopper Valley
6-95	Dry Valley
6-96	Eagle Lake Area
6-97	Horse Lake Valley
6-98	Tuledad Canyon
6-99	Painters Flat
6-100	Secret Valley
6-101	Bull Flat
6-104	Long Valley
6-105	Slinkard Valley
6-106	Little Antelope Valley
6-107	Sweetwater Flat
6-108	Olympic Valley

Description of the Region

The North Lahonton HR covers approximately 3.91 million acres (6,110 square miles) and includes portions of Modoc, Lassen, Sierra, Nevada, Placer, El Dorado, Alpine, Mono, and Tuolumne counties (Figure 39). Reaching south from the Oregon border almost to Mono Lake on the east side of the Sierra, this region encompasses portions of two geomorphic provinces. From Long Valley north, most of the groundwater basins of the region were formed by basin and range block faulting near the western extent of the province. South from Long Valley, most of the basins are in the alpine valleys of the Sierra Nevada or are at the foot of the Sierra along the California-Nevada border where streams and rivers draining the eastern Sierran slopes terminate in desert sinks or lakes. The region corresponds to approximately the northern half of RWQCB 6. Significant geographic features include the Sierra Nevada, the volcanic terrane of the Modoc Plateau, Honey Lake Valley, and Lake Tahoe. The latter two areas are the major population centers in the region. The 1995 population of the entire region was about 84,000 people (DWR, 1998).

The northern portion of the region is rural and sparsely populated. Cattle ranching and associated hay cropping are the predominant land uses in addition to some pasture irrigation. Less than 4 percent of the entire region is irrigated. About 75 percent of the irrigated lands are in Modoc and Lassen counties, and most of the remainder is in Alpine and Mono counties. Much of the southern portion of the region is federally owned and managed as national forest lands where tourism and recreation constitute much of the economic base.

Much of the North Lahontan HR is chronically short of water due to the arid, high desert climate, which predominates in the region. Throughout the northern portion of the region where annual precipitation can be as low as 4 inches, runoff is typically scant and streamflows decrease rapidly during the irrigation season as the snowpack in the higher elevations melts. In the southern portion of the region, annual precipitation ranges from more than 70 inches (mostly snow in the higher elevations of the mountains) to as little as 8 inches in the low elevation valleys. In wet years, surface water can meet much of the agricultural demand, but in dry years, most of the region relies heavily on groundwater to meet water supply needs.

Groundwater Development

There are 24 groundwater basins in the region, one of which is divided into three subbasins. Thirteen of these basins are shared with Nevada and one with Oregon. These basins underlie approximately 1.03 million acres (1,610 square miles) or about 26 percent of the entire region. Although the groundwater basins were delineated based on mapped alluvial fill, much of the groundwater produced in many of them actually comes from underlying fractured rock aquifers. This is particularly true in the volcanic areas of Modoc and Lassen counties where, in many basins, volcanic flows are interstratified with lake sediments and alluvium. Wells constructed in the volcanics commonly produce large amounts of groundwater, whereas wells constructed in fine-grained lake deposits produce less. Because the thickness and lateral extent the of the hard rocks outside of the defined basin are generally not known, actual groundwater in storage in these areas is unknown.

Locally, groundwater is an important resource accounting for about 28 percent of the annual supply for agricultural and urban uses. Groundwater use in the region represents less than 1 percent of the State's overall supply for agricultural and urban uses (DWR 1998).

In the northern portion of the region, a sizable quantity of groundwater (nearly 130,000 acre-feet) is extracted annually for agricultural and municipal purposes. Groundwater extracted from the Honey Lake Valley Basin accounts for 41,900 acre-feet of the agricultural supply and 12,000 acre-feet of the municipal supply (based on normalized data from 1990). An additional 3,100 acre-feet is extracted to meet the demands of the Honey Lake Wildlife Area, which provides habitat for several threatened species (Bald Eagle, Sandhill Crane, Bank Swallow, and Peregrine Falcon).

Well yields in the Honey Lake Valley Basin are greatest in alluvial and volcanic deposits. Wells drawing from these deposits may have yields that vary from 10 gpm to more than 2,000 gpm, but drawdown in these cases is generally high. Eight wells in the Honey Lake Wildlife Area have an average yield of between 1,260 and 2,100 gpm. Depths of completed wells in the region range from 20 to 720 feet.

The Honey Lake Valley Basin is very close to exceeding prudent perennial yield, and future development could come at the expense of water for agriculture. A 1987 agreement between DWR, the state of Nevada, and the U.S. Geological Survey resulted in a study of the groundwater flow system in eastern Honey Lake Valley. Upon conclusion of the study in September 1990, a Nevada state engineer ruled that only about 13,000 acre-feet could be safely transferred from the basin.

No major changes in water use are anticipated in the near future in the northern portion of the region. Irrigated agriculture is already constrained by economically available water supplies. A small amount of agricultural expansion is expected but only in areas that can support minor additional groundwater development. Likewise, the modest need for additional municipal and irrigation supplies can be met by minor expansion of present surface systems or by increased use of groundwater.

The principal drainages in the southern portion of the region are the Truckee, Walker and Carson rivers. Water rights in these drainages historically have been heavily contested, and allocations are limited by interstate agreements with Nevada, in-stream environmental requirements, and miscellaneous private rights holders. In the Lake Tahoe Basin, further development is strictly limited because of concerns regarding water quality in the lake. Surface water storage developed in the region's drainages provides urban and agricultural supply to the Reno/Sparks area and to the many smaller communities in the eastern Sierra and at the foot of the mountain slopes. Most communities rely on a combination of surface water and groundwater supply.

In the upper Truckee drainage, the primary groundwater basins underlie the areas around Lake Tahoe and Martis Valley, where the Town of Truckee is located. Both areas use surface water and groundwater for urban and surrounding rural domestic supplies.

Little is known about the small groundwater basins developed along the foot of the eastern Sierra. Most communities overlying these basins are along the streams and rivers flowing down the mountains, and groundwater is extracted from the underlying alluvium. Groundwater augments surface supplies for agricultural purposes and supports municipal and rural domestic supplies.

Groundwater Quality

In basins in the northern portion of the region, groundwater quality ranges widely from excellent to poor. Wells that obtain their water supply from lake deposits can have high concentrations of boron, arsenic, fluoride, nitrate, and TDS. TDS content generally increases toward the central portions of these basins where concentrations have accumulated over time. The groundwater quality along the margins of most of these basins tends to be of much better quality. There is a potential for future groundwater pollution occurring in urban/suburban areas where single-family septic systems have been installed, especially in hard rock areas. Groundwater quality in the alpine basins is good to excellent; but, as in any area where single-family septic systems have been installed, there is potential for degradation of groundwater quality.

Water Quality in Public Supply Wells

From 1994 through 2000, 169 public supply water wells were sampled in 8 of the 26 basins and subbasins in the North Lahontan HR. Evaluation of the analyzed samples indicates that 147 wells, or 87 percent, met the state primary MCLs for drinking water. Twenty-two wells, or 13 percent, have constituents that exceed one or more MCL. Figure 40 shows the percentages of each contaminant group that exceeded MCLs in the 22 wells.

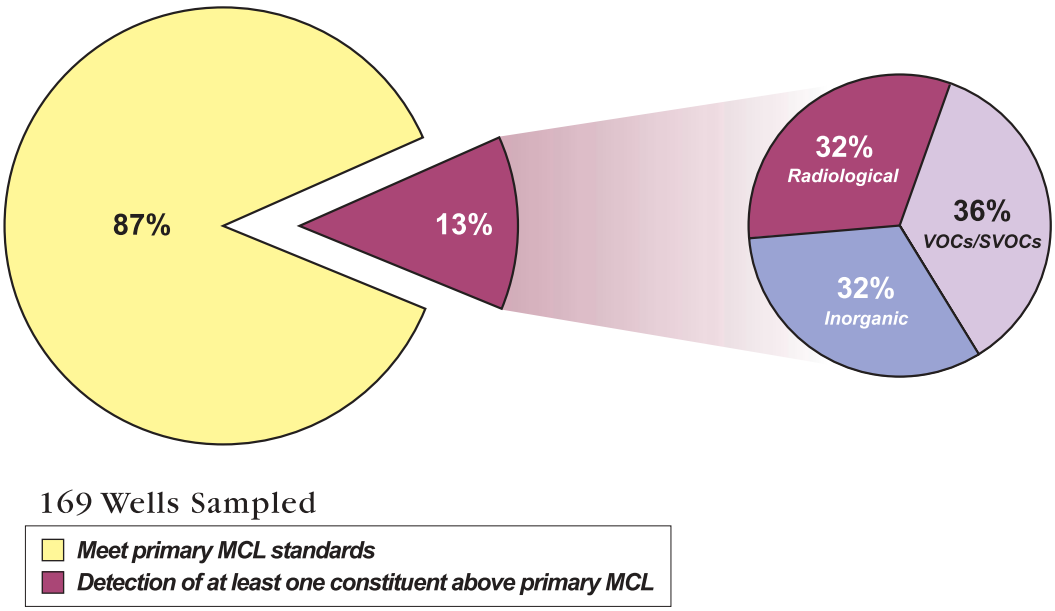

Figure 40 MCL exceedances in public supply wells in the North Lahontan Hydrologic Region

Table 34 lists the three most frequently occurring contaminants in each contaminant group and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 34 Most frequently occurring contaminants by contaminant group in the North Lahontan Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 3	Thallium – 3	3 tied at 1 exceedance
Inorganics – Secondary	Iron – 14	Manganese – 13	TDS – 1
Radiological	Gross Alpha – 7	Uranium – 5	Radium 226 – 1
VOCs/SVOCs	1,2 Dichloroethane – 8	TCE – 2	MTBE – 1

TCE = Trichloroethylene
MTBE = Methyltertiarybutylether
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound

Changes from Bulletin 118-80

There are no newly defined basins since Bulletin 118-80. The only delineated areas removed from the list of region basins are the Recent and Pleistocene volcanic areas of the Modoc Plateau, previously numbered 6-102 and 6-103, respectively.

Table 35 North Lahontan Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
6-1	SURPRISE VALLEY	228,000	B	2,500	1,383	16	11	4	224	87 - 1,800
6-2	MADELINE PLAINS	156,150	B	-	450	2	6	-	402	81 - 1,790
6-3	WILLOW CREEK VALLEY	11,700	B	-	-	7	4	-	401	90 - 1,200
6-4	HONEY LAKE VALLEY	311,150	B	2,500	784	39	24	49	518	89 - 2,500
6-5	TAHOE VALLEY									
6-5.01	TAHOE SOUTH	14,800	C	4,000	-	6	-	54	-	59 - 206
6-5.02	TAHOE WEST	6,000	C	-	-	-	9	3	103	68 - 128
6-5.03	TAHOE VALLEY NORTH	2,000	C	900	-	-	-	-	141	-
6-6	CARSON VALLEY	10,700	C	-	-	-	-	-	-	-
6-7	ANTELOPE VALLEY	20,100	A	-	-	-	-	12	-	-
6-8	BRIDGEPORT VALLEY	32,500	C	-	-	-	-	6	-	-
6-67	MARTIS VALLEY	35,600	C	-	-	-	-	-	-	-
6-91	COW HEAD LAKE VALLEY	5,600	B	-	-	-	-	-	-	-
6-92	PINE CREEK VALLEY	9,530	B	-	-	-	-	1	-	-
6-93	HARVEY VALLEY	4,500	B	-	-	-	-	-	-	-
6-94	GRASSHOPPER VALLEY	17,670	B	-	-	-	-	-	-	-
6-95	DRY VALLEY	6,500	B	-	-	-	-	-	-	-
6-96	EAGLE LAKE AREA	-	B	-	-	-	4	4	-	-
6-97	HORSE LAKE VALLEY	3,800	B	-	-	-	-	-	-	-
6-98	TULEDAD CANYON	5,200	B	-	-	-	-	-	-	-
6-99	PAINTERS FLAT	6,400	B	-	-	-	-	-	-	-
6-100	SECRET VALLEY	33,680	B	-	-	2	2	-	-	125 - 3,200
6-101	BULL FLAT	18,100	B	-	-	-	-	-	-	-
6-104	LONG VALLEY	46,840	B	-	-	31	4		302	127 - 570
6-105	SLINKARD VALLEY	4,500	C	-	-	-	-	-	-	-
6-106	LITTLE ANTELOPE VALLEY	2,500	C	-	-	-	-	-	-	-
6-107	SWEETWATER FLAT	4,700	C	-	-	-	-	-	-	-
6-108	OLYMPIC VALLEY	700	C	600	330	-	-	2	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

South Lahontan Hydrologic Region

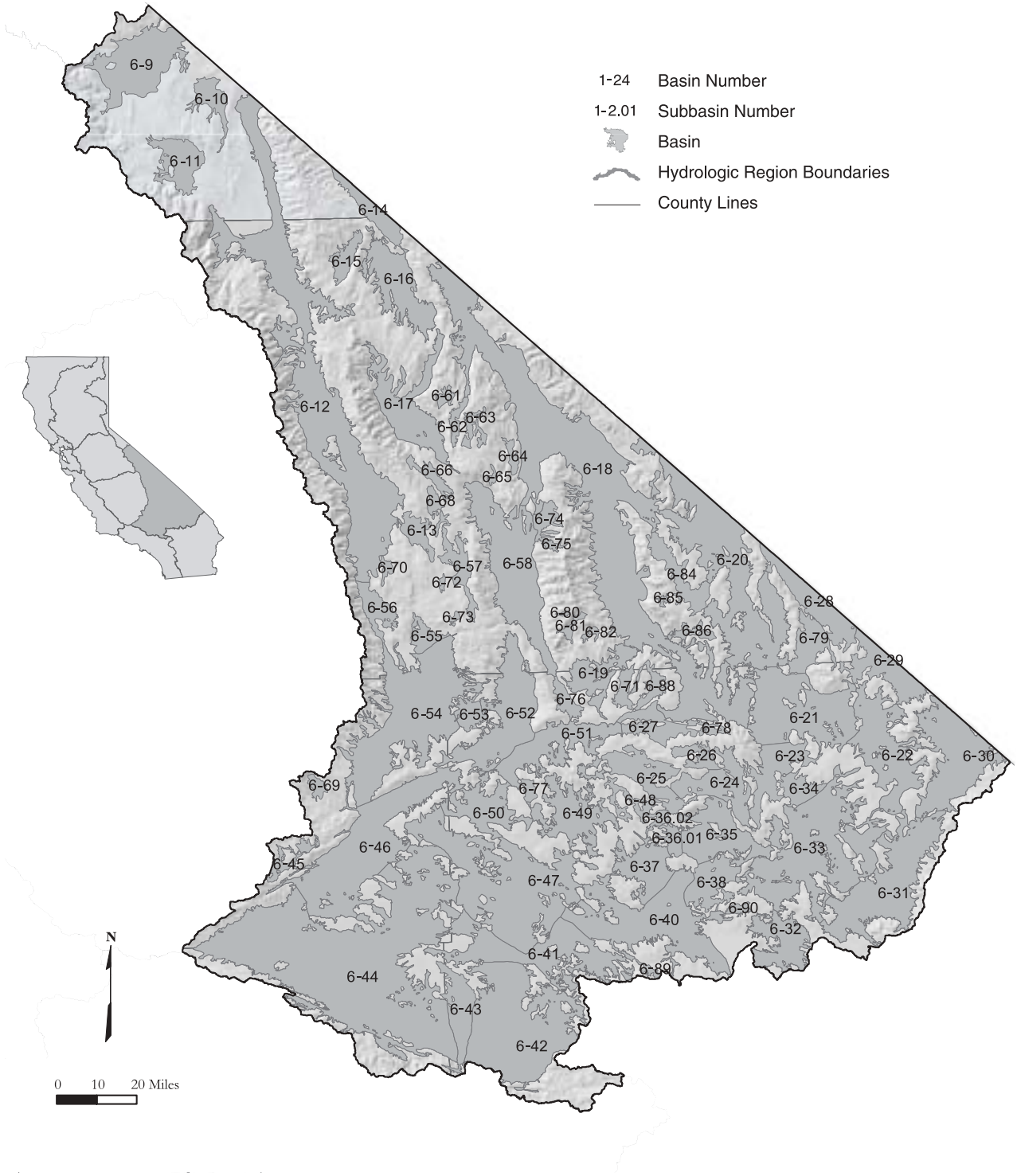

Figure 41 South Lahontan Hydrologic Region

Basins and Subbasins of the South Lahontan Hydrologic Region

Basin/subbasin	Basin name
6-9	Mono Valley
6-10	Adobe Lake Valley
6-11	Long Valley
6-12	Owens Valley
6-13	Black Springs Valley
6-14	Fish Lake Valley
6-15	Deep Springs Valley
6-16	Eureka Valley
6-17	Saline Valley
6-18	Death Valley
6-19	Wingate Valley
6-20	Middle Amargosa Valley
6-21	Lower Kingston Valley
6-22	Upper Kingston Valley
6-23	Riggs Valley
6-24	Red Pass Valley
6-25	Bicycle Valley
6-26	Avawatz Valley
6-27	Leach Valley
6-28	Pahrump Valley
6-29	Mesquite Valley
6-30	Ivanpah Valley
6-31	Kelso Valley
6-32	Broadwell Valley
6-33	Soda Lake Valley
6-34	Silver Lake Valley
6-35	Cronise Valley
6-36	Langford Valley
6-36.01	Langford Well Lake
6-36.02	Irwin
6-37	Coyote Lake Valley
6-38	Caves Canyon Valley
6-40	Lower Mojave River Valley
6-41	Middle Mojave River Valley
6-42	Upper Mojave River Valley
6-43	El Mirage Valley
6-44	Antelope Valley
6-45	Tehachapi Valley East
6-46	Fremont Valley
6-47	Harper Valley
6-48	Goldstone Valley
6-49	Superior Valley
6-50	Cuddeback Valley
6-51	Pilot Knob Valley
6-52	Searles Valley
6-53	Salt Wells Valley
6-54	Indian Wells Valley
6-55	Coso Valley
6-56	Rose Valley
6-57	Darwin Valley
6-58	Panamint Valley
6-61	Cameo Area
6-62	Race Track Valley
6-63	Hidden Valley
6-64	Marble Canyon Area
6-65	Cottonwood Spring Area
6-66	Lee Flat
6-68	Santa Rosa Flat
6-69	Kelso Lander Valley
6-70	Cactus Flat
6-71	Lost Lake Valley
6-72	Coles Flat
6-73	Wild Horse Mesa Area
6-74	Harrisburg Flats
6-75	Wildrose Canyon
6-76	Brown Mountain Valley
6-77	Grass Valley
6-78	Denning Spring Valley
6-79	California Valley
6-80	Middle Park Canyon
6-81	Butte Valley
6-82	Spring Canyon Valley
6-84	Greenwater Valley
6-85	Gold Valley
6-86	Rhodes Hill Area
6-88	Owl Lake Valley
6-89	Kane Wash Area
6-90	Cady Fault Area

Description of the Region

The South Lahontan HR covers approximately 21.2 million acres (33,100 square miles) in eastern California. This region includes about 21 percent of the surface area of California and both the highest (Mount Whitney) and lowest (Death Valley) surface elevations of the contiguous United States. The HR is bounded on the west by the crest of the Sierra Nevada and on the north by the watershed divide between Mono Lake and East Walker River drainages; on the east by Nevada and the south by the crest of the San Gabriel and San Bernardino mountains and the divide between watersheds draining south toward the Colorado River and those draining northward. This HR includes the Owens, Mojave, and Amargosa River systems, the Mono Lake drainage system, and many other internally drained basins. Average annual precipitation is about 7.9 inches, and runoff is about 1.3 maf per year (DWR 1994).

The South Lahontan HR includes Inyo County, much of Mono and San Bernardino counties, and parts of Kern and Los Angeles counties (Figure 41). National forests, national and state parks, military bases and other public lands comprise most of the land in this region. The Los Angeles Department of Water and Power is also a major landowner in the northern part of the HR and controls rights to much of the water draining the eastern Sierra Nevada.

According to 2000 census data, the South Lahontan HR is home to about 530,000 people, or 1.6 percent of the state's population. The major population centers are in the southern part of the HR and include Palmdale, Lancaster, Victorville, Apple Valley, and Hesperia.

Groundwater Development

In this report, 76 groundwater basins are delineated in the South Lahontan HR, and the Langford Valley Groundwater Basin (6-36) is divided into two subbasins. The groundwater basins underlie about 11.60 million acres (18,100 square miles) or about 55 percent of the HR.

Most of the groundwater production is concentrated, along with the population, in basins in the southern part of this region. Groundwater provides 41 percent of water supply for agriculture and urban uses (DWR 1998). Much of this HR is public land with very low population density, within these areas there has been little groundwater development and little is known about the basins.

In most smaller basins, groundwater is found in unconfined alluvial aquifers; however, in some of the larger basins, or near dry lakes, aquifers may be separated by aquitards that cause confined groundwater conditions. Depths of the basins range from tens or hundreds of feet in smaller basins to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this region depending on aquifer characteristics and well location, size, and use.

Conjunctive use of surface water and groundwater is practiced in the more heavily pumped basins. Some water used in the southern part of the HR is imported from Northern California by the State Water Project. Some of this imported water is used to recharge groundwater in the Mojave River Valley basins (6-40, 6-41, and 6-42). Surface water and groundwater are exported from the South Lahontan HR to the South Coast HR by the Los Angeles Department of Water and Power.

Groundwater Quality

The chemical character of the groundwater varies throughout the region, but most often is calcium or sodium bicarbonate. Near and beneath dry lakes, sodium chloride and sodium sulfate-chloride water is common. In general, groundwater near the edges of valleys contains lower TDS content than water beneath the central part of the valleys or near dry lakes.

Drinking water standards are most often exceeded for TDS, fluoride, and boron content. The EPA lists 13 sites of contamination in this HR. Of these, three military installations in the Antelope Valley and Mojave River Valley groundwater basins are federal Superfund sites because of VOCs and other hazardous contaminants.

Water Quality in Public Supply Wells

From 1994 through 2000, 605 public supply water wells were sampled in 19 of the 77 basins and subbasins in the South Lahontan HR. Analyzed samples indicate that 506 wells, or 84 percent, met the state primary MCLs for drinking water. Ninety-nine wells, or 16 percent, have constituents that exceed one or more MCL. Figure 42 shows the percentages of each contaminant group that exceeded MCLs in the 99 wells.

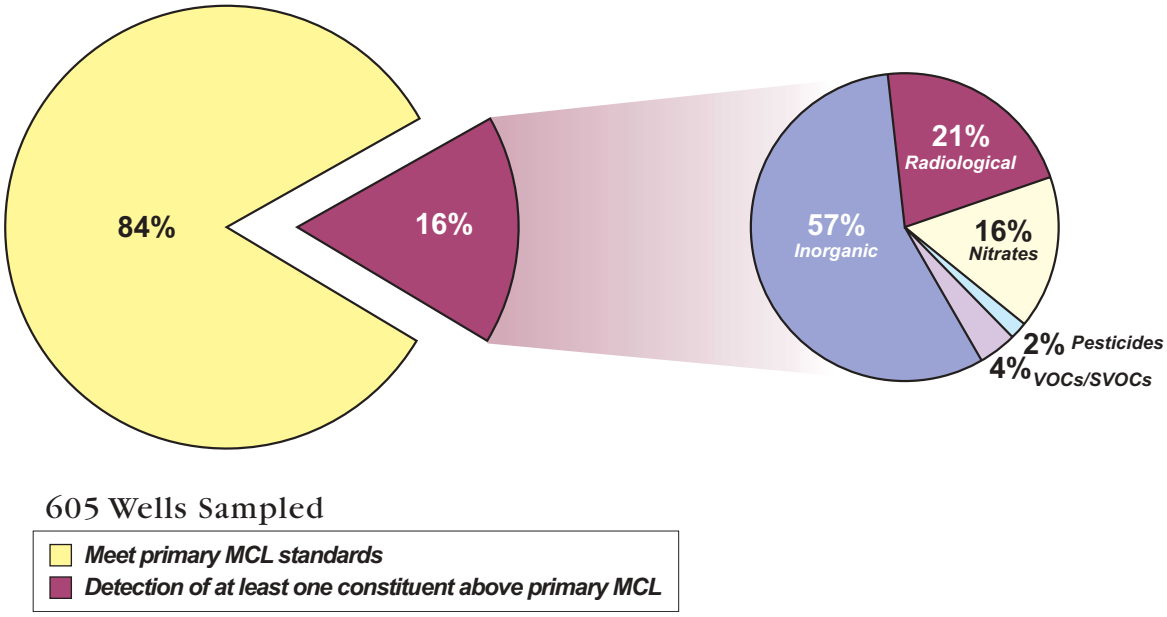

Figure 42 MCL exceedances in public supply wells in the South Lahontan Hydrologic Region

Table 36 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 36 Most frequently occurring contaminants by contaminant group in the South Lahontan Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 30	Arsenic – 19	Antimony – 5
Inorganics – Secondary	Iron – 82	Manganese – 36	Specific Conductance – 5 TDS – 5
Radiological	Gross Alpha – 18	Uranium – 7	Radium 228 – 2
Dissolved Nitrogen	Nitrate (as NO_3) – 12	Nitrate + Nitrite–6	Nitrite (as N) – 4
Pesticides	Di(2-Ethylhexyl)phthalate) – 2		
VOCs/SVOCs	MTBE – 2	TCE – 2	Carbon Tetrachloride – 2

TCE = Trichloroethylene
MTBE = Methyltertiarybutylether
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound

Changes from Bulletin 118-80

Several modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report (Table 37). Langford Valley Groundwater Basin (6-36) has been divided into two subbasins. Granite Mountain Area (6-59) and Fish Slough Valley (6-60) groundwater basins have been deleted because no information was found concerning wells or groundwater in these basins or because well completion reports indicate that groundwater production is derived from fractured rocks beneath the basin. Furnace Creek Area Groundwater Basin (6-83) has been incorporated into Death Valley Groundwater Basin (6-18), and Butterbread Canyon Valley Groundwater Basin (6-87) has been incorporated into Lost Lake Valley Groundwater Basin (6-71).

Table 37 Modifications since Bulletin 118-80 of groundwater basins and subbasins in South Lahontan Hydrologic Region

Basin/subbasin name	New number	Old number
Langford Well Lake	6-36.01	6-36
Irwin	6-36.02	6-36
Troy Valley	Incorporated into 6-40 and 7-14.	6-39
Granite Mountain Area	Deleted	6-59
Fish Slough Valley	Deleted	6-60
Furnace Creek Area	Deleted – incorporated into 6-18	6-83
Butterbread Canyon Valley	Deleted – incorporated into 6-71	6-87

Troy Valley Groundwater Basin (6-39) has been split at the Pisgah fault, which is a groundwater barrier, and has been incorporated into Lower Mojave River Valley (6-40) and Lavic Valley (7-14) groundwater basins. This change incorporates part of the South Lahontan HR into a basin in the Colorado River HR[1]. The Middle Mojave River Valley Groundwater Basin (6-41) has changed boundaries along the north (Harper Valley; 6-47) and east sides (Lower Mojave River Valley; 6-40). The new boundaries are along the Camp Rock-Harper Lake fault zone, Waterman fault, and Helendale fault. Groundwater level elevations indicate that these faults are likely strong barriers to groundwater movement.

The boundary between the Upper Mojave River Valley Groundwater Basin (6-42) and the Lucerne Valley Groundwater Basin (7-19) was changed from the regional surface divide to the southern part of the Helendale fault, which is a groundwater barrier. This change incorporates part of the Colorado Desert HR into a basin in the South Lahontan HR[2].

[1] The boundaries of the hydrologic regions are defined by surface drainage patterns. In this case, faults impede groundwater flow causing it to flow beneath the surface drainage divide into the adjacent hydrologic region.
[2] See previous note.

Table 38 South Lahontan Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
6-09	MONO VALLEY	173,000	A	800	480	-	-	-	-	2060
6-10	ADOBE LAKE VALLEY	39,800	C	-	-	-	-	-	-	-
6-11	LONG VALLEY	71,800	A	250	90	20	-	5	-	-
6-12	OWENS VALLEY	661,000	A	8,100	1,870	700	7	89	-	300-450,000
6-13	BLACK SPRINGS VALLEY	30,800	C	-	-	-	-	-	-	-
6-14	FISH LAKE VALLEY	48,100	C	-	-	-	-	-	-	-
6-15	DEEP SPRINGS VALLEY	29,900	C	700	390	-	-	-	-	-
6-16	EUREKA VALLEY	129,000	C	-	-	-	-	1	-	-
6-17	SALINE VALLEY	146,000	C	-	-	-	-	-	-	-
6-18	DEATH VALLEY	921,000	C	-	-	28	-	6	-	-
6-19	WINGATE VALLEY	71,400	C	-	-		-		-	-
6-20	MIDDLE AMARGOSA VALLEY	390,000	C	3,000	2,500	2	-	4	-	-
6-21	LOWER KINGSTON VALLEY	240,000	C	-	-	-	-	-	-	-
6-22	UPPER KINGSTON VALLEY	177,000	C	24	-	-	-	5	-	-
6-23	RIGGS VALLEY	87,700	C	-	-	-	-	-	-	-
6-24	RED PASS VALLEY	96,500	C	-	-	-	-	-	-	-
6-25	BICYCLE VALLEY	89,600	C	710	-	-	12	6	618	508-810
6-26	AVAWATZ VALLEY	27,700	C	-	-	-	-	-	-	-
6-27	LEACH VALLEY	61,300	C	-	-	-	-	-	-	-
6-28	PAHRUMP VALLEY	93,100	C	300	150	-	-	-	-	-
6-29	MESQUITE VALLEY	88,400	C	1,500	1,020	-	-	-	-	-
6-30	IVANPAH VALLEY	199,000	C	600	400	-	-	9	-	-
6-31	KELSO VALLEY	255,000	C	370	290	-	-		-	-
6-32	BROADWELL VALLEY	92,100	C	-	-	-	-	1	-	-
6-33	SODA LAKE VALLEY	381,000	C	2,100	1,100	-	-	3	-	-
6-34	SILVER LAKE VALLEY	35,300	C	-	-	-	-		-	-
6-35	CRONISE VALLEY	127,000	C	600	340	-	-	-	-	-
6-36	LANGFORD VALLEY									
6-36.01	LANGFORD WELL LAKE	19,300	C	1,700	410	11	7	3	498	440-568
6-36.02	IRWIN	10,500	C	550	-	40	-	3	528	496-598
6-37	COYOTE LAKE VALLEY	88,200	A	1,740	660	5	-	-	-	300-1000
6-38	CAVES CANYON VALLEY	73,100	A	300	-	4	1	4	-	300-1000
6-40	LOWER MOJAVE RIVER VALLEY	286,000	A	2,700	770	70	21	52	300	-
6-41	MIDDLE MOJAVE RIVER VALLEY	211,000	A	4,000	1,000	74	3	14	500	-
6-42	UPPER MOJAVE RIVER VALLEY	413,000	A	5,500	1,030	120	22	153	500	1105
6-43	EL MIRAGE VALLEY	75,900	A	1,000	230	50	3	21	-	-
6-44	ANTELOPE VALLEY	1,110,000	A	7,500	286	262	10	248	300	200-800
6-45	TEHACHAPI VALLEY EAST	24,000	C	150	31	31	-	9	361	298-405
6-46	FREMONT VALLEY	2,370,000	C	4,000	500	23	-	13	596	350-100,000
6-47	HARPER VALLEY	410,000	A	3,000	725	11	3	19	-	179-2391
6-48	GOLDSTONE VALLEY	28,100	C	-	-	-	-	-	-	-
6-49	SUPERIOR VALLEY	120,000	C	450	100	-	-	-	-	-

Table 38 South Lahontan Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
6-50	CUDDEBACK VALLEY	94,900	C	500	300	-	-	-	-	-
6-51	PILOT KNOB VALLEY	139,000	C	-	-	-	-	1	-	-
6-52	SEARLES VALLEY	197,000	C	1,000	300	-	-	-	-	-
6-53	SALT WELLS VALLEY	29,500	C	-	-	-	-	-	-	-
6-54	INDIAN WELLS VALLEY	382,000	A	3,800	815	116	20	63	312	110-1620
6-55	COSO VALLEY	25,600	C	-	-	-	-	-	-	-
6-56	ROSE VALLEY	42,500	C	-	-	-	-	1	-	-
6-57	DARWIN VALLEY	44,200	C	130	43	-	-	-	-	-
6-58	PANAMINT VALLEY	259,000	C	35	30	-	-	-	-	-
6-61	CAMEO AREA	9,310	C	-	-	-	-	-	-	-
6-62	RACE TRACK VALLEY	14,100	C	-	-	-	-	-	-	-
6-63	HIDDEN VALLEY	18,000	C	-	-	-	-	-	-	-
6-64	MARBLE CANYON AREA	10,400	C	-	-	-	-	-	-	-
6-65	COTTONWOOD SPRING AREA	3,900	C	-	-	-	-	-	-	-
6-66	LEE FLAT	20,300	C	-	-	-	-	-	-	-
6-68	SANTA ROSA FLAT	312	C	-	-	-	-	-	-	-
6-69	KELSO LANDER VALLEY	11,200	C	-	-	-	-	-	-	-
6-70	CACTUS FLAT	7,030	C	-	-	-	-	-	-	-
6-71	LOST LAKE VALLEY	23,300	C	-	-	-	-	-	-	-
6-72	COLES FLAT	2,950	C	-	-	-	-	-	-	-
6-73	WILD HORSE MESA AREA	3,320	C	-	-	-	-	-	-	-
6-74	HARRISBURG FLATS	24,900	C	-	-	-	-	1	-	-
6-75	WILDROSE CANYON	5,160	C	-	-	-	-	-	-	-
6-76	BROWN MOUNTAIN VALLEY	21,700	C	-	-	-	-	-	-	-
6-77	GRASS VALLEY	9,980	C	-	-	-	-	-	-	-
6-78	DENNING SPRING VALLEY	7,240	C	-	-	-	-	-	-	-
6-79	CALIFORNIA VALLEY	58,300	C	-	-	-	-	-	-	-
6-80	MIDDLE PARK CANYON	1,740	C	-	-	-	-	-	-	-
6-81	BUTTE VALLEY	8,810	C	-	-	-	-	-	-	-
6-82	ANVIL SPRING CANYON VALLEY	4,810	C	-	-	-	-	-	-	-
6-84	GREENWATER VALLEY	59,900	C	-	-	-	-	-	-	-
6-85	GOLD VALLEY	3,220	C	-	-	-	-	-	-	-
6-86	RHODES HILL AREA	15,600	C	-	-	-	-	-	-	-
6-88	OWL LAKE VALLEY	22,300	C	-	-	-	-	-	-	-
6-89	KANE WASH AREA	5,960	C	60	-	-	-	-	-	-
6-90	CADY FAULT AREA	7,960	C	-	-	-	-	-	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

Colorado River Hydrologic Region

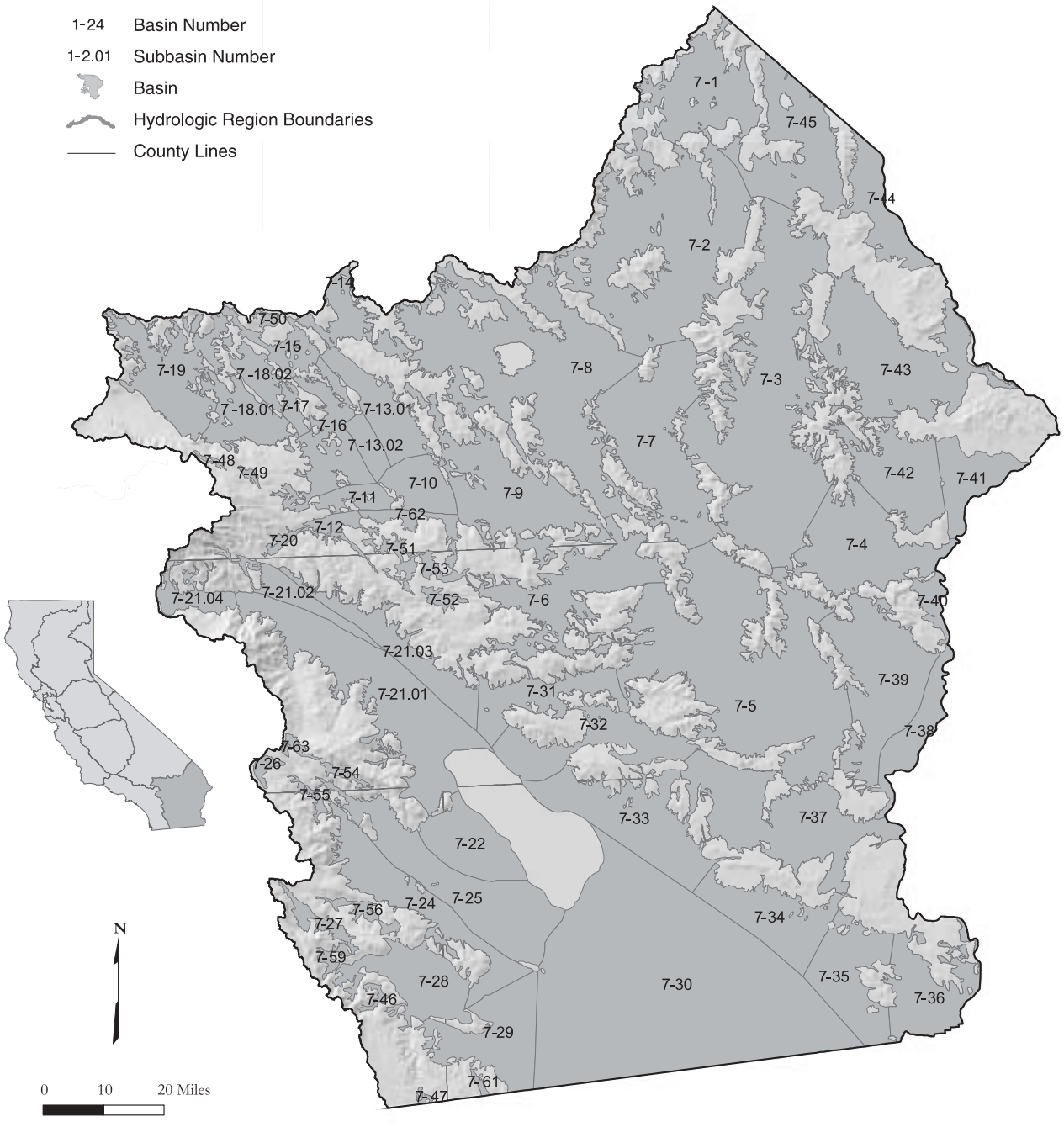

Figure 43 Colorado River Hydrologic Region

Basins and Subbasins of Colorado River Hydrologic Region

Basin/subbasin	Basin name
7-1	Lanfair Valley
7-2	Fenner Valley
7-3	Ward Valley
7-4	Rice Valley
7-5	Chuckwalla Valley
7-6	Pinto Valley
7-7	Cadiz Valley
7-8	Bristol Valley
7-9	Dale Valley
7-10	Twentynine Palms Valley
7-11	Copper Mountain Valley
7-12	Warren Valley
7-13	Deadman Valley
7-13.01	Deadman Lake
7-13.02	Surprise Spring
7-14	Lavic Valley
7-15	Bessemer Valley
7-16	Ames Valley
7-17	Means Valley
7-18	Johnson Valley Area
7-18.01	Soggy Lake
7-18.02	Upper Johnson Valley
7-19	Lucerne Valley
7-20	Morongo Valley
7-21	Coachella Valley
7-21.01	Indio
7-21.02	Mission Creek
7-21.03	Desert Hot Springs
7-21.04	San Gorgonio Pass
7-22	West Salton Sea
7-24	Borrego Valley
7-25	Ocotillo-Clark Valley
7-26	Terwilliger Valley
7-27	San Felipe Valley
7-28	Vallecito-Carrizo Valley
7-29	Coyote Wells Valley
7-30	Imperial Valley
7-31	Orocopia Valley
7-32	Chocolate Valley
7-33	East Salton Sea
7-34	Amos Valley
7-35	Ogilby Valley
7-36	Yuma Valley
7-37	Arroyo Seco Valley
7-38	Palo Verde Valley
7-39	Palo Verde Mesa
7-40	Quien Sabe Point Valley
7-41	Calzona Valley
7-42	Vidal Valley
7-43	Chemehuevi Valley
7-44	Needles Valley
7-45	Piute Valley
7-46	Canebrake Valley
7-47	Jacumba Valley
7-48	Helendale Fault Valley
7-49	Pipes Canyon Fault Valley
7-50	Iron Ridge Area
7-51	Lost Horse Valley
7-52	Pleasant Valley
7-53	Hexie Mountain Area
7-54	Buck Ridge Fault Valley
7-55	Collins Valley
7-56	Yaqui Well Area
7-59	Mason Valley
7-61	Davies Valley
7-62	Joshua Tree
7-63	Vandeventer Flat

Description of the Region

The Colorado River HR covers approximately 13 million acres (20,000 square miles) in southeastern California. It is bounded on the east by Nevada and Arizona, the south by the Republic of Mexico, the west by the Laguna, San Jacinto, and San Bernardino mountains, and the north by the New York, Providence, Granite, Old Dad, Bristol, Rodman, and Ord Mountain ranges. An average annual precipitation of 5.5 inches and average annual runoff of only 200,000 acre-feet makes this the most arid HR of California (DWR 1994). Surface runoff drains to many closed basins or to the Colorado River.

This HR includes all of Imperial, most of Riverside, much of San Bernardino, and part of San Diego counties (Figure 43). Many of the alluvial valleys in the region are underlain by groundwater aquifers that are the sole source of water for local communities.

About 533,000 people live within the Colorado River HR (DWR, 1998). The largest population centers are Palm Springs, Palm Desert, Indio, Coachella, and El Centro.

Groundwater Development

The earliest groundwater development in California may have been prehistoric water wells dug by the Cahuilla Indians in Coachella Valley of the Colorado River HR. In this report, 64 groundwater basins/subbasins are delineated in this HR. The Deadman Valley, Johnson Valley Area, and Coachella Valley groundwater basins have been divided into subbasins. Groundwater basins underlie about 8.68 million acres or about 26 percent of this HR.

In the Colorado River HR, groundwater provides about 8 percent of the water supply in normal years for agricultural and urban uses (DWR 1998). In most smaller basins, groundwater is found in unconfined alluvial aquifers. In some of the larger basins, particularly near dry lakes, aquifers may be separated by aquitards that create confined groundwater conditions. Depths of basins range from tens or hundreds of feet in smaller basins and along arms of ephemeral rivers to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this region depending on aquifer characteristics and well location, size, and use. Some aquifers are capable of yielding thousands of gallons per minute to municipal wells.

Conjunctive use of surface water and groundwater is a long-standing practice in the region. Water is imported from the Colorado River for irrigation in Imperial, Coachella, and Palo Verde Valleys and from groundwater recharge in Coachella Valley. Water imported from Northern California is used to replenish Warren and Joshua Tree groundwater basins. Many agencies have erected systems of barriers to allow more efficient percolation of ephemeral runoff from surrounding mountains. The concept of utilizing groundwater basins in this sparsely populated HR for storing water that would be pumped during drought years is getting much attention.

Groundwater Quality

The chemical character of groundwater in the Colorado River HR is variable. Cation concentration is dominated by sodium with calcium common and magnesium appearing less often. Bicarbonate is usually the dominant anion, although sulfate and chloride waters are also common. In basins with closed drainages, water character often changes from calcium-sodium bicarbonate near the margins to sodium chloride or chloride-sulfate beneath a dry lake. It is not uncommon for concentrations of dissolved constituents to rise dramatically toward a dry lake where saturation of mineral salts is reached. An example of this is found at Bristol Valley Groundwater Basin, where the mineral halite (sodium chloride) is formed and then mined by

evaporation of groundwater in trenches in Bristol (dry) Lake. The TDS content of groundwater is high in many of the basins in this region. High fluoride content is common; sulfate content occasionally exceeds drinking water standards; and high nitrate content is common, especially in agricultural areas.

Two of the primary challenges in the Colorado River HR are overdraft in the Coachella Valley and leaking underground storage tanks. The EPA has not yet placed any contamination sites in this HR on the Superfund National Priorities List; however, one site is under consideration because of high pesticide levels.

Water Quality in Public Supply Wells

From 1994 through 2000, 314 public supply water wells were sampled in 23 of the 64 basins and subbasins in the Colorado River HR. Analyzed samples indicate that 270 wells, or 86 percent, met the state primary MCLs for drinking water standards. Forty-four wells, or 14 percent, have constituents that exceed one or more MCL. Figure 44 shows the percentages of each contaminant group that exceeded MCLs in the 44 wells.

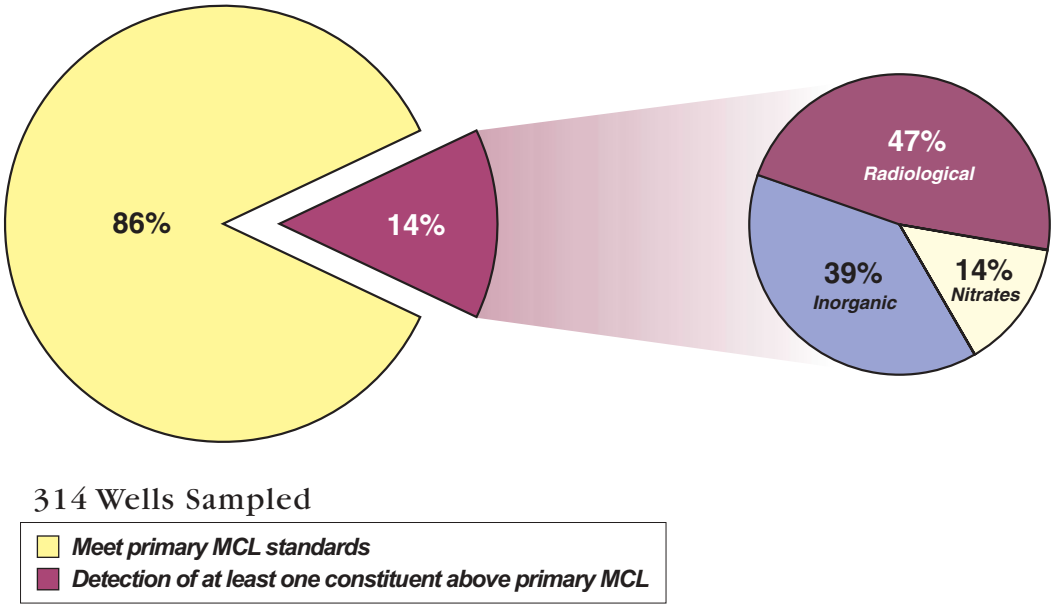

Figure 44 MCL exceedances in public supply wells in the Colorado River Hydrologic Region

Table 39 lists the three most frequently occurring contaminants in each contaminant group and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 39 Most frequently occurring contaminants by contaminant group in the Colorado River Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 17		
Inorganics – Secondary	Iron – 38	Manganese – 26	TDS – 5
Radiological	Radium 228 – 3	Combined RA226 + RA228 – 3	Radium 226 – 1
Nitrates	Nitrate (as NO_3) – 6	Nitrate + Nitrite – 1	

Changes from Bulletin 118-80

Several modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report (Table 40). Jacumba Valley East Groundwater Basin (7-60) has been deleted because of lack of information about groundwater in this basin. The Pinyon Wash Area (7-57) and Whale Peak Area (7-58) groundwater basin names have been deleted because they are now incorporated into other larger basins. Similarly, Clark Valley (7-23) and Ocotillo Valley (7-25) groundwater basins are now the combined Ocotillo-Clark Valley Groundwater Basin (7-25). The Deadman Valley (7-13), Johnson Valley Area (7-18), and Coachella Valley (7-21) groundwater basins have been subdivided into subbasins in this report. The western boundary of Lucerne Valley Groundwater Basin (7-19) has been moved eastward from the HR boundary to the Helendale fault. Groundwater level elevations indicate that this fault is a groundwater barrier and that groundwater flows westward back under the surface divide into the Upper Mojave River Groundwater Basin (6-42). The boundary between Lucerne Valley (7-19) and Johnson Valley Area (7-18) groundwater basins is delineated in this report.

The boundaries of Twentynine Palms Valley (7-10), Copper Mountain Valley (7-11), Warren Valley (7-12), Deadman Lake (7-13), and Ames Valley (7-16) groundwater basins have been redrawn in light of newer groundwater level data. These data indicate that the Pinto Mountain fault is a groundwater barrier. Joshua Tree Groundwater Basin (7-62) is a new basin that has been delineated from parts of Copper Mountain Valley and Twentynine Palms Valley Groundwater Basins because the Pinto Mountain fault is such a strong barrier. Buck Ridge Fault Valley Groundwater Basin (7-54) was presented in Bulletin 118-80 as two unconnected deposits of water-bearing alluvium separated by outcrop of nonwater-bearing rocks. These water-bearing deposits have been designated as separate groundwater basins in this report, with the Buck Ridge Fault Valley Groundwater Basin (7-54) as the northern basin and Vandeventer Flat Groundwater Basin (7-63) presented as the southern basin.

Table 40 Modifications since Bulletin 118-80 of groundwater basins in Colorado River Hydrologic Region

Basin name	New number	Old number
Clark Valley	Delete – combined with 7-25	7-23
Ocotillo-Clark Valley	7-25 (now combined)	7-25
Pinyon Wash Area	Incorporated into 7-56	7-57
Whale Peak Area	Incorporated into 7-28	7-58
Jacumba Valley East	Deleted	7-60
Joshua Tree	7-62 (new)	
Vandeventer Flat	7-63 (new)	

Table 41 Colorado River Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
7-1	LANFAIR VALLEY	157,000	C	70	16	-	-	9	515	173-2,260
7-2	FENNER VALLEY	454,000	A	200	100	-	-	4	515	173-2,260
7-3	WARD VALLEY	961,000	A	260	180	-	-	1	-	327-589
7-4	RICE VALLEY	189,000	C	65	-	-	-	-	-	-
7-5	CHUCKWALLA VALLEY	604,000	C	3,900	1,800	12	-	10	-	424
7-6	PINTO VALLEY	183,000	A	1,480	900	-	-	1	-	-
7-7	CADIZ VALLEY	270,000	C	167	66	-	-	-	400	300-3000
7-8	BRISTOL VALLEY	498,000	A	3,000	-	-	-	-		300-298,000
7-9	DALE VALLEY	213,000	C	380	275	-	-	2	-	-
7-10	TWENTYNINE PALMS VALLEY	62,400	C	3,000	540	27	-	2	640	-
7-11	COPPER MOUNTAIN VALLEY	30,300	A	2,450	250	2	-	2	-	180-214
7-12	WARREN VALLEY	17,200	A	4,000	350	27	18	17	196	129-269
7-13	DEADMAN VALLEY									
7-13.01	DEADMAN LAKE	89,200	C	2,000	-	28	3	1	-	311-985
7-13.02	SURPRISE SPRING	29,300	C	1,370	680	26	6	9	177	141-1,050
7-14	LAVIC VALLEY	102,000	C	140	80	-	-	-	-	-
7-15	BESSEMER VALLEY	39,100	C	0	-	-	-	-	-	-
7-16	AMES VALLEY	110,000	C	2,000	-	19	3	11	459	-
7-17	MEANS VALLEY	15,000	C	0	-	1	-	-	-	-
7-18	JOHNSON VALLEY AREA									
7-18.01	SOGGY LAKE	76,800	C	-	-	6	-	1	-	300-2,000
7-18.02	UPPER JOHNSON VALLEY	34,800	C	-	-	-	-	-	-	3,000
7-19	LUCERNE VALLEY	148,000	A	1,000	-	22	9	21	301	200-5,000
7-20	MORONGO VALLEY	7,240	C	600	90	-	-	5	-	-
7-21	COACHELLA VALLEY									
7-21.01	INDIO	336,000	A	1,880	650	30	-	204	300	-
7-21.02	MISSION CREEK	49,000	A	3,500	715	5	-	15	<500	-
7-21.03	DESERT HOT SPRINGS	101,000	C	2,500	985	10	-	2	-	800-1,000
7-21.04	SAN GORGONIO PASS	38,700	A	1,000	0	17	8	5	-	106-205
7-22	WEST SALTON SEA	106,000	C	540	400	v	-	-	-	-
7-24	BORREGO VALLEY	153,000	A	2,000	0	10	10	25	-	300-2,440
7-25	OCOTILLO-CLARK VALLEY	223,000	C	3,500	1,760	1	-	2	-	-
7-26	TERWILLIGER VALLEY	8,030	C	100	-	-	-	1	-	500
7-27	SAN FELIPE VALLEY	2,340	C	500	30	-	-	1	-	-
7-28	VALLECITO-CARRIZO VALLEY	122,000	C	2,500	260	-	-	1	-	-
7-29	COYOTE WELLS VALLEY	146,000	A	-	-	25	6	9	-	-
7-30	IMPERIAL VALLEY	961,000	A	1,000	-	19	-	45	1088	498-7,280
7-31	OROCOPIA VALLEY	96,500	A	210	165	0	-	1	-	-
7-32	CHOCOLATE VALLEY	130,000	C	0	0	0	-	-	-	-
7-33	EAST SALTON SEA	196,000	C	0	0	1	-	4	-	-
7-34	AMOS VALLEY	130,000	C	100	50	3	-	1	-	-
7-35	OGILBY VALLEY	134,000	C	4,000	50	27	1	3	-	-

Table 41 Colorado River Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
7-36	YUMA VALLEY	3,780	C	100	40	59	0	15	-	-
7-37	ARROYO SECO VALLEY	258,000	C	-	-	2	0	0	-	-
7-38	PALO VERDE VALLEY	73,400	A	-	-	11	-	19	840	658-1,030
7-39	PALO VERDE MESA	226,000	C	2,750	1,650	20	-	13	-	-
7-40	QUIEN SABE POINT VALLEY	25,300	C	25	-	-	-	3	-	-
7-41	CALZONA VALLEY	81,000	C	2,340	500	0	0	0	-	
7-42	VIDAL VALLEY	138,000	C	1,800	675	-	-	1	-	-
7-43	CHEMEHUEVI VALLEY	273,000	A	0	0	1	0	1	-	-
7-44	NEEDLES VALLEY	88,400	A	1,500	980	34	-	11	-	-
7-45	PIUTE VALLEY	176,000	C	1,500	200	-	-	-	-	-
7-46	CANEBRAKE VALLEY	5,420	C	125	-	-	-	-	-	-
7-47	JACUMBA VALLEY	2,450	A	1,000	-	-	-	3		296-6,100
7-48	HELENDALE FAULT VALLEY	2,620	C	-	-	-	-	-	-	-
7-49	PIPES CANYON FAULT VALLEY	3,390	C	-	-	-	-	-	-	-
7-50	IRON RIDGE AREA	5,250	C	-	-	-	-	-	-	-
7-51	LOST HORSE VALLEY	17,300	C	-	-	-	-	-	-	-
7-52	PLEASANT VALLEY	9,670	C	-	-	-	-	-	-	-
7-53	HEXIE MOUNTAIN AREA	11,200	C	-	-	-	-	-	-	-
7-54	BUCK RIDGE FAULT VALLEY	6,930	C	-	-	-	-	-	-	-
7-55	COLLINS VALLEY	7,080	C	1,500	-	-	-	-	-	-
7-56	YAQUI WELL AREA	15,000	C	0	-	-	-	1	-	-
7-59	MASON VALLEY	5,530	C	0	0	0	0	1	-	-
7-61	DAVIES VALLEY	3,570	C	0	0	0	0	-	-	-
7-62	JOSHUA TREE	33,800	A	2,200	1,110	25	5	14	180	117-185
7-63	VANDEVENTER FLAT	6,750	C	50	17	-	-	-	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

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Glossary

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Glossary

A

acre-foot (af) The volume of water necessary to cover one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

adjudication A case that has been heard and decided by a judge. In the context of an adjudicated groundwater basin, landowners or other parties have turned to the courts to settle disputes over how much groundwater can be extracted by each party to the decision.

alluvial Of or pertaining to or composed of alluvium.

alluvium A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material, deposited during comparatively recent geologic time by a stream or other body of running water, as a sorted or semi sorted sediment in the bed of the stream or on it's floodplain or delta, as a cone or fan at the base of a mountain slope**.**

anthropogenic Of human origin or resulting from human activity.

appropriative right The right to use water that is diverted or extracted by a nonriparian or nonoverlying party for nonriparian or nonoverlying uses. In California, surface water appropriative rights are subject to a statutory permitting process while groundwater appropriation is not.

aquitard A confining bed and/or formation composed of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs, but stores ground water.

aquifer A body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs.

aridity A term describing a climate or region in which precipitation is so deficient in quantity or occurs so infrequently that intensive agricultural production is not possible without irrigation.

artesian aquifer A body of rock or sediment containing groundwater that is under greater than hydrostatic pressure; that is, a confined aquifer. When an artesian aquifer is penetrated by a well, the water level will rise above the top of the aquifer.

artesian pressure Hydrostatic pressure of artesian water, often expressed in terms of pounds per square inch; or the height, in feet above the land surface, of a column of water that would be supported by the pressure.

artificial recharge The addition of water to a groundwater reservoir by human activity, such as putting surface water into dug or constructed spreading basins or injecting water through wells.

available groundwater storage capacity The volume of a groundwater basin that is unsaturated and capable of storing groundwater.

average annual runoff The average value of total annual runoff volume calculated for a selected period of record, at a specified location, such as a dam or stream gage.

average year water demand Demand for water under average hydrologic conditions for a defined level of development.

B

basin management objectives (BMOs) See management objectives

beneficial use One of many ways that water can be used either directly by people or for their overall benefit. The State Water Resources Control Board recognizes 23 types of beneficial use with water quality criteria for those uses established by the Regional Water Quality Control Boards.

borehole geophysics The general field of geophysics developed around the lowering of a variety of probes into a boring or well. Borehole logging provides additional information concerning physical, electrical, acoustic, nuclear and chemical aspects of the soils and rock encountered during drilling.

C

community water system A public water system that serves at least 15 service connections used by yearlong residents or regularly serves at least 25 year-long residents (DHS 2000).

confined aquifer An aquifer that is bounded above and below by formations of distinctly lower permeability than that of the aquifer itself. An aquifer containing confined ground water. See artesian aquifer.

conjunctive use The coordinated and planned management of both surface and groundwater resources in order to maximize the efficient use of the resource; that is, the planned and managed operation of a groundwater basin and a surface water storage system combined through a coordinated conveyance infrastructure. Water is stored in the groundwater basin for later and planned use by intentionally recharging the basin during years of above-average surface water supply.

contaminant Any substance or property preventing the use or reducing the usability of the water for ordinary purposes such as drinking, preparing food, bathing washing, recreation, and cooling. Any solute or cause of change in physical properties that renders water unfit for a given use. (Generally considered synonymous with pollutant).

critical conditions of overdraft A groundwater basin in which continuation of present practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts. The definition was created after an extensive public input process during the development of the Bulletin 118-80 report.

D

deep percolation Percolation of water through the ground and beyond the lower limit of the root zone of plants into groundwater.

desalination A process that converts seawater or brackish water to fresh water or an otherwise more usable condition through removal of dissolved solids.

domestic well A water well used to supply water for the domestic needs of an individual residence or systems of four or fewer service connections.

drinking water system See public water system

drought condition Hydrologic conditions during a defined period when rainfall and runoff are much less than average.

drought year supply The average annual supply of a water development system during a defined drought period.

E

electrical conductivity (EC) The measure of the ability of water to conduct an electrical current, the magnitude of which depends on the dissolved mineral content of the water.

effective porosity The volume of voids or open spaces in alluvium and rocks that is interconnected and can transmit fluids.

environmental water Water serving environmental purposes, including instream fishery flow needs, wild and scenic river flows, water needs of fresh-water wetlands, and Bay-Delta requirements.

evapotranspiration (ET) The quantity of water transpired (given off), retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces.

G

groundwater basin An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom.

groundwater budget A numerical accounting, the *groundwater equation*, of the recharge, discharge and changes in storage of an aquifer, part of an aquifer, or a system of aquifers.

groundwater in storage The quantity of water in the zone of saturation.

groundwater management The planned and coordinated management of a groundwater basin or portion of a groundwater basin with a goal of long-term sustainability of the resource.

groundwater management plan A comprehensive written document developed for the purpose of groundwater management and adopted by an agency having appropriate legal or statutory authority.

groundwater mining The process, deliberate or inadvertent, of extracting groundwater from a source at a rate in excess of the replenishment rate such that the groundwater level declines persistently, threatening exhaustion of the supply or at least a decline of pumping levels to uneconomic depths.

groundwater monitoring network A series of monitoring wells at appropriate locations and depths to effectively cover the area of interest. Scale and density of monitoring wells is dependent on the size and complexity of the area of interest, and the objective of monitoring.

groundwater overdraft The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions.

groundwater quality See water quality

groundwater recharge facility A structure that serves to conduct surface water into the ground for the purpose of replenishing groundwater. The facility may consist of dug or constructed spreading basins, pits, ditches, furrows, streambed modifications, or injection wells.

groundwater recharge The natural or intentional infiltration of surface water into the zone of saturation.

groundwater source area An area where groundwater may be found in economically retrievable quantities outside of normally defined groundwater basins, generally referring to areas of fractured bedrock in foothill and mountainous terrain where groundwater development is based on successful well penetration through interconnecting fracture systems. Well yields are generally lower in fractured bedrock than wells within groundwater basins.

groundwater storage capacity volume of void space that can be occupied by water in a given volume of a formation, aquifer, or groundwater basin.

groundwater subbasin A subdivision of a groundwater basin created by dividing the basin using geologic and hydrologic conditions or institutional boundaries.

groundwater table The upper surface of the zone of saturation in an unconfined aquifer.

groundwater Water that occurs beneath the land surface and fills the pore spaces of the alluvium, soil, or rock formation in which it is situated. It excludes soil moisture, which refers to water held by capillary action in the upper unsaturated zones of soil or rock.

H

hazardous waste Waste that poses a present or potential danger to human beings or other organisms because it is toxic, flammable, radioactive, explosive or has some other property that produces substantial risk to life.

hydraulic barrier A barrier created by injecting fresh water to control seawater intrusion in an aquifer, or created by water injection to control migration of contaminants in an aquifer.

hydraulic conductivity A measure of the capacity for a rock or soil to transmit water; generally has the units of feet/day or cm/sec.

hydrograph A graph that shows some property of groundwater or surface water as a function of time.

hydrologic cycle The circulation of water from the ocean through the atmosphere to the land and ultimately back to the ocean.

hydrologic region A study area consisting of multiple planning subareas. California is divided into 10 hydrologic regions.

hydrostratigraphy A geologic framework consisting of a body of rock having considerable lateral extent and composing a reasonably distinct hydrologic system.

hyporheic zone The region of saturated sediments beneath and beside the active channel and that contain some proportion of surface water that was part of the flow in the surface channel and went back underground and can mix with groundwater.

I

infiltration The flow of water downward from the land surface into and through the upper soil layers.

infiltration capacity The maximum rate at which infiltration can occur under specific conditions of soil moisture.

in-lieu recharge The practice of providing surplus surface water to historic groundwater users, thereby leaving groundwater in storage for later use.

ISI Integrated Storage Investigations Program, an element of the CALFED Bay Delta initiative.

J

joint powers agreement (JPA) An agreement entered into by two or more public agencies that allows them to jointly exercise any power common to the contracting parties. The JPA is defined in Chapter 5 (commencing with Section 6500) of Division 7 of Title 1 of the California Government Code.

L

land subsidence The lowering of the natural land surface due to groundwater (or oil and gas) extraction.

leaky confining layer A low-permeability layer that can transmit water at sufficient rates to furnish some recharge from an adjacent aquifer to a well.

lithologic log A record of the lithology of the soils, sediments and/or rock encountered in a borehole from the surface to the bottom.

lithology The description of rocks, especially in hand specimen and in outcrop, on the basis of such characteristics as color, mineralogic composition, and grain size.

losing stream A stream or reach of a stream that is losing water by seepage into the ground.

M

management objectives Objectives that set forth the priorities and measurable criteria of local groundwater basin management. For example, one management objective could be to minimize degradation of groundwater quality with a criteria set that groundwater will not be degraded by more than 100 mg/l in terms of TDS.

maximum contaminant level (MCL) The highest drinking water contaminant concentration allowed under federal and State Safe Drinking Water Act regulations.

N

natural recharge Natural replenishment of an aquifer generally from snowmelt and runoff; through seepage from the surface.

nonpoint source Pollution discharged over a wide land area, not from one specific location. These are forms of diffuse pollution caused by sediment, nutrients, etc., carried to lakes and streams by surface runoff.

O

operational yield An optimal amount of groundwater that should be withdrawn from an aquifer system or a groundwater basin each year. It is a dynamic quantity that must be determined from a set of alternative groundwater management decisions subject to goals, objectives, and constraints of the management plan.

ordinance A law set forth by a governmental authority.

overdraft See groundwater overdraft

overlying right Property owners above a common aquifer possess a mutual right to the reasonable and beneficial use of a groundwater resource on land overlying the aquifer from which the water is taken. Overlying rights are correlative (related to each other) and overlying users of a common water source must share the resource on a pro rata basis in times of shortage. A proper overlying use takes precedence over all non-overlying uses**.**

P

perched groundwater Groundwater supported by a zone of material of low permeability located above an underlying main body of groundwater.

perennial yield The maximum quantity of water that can be annually withdrawn from a groundwater basin over a long period of time (during which water supply conditions approximate average conditions) without developing an overdraft condition.

perforated interval The depth interval where slotted casing or screen is placed in a well to allow entry of water from the aquifer formation.

permeability The capability of soil or other geologic formations to transmit water. See hydraulic conductivity.

pesticide Any of a class of chemicals used for killing insects, weeds or other undesirable entities. Most commonly associated with agricultural activities, but has significant domestic use in California.

point source A specific site from which wastewater or polluted water is discharged into a water body.

pollution (of water) The alteration of the physical, chemical, or biological properties of water by the introduction of any substance into water that adversely affects any beneficial use of water.

porosity The ratio of the voids or open spaces in alluvium and rocks to the total volume of the alluvium or rock mass.

possible contaminating activity (PCA) Human activities that are actual or potential origins of contamination for a drinking water source. PCAs include sources of both microbiological and chemical contaminants that could have an adverse effect upon human health (DHS 2000).

potentiometric surface The surface to which the water in a confined aquifer will rise in a tightly cased well.

prescriptive right rights obtained through the open and notorious adverse use of another's water rights. By definition, adverse use is not use of a surplus, but the use of non-surplus water to the direct detriment of the original rights holder.

primary porosity Voids or open spaces that were present when alluvium and rocks were originally deposited or formed.

public supply well A well used as a part of a public water system.

public water system A system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. (DHS 2000).

pueblo right A water right possessed by a municipality which, as a successor of a Spanish or Mexican pueblo, entitled to the beneficial use of all needed, naturally-occurring surface and groundwater of the original pueblo watershed Pueblo rights are paramount to all other claims.

R

recharge Water added to an aquifer or the process of adding water to an aquifer. Ground water recharge occurs either naturally as the net gain from precipitation, or artificially as the result of human influence. See artificial recharge.

recharge basin A surface facility constructed to infiltrate surface water into a groundwater basin.

riparian right A right to use surface water, such right derived from the fact that the land in question abuts upon the banks of streams.

runoff The volume of surface flow from an area.

S

safe yield The maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect.

salinity Generally, the concentration of mineral salts dissolved in water. Salinity may be expressed in terms of a concentration or as electrical conductivity. When describing salinity influenced by seawater, salinity often refers to the concentration of chlorides in the water. See also total dissolved solids.

saline intrusion The movement of salt water into a body of fresh water. It can occur in either surface water or groundwater bodies.

saturated zone The zone in which all interconnected openings are filled with water, usually underlying the unsaturated zone.

seawater intrusion barrier A system designed to retard, cease or repel the advancement of seawater intrusion into potable groundwater supplies along coastal portions of California. The system may be a series of specifically placed injection wells where water is injected to form a hydraulic barrier.

secondary porosity Voids in a rock formed after the rock has been deposited; not formed with the genesis of the rock, but later due to other processes. Fractures in granite and caverns in limestone are examples of secondary openings.

seepage The gradual movement of water into, through or from a porous medium. Also the loss of water by infiltration into the soil from a canal, ditches, laterals, watercourse, reservoir, storage facilities, or other body of water, or from a field.

semi-confined aquifer A semi-confined aquifer or leaky confined aquifer is an aquifer that has aquitards either above or below that allow water to leak into or out of the aquifer depending on the direction of the hydraulic gradient.

service area The geographic area served by a water agency.

specific conductance See electrical conductivity

specific retention The ratio of the volume of water a rock or sediment will retain against the pull of gravity to the total volume of the rock or sediment.

specific yield the ratio of the volume of water a rock or soil will yield by gravity drainage to the total volume of the rock or soil**.**

spring a location where groundwater flows naturally to the land surface or a surface water body.

stakeholders Any individual or organization that has an interest in water management activities. In the broadest sense, everyone is a stakeholder, because water sustains life. Water resources stakeholders are typically those involved in protecting, supplying, or using water for any purpose, including environmental uses, who have a vested interest in a water-related decision.

stratigraphy The science of rocks. It is concerned with the original succession and age relations of rock strata and their form, distribution, lithologic composition, fossil content, geophysical and geochemical properties—all characters and attributes of rocks as strata—and their interpretation in terms of environment and mode of origin and geologic history.

subsidence See land subsidence

subterranean stream Subterranean streams "flowing through known and definite channels" are regulated by California's surface water rights system.

surface supply Water supply obtained from streams, lakes, and reservoirs.

sustainability Of, relating to, or being a method of using a resource so that the resource is not depleted or permanently damaged.

T

total dissolved solids (TDS) a quantitative measure of the residual minerals dissolved in water that remain after evaporation of a solution. Usually expressed in milligrams per liter. See also salinity

toxic Poisonous, relating to or caused by a poison. Toxicity is determined for individual contaminants or for mixtures of contaminants as found in waste discharges.

transmissivity The product of hydraulic conductivity and aquifer thickness; a measure of a volume of water to move through an aquifer. Transmissivity generally has the units of ft^2/day or gallons per day/foot. Transmissivity is a measure of the subsurface's ability to transmit groundwater horizontally through its entire saturated thickness and affects the potential yield of wells.

transpiration An essential physiological process in which plant tissues give off water vapor to the atmosphere.

U

unconfined aquifer An aquifer which is not bounded on top by an aquitard. The upper surface of an unconfined aquifer is the water table.

underground stream Body of water flowing as a definite current in a distinct channel below the surface of the ground, usually in an area characterized by joints or fissures. Application of the term to ordinary aquifers is incorrect.

unsaturated zone The zone below the land surface in which pore space contains both water and air.

urban water management plan (UWMP) An UWMP is required for all urban water suppliers having more than 3,000 connections or supplying more than 3,000 acre-feet of water. The plans include discussions on water supply, supply reliability, water use, water conservation, and water shortage contingency and serve to assist urban water suppliers with their long-term water resources planning to ensure adequate water supplies for existing and future demands.

usable storage capacity The quantity of groundwater of acceptable quality that can be economically withdrawn from storage.

V

vadose zone See unsaturated zone

volatile organic compound (VOC) A manmade organic compound that readily vaporizes in the atmosphere. These compounds are often highly mobile in the groundwater system and are generally associated with industrial activities.

W

water quality Description of the chemical, physical, and biological characteristics of water, usually in regard to its suitability for a particular purpose or use.

water table See groundwater table

water year A continuous 12-month period for which hydrologic records are compiled and summarized. Different agencies may use different calendar periods for their water years.

watershed The land area from which water drains into a stream, river, or reservoir.

well completion report A required, confidential report detailing the construction, alteration, abandonment, or destruction of any water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well. The reports were called *Water Well Drillers' Report* prior to 1991 and are often referred to as "driller's logs." The report requirements are described in the California Water Code commencing with Section 13750.

WQCP Water Quality Control Plan for the San Francisco Bay/Sacramento San Joaquin Delta Estuary.

Metric Conversions

Quantity	To Convert from Metric Unit	To Customary Unit	Multiply Metric Unit By	To Convert to Metric Unit Multiply Customary Unit By
Length	millimeters (mm)	inches (in)	0.03937	25.4
	centimeters (cm) for snow depth	inches (in)	0.3937	2.54
	meters (m)	feet (ft)	3.2808	0.3048
	kilometers (km)	miles (mi)	0.62139	1.6093
Area	square millimeters (mm^2)	square inches (in^2)	0.00155	645.16
	square meters (m^2)	square feet (ft^2)	10.764	0.092903
	hectares (ha)	acres (ac)	2.4710	0.40469
	square kilometers (km^2)	square miles (mi^2)	0.3861	2.590
Volume	liters (L)	gallons (gal)	0.26417	3.7854
	megaliters	million gallons (10*)	0.26417	3.7854
	cubic meters (m^3)	cubic feet (ft^3)	36.315	0.028317
	cubic meters (m^3)	cubic yards (yd^3)	1.308	0.76455
	cubic dekameters (dam^3)	acre-feet (ac-ft)	0.8107	1.2335
Flow	cubic meters per second (m^3/s)	cubic feet per second (ft^3/s)	35.315	0.028317
	liters per minute (L/mn)	gallons per minute (gal/mn)	0.26417	3.7854
	liters per day (L/day)	gallons per day (gal/day)	0.26417	3.7854
	megaliters per day (ML/day)	million gallons per day (mgd)	0.26417	3.7854
	cubic dekameters per day (dam^3/day)	acre-feet per day (ac-ft/day)	0.8107	1.2335
Mass	kilograms (kg)	pounds (lbs)	2.2046	0.45359
	megagrams (Mg)	tons (short, 2,000 lb.)	1.1023	0.90718
Velocity	meters per second (m/s)	feet per second (ft/s)	3.2808	0.3048
Power	kilowatts (k/W)	horsepower (hp)	1.3405	0.746
Pressure	kilopascals (kPa)	pounds per square inch (psi)	0.14505	6.8948
	kilopascals (kPa)	feet head of water	0.32456	2.989
Specific Capacity	liters per minute per meter drawdown	gallons per minute per foot drawdown	0.08052	12.419
Concentration	milligrams per liter (mg/L)	parts per million (ppm)	1.0	1.0
Electrical Conductivity	microsiemens per centimeter (µS/cm)	micromhos per centimeter	1.0	1.0
Temperature	degrees Celsius (°C)	degrees Fahrenheit (°F)	(1.8X°C)+32	0.56(°F-32)

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Appendices

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Appendix A
Obtaining Copies of Supplemental Material

Bulletin 118 Update 2003 includes this report and supplemental material consisting of individual basin descriptions and a GIS-compatible map of each of the delineated groundwater basins in California. The supplemental material will be updated as new information becomes available and can be viewed or downloaded at http://www.waterplan.water.ca.gov/groundwater/118index.htm

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Appendix B
The Right to Use Groundwater in California

California does not have a statewide management program or statutory permitting system for groundwater. Some local agencies have adopted groundwater ordinances under their police powers, or have adopted groundwater management programs under a variety of statutory authorities.

Prior to a discussion of groundwater management, it is helpful to understand some of the laws governing the right to use groundwater in California. When the Water Commission Act of 1913 (Stats. 1913, Ch. 586) became effective in 1914, appropriative surface water rights became subject to a statutory permitting process. This appropriation procedure can be found in Water Code Section 1200 *et seq*. Groundwater classified as underflow of a surface stream, a "subterranean stream flowing through a known and definite channel," was made subject to the State permit system. However, most groundwater in California is presumed to be "percolating water," that is, water in underground basins and groundwater which has escaped from streams. This percolating water is not subject to a permitting process. As a result, most of the body of law governing groundwater use in California today has evolved through a series of court decisions beginning in the early 20th century. Key cases are listed in Table B-1, and some of the most significant are discussed below.

Table B-1 Significant court cases related to the right to use groundwater in California

Case	Issues addressed
Katz v. Walkinshaw, 141 Cal. 116 (1903)	Established Correlative Rights Doctrine. Correlative rights of overlying users, and surplus supply available for appropriation among non-overlying users.
Peabody v. City of Vallejo, 2 Cal. 2d 351 (1935)	Limited riparian rights under the reasonable and beneficial use requirement of the 1928 constitutional amendment; requirement of reasonable and beneficial use.
Pasadena v. Alhambra, 33 Cal. 2d 908 (1949)	First basin adjudication in California; established Doctrine of Mutual Prescription.
Niles Sand and Gravel Co. v. Alameda County Water District, 37 Cal. App. 3d 924 (1974)	Established right to store water underground as a servitude.
Techachapi-Cummings County Water District v. Armstrong, 49 Cal. App. 3d 992 (1975)	Modified the Mutual Prescription Doctrine articulated in Pasadena v. Alhambra. Overlying owners' water rights must be quantified on the basis of current, reasonable and beneficial need, not past use. By analogy to riparian rights, factors to be considered include: the amount of water available, the extent of ownership in the basin, and the nature of projected use.
Los Angeles v. San Fernando, 14 Cal. 3d 199 (1975)	Significantly modified Mutual Prescription Doctrine by disallowing it against public entities (Civil Code section 1007); established pueblo right above overlying owner right; established right to store imported water underground and recapture when needed above the right of overlying landowner.
Wright v. Goleta Water District, 174 Cal. App. 3d 74 (1985)	The unexercised water rights of overlying owners are protected from appropriators; notice and opportunity must be given to overlying owners to resist any interference with their rights.
Hi-Desert County Water District v. Blue Skies Country Club,	Retention of overlying right; no acquisition of prescriptive
23 Cal. App. 4th 1723 (1994)	right by overlying owner.
Baldwin v. Tehama County, 31 Cal. App. 4th 166 (1994)	City and County regulation of groundwater through police power. County limitations on export upheld.
City of Barstow v. Mojave Water Agency,	Held that in considering a stipulated physical solution
23 Cal. 4th 1224 (2000)	involving equitable apportionment, court must consider correlativerights of parties that did not join the stipulation.

This table modified from Bachman and others 1997

Katz v. Walkinshaw (141 Cal. 116)

In the 1903 decision, *Katz v. Walkinshaw*, the California Supreme Court rejected the English Common Law doctrine of groundwater rights and established the Doctrine of Correlative Rights. Prior to the *Katz* decision, California had followed the doctrine articulated in the 1843 English decision of *Acton v. Blundell* (12 M. & W. 324, 152 Eng. Rep. 1223), which established that landowners enjoyed absolute ownership of groundwater underneath their property. The 1903 decision rejected the English Common Law approach as unsuitable for the "natural conditions" in California, and instead established the Correlative Rights Doctrine analogous to a riparian right. Each overlying landowner was entitled to make reasonable beneficial use of groundwater with a priority equal to all other overlying users. Water in excess of the needs of the overlying owners could be pumped and used on nonoverlying lands on a first-in-time, first-in-right basis under what is known as an appropriative right. An appropriative groundwater right, unlike its surface water counterpart, is not subject to a permitting process. Where overlying owners made full use of available supplies, appropriative rights were extinguished. Where there was insufficient water to meet even the needs of the overlying owners, the court applied the Correlative Rights Doctrine to apportion the available groundwater among the overlying landowners. Figure B-1 depicts the rights to use groundwater established in *Katz v. Walkinshaw*.

City of Pasadena v. City of Alhambra (33 Cal. 2d 908)

The 1949 decision, *Pasadena v. Alhambra*, added significant complexity to the right to use groundwater in California. This decision, involving the adjudication of the Raymond Basin, established the doctrine of mutual prescription. Groundwater levels in the basin had been declining for many years by the time court action was initiated. Most substantial pumpers, both overlying and appropriators, were joined in the action. Previously, appropriators only had a right to water surplus to the needs of overlying users. However, based upon a stipulation by most of the parties, the court in *Pasadena* adopted a program of proportionate reductions. These appropriators had each effectively gained a prescriptive right, similar to that of surface water rights, in which they had taken the water in an open, notorious, and hostile manner for at least five years. Mutual prescription provided groundwater rights to both overlying users and appropriators in depleted groundwater basins by prorating their rights based on the highest continuous amount of pumping during the five years following commencement of the overdraft. All of the users in the Raymond Basin were thus entitled to extract their portion of the court-approved safe yield of the basin.

City of Los Angeles v. City of San Fernando (14 Cal. 3d 199)

In 1975, in *Los Angeles v. San Fernando*, the California Supreme Court significantly limited the Mutual Prescription Doctrine introduced in Pasadena v. Alhambra. This opinion had far-reaching impacts on both the right to use groundwater and the practice of conjunctive use of groundwater and surface water to manage a basin. The case began in 1955, when the City of Los Angeles sued the cities of San Fernando, Glendale, Burbank and other pumpers, asserting a prior right to the San Fernando Valley groundwater basins in the northern part of the City of Los Angeles. The court, relying on Civil Code Section 1007, held that public agencies and public utilities cannot lose their groundwater rights by prescription. This holding effectively ruled out any future "mutual prescription" settlements or judgments involving rights held by public entities.

With respect to the native water supply of the San Fernando Basin, the court found that the City of Los Angeles had prior rights to all of this supply pursuant to its "pueblo right." Pueblo rights are traceable to rights recognized by the Spanish crown and the Mexican government. Under the Spanish/Mexican system, water rights were held in trust by pueblos for the benefit of all of its inhabitants. Under the Treaty of Guadalupe Hidalgo executed by Mexico and the United States in 1848, the municipal successors to Spanish/Mexican pueblos retained their pueblo rights upon the cession of California. In the San Fernando decision, the court confirmed Los Angeles' pueblo right, finding it superior to the rights of all overlying landowners. While a pueblo right is rare, it is an example of the complexity of the rights to use groundwater in California.

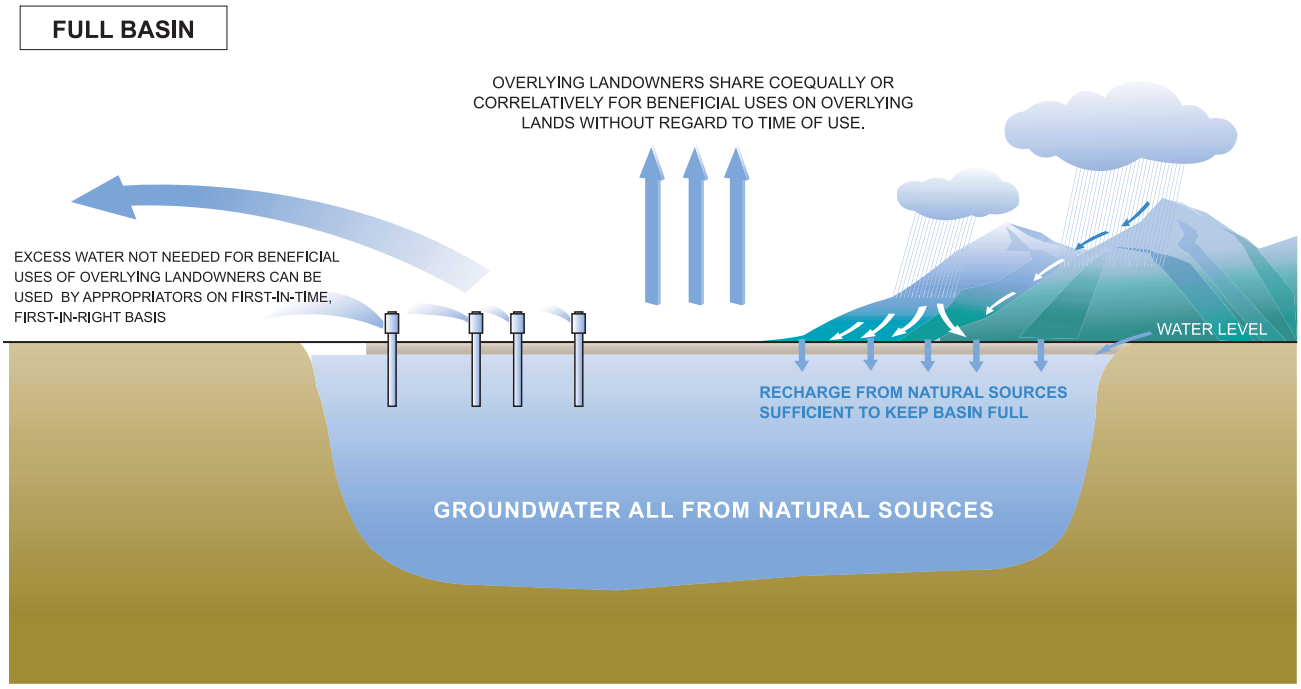

Figure B-1 Rights to groundwater use in full basin established in Katz v. Walkinshaw

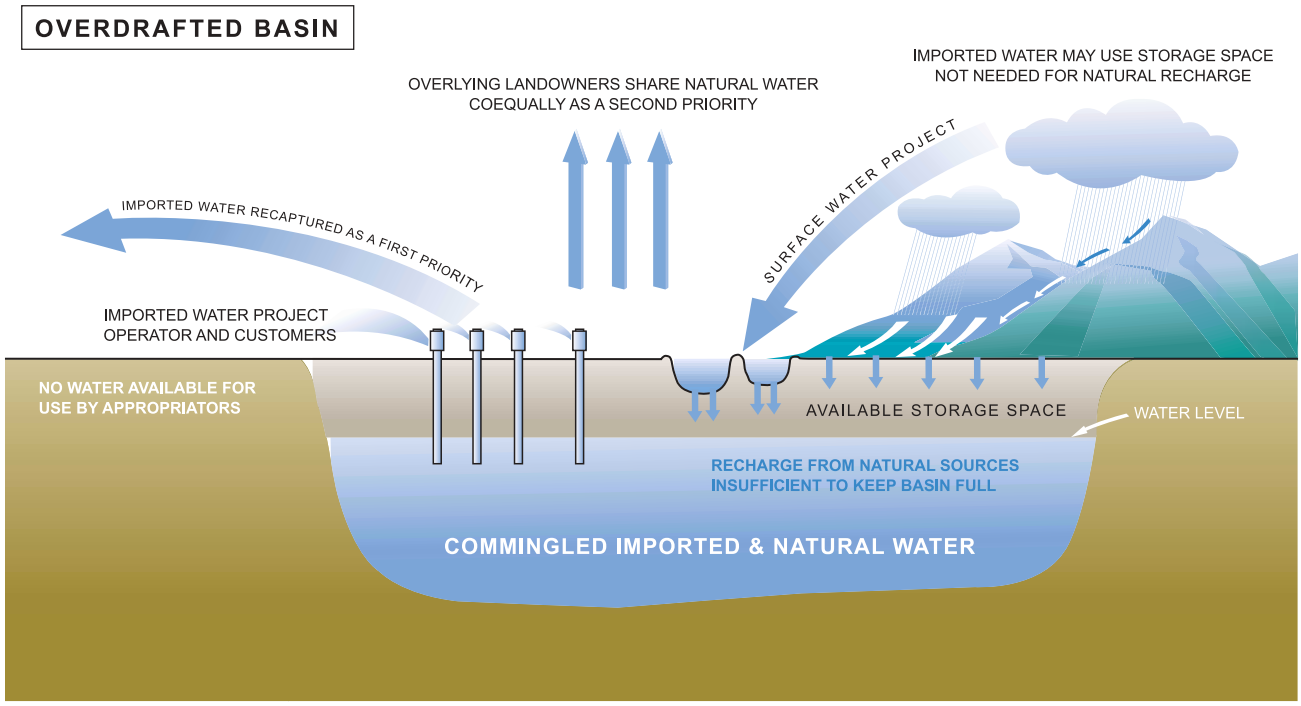

Figure B-2 Rights to groundwater use in overdrafted basin established in Los Angeles v. San Fernando

For the future of conjunctive use of groundwater basins, the court's holding with respect to the rights to available storage space in the Basin is significant. The court upheld the right of public agencies – namely the cities of San Fernando, Los Angeles, Burbank, and Glendale–to recapture the imported water they added to the Basin. The court held that the rights of the respective public agencies to recover such imported water are of equal priority to the City of Los Angeles' pueblo right, and that all such public agency rights are "prior to the rights dependent on ownership of overlying land or based solely upon appropriation of groundwater from the basin." The court remanded the case, directing the trial court to apportion the safe yield of the Basin accordingly.

The court noted that there did not appear to be any shortage of underground storage space in relation to the demand and, hence, the court did not find it necessary to determine priorities as to the future use of such space. The Judgment issued by the trial court on remand, however, provided: "To the extent of any future spreading or in lieu storage of import water or reclaimed water by Los Angeles, Glendale, Burbank or San Fernando, the party causing said water to be so stored shall have a right to extract an equivalent amount of ground water from the San Fernando Basin." Pursuant to the Judgment, a court-appointed Watermaster now manages the groundwater extraction and storage rights within the ULARA. Figure B-2 depicts the rights to use groundwater established in Los Angeles v. San Fernando in an overdrafted basin where water has been stored.

City of Barstow v. Mojave Water Agency (23 Cal. 4th 1224)

In 2000, the California Supreme Court partially overturned the 1995 adjudication of the Mojave River Basin. The trial court had approved a negotiated settlement (or stipulated agreement) that failed to include a well-by-well determination of water rights. The trial court held the negotiated settlement to be binding on all users in the basin, including some pumpers who had not agreed to the settlement. The lower court decision was based on the doctrine of "equitable apportionment," in which the available water is shared based on concepts of equity and fairness. The Court of Appeal had partially reversed the lower court, and held that the trial court did not have the authority to ignore California's traditional water rights doctrine giving overlying users a priority right to beneficial and reasonable use of the groundwater. The Court of Appeal affirmed the trial court's negotiated settlement except as it applied to two of the parties. First, the Court of Appeal reversed the holding against a non-negotiating party since the trial court had ignored that party's existing overlying water rights. Secondly, the Court of Appeal reversed the trial court's judgment as it applied to a company, where the negotiated agreement did not give the company a water-allowance equal to its actual water use. The Supreme Court affirmed the Court of Appeal decision, but reversed the judgment applying to the company's water-allowance. The Supreme Court also affirmed that the trial court could not apply the doctrine of equitable apportionment when overlying water users had already established a prior water right. The Court stated that, while the trial court could impose a physical solution (such as the negotiated settlement), the court could not simply ignore affected owners' legal water rights. Equitable apportionment, thus, remains a tool for adjudicating basin groundwater rights, but only if all parties stipulate to its use.

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Appendix C
Required and Recommended Components of Local Groundwater Management Plans

Section 10750 et seq. of the Water Code, commonly referred to as Assembly Bill 3030, stipulates certain procedures that must be followed in adopting a groundwater management plan under this section.

Amendments to Section 10750 et seq. added the requirement that new groundwater management plans prepared under Section 10750 et seq. must include component 1 below (SB1938 (Stats 2002, Ch 603)).

In addition, the amendments mandate that if the agency preparing the groundwater management plan intends to apply for funding administered by the California Department of Water Resources (DWR) for groundwater or groundwater quality projects, the agency must prepare and implement a groundwater management plan that includes components 2, 3, 6, 7 and 9 below. DWR recommends that all the components below be included in any groundwater management plan to be adopted and implemented by a local managing entity.

Consideration and development of these components for the specific conditions of the basin to be managed under the plan will help to ensure effective groundwater management. In developing these criteria, DWR recognizes that the goal of a groundwater management plan and the goal of an ordinance to manage groundwater should be the same—assurance of a long-term, sustainable, reliable, good quality groundwater supply. Such efforts can benefit greatly from cooperative management within the basin or region.

None of the suggested data reporting in the components below should be construed as recommending disclosure of information that is confidential under State law.

1. Include documentation that a written statement was provided to the public "describing the manner in which interested parties may participate in developing the groundwater management plan," which may include appointing a technical advisory committee (Water Code § 10753.4 (b)).
2. Include a plan by the managing entity to "involve other agencies that enables the local agency to work cooperatively with other public entities whose service area or boundary overlies the groundwater basin." (Water Code § 10753.7 (a)(2)). A local agency includes "any local public agency that provides water service to all or a portion of its service area"
(Water Code § 10752 (g)).
3. Provide a map showing the area of the groundwater basin, as defined by DWR Bulletin 118, with the area of the local agency subject to the plan as well as the boundaries of other local agencies that overlie the basin in which the agency is developing a groundwater management plan (Water Code § 10753.7 (a)(3)).
4. Establish an advisory committee of stakeholders (interested parties) within the plan area that will help guide the development and implementation of the plan and provide a forum for resolution of controversial issues.
5. Describe the area to be managed under the plan, including:
    a. The physical structure and characteristics of the aquifer system underlying the plan area in the context of the overall basin.

b. A summary of the availability of historical data including, but not limited to, the components in Section 7 below.

c. Issues of concern including, but not limited to, issues related to the components in Section 7 below.

d. A general discussion of historical and projected water demands and supplies.

6. Establish management objectives (MOs) for the groundwater basin that is subject to the plan. (Water Code § 10753.7 (a)(1)).

7. Include components relating to the monitoring and management of groundwater levels, groundwater quality, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping. (Water Code § 10753.7 (a)(1)). Consider additional components listed in Water Code § 10753.8 (a) through (l).

8. For each MO, describe how meeting the MO will contribute to a more reliable supply for long-term beneficial uses of groundwater in the plan area, and describe existing or planned management actions to achieve MOs.

9. Adopt monitoring protocols for the components in Section 7 (Water Code § 10753.7 (a)(4)). Monitoring protocols are not defined in the Water Code, but the section is interpreted to mean developing a monitoring program capable of tracking changes in conditions for the purpose of meeting MOs.

10. Describe the monitoring program, including:

a. A map indicating the general locations of any applicable monitoring sites for groundwater levels, groundwater quality, subsidence stations, or stream gages.

b. A summary of monitoring sites indicating the type (groundwater level, groundwater quality, subsidence, stream gage) and frequency of monitoring. For groundwater level and groundwater quality wells, indicate the depth interval(s) or aquifer zone monitored and the type of well (public, irrigation, domestic, industrial, monitoring).

11. Describe any current or planned actions by the local managing entity to coordinate with other land use, zoning, or water management planning agencies or activities (Water Code § 10753.8 (k), (l)).

12. Provide for periodic report(s) summarizing groundwater basin conditions and groundwater management activities. The report(s), prepared annually or at other frequencies as determined by the local management agency, should include:

a. Summary of monitoring results, including a discussion of historical trends.

b. Summary of management actions during the period covered by the report.

c. A discussion, supported by monitoring results, of whether management actions are achieving progress in meeting MOs.

d. Summary of proposed management actions for the future.

e. Summary of any plan component changes, including addition or modification of MOs, during the period covered by the report.

f. Summary of actions taken to coordinate with other water management and land use agencies, and other government agencies.

13. Provide for the periodic re-evaluation of the entire plan by the managing entity.

14. For local agencies not overlying groundwater basins, plans should be prepared including the above listed components and using geologic and hydrologic principles appropriate to those areas (Water Code § 10753.7 (a)(5)).

Appendix D
Groundwater Management Model Ordinance

In developing this model ordinance, the California Department of Water Resources recognizes that the goal of a groundwater management plan and the goal of an ordinance to manage groundwater should be the same—assurance of a long-term, sustainable, reliable, good quality groundwater supply. Such efforts require cooperative management within the region or sub-region.

Chapter X

Groundwater Management Ordinance

Sections:

X.01 Declaration of Findings - The Board finds that:

A. The protection of the groundwater resource for its use within the County is of major concern to the residents of the County for the protection of their health, welfare, and safety.
B. The reliability and sustainability of the groundwater supply for all beneficial uses are of critical importance to the economic, social, and environmental well-being of the County.
C. A lack of effective groundwater management may have significant negative impacts, including, but not limited to:
    1. Lower groundwater levels leading to additional expenses from:
        a) Increased energy consumption.
        b) The need to deepen existing wells.
        c) The need to build new wells.
        d) The need to destroy non-functioning wells.
    2. Costly damage to public roads, bridges, canals, and other structures caused by land subsidence.
    3. Reduction of surface and subsurface flows leading to the potential loss of critical riparian and wetland habitat.
    4. Degradation of groundwater quality.

D. It is essential for management purposes to adopt a monitoring program addressing groundwater levels, groundwater quality, land subsidence, and surface water flow and quality where it directly impacts or is impacted by groundwater.

X.02 Purpose - In support of the findings above, the County has determined that this groundwater management ordinance is necessary to ensure that:

A. Groundwater continues to be a reliable and sustainable resource.
B. The extraction of groundwater does not result in significant adverse economic, environmental, or social impacts.
C. Groundwater quality is protected.
D. Excessive land surface subsidence from groundwater extraction is prevented.

X.03 Declaration of Intent

A. The County intends to foster prudent groundwater management practices by establishing a policy that encourages appropriate management of the resource based on recommendations by a committee of stakeholders.
B. The County intends that its groundwater management activities occur as an open and public process that considers input from all stakeholders in the County.
C. The County intends to work cooperatively with interested local agencies to further develop and implement joint groundwater management activities.
D. The County does not intend to regulate, in any manner, the use of groundwater, except as a last resort to protect the groundwater resource.
E. The County intends to act as an enforcing agency should the local resource become threatened.
F. The County does not intend to infringe upon the rights of surface water users in the managed area.
G. The County does not intend to limit other authorized means of managing groundwater within the County.

X.04 Definitions

A. "Aquifer" means a geologic formation that stores groundwater and transmits and yields significant quantities of water to wells and springs. Significant quantity is an amount that that satisfies local needs and may range from thousands of gallons per minute to less than 5 gpm, depending on rock type and intended use.
B. "Board" means the Board of Supervisors of the County.
C. "District" means a district or municipality, located wholly or partially within the boundaries of the County, that is a purveyor of water for agricultural, domestic, or municipal use.
D. "Enforcement Agency" means the Board as the enforcement agency under this chapter.
E. "Groundwater" means all water beneath the surface of the earth below the zone of saturation, but does not include subterranean streams flowing in known and definite channels.
F. "Groundwater Basin" means an aquifer or series of aquifers with a reasonably defined lateral and vertical extent, as defined in Bulletin 118 by Department of Water Resources. "Non-basin areas" are outside defined groundwater basins and contain smaller amounts of groundwater in consolidated sediments or fractured hard rock.
G. "Groundwater Export" means the conveyance of groundwater outside of the boundaries of the County and outside of the boundaries of any district that is partially within the County.
H. "Groundwater Substitution" means the voluntary use of an available groundwater supply instead of surface water for the purposes of using the surface water outside the County and outside the boundaries of any district that is partially within the County.

I. "Land Subsidence" means the lowering of the ground surface caused by the inelastic consolidation of clay beds in the aquifer system.
J. "Management Objective"(MO) means a condition identified for each subunit to ensure that the groundwater supply is reliable and sustainable. The MOs set acceptable conditions with respect to groundwater levels, groundwater quality, inelastic land surface subsidence, and surface water flows and quality. Compliance with the MO is tracked by a monitoring program and threshold values that are adopted for each Management Objective.
K. "Recharge" means flow to groundwater storage from precipitation, and infiltration from streams, irrigation, spreading basins, injection wells, and other sources of water.
L. "Reliability" means having an available, predictable, and usable groundwater supply at any given point in time.
M. "Stakeholder" means an individual or an entity, such as a water supplier or a county resident, with a permanent interest in the availability of the groundwater resource.
N. "Subunit" means any subdivision of a groundwater basin or non-basin area in the County created for the purposes of representation of stakeholders and the establishment of local area management objectives.
O. "Sustainable" means the groundwater resource is maintained for use by residents in the basin over a prolonged period of time.
P. "Technical Advisory Committee" means a committee of persons knowledgeable in groundwater management, hydrology, and hydrogeology established for the purpose of providing technical guidance to the Water Advisory Committee.
Q. "Threshold values" mean the limits established by the WAC for groundwater levels, groundwater quality, land surface subsidence, and surface water flow and quality that are not to be exceeded if the MOs are to be met.
R. "Water Advisory Committee" (WAC) means a multimember advisory body established for the purpose of aiding the Board in providing effective management of the groundwater resources in the County, and representing all of the subunits that are identified.
S. "Water Management Entities" means any local agency, or group of agencies, authorized to manage groundwater.

X.05 Groundwater Management Program

A. The County recognizes that effective groundwater management is key to maintaining a reliable and sustainable resource. For the purposes of establishing an effective groundwater management program, the Board shall appoint a WAC to establish MOs and make recommendations to the Board to ensure that MOs are met.
B. For purposes of establishing a WAC, the groundwater basins and non-basin areas of the County will be divided into subunits based on hydrogeologic principles and institutional boundaries. These subunits shall be established by the Board based on public input to address the groundwater management needs of the County. The WAC shall consist of members that represent each subunit. Upon establishment of the subunits, the Board shall appoint a member to represent each subunit on the WAC.
C. The WAC shall have the following responsibilities to the Board:
    1. Recommend MOs for each groundwater management subunit.
    2. Recommend a groundwater monitoring network for purposes of tracking MOs.
    3. Recommend the frequency of monitoring.
    4. Propose changes in monitoring.
    5. Ensure monitoring data receive technical review.
    6. Ensure that monitoring data are made available to the public.

7. Recommend actions to resolve noncompliance with MOs.

D. For the purposes of providing technical advice to the WAC in carrying out its responsibilities, a technical advisory committee (TAC) shall be established. The TAC shall consist of local experts or a combination of local expertise and technical consultants from private and public organizations that are nominated by the WAC and approved by the Board. Individuals appointed to the TAC should be highly knowledgeable in groundwater management, hydrology, and hydrogeology. The TAC shall review technical data collected by monitoring programs within the County and advise the WAC.

X.06 Management Objectives

A. To ensure that the County maintains a reliable and sustainable groundwater supply, MOs for groundwater levels, groundwater quality, land subsidence, and surface water flow and quality shall be adopted for each subunit. Threshold values that are not to be exceeded shall be defined for each MO.

B. Compliance with the MOs will be determined by evaluation of data collected from groundwater level, groundwater quality, land subsidence, and surface water flow and quality monitoring networks. Evaluation of these data with respect to threshold values shall be the basis for determining compliance with the MOs.

C. Each WAC member shall recommend MOs for their subunit. The WAC shall develop a comprehensive set of recommendations for all subunits, and the Board shall adopt these MOs for the County. MOs may differ from subunit to subunit, but the established MOs shall be consistent with the overall goal of supply reliability for the County.

D. Groundwater management practices based on the established MOs for one subunit of the County shall not adversely impact adjacent subunits.

X.07 Monitoring Program Network

The WAC shall develop County-wide monitoring programs to collect representative data on groundwater levels, groundwater and surface water quality, land surface subsidence, and stream flow and quality. Each subunit shall propose its own monitoring program, and the WAC shall adopt a comprehensive monitoring program for the County. The data collected, showing current conditions and changes over time as a result of groundwater extraction, shall be evaluated by the WAC in consultation with the TAC. The WAC will recommend policies and actions to ensure that MOs for each subunit are met. The collection and evaluation of the data shall be based on scientifically sound principles, and shall incorporate appropriate quality assurance and quality control protocols.

A. Groundwater levels: The groundwater level monitoring network shall be proposed by the WAC and approved by the Board. The intent of the groundwater level monitoring network is to measure water levels in selected wells that can adequately determine representative conditions in the aquifer system for determination of compliance with the MOs. The network will include selected municipal, domestic, and irrigation wells owned by water districts, private parties, and municipal and industrial water suppliers. Where needed, dedicated monitoring wells may be installed. Participation by well owners will be voluntary.

B. Water Quality: The groundwater quality monitoring network shall be proposed by the WAC and approved by the Board. The intent of the groundwater quality monitoring network is to monitor selected wells that can adequately determine representative groundwater quality conditions in the aquifer system for identification of compliance with the MOs. The network will include selected municipal, domestic, and irrigation wells owned by water districts, private parties, and municipal

and industrial water suppliers. Where needed, dedicated monitoring wells may be installed. Participation by well owners will be voluntary.

C. Land Subsidence: The land subsidence program and network shall be proposed by the WAC and approved by the Board. The intent of the land subsidence monitoring is to detect land subsidence for determination of compliance with the MOs. The network may include benchmarks that are surveyed for changes in elevation throughout the County, based on the judgment of the WAC of the need for such a program.

D. Surface Water Flow and Quality: The surface water flow and quality network shall be proposed by the WAC and approved by the Board. The intent of this network is to detect changes in surface water flow or surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping for evaluation of compliance with MOs.

X.08 Monitoring Frequency

The recommended frequency of collection of data for each of the parameters listed above shall be determined by the WAC. Initially, each parameter should be measured at the frequencies outlined below, unless the WAC notes upon evaluation of existing data that more frequent monitoring or additional analyses are called for.

A. Groundwater levels should be measured at least three times during the year: one measurement prior to the period of highest groundwater use, one measurement during peak groundwater use, and one measurement following the period of highest groundwater use (approximately the months of _____, _____, and _____).

B. Groundwater quality measurements of electrical conductivity, temperature, and pH should be obtained at least twice annually during the periods of highest and lowest groundwater use (approximately the months of _____ and _____). Upon evaluation of the data, the WAC may propose analyses for other constituents.

C. Selected benchmarks in the County land subsidence monitoring network should be surveyed every five years at a minimum. These surveys should be conducted following aquifer recovery and prior to the period of highest groundwater extraction (approximately the month of_____).

D. Measurement of surface water flow and quality in areas determined to directly affect groundwater levels or quality or that are affected by groundwater pumping shall be obtained at least ___ times per month as long as there are flows in the channel.

X.09 Changes in Monitoring

If evaluation of the groundwater level, groundwater quality, land subsidence, surface water flow, or surface water quality data indicates a need for more or less frequent measurements or analyses, the WAC may propose a change in the monitoring frequency. Similarly, if evaluation of the data indicates that additional monitoring sites are necessary, the WAC may propose an additional or a reduced number of sites for data collection. The Board shall adopt these changes when supported by credible evidence.

X.10 Review of Technical Data

A. The TAC shall propose and the WAC shall adopt standard methods using scientifically sound principles for review and analysis of the collected data. The TAC will meet, as needed and requested by the WAC, to evaluate the technical data and shall report their findings at appropriate meetings of the WAC. The WAC shall meet at least __ times per month during the period of maximum groundwater use (months of _____ through _____) and quarterly during the off season (months of _____ through _____), or as necessary.

B. During the period of highest groundwater use, the WAC meetings will focus on data review and analysis with respect to compliance with the current MOs. During the period of low

groundwater use, the WAC meetings will focus on a review of compliance with MOs for the previous period of high groundwater use and consideration of the need for changes to the MOs.

X.11 Data Dissemination

The WAC, in addition to establishing methods for data collection and evaluation, shall establish methods for data storage and dissemination. The WAC shall disseminate the monitoring data and evaluation reports through public presentations and through a County-maintained groundwater Internet site. At a minimum, the WAC shall publicly present findings from the monitoring program to the Board twice annually.

X.12 Actions when MO Noncompliance is Reported

A. Action by Technical Advisory Committee. In the event that the TAC identifies an area that is not in compliance with the MOs, or if noncompliance is reported by any other means, the TAC shall report to the WAC on the regional extent and magnitude of the noncompliance. This information shall also be released to the public no later than ___ days from the time that noncompliance with MOs was identified. The TAC shall then collect all available pertinent hydrologic data, investigate possible causes for noncompliance with MOs, and recommend actions to the WAC to bring the area into compliance. These recommendations shall be made no later than ___ days after the report of noncompliance is released to the public. The TAC shall first make recommendations that focus on correcting the noncompliance through negotiations with all parties in the affected area.

B. Action by Water Advisory Committee. The WAC shall act as lead negotiator in re-establishing compliance with the MO. If negotiations with parties in the affected area do not result in timely and positive action to re-establish compliance with MOs for the basin, the WAC may recommend a plan to the Board to modify, reduce or terminate groundwater extraction in the affected area or take other necessary actions. Such a plan will be recommended to the Board only after the WAC has thoroughly reviewed the recommendations of the TAC at a public meeting. The modification, reduction, or termination of groundwater extraction in the affected area shall first be applied to wells involved in any export or substitution programs, and then to other wells if necessary. Domestic wells shall not be considered for any modification, reductions, or termination of groundwater extraction.

C. Action by Board of Supervisors. The Board of Supervisors, using its police powers, shall act as the enforcement agency for this ordinance. Any recommendation of the WAC may be appealed to the Board within __ working days.

X.13 Regional Coordination

Management decisions recommended by the WAC and adopted by the Board shall not deleteriously affect groundwater resources in any portions of groundwater basins or non-basin areas that share a common groundwater resource in adjacent counties. To accomplish this goal, the WAC shall meet and coordinate with water management entities outside the County that overlie a common groundwater basin at least twice per year once prior to the period of highest groundwater use and once following the period of highest groundwater use.

X.14 Integrated Resource Management

A. To ensure integration of planning activities within the County, the WAC shall inform County departments involved with groundwater related activities, including but not limited to Land Use or Zoning, Planning, Public Works, Utilities, and Environmental Health, of all WAC meetings and actions regarding MOs. In turn, these County departments shall take into consideration the

adopted MOs when approving development or zoning changes or construction projects that may rely on or affect groundwater quantity or quality.

B. To the greatest extent practicable, the WAC should also integrate resource management planning with other agencies within the basin. Resource activities that could benefit from integrated planning with groundwater management include, but are not limited to:
   - Groundwater management planning by other agencies—agricultural, municipal, industrial, local government
   - Watershed management plans
   - Urban water management plans
   - Management and disposal of municipal solid waste and municipal sewage
   - Drinking water source assessment and protection programs
   - Public water system emergency and disaster response plans
   - Surface water and groundwater conjunctive management programs
   - Expansion of surface and groundwater facilities
   - Water efficiency programs
   - Water recycling programs
   - Environmental habitat construction or restoration programs
   - Water quality protection programs
   - Recharge programs
   - Transportation infrastructure planning

X.15 Data Relating to Export and Substitution of Groundwater

A. Districts, persons, or contractors intending to operate a groundwater export or groundwater substitution program shall submit the following data to the WAC __ working days prior to commencing the program:
   1. A description of the project with the total amount of groundwater to be exchanged or substituted
   2. The dates over which the project will take place.
   3. A statement of the anticipated impacts of the project relative to adopted MOs.
   4. A discussion of possible contingencies in the event of MO noncompliance.
   5. A map showing the location of the wells to be used by the program.
   6. A summary of any monitoring program proposed.
   7. All required environmental documentation.

B. While the program is in operation, the following information shall be provided to the WAC at least ___ times per month:
   1. All static and pumping groundwater level measurements made in the pumping well during the period of extraction for the export or substitution program.
   2. The amount of groundwater extracted from each well per week.
   3. Static groundwater level measurements in at least __ of the most proximal wells to the project pumping wells that can be practicably monitored.

C. All costs for providing such information to the WAC shall be borne by the project participants.

Note: Although the terms “County” and “Board” are used throughout the model ordinance for clarity, the model could be used by any local government or agency with appropriate authority or powers.

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Appendix E
SWRCB Beneficial Use Designations[1]

Agricultural Supply (AGR) – Uses of water for farming, horticulture, or ranching including, but not limited to irrigation, stock watering, or support of vegetation for ranch grazing.

Aquaculture (AQUA) – Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Cold Freshwater Habitat (COLD) – Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Estuarine Habitat (EST) – Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Freshwater Replenishment (FRSH) – Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Groundwater Recharge (GWR) – Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Hydropower Generation (POW) – Uses of water for hydropower generation.

Industrial Process Supply (PRO) – Uses of water for industrial activities that depend primarily on water quality.

Industrial Service Supply (IND) – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.

Inland Saline Water Habitat (SAL) – Uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Marine Habitat (MAR) – Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Migration of Aquatic Organisms (MIGR) – Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Municipal and Domestic Supply (MUN) – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Navigation (NAV) – Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Noncontact Water Recreation (REC-2) – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Ocean Commercial and Sport Fishing (COMM) – Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

[1] From SWRCB 2000

Preservation of Biological Habitats of Special Significance (BIOL) – Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

Rare, Threatened, or Endangered Species (RARE) – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance or plant or animal species established under State or federal law as rare, threatened or endangered.

Shellfish Harvesting (SHELL) – Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sports purposes.

Spawning, Reproduction, and/or Early Development (SPWM) – Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Warm Freshwater Habitat (WARM) – Uses of water that support warmwater ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Water Contact Recreation (REC-1) – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Wildlife Habitat (WILD) – Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Appendix F
Federal and State MCLs and Regulation Dates for Drinking Water Contaminants

	U.S. Environmental Protection Agency		California Department of Health Services	
Contaminant	**MCL (mg/L)**	**Date[a]**	**MCL (mg/L)**	**Effective date**
Inorganics				
Aluminum	0.05 to 2[b]	1/91	1 0.2[b]	2/25/89 9/8/94
Antimony	0.006	7/92	0.006	9/8/94
Arsenic	0.05 0.01	eff: 6/24/77 2001	0.05	77
Asbestos	7 MFL[c]	1/91	7 MFL[c]	9/8/94
Barium	1 2	eff: 6/24/77 1/91	1	77
Beryllium	0.004	7/92	0.004	9/8/94
Cadmium	0.010 0.005	eff: 6/24/77 1/91	0.010 0.005	77 9/8/94
Chromium	0.05 0.1	eff: 6/24/77 1/91	0.05	77
Copper	1.3[d]	6/91	1[b] 1.3[d]	77 12/11/95
Cyanide	0.2	7/92	0.2 0.15	9/8/94 6/12/03
Fluoride	4 2[b]	4/86 4/86	2	4/98
Lead	0.05[e] 0.015[d]	eff: 6/24/77 6/91	0.05[e] 0.015[d]	771 2/11/95
Mercury	0.002	eff: 6/24/77	0.002	77
Nickel	Remanded	0.1	9/8/94	
Nitrate	(as N)10	eff: 6/24/77	(as N03) 45	77
Nitrite (as N)	1	1/91	1	9/8/94
Total Nitrate/Nitrite (as N)	10	1/91	10	9/8/94
Selenium	0.01 0.05	eff: 6/24/77 1/91	0.01 0.05	77 9/8/94
Thallium	0.002	7/92	0.002	9/8/94
Radionuclides				
Uranium	30 g/L	12/7/00	20 pCi/L	1/1/89
Combined radium-226 & 228	5 pCi/L	eff: 6/24/77	5 pCi/L	77
Gross Alpha particle activity	15 pCi/L	eff: 6/24/77	15 pCi/L	77
Gross Beta particle activity	dose of 4 millirem/yr	eff: 6/24/77	50 pCi/L[f]	77

Contaminant	U.S. Environmental Protection Agency MCL (mg/L)	Date[a]	California Department of Health Services MCL (mg/L)	Effective date
Strontium-90	8 pCi/L	eff: 6/24/77 now covered by Gross Beta	8 pCi/L[f]	77
Tritium	20,000 pCi/L	eff: 6/24/77 now covered by Gross Beta	20,000 pCi/L[f]	77
VOCs				
Benzene	0.005	6/87	0.001	2/25/89
Carbon Tetrachloride	0.005	6/87	0.0005	4/4/89
1,2-Dichlorobenzene	0.6	1/91	0.6	9/8/94
1,4-Dichlorobenzene	0.075	6/87	0.005	4/4/89
1,1-Dichloroethane	- -	- -	0.005	6/24/90
1,2-Dichloroethane	0.005	6/87	0.0005	4/4/89
1,1-Dichloroethylene	0.007	6/87	0.006	2/25/89
cis-1,2-Dichloroethylene	0.07	1/91	0.006	9/8/94
trans-1,2-Dichloroethylene	0.1	1/91	0.01	9/8/94
Dichloromethane	0.005	7/92	0.005	9/8/94
1,3-Dichloropropene	- -	- -	0.0005	2/25/89
1,2-Dichloropropane	0.005	1/91	0.005	6/24/90
Ethylbenzene	0.7	1/91	0.68 0.7 0.3	2/25/89 9/8/94 6/12/03
Methyl-tert-butyl ether (MTBE)	- -	- -	0.005[b] 0.013	1/7/99 5/17/00
Monochlorobenzene	0.1	1/91	0.03 0.07	2/25/89 9/8/94
Styrene	0.1	1/91	0.1	9/8/94
1,1,2,2-Tetrachloroethane	- -	- -	0.001	2/25/89
Tetrachloroethylene	0.005	1/91	0.005	5/89
Toluene	1	1/91	0.15	9/8/94
1,2,4 Trichorobenzene	0.07	7/92	0.07	9/8/94
1,1,1-Trichloroethane	0.200	6/87	0.200	2/25/89
1,1,2-Trichloroethane	0.005	7/92	0.032 0.005	4/4/89 9/8/94
Trichloroethylene	0.005	6/87	0.005	2/25/89
Trichlorofluoromethane	- -	- -	0.15	6/24/90
1,1,2-Trichloro-1,2,2- Trifluoroethane	- -	- -	1.2	6/24/90
Vinyl chloride	0.002	6/87	0.0005	4/4/89
Xylenes	10	1/91	1.750	2/25/89

Contaminant	U.S. Environmental Protection Agency MCL (mg/L)	Date[a]	California Department of Health Services MCL (mg/L)	Effective date
SVOC's				
Alachlor	0.002	1/91	0.002	9/8/94
Atrazine	0.003	1/91	0.003 0.001	4/5/89 6/12/03
Bentazon	- -	- -	0.018	4/4/89
Benzo(a) Pyrene	0.0002	7/92	0.0002	9/8/94
Carbofuran	0.04	1/91	0.018	6/24/90
Chlordane	0.002	1/91	0.0001	6/24/90
Dalapon	0.2	7/92	0.2	9/8/94
Dibromochloropropane	0.0002	1/91	0.0001 0.0002	7/26/89 5/3/91
Di(2-ethylhexyl)adipate	0.4	7/92	0.4	9/8/94
Di(2-ethylhexyl)phthalate	0.006	7/92	0.004	6/24/90
2,4-D	0.10.07	eff: 6/24/77 1/91	0.1 0.07	77 9/8/94
Dinoseb	0.007	7/92	0.007	9/8/94
Diquat	0.02	7/92	0.02	9/8/94
Endothall	0.1	7/92	0.1	9/8/94
Endrin	0.0002 0.002	eff: 6/24/77 7/92	0.0002 0.002	77 9/8/94
Ethylene Dibromide	0.00005	1/91	0.00002 0.00005	2/25/89 9/8/94
Glyphosate	0.7	7/92	0.7	6/24/90
Heptachlor	0.0004	1/91	0.00001	6/24/90
Heptachlor Epoxide	0.0002	1/91	0.00001	6/24/90
Hexachlorobenzene	0.001	7/92	0.001	9/8/94
Hexachlorocyclopentadiene	0.05	7/92	0.05	9/8/94
Lindane	0.004 0.0002	eff: 6/24/77 1/91	0.004 0.0002	77 9/8/94
Methoxychlor	0.1 0.04	eff: 6/24/77 1/91	0.1 0.04 0.03	77 9/8/94 6/12/03
Molinate	- -	- -	0.02	4/4/89
Oxamyl	0.2	7/92	0.2 0.05	9/8/94 6/12/03
Pentachlorophenol	0.001	1/91	0.001	9/8/94
Picloram	0.5	7/92	0.5	9/8/94
Polychlorinated Biphenyls	0.0005	1/91	0.0005	9/8/94
Simazine	0.004	7/92	0.010 0.004	4/4/89 9/8/94

Contaminant	U.S. Environmental Protection Agency MCL (mg/L)	U.S. Environmental Protection Agency Date[a]	California Department of Health Services MCL (mg/L)	California Department of Health Services Effective date
Thiobencarb	- -	- -	0.07 0.001[b]	4/4/89 4/4/89
Toxaphene	0.005 0.003	eff: 6/24/77 1/91	0.005 0.003	77 9/8/94
2,3,7,8-TCDD (Dioxin)	$3x10^{-8}$	7/92	$3x10^{-8}$	9/8/94
2,4,5-TP (Silvex)	0.01 0.05	eff: 6/24/77 1/91	0.01 0.05	77 9/8/94
Disinfection Byproducts				
Total trihalomethanes	0.10 0.080	11/29/79 eff: 11/29/83 eff: 1/1/02[g]	0.10	3/14/83
Total haloacetic acids	0.060	eff: 1/1/02[g]		
Bromate	0.010	eff: 1/1/02[g]		
Chlorite	1.0	eff: 1/1/02[g]		
Treatment Technique				
Acrylamide	TT[h]	1/91	TT[h]	9/8/94
Epichlorohydrin	TT[h]	1/91	TT[h]	9/8/94

Source: http://www.dhs.ca.gov/ps/ddwem/chemicals/MCL/EPAandDHS.pdf

a. "eff." indicates the date the MCL took effect; any other date provided indicates when EPA established (that is, published) the MCL.

b. Secondary MCL.

c. MFL = million fibers per liter, with fiber length > 10 microns.

d. Regulatory Action Level; if system exceeds, it must take certain actions such as additional monitoring, corrosion control studies and treatment, and for lead, a public education program; replaces MCL.

e. The MCL for lead was rescinded with the adoption of the regulatory action level described in footnote d.

f. MCLs are intended to ensure that exposure above 4 millirem/yr does not occur.

g. Effective for surface water systems serving more than 10,000 people; effective for all others 1/1/04.

h. TT = treatment technique, because an MCL is not feasible.

Federal and State MCLs – updated 05/23/03

Appendix G
Development of Current Groundwater Basin/Subbasin Map

This Bulletin 118 update represents the first time that groundwater basin boundaries have been released as a digital coverage. The basin boundaries for the revised groundwater basin map were primarily defined using geologic contacts and hydrogeologic barriers. Specifically the identification of the groundwater basins was initially based on the presence and areal extent of unconsolidated alluvial sediments identified on 1:250,000 scale, geologic maps published by the California Department of Conservation, Division of Mines and Geology. The identified groundwater basin areas were then further evaluated through review of relevant geologic and hydrogeologic reports and well completion reports, and using the basin definition criteria listed in Table 8. Basin boundaries that are specified in each of the court decisions has been used for the boundaries of adjudicated basins.

Well completion reports for wells present in basin areas that were identified from the geologic map were reviewed to identify the depth to the top of the water table and the top of impermeable bedrock. If there was less than 25 feet of permeable material present or if there was no groundwater present within the permeable material, the area was eliminated from the map. The well completion reports were also reviewed to determine if water supply wells located within the delineated basin area were extracting groundwater from the permeable materials underlying the area or from the bedrock beneath the permeable material. If the wells only extracted groundwater from the bedrock, the area was eliminated from the map. This resulted in the elimination of some areas identified as basins in previous Bulletin 118 publications. If there were no wells present in basin areas identified from the geologic map and no other information on the geology underlying these areas, the areas were retained in the current version of the map. Additional hydrogeologic information might or might not verify that these areas should be retained as groundwater basins.

Groundwater basins were delineated and separated from each other by the following restrictions on groundwater flow. For more detail on the types of basins and the flow boundaries of those basins, see Table 8.

Impermeable Bedrock. Impermeable bedrock with lower water yielding capacity. These include consolidated rocks of continental and marine origin and crystalline/or metamorphic rock.

Constrictions in Permeable Materials. A lower permeability material, even with openings that are filled with more permeable stream channel materials, generally forms a basin boundary for practical purposes. While groundwater may flow through the sediment-filled gaps, the flow is restricted to those gaps.

Fault. A fault that crosses permeable materials may form a barrier to groundwater movement if movement along the fault plane has created fine material that impedes groundwater movement or juxtaposed low permeability material adjacent to an aquifer. This is usually indicated by noticeable difference in water levels in wells and/or flow patterns on either side of the fault. Not all faults act as barriers to groundwater flow.

Low Permeability Zone. Areas of clay or other fine-grained material that have significant areal or vertical extent generally form a barrier to groundwater movement within the basin but do not form basin boundaries.

Groundwater Divide. A groundwater divide is generally considered a barrier to groundwater movement from one basin to another for practical purposes. Groundwater divides have noticeably divergent groundwater flow directions on either side of the divide with the water table sloping away from the divide. The location of the divide may change as water levels in either one of the basins change, making such a "divide" less useful. Such a boundary is often used for subbasins.

Adjudicated Basin Boundaries. The basin boundaries established by court order were used for all adjudicated basins. These court-decided boundaries affect the location of natural boundaries of adjoining basins. Some adjudicated basins are represented as subbasins in this bulletin.

Available reports on the geologic and hydrogeologic conditions in the delineated basin areas were also reviewed to determine if there was information that would further define the boundaries of the basin areas. This review resulted in changes to some of the basin boundaries identified in previous versions of Bulletin 118.

Several of the larger groundwater basins were further subdivided into groundwater subbasins in Bulletin 118-80 and additional large groundwater basins were subdivided during this 2003 revision. The subbasin boundaries were also primarily defined using geologic contacts and hydrogeologic divides where possible. If this was not possible, political or institutional boundaries were used.

The hydrogeologic information contained in the basin descriptions that supplement this update of Bulletin 118 includes only the information that was available in California Department of Water Resources (DWR) files through reference searches and through limited contact with local agencies. Local agencies may have conducted more recent studies that have generated additional information about water budgets and aquifer characteristics. Unless the agency notified DWR or provided a copy of the recent reports to DWR staff that recent information has not been included in the basin descriptions. Therefore, although Senate Bill 610 refers to groundwater basins identified as overdrafted in Bulletin 118, it would be prudent for local water suppliers to evaluate the potential for overdraft of any basin included as a part of a water supply assessment.

Persons interested in collecting groundwater information in accordance with the Water Code as amended by SB 221 and SB 610 may start with the information in Bulletin 118, but should follow up by consulting the references listed for each basin and contacting local water agencies to obtain any new information that is available. Otherwise, evaluation of available groundwater resources as mandated by SB 221 and SB 610 may not be using the most complete and recent information about water budgets and aquifer characteristics.

Groundwater basin and subbasin boundaries shown on the map included with this bulletin are based on evaluation of the best available information. In basins where many studies have been completed and the basin has been operated for a number of years, the basin response is fairly well understood and the boundaries are fairly well defined. Even in these basins, however, there are many unknowns and changes in boundaries may result as more information about the basin is collected and evaluated.

In many other basins where much less is known and understood about the basin, boundaries will probably change as a better understanding of the basin is developed. A procedure for collecting information from all the stakeholders should be developed for use statewide so that agreement on basin boundaries can be achieved.

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DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA

Appendix E
Stakeholder Outreach Materials

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Advisory Committee By-Laws

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SAN PASQUAL VALLEY
GROUNDWATER SUSTAINABILITY PLAN
ADVISORY COMMITTEE
BY-LAWS

Article 1 PURPOSE, ROLE AND FORMATION OF THE ADVISORY COMMITTEE

Section A – On October 25, 2016, San Diego City Council (City Council) held a public hearing and approved a resolution to become a Groundwater Sustainable Agency (GSA) for the San Pasqual Valley Groundwater Basin (Basin). On June 21, 2017, the Board of Supervisors of the County of San Diego (County) approved the Memorandum of Understanding (MOU) between the City of San Diego (City) and County for the Basin. On June 27, 2017, City Council held a public hearing and also approved the MOU, which memorializes each agency's role and responsibility for developing a Groundwater Sustainability Plan (GSP) by January 31, 2022, and establishes a multi-agency GSA for the Basin. The MOU establishes a Core Team comprised of City and County staff tasked with coordinating the activities of the Advisory Committee (AC) for the Basin GSP.

Section B – In consideration of the interests of all beneficial uses and users of groundwater in the basin, stakeholder engagement and education of both stakeholders and the general public will be conducted in part via the deliberations of the AC pursuant to California Water Code Section 10723.2. The purpose of the AC is to provide input and community perspective to aid in the development of the GSP. As information supporting the GSP is prepared by the GSA, these items will be brought before the AC for discussion, analysis, and input.

Section C – The AC is a non-partisan, non-sectarian, non-partisan, non-sectarian, collaborative organization. The AC is not empowered by ordinance, establishing authority, or policy to render a binding decision of any kind. Membership on the AC shall not waive or preclude comment or participation, formally or informally, on any related decisions or process.

Section D – The AC is advisory to the Core Team. The Core Team will develop a GSP that is technically sound, meets the requirements of the Sustainable Groundwater Management Act (SGMA), and is acceptable to the City and to the County. The GSP shall include, but not be limited to, groundwater use enforcement measures, a detailed breakdown of each GSA Party's responsibilities for GSP implementation, anticipated costs of implementing the GSP, and cost recovery mechanisms, if necessary.

Article 2 MEMBERSHIP AND TERM OF OFFICE

Section A – The AC shall consist of individuals with interests in developing, deliberating, planning, and/or advocating for sustainable use of groundwater in the San Pasqual Basin, under the requirements of SGMA.

Section B – The AC is limited to nine (9) members. Potential representatives shall be apportioned as follows:

(1) One member to represent San Pasqual Academy

(2) One member to represent Rancho Guejito/Large Land Owner

(3) One member to represent Small Land Owner/Aggregate Group

(4) One member to represent San Diego Zoo Safari Park

(5) One member to represent Agricultural/Crop

(6) One member to represent Agricultural/Animal

(7) One member to represent San Dieguito River Valley Conservancy

(8) One member to represent San Diego County Farm Bureau

(9) One member to represent San Pasqual Tribe

Each organization/category above may nominate another AC member appointee to represent their organization/category, if a vacancy occurs. Each person nominated to the AC by the above stakeholder/category must be endorsed by the Core Team before serving on the AC. Only endorsed members may serve on the AC.

Section C – Each AC member shall serve a term, which shall run concurrently with the development and completion of the GSP.

Section D - A vacancy shall be recognized for any AC member who: (1) dies; (2) resigns; (3) has unexcused absences from more than three of the scheduled AC meetings within a single calendar year; (4) misses three meetings in a row; (5) regularly fails to abide by the discussion covenants of the AC; (6) violates the Ralph M. Brown Act; or (7) fails to exercise the purpose and authority of the AC as described in Article 1 above. The AC member shall notify the Core Team if a position is deemed vacant pursuant to items 1-4 above, or if the AC member recommends the removal of a member as related to items 5–7 above. If a vacancy occurs, the stakeholder/category may nominate another AC member appointee for that position that must then be endorsed by the Core Team. The new appointee AC member shall serve through the development and completion of the GSP.

Article 3 DUTIES

The AC shall have the following duties and responsibilities:

(1) Serve as a resource to the Core Team on GSP development issues for the San Pasqual Basin;

(2) Advise and provide input in the formation of the planning and policy recommendations to be included in the GSP. This may include reviewing technical materials and providing comments, data, and relevant local information to the GSA related to GSP development; assisting in communicating concepts and requirements to the member's own stakeholder constituents that they represent; providing comments on materials and reports prepared; assisting the Core Team to anticipate short- and long-term future events that may impact groundwater sustainability, trends and conditions that will impact groundwater management; and

(3) Participate in AC and Core Team public meetings, expected to occur on an approximately quarterly basis or as needed during GSP development.

Article 4 STRUCTURE

Section A – AC meetings may be facilitated by a Facilitator acceptable to the Core Team. The Facilitator shall convene the meeting, establish the existence of a quorum and oversee the meeting to insure the timely completion of the published agenda. If for any reason, the Facilitator cannot facilitate at a particular meeting, a Core Team member shall assume the facilitation responsibilities assigned above to the facilitator.

Section B – The Facilitator, in consultation with the AC, shall assign coordinating duties and/or specific tasks to subcommittees of the AC as necessary. The Facilitator will work with the Core Team to determine a meeting schedule, develop meeting materials, coordinate communications to the AC in advance of meetings, and other similar organizational responsibilities.

Section C – The City shall assign staff to record the minutes of all AC meetings, maintain a list of all active representatives, handle committee correspondence, and keep records of actions as they occur at each meeting. It is the responsibility of the Core Team staff to ensure that posting of meeting notices in a publicly accessible place for 72 hours prior to an AC meeting, to keep a record of such posting, and to reproduce and distribute the AC notices and minutes of all meetings.

Article 5 ORGANIZATIONAL PROCEDURES

Section A – AC meetings shall be held under the following discussion covenants:

(1) Focus on the future as much as possible

(2) All perspectives are valued. You are not required to defend your perspective, but you are asked to share it and to provide supporting rationale

(3) All ideas have value; if you believe another approach is better, offer it as a constructive alternative

(4) Everyone will have an equal opportunity to participate

(5) Everyone will be encouraged to talk

(6) One person speaks at a time

(7) No side conversations

(8) View disagreements as problems to be solved rather than battles to be won

(9) Avoid ascribing motives to or judging the actions of others. Please speak about your experiences, concerns, and suggestions; treat each other with respect

(10) Avoid right-wrong paradigms

(11) When communicating outside of the AC, members are asked to speak only for themselves when asked about AC progress

(12) AC members represent their group interest not personal interest

Section B – A majority of the AC members currently appointed shall constitute a quorum. A quorum is required for an official meeting to occur.

Section C– All meetings of the AC and its subcommittees are open to the public. ~~to~~ the extent required by the Ralph M. Brown Act. Meetings are to be held in accessible, public places in San Diego, California. Notice of all AC meetings shall be posted in a publicly accessible place for a period of 72 hours prior to the meeting. AC members shall not use a series of communications of any kind, directly or through intermediaries, to discuss, deliberate, or take action on any AC-related business outside of a public meeting in violation of the Ralph M. Brown Act.

Section D –All members of the AC must abide by these by-laws. The City and County reserve the right to remove members that do not abide by the by-laws.

Article 6 TECHNICAL PEER REVIEW (TPR)

To ensure quality assurance and the preparation of a scientifically sound GSP, the Core Team is requiring a technical peer review process for the development of the GSP, which shall include a quality assurance and quality control process.

Two (2) qualified specialists (independent technical reviewers) who are independent of the GSP development but with expertise to perform the work will be hired and shall meet the following qualifications:

- Be a Registered Geologist in any State of the United States of America
- Be a Professional Engineer in the State of California, and/or
- Have a PhD in Hydrology, Hydrogeology, Geology, or related field

The qualified specialists should also have appropriate expertise in hydrogeologic water supply investigations and/or related modeling and research. AC members may also hire one qualified specialist that meets the criteria above to serve as a TPR member for their own benefit, assuming all fees are borne by the AC member. Only the TPR members will be allowed to engage in meeting discussions. After each agenda item in the TPR meetings, AC members may ask questions and offer comments, limited to 3 minutes per AC member per agenda item.

The TPR members will review and provide comments where technical concerns may arise for specific sections during the development of the GSP. They will also attend and participate in TPR public discussion meetings with other key technical team members.

The Core Team will develop a mission and principles of participation for TPR meetings, which will be held the same day as AC meetings. The TPR meetings will be open to the public and a meeting summary will be available for public review.

Article 7 COMPENSATION

Members of the AC shall serve without compensation.

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Advisory Committee Meeting
Agendas and Summaries

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Sustainable Groundwater Management Act 2014 (SGMA)
San Pasqual Valley Groundwater Sustainability Plan Basin Advisory Committee
Meeting Minutes

Meeting Date: Thursday June 6, 2019 from 2:00pm to 4:00pm

Meeting Location: San Pasqual Archaeological Center, 16666 San Pasqual Valley Road, Escondido 92027

Purpose: San Pasqual Valley Groundwater Basin Groundwater Sustainability Plan Advisory Committee Meeting 1

Attendees:

City of San Diego
- Andrew Funk
- Delaney Sisk
- Karina Danek
- Niki McGinnis
- Sandra Carlson

County of San Diego
- Jim Bennett
- Leanne Crow
- Jamelle McCullough

Advisory Committee
- Carole Burkhard
- David L. Toler Jr.
- Eric Larson
- Frank Konyn
- Lisa Peterson
- Mark Dederian
- Matt Witman
- Rikki Schroeder
- Trish Boaz

Woodard & Curran
- John Ayres
- Micah Eggleton
- Rosalyn Prickett

Public
- Brad Blaes
- Charlie Burkhard
- Jennifer Turner
- Lisa Skutecki
- Marc Linshield
- Patti Huntley
- Quinton Grounds (Council District 5 Representative)
- Tyson Short

Referenced Documents:
1. Meeting Agenda
2. *Copy of PowerPoint* Handout 1
3. *Draft Advisory Committee Bylaws* Handout 2
4. *Proposed Advisory Committee (AC) Meetings* Handout 3

ACRONYMS
- AC – Advisory Committee
- CEQA – California Environmental Quality Act
- City – City of San Diego
- Core Team – GSA City and County Staff
- County – County of San Diego
- EIR – Environmental Impact Report

- GSA – Groundwater Sustainability Agency
- GSP – Groundwater Sustainability Plan
- MOU – Memorandum of Understanding
- SGMA – Sustainable Groundwater Management Act
- SPV – San Pasqual Valley

WELCOME AND OPENING REMARKS

Sandra Carlson, as the Project Manager for the GSP, opened the meeting and introduced Niki McGinnis, Interim Deputy Director for the City of San Diego (City) Public Utilities Department who gave opening remarks. Members of the GSA Core Team including Karina Danek, Jim Bennett and Leanne Crow then gave a brief introduction of themselves and provided their own welcoming remarks. Members of the AC and the public were given an opportunity to introduce themselves. Sandra Carlson reviewed the agenda and facilitated most of the meeting.

SUSTAINABLE GROUNDWATER MANAGEMENT ACT AND THE GROUNDWATER SUSTAINABILITY PLAN

A general overview of SGMA and GSP was provided by Sandra Carlson. The main points are as follows:

- SGMA was passed into law in 2014 to manage groundwater resources in specific basins throughout the State including the San Pasqual Valley Basin.
- The City and the County became a GSA in 2016.
- The City and the County signed a MOU in 2017 and will sign a Cost Sharing Agreement for the GSP in 2019.
- The GSP must be submitted to the State of California by January 31, 2022.
- The boundaries of the jurisdiction of the City and the County in SPV were explained using a visual. About 90% of the basin is in City jurisdiction, and 10% of the basin is in County jurisdiction.
- A list of essential GSP components was provided on the PowerPoint and reviewed for clarity.

For the San Pasqual Valley GSP, it was announced that, subject to City Council approval in July 2019, Woodard & Curran will be the consultants preparing the GSP. John Ayres, Micah Eggleton and Rosalynn Prickett were present as members of the public and representatives of Woodard & Curran. John Ayres elaborated on the consultant's previous experience with GSPs and his personal thoughts on why each groundwater basin is unique.

BROWN ACT CONSIDERATION

Niki McGinnis presented a brief overview and highlights to the Brown Act, of which the AC is subject to. The key points are as follows:

- The Brown Act is also known as the Open Meeting Law which allows the public the right to participate in public meetings.
- Public comment at meetings is encouraged, and time will be provided at the end of meetings.
- All action items must be on the agenda. Other topics may be discussed but not acted upon.
- A quorum of the AC must not hold a private meeting where AC business is discussed. Individual contacts are allowed, however, a series of individual contacts (such as email) that leads to discussion, deliberation or action among a majority of AC members is prohibited.

An AC member asked if providing information to the planned GSP consultant is allowed on an individual basis within the Brown Act. Providing information to the GSP consultant is not a violation of the Brown Act. It was noted that an ad hoc committee could also be created if there is a topic where a few AC members are particularly knowledgeable, and that information could be useful to the GSP.

A member of the public also asked if Core Team meetings were subject to the Brown Act. Staff meetings are not required to be open public meetings and that the Brown Act does not apply to local agency staff or employees.

For a more detailed explanation of the Brown Act, attendees were referred to the following link: https://www.cacities.org/Resources-Documents/Resources-Section/Open-Government/Open-Public-2016.aspx

ADVISORY COMMITTEE/TECHNICAL PEER REVIEW

Sandra Carlson discussed that the chosen AC members all have a great working knowledge of the SPV to make each member a good resource and provide input to the GSA for the GSP development. Each AC member supplies his/her unique background to provide a diversified AC to represent the SPV.

Sandra Carlson also explained the purpose of the planned Technical Peer Review group, and how it differs from the AC. The purpose of the Technical Peer Review is to ensure the GSA that the GSP is a technically sound document. The Core Team explained this will be accomplished using the consultant's technical experts and two technical reviewers who are outside independents and are not a part of the consultant firm. These two technical reviewers are independent of the GSP development but with expertise to perform the work. Their qualifications will be Professional Geologists in the State of California, a Professional Engineer in the State of California, and/or PhD in Hydrology, Hydrogeology, Geology, or related field with appropriate expertise in hydrogeologic water supply investigations and/or related modeling and research.

The consultant will manage these meetings and this group will be present at all the Technical Peer Review meetings. John Ayres then spoke to why there was to be a Technical Peer Review and the importance of having technical meetings in addition to the AC meetings.

The Technical Peer Review meetings will be scheduled as the same day as the AC, but in the morning and at either City or County offices in Kearny Mesa. These meetings will be scheduled as-needed throughout the GSP development and will cover various required technical topics of the GSP. A member of the public asked why Technical Peer Review meetings were being held at a different location than the AC meetings? Core Team explained it had to do with availability of staff resources. It would be difficult to have Core Team staff be in San Pasqual all day without access to their offices/computers, etc. AC members can, as explained in detail in Article 6 of the draft By-Laws, bring their own qualified expert to the Technical Peer Review meeting should they choose to do so.

It was also noted that the Technical Peer Review meetings are open to the public, and more clarification about the Technical Peer Review meeting would be given at the next AC meeting.

- Action Item: Create a formal application form for members of the AC to use should they choose to bring their own independent technical reviewer (a.k.a., expert) to the Technical Peer Review meeting.
- Action Item: Explain who will take part in the Technical Peer Review meetings to the AC.

DRAFT ADVISORY COMMITTEE BY-LAWS

Sandra Carlson emphasized important points in the draft By-Laws, which are:

- AC members may not have a proxy at meetings.
- There must be a quorum to hold an AC meeting.
- A professional facilitator hired by the consultant will be running all future meetings.
- The AC meetings will follow Roberts Rules of Order when facilitating a dialogue.

It was clarified that the By-Laws are subject to the approval of the AC, and not the Core Team, within reason. For example, the AC cannot add that they shall receive pay.

- Action Item: AC Members to review and comment on the draft By-Laws on or before June 27th, 2019. Comments should be sent to Sandra Carlson at carlsons@sandiego.gov. Submitted comments will be discussed and By-Laws will be finalized by AC at the next meeting.

FUTURE MEETING DATES

The AC held a brief discussion on when to hold future meetings. It was decided that AC meetings will be held quarterly on the second Thursday of the month from 2-4pm starting October 2019. Meetings will be held at the San Pasqual Archaeological Center located at 16666 San Pasqual Valley Road, Escondido 92027.

- The next meeting will occur on October 10, 2019: the rest to follow accordingly. Please see revised calendar.
- Meeting materials will be posted at least 72 hours in advance online. They can be accessed at this web address: www.sandiegocounty.gov/pds/SGMA

PUBLIC COMMENT SUMMARY

There were requests from multiple AC members to use previous reports that have been completed by the City for the SPV to supplement the GSP. These members feel that much of the information that is needed for the GSP will be in the preexisting reports, and that it would simplify the process to use these as background.

It was discussed whether the GSP would require an EIR. The GSP is exempt from CEQA, however the implementation of it is not exempt.

The City of San Diego has received a million-dollar grant to help pay for the costs of developing the GSP.

Questions asked:

1. How will the previous reports and information on the San Pasqual Groundwater Basin (Basin) play into this GSP? The Core Team indicated that the previous reports and information are essential and will be used in development of the GSP.
2. Will the GSP be concerned with water quality in the Basin or overall volume of water? The Core Team indicated that both water quality and volume of water will be evaluated in the GSP.
3. What will be done for the water that is leaving the Basin and how will it be regulated? The Core Team stated that the GSP process will be used to determine how water leaving the basin will be regulated.
4. Will there be anything done about land use projects that border the Basin and could impact the water quality? The County stated that for land use projects outside the Basin, these projects are regulated by the County and have a separate process from SGMA. SGMA gives no additional authority to the area of the watershed outside of the defined Basin boundaries.

Note:

During the question and answer period, this meeting did not follow public comment protocol. Members of the public could comment at any point during the meeting. For all future meetings, public comment will be restricted to the end of the meeting.

MEETING ENDED AT 3:30PM.

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Basin Advisory Committee (AC) Meeting 2
Meeting Minutes

Date: Thursday October 10, 2019 from 2:00 to 4:00 pm

Location: San Diego County Farm Bureau
420 S. Broadway, Ste. 200, Escondido, CA 92025

Purpose: SPV Groundwater Basin AC Meeting 2

Attendees:

City of San Diego (City)
- Sandra Carlson
- Karina Danek
- Niki McGinnis
- Delaney Sisk

County of San Diego (County)
- Leanne Crow

GSP Consultant (Woodard & Curran)
- John Ayres
- Rosalyn Prickett

GSP Consultant (Katz & Associates)
- Patsy Tennyson

Advisory Committee
- Trish Boaz — San Dieguito River Valley Conservancy
- Carole Burkhard — Small land Owner
- Frank Konyn — Agricultural/Animal
- Eric Larson — San Diego County Farm Bureau
- Lisa Peterson — San Diego Zoo Safari Park
- Rikki Schroeder — Rancho Guejito
- David L. Toler Jr. — San Pasqual Tribe
- Matt Witman — Agricultural/Crop

Public
- Alicia Appel, City of Escondido
- Bill Hunter, Santa Fe Irrigation District
- Mark Lindshield
- Mary Montgomery, Santa Fe Irrigation District
- Marissa Potter, Santa Fe Irrigation District
- Hank Rupp, Rancho Guejito
- Jose Tosteow, Gilemerre

Welcome and Introductions

Patsy Tennyson, the meeting facilitator, opened the meeting and gave an overview of the meeting's objectives. Karina Danek of the City welcomed attendees and thanked the Farm Bureau for hosting the meeting.

AC members had no comments on the minutes from the June meeting. Patsy reviewed the agenda for today's meeting with the group.

Patsy then reviewed key discussion items from the draft AC by-laws, including that they are focused on the future, that all perspectives are valuable, that everyone had equal opportunity to participate, that it was important to avoid ulterior motives and set aside judgment, and represent the AC as a group.

AC By-Laws Review

The meeting facilitator reviewed changes to the AC by-laws that had been recommended by AC members and/or the Core Team before the meeting. These included:

- Adding a sentence at the end of Article 1, Section C and adding two words in the middle of Article 3, (2) as shown in the attached **By-Law Handout**
- Deleting Article 5 Section A paragraph on Robert's rules
- Modifying Article 6 – the paragraph about the qualified specialist, allowing only one Technical Peer Review (TPR) member per AC member and allowing a professional Geologist to be from any state of the USA

Additional discussion about the by-laws is summarized below.

- In Article 3, Section C of the by-laws, "non-profit" could be interpreted to have a legal connotation; AC member suggested a change to "non-partisan, non-sectarian, collaborative organization." The AC agreed to this change.
- AC member asked for clarification about the responsibility to disseminate information to those referred to by "member's-own stakeholder constituents that they represent". The AC determined that it is not required for AC members to convey the information discussed in Advisory Committee meetings to affiliated parties, and that any interested parties can be added to the existing email list to receive all meeting information. The AC agreed to delete Article 5, Section A, Covenant 13 from the by-laws in accordance with this.
- AC member asked how votes will be handled if conflicts arise. AC is intended as forum for hearing opinions, advice, and suggestions; no formal voting. Consultant team will document all positions.
- AC member asked for clarification about why AC members could have their own TPR member; he felt this might introduce bias into the GSP process.
  - Karina Danek of the City explained that when City Council approved establishment of the SPV GSA, they directed that a transparent AC and TPR process be used and that staff doesn't really have a choice about how to manage the process at this point. It has been decided at the Council level and staff is following their directions. Both the City and County agencies developed the proposed structure together.
  - John Ayres, Consultant Project Manager, emphasized that it is the duty of the Consultant team to be objective when writing the GSP, and that the comments from TPR members will be considered but won't necessarily be incorporated into the final GSP.

    TPR will vet the GSP's general approach and how data will be analyzed. Proposed structure attempts to level bias by allowing only one TPR member per AC member. It was also noted that there are two independent reviewers in the TPR group.
  - Another AC member commented that he too was concerned about an AC Member being able to create a large impact on the GSP development if only one AC member hired a technical reviewer. He also noted that the leaseholders in the Basin would have different goals/concerns/needs than the landowners and that this should be considered in the GSP.

Due to concern for running out of time, this topic was tabled for further discussion until after agenda item No. 7, *Technical Peer Review purpose and composition*.

GSP Overview and Call for Data Request

John Ayres, Consultant Project Manager, gave an overview of SGMA terminology, consulting team members and roles, discussed the GSP document's sections and process, and basin settings information. He also noted that the Consultant team has received City and County data, California Department of Water Resources (DWR) data, and previous reports and studies. The Consultant team is looking to compile any well data, monitoring data, or any other information AC members may have.

It was requested that all AC members send any pertinent data they have about the San Pasqual Valley Groundwater Basin, whether it be well information, water quality data or anything else that could help the GSP development, **send the data to Sandra Carlson at the City. Her email is carlsons@sandiego.gov.**

John explained that the Consultant team was developing a list of frequently asked questions (FAQ), and asked if any AC members had any specific questions they wanted answered.

AC members asked about or noted the following:

- FAQs on the County website are several years old; they will be updated before next AC meeting
- Explain why we are developing a GSP
- Ask people to share their data (including those who are not AC members)
- Explain where the data goes
- Describe the timeline for GSP development, post a flow chart
- State the DWR deadline of January 2022
- Share work plan information

Questions About the Brown Act

Patsy Tennyson, the meeting facilitator, explained that Core Team meetings are not subject to Brown Act, but AC and TPR meetings are subject to the Brown Act and are being noticed per the Act.

TPR Purpose and Composition

Patsy Tennyson reviewed the draft TPR mission statement, the TPR's proposed composition, and schedule with the AC, along with a proposed change to AC by-laws, Article 6 (i.e., allow a Professional Geologist to be from any US State). The AC approved this change to the by-laws.

AC member suggested that AC members be allowed to comment during TPR meetings. John Ayres of the Consultant team said that these meetings were technical in nature and that it would be counterproductive to the purpose of the TPR. As a compromise, Patsy suggested a change to the AC by-laws to allow AC members to speak to each TPR meeting agenda item after it had been discussed by the Technical Reviewers. Patsy summarized that only the TPR members would be allowed to engage in meeting discussions, but there would be an opportunity for AC members to ask questions after each agenda item, with each comment limited to 3 minutes, per AC member. Only AC members would be able to comment during

this period and all other members of the public would be able to speak only at the end of the entire meeting. John Ayres expressed his concern that the TPR meetings would be very long if we included a comment period after each agenda item but tentatively agreed. Patsy asked if this was a solution that all the AC members could live with, and all agreed they could.

Leanne Crow of the County noted that they were working per direction from the County Board and the City Council to establish the TPR. Karina Danek further stated that executive management teams met many times to agree on the structure of two independent reviewers and AC nominees. It was noted that the TPR is not a voting body, and that John Ayres of the Consultant team will decide about what is technically appropriate because he will stamp the GSP with his professional license (California registered professional geologist) before submission to the California Department of Water Resources. John Ayres noted that the consultant's job is to prove conclusions through data and analysis, which will be fully documented, so it can be replicated and is accessible.

AC member suggested an addition to the TPR mission and principles of participation, stating that independent consultants would remain independent, and that their role would be to check not only Consultant's work, but also TPR members' contributions.

Action Items

AC Members:

- Send data to Sandra Carlson at the City. Her email is scarlson@sandiego.gov or call her at (619) 533-4235.

Sandra Carlson of the City will:

- Send out revised TPR screening form and request return in one week for first TPR meeting (Nov 7th)
- Send AC members information about the upcoming TPR meeting via email

Consultant team will (via Sandra):

- Share a project schedule/flow chart of the GSP with AC members
- Share a work plan of the GSP at the next AC meeting on January 9, 2020
- Send information about the TPR's mission and principles before the first TPR meeting on November 7, and AC members will be invited to comment
- Update the meeting sign in sheet with an area to add attendees' affiliations

Future Meeting Dates

The next AC meeting will take place on January 9, 2020.

The first TPR meeting will take place on November 7, 2019. The TPR will meet at the County Operations Center at 5510 Overland Drive.

Public Comments

- Can a TPR member be hired later if the process appears to be going sideways? Yes, AC members would be permitted to add new TPR members as desired; the TPR screening

form will be on the website. It is requested that if an AC member wishes to do this that ample time should be given to process the screening form.

- Please add a space for AC members and all other meeting attendees to write in their affiliation on the sign in sheet for meetings; please add this information in future meeting notes.
- The City owns Lake Hodges, and Santa Fe Irrigation District uses water from Lake Hodges, which is a major source of water supply. The Santa Fe Irrigation District is interested in water quantity and quality information for areas upstream of Lake Hodges.
- There is a real estate transaction for local private property under way, and this groundwater basin is not disclosed in their sales information; they should have disclosed this basin and GSP regulations. The AC meeting ended at 3:50 pm.

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Sustainable Groundwater Management Act 2014 (SGMA)
San Pasqual Valley Groundwater Basin
Advisory Committee Meeting Agenda

January 9, 2020 2:00 –4:00 pm
San Diego County Farm Bureau
420 S. Broadway, Ste. 200, Escondido, CA 92025

NOTE: Public comment period will be accommodated at the end of meeting. The duration of the comment period will be at the discretion of the meeting Facilitator.

#	TIME*	ITEM	PRESENTER
1	2:00 pm	**Roll Call and Introductions**	Patsy Tennyson, Facilitator
2	2:10 pm	**Review** • **Agenda** • **Meeting Objectives** • **Meeting Summary for AC Meeting #1** (Handout 1) • **Information Only:** ○ **Final AC Bylaws** • **November 7 TPR Recap**	Patsy Tennyson
3	2:25 pm	**GSP Content Review** • **Project Schedule** • **GSP Workplan** (Handout 2) • **Plan Area** • **Hydrogeologic Conceptual Model** • **Groundwater Conditions**	John Ayres, Consultant Team
4	3:00 pm	**Undesirable Results** **Exercise: What do we want to have happen and what do we not want to happen in San Pasqual?**	John Ayres Patsy Tennyson
5	3:45 pm	**General Public Comment** *(3-minute limit each commentator)*	All
6	3:55 pm	**Next Steps and Closing Remarks** Next Meeting Date (Handout 3)	Patsy/All

**times are subject to change*

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Advisory Committee Meeting
Meeting Summary

Date: Thursday January 9, 2020 from 2:00 to 4:00 pm

Location: San Diego County Farm Bureau
420 S. Broadway, Ste. 200, Escondido, CA 92025

Purpose: Advisory Committee Meeting

Attendees:	**Advisory Committee (AC)** • Carole Burkhard • Eric Larson • Frank Konyn • Lisa Peterson • Mark Dederian • Matt Witman • Rikki Schroeder • Trish Boaz	**City of San Diego (City)** • Sandra Carlson • Karina Danek • Niki McGinnis • Mike Bolouri • Delaney Sisk **County of San Diego (County)** • Leanne Crow
	Public • Brad Blaes, The Pinery • Dustin Meads, The Pinery • Marisa Potter, SFID • Mark Stadler, SDCWA • Rania Amen, SFID • Whitney Blackhurst, Rancho Guejito	**Consultant Team** • John Ayres, Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Patsy Tennyson, Katz & Associates • Nate Brown, Jacobs (by phone)

Roll Call and Introductions

Patsy Tennyson, meeting facilitator, welcomed the group and invited everyone to introduce themselves.

Review

Patsy reviewed the meeting agenda and meeting objectives.

The AC reviewed the summary of its last meeting and had the following comments:

- Meeting Summary: Sandra's email address will be corrected in the summary to the following carlsons@sandiego.gov.

Patsy gave a summary of the November 7, 2019 Technical Peer Review meeting so the members of the AC are kept up-to-date.

GSP Content Review

John Ayres, consultant team, provided an overview of Sustainable Groundwater Management Act (SGMA), reviewed GSP components, and proposed a work plan and schedule. John gave an overview of the Plan Area maps via a PowerPoint presentation. The AC had the following comments and questions:

- *Water Quality*: AC member asked whether SGMA addressed the issue of water quality. John explained that water quality was part of the GSP, and that the team was working on creating maps of water quality. He noted that water quality would be part of the undesirable results agenda item.
- *Basin Priorities*: AC member asked about the different DWR-assigned priorities for groundwater basins throughout San Diego County. Leanne Crow, City of San Diego, clarified that the San Luis Rey Valley Groundwater Basin was medium priority, Borrego Valley Groundwater Basin was high priority, San Pasqual Valley Groundwater Basin was medium priority, and in December 2019, the San Diego River Valley Basin was downgraded to very low priority.
- *Land Use*: AC member noted that there are inaccuracies in certain land use maps, and that certain areas had been recently planted in orchard crops. John asked all AC members to submit comments and any suggested changes in map format no later than Thursday, January 23, 2020.

AC member asked if the maps showed existing or proposed/planned land use. John responded that the land use maps are existing, but the methodology for providing that data to SANDAG varied from agency to agency.

AC member suggested that, since orchard crops use more water than vineyards, they need to be clarified in land use maps. AC member will provide comments to project team for orchards vs. vineyards in current use.

AC member asked about what time range of data would be used. John responded that the GSP needs detailed land uses over a 10-year hydrologic period for the hydrogeologic conceptual model (HCM), but wasn't exactly sure what that time period would be yet.

AC member also noted that Safari Park was designated as having urban land use, which seemed incorrect, and that a clear definition of land use types needs to be included in GSP.

John then provided an overview of HCM maps and groundwater conditions, including hydrographs. The AC had the following comments and questions:

- *Hydrographs*: AC member asked if more hydrographs were available for more wells, of if there were more hydrographs available over a longer span of time (existing data spans a 12-year timeframe). John explained that the team has previous report data that will be used to better understand groundwater conditions, but these hydrographs and their timeframe would be used to establish the sustainable management criteria for the basin.
    - AC member noted that this information was key, and wanted to make sure the team has as much information as possible so the GSP takes a longer historical view and was not basing the sustainable management criteria on short-term data.
    - AC member noted the hydrographs all looked similar, and asked how these would be turned into a basinwide plan. John responded that this issue would be addressed at length during GSP development. He noted that, in general, water levels in wells shifted seasonally, responding to drought and then recovering in wet years.
    - AC member noted that there was a spike in the 2014 hydrograph data that appeared to be human error. John agreed that this spike was most likely a human error, and that some wildcard measurements may be thrown out during analysis. This is not a concern, as the team is more interested in understanding long-term trends.

Undesirable Results Breakout Exercise

John reviewed the six SGMA sustainable management criteria that must be addressed in the GSP with undesirable results statements. He explained that the AC would break out into groups for a team exercise

to develop these statements. John qualified that this exercise was to understand what the AC's concerns were; it was not meant to determine any specific effect in or out of the basin.

John then reviewed how the sustainable management criteria concepts include five components as follows: undesirable results, minimum thresholds, measurable objectives, interim objectives, and margin of operational flexibility. The AC had the following comments and questions:

- AC member asked how minimum thresholds would be established. John responded that it would depend on what AC members determined to be undesirable results.
- AC member asked how sustainable management criteria would be set for the basin if there were only 12 years of recorded data. Again, this will be part of the GSP development process and discussed with AC at length at a future AC meeting. John explained that the GSP would be updated every five years (or more frequently), that the sustainable management criteria could be revisited based on any new data.
- AC member asked if there were any State requirement for monitoring and sharing well information. John responded that, before SGMA, there were no State monitoring requirements. In the basin, the City of San Diego monitors 10-15 wells in their jurisdiction, which includes three wells that they pay the U.S. Geological Survey (USGS) to monitor.
    - AC member noted that there was one monitoring well on County of San Diego conservancy lands, and they would share the Initial Study document that was prepared before the well was constructed. Leanne noted that, when drilling on County land, a landowner is required to get a well construction perming and the County asks the landowner to share well data.

The AC members and public participants divided into two groups to discuss "What do you want and <u>not</u> want to happen with groundwater in the future?" Following the breakout groups, one member of each group reported out on their discussions. The following page has a summary of the report-outs.

Public Comments

A member of the public said they would like to see a natural sampling site included for study (i.e., a monitoring well that was not actively pumped) to better understand groundwater elevation data. John noted that this information was in the hydrographs from the three USGS monitoring wells.

Next Steps

The next AC meeting is scheduled for Thursday, April 9, 2020 from 2:00 to 4:00 pm

The AC shall submit comments on today's meeting subjects by Thursday, January 23, 2020.

Please send any comments to Sandra Carlson at the City of San Diego using her email address at carlsons@sandiego.gov.

The AC meeting ended at 3:45 pm.

Breakout Group 1

Wants

- Ability to stay in agriculture business over a long period of time
- Create a lean and efficient management system
- Consistent, reliable supply of water
- Use recycled water for recharge or direct use
- Seek grant funds and related partnerships to underwrite conservation improvements
- Help farmers establish their own best management practices (BMPs)
- Maintain ability to market crops
- Manage streambeds to maximize infiltration (i.e., need a flatter cross section and lower velocity flow)
- Maximize stormwater capture in the basin and in the watershed (i.e., no reduced stream contributions based on upstream developments)
- Ensure the Regional Water Quality Control Board (RWQCB) allows maximum runoff into the basin for recharge
- Limit new users if restrictions are placed on pumping
- Allow alternate dust control methods (other than watering dirt roads)
- Maintain and sustain water quality (no PFAS or Per- and polyfluoroalkyl substances)
- Sustain natural habitat

Do Not Want

- No unmanaged open space (potential fire hazard)
- Avoid having to purchase imported water
- No wells going dry

Breakout Group 2

Wants

- Protect native plants and species, especially habitat restoration areas
- Maintain and improve water quality (for agricultural use and ecosystem health)
- Sustain agricultural uses – protect the San Pasqual Agricultural Preserve
- Sustain and restore the natural environment
- Maintain productivity of existing wells (existing users shouldn't have to drill more wells)
- Collaborate and cooperate – work together on these outcomes!
- Protect drinking water quality
- Ensure adequate water supply for animals (including rare and threatened/endangered species)
- Incorporate the ephemeral nature of streams into methodology/philosophy (this minimizes growth of invasive species)
- Maintain stable groundwater levels for pumping

Do Not Want

- Don't delete groundwater supplies
- Don't impact downstream neighbors – both groundwater and surface water
- Don't deplete east end wells with increased west end pumping
- No dry wells (i.e., protect property values)
- No wildfires
- No economic impacts (i.e., to Safari Park employees)
- No unreasonable minimum thresholds (i.e., those that might require capital investment such as a new wells)
- No transport of contaminants from stormwater to groundwater (or other sources)
- No invasive species that affect water supply

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Public Utilities

San Pasqual Valley Groundwater Sustainability Plan
Advisory Committee
Teleconference Meeting Agenda

Date: Thursday May 14, 2020 from 2:00 to 3:00 pm

Location: Teleconference Dial-In: +1 (224) 501-3412, Passcode 181-241-181 #
GoToMeeting Link: https://global.gotomeeting.com/join/181241181

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	2:00 pm	Roll Call and Introductions	Patsy Tennyson (Facilitator), Consultant Team
2	2:05 pm	Review • Agenda • Meeting Objectives • Previous Meeting's Minutes (Handout 1) • January 9 Technical Peer Review (TPR) Group Meeting Recap	Patsy Tennyson
3	2:15 pm	Groundwater Sustainability Plan (GSP) Content Review • Sustainable Groundwater Management Act (SGMA) Terminology • GSP Development Process • Project Schedule	John Ayres, Consultant Team
4	2:20 pm	Basin Definition • Discussion	John Ayres, Consultant Team
5	2:30 pm	Undesirable Results (Handout 2) • Undesirable Results Matrix • Undesirable Results Narrative	John Ayres, Consultant Team
6	2:40 pm	Field Program Update • Monitoring Well Installation • Isotope Sampling	John Ayres, Consultant Team
7	2:45 pm	Public Comments	John Ayres, Consultant Team
8	2:55 pm	Next Steps and Closing Remarks • Next Meeting Date (Handout 3)	Patsy Tennyson/All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Advisory Committee Meeting
Meeting Summary

The following is a summary of the Advisory Committee discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday May 14, 2020 from 2:00 to 3:30 pm

Location: GoToMeeting

Purpose: Advisory Committee Meeting

Attendees:	Advisory Committee (AC) • Carole Burkhard (CB) • Eric Larson (EL) • Frank Konyn (FK) • Lisa Peterson • Matt Witman (MWit) • Rikki Schroeder • Trish Boaz (TB)	City of San Diego (City) • Sandra Carlson (SC) • Niki McGinnis • Mike Bolouri • Sarah Brower • Ally Berenter, Mayors Office County of San Diego (County) • Leanne Crow • Jim Bennett (JB)
	Public • Anita Regmi, Dept of Water Resources • Pat McTigue, San Diego Safari Park • Raj Brown, San Diego Safari Park • Chris Brzezicki, San Diego Safari Park • Robyn Badger, San Diego Safari Park • Alicia Appel, City of Escondido • Brad Blaes, The Pinery • Hank Rupp, Rancho Guejito • Mark Stadler, San Diego County Water Authority	Consultant Team • John Ayres (JA), Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Nicole Poletto, Woodard & Curran • Micah Eggleton, Woodard & Curran • Patsy Tennyson, Katz & Associates • Emily Michaelson, Katz & Associates

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, reviewed the list of participants signed onto GoToMeeting and asked all other phone participants to identify themselves. Patsy Tennyson, meeting facilitator, welcomed the group and reviewed basic instructions for GoToMeeting user tools. Sandra Carlson, City of San Diego, announced that Karina Danek's baby boy was born on April 27, 2020 and introduced Niki McGinnis as the City's replacement on the Groundwater Sustainability Agency (GSA) Core Team (consisting of the City and the County).

Review

Patsy reviewed the meeting agenda and meeting objectives, and gave a brief overview of the January 7, 2020 Technical Peer Review meeting so the members of the AC are kept up to date.

GSP Content Review

John Ayres, Consultant Team, provided an overview of the Sustainable Groundwater Management Act (SGMA), reviewed GSP components, and explained why the San Pasqual Valley Groundwater Basin (Basin) was designated as a medium priority basin by DWR. The AC had the following comments and questions:

- AC Member (FK): Based on DWR's prioritization criteria, is it safe to say that water quality was not a contributing factor to San Pasqual Valley Basin becoming a medium priority basin – that it was more based on groundwater dependence and irrigated acreage?
    - (JA) Yes – there are enough points based on number of wells, groundwater dependence and irrigated acreage to make the basin medium priority alone. One thing the evaluation tells us is that DWR is not terribly concerned about water quality in the Basin. If DWR had given 5 points in the prioritization for groundwater quality, the GSA would have to do something significant about it. Instead, we get to consider surface water quality, groundwater quality and water use in determining sustainability thresholds in the Basin. This is something we will get into more detail about in the next meeting.

Refined Analysis - Basin Definition

John presented the definition of basin statement that was developed for the San Pasqual Valley Basin. We are using the DWR Bulletin 118 definition of the basin. He also acknowledged that we do not understand the interaction of the basin with underlying granitic rock. If groundwater conditions require the implementation of management actions, additional data collection, studies, aquifer testing and/or surveying may be recommended to improve understanding of this interaction,

- AC Member (MWit): The paradox is how this information is collected and analyzed. We recognize that data gaps exist, but we don't appear willing to address those.
    - (JA) We recognize there are data gaps, but the GSP process is moving quickly so we will decide later in the GSP process whether we need to fill that gap in Plan implementation. If filling that gap is critical to managing the Basin, we will include it; if not, then we will decide whether to spend resources there.
- AC Member (FK): New monitoring wells were installed on Matt Witman's/West Coast Turf's and Frank Konyn's properties. Will those wells help us gain a better understanding of alluvium, residuum, and bedrock?
    - (JA) Yes, those wells will help us to understand how the Basin works. But because they vary spatially, we will need more information to fully understand the Basin.
- AC Member (FK): Why wouldn't we use the new monitoring wells to inform the GSP, since those two wells will help us better understand the bedrock influence?
    - (JA) The well construction information from all five multi-completion wells (three USGS and two City wells) is being used to develop the HCM, and all five wells will be in the GSP monitoring well network to collect and analyze data in detail during GSP implementation.
- AC Member (FK): The bathtub analogy is not a good analogy for the San Pasqual Valley Basin because some of the water may be lost out the bottom of the basin. Why wouldn't we use the new monitoring well data to help us understand the bottom of the basin during Plan development?
    - (JA) The groundwater model does estimate this interaction because it is bigger (deeper) than the basin definition as included in the GSP – the model will estimate and simulate all inflow and outflow.

Undesirable Results

John explained how the information from the January AC meeting breakout groups and January TPR meeting discussion was used to develop the Undesirable Results matrix in Handout 2. The undesirable results matrix explains the "bad" basin conditions and defines how they can be measured.

The AC had no comments or questions on the Undesirable Results matrix. This information will be revisited in a future AC meeting.

Field Program Update

John provided an update on the field program. Two triple-completion monitoring wells were installed as part of the City's DWR grant. Isotope sampling for groundwater and stream gages has already occurred.

- AC Member (FK): What information from the isotope sampling will be provided to the AC?
    - (JA) The surface water gages are useful for understanding how much water is discharged into the Basin; that will contribute to the groundwater model. The water quality information will also help us to set sustainability thresholds for water quality.
- AC Member (FK): Please add acreage/watershed area for each of those stream gages. Winter 2020 has been an extremely wet season, yet only some of the streams appear to be flowing. That is surface water recharging the San Pasqual Valley Basin. It is interesting that some seasonal streams are flowing, and some are not.
    - (JA) Surface water flow amounts are important, but catchment is not as important.
- AC Member (FK): I disagree – the catchment may dictate whether the seasonal streams flow (depending on how big they are).
    - (JA) Understood. We will follow up with you on catchment size after this meeting. The City has some watershed information that can be provided.

Public Comments

Public comments provided in the "Chat" during the meeting are listed below. The following public comments were provided verbally by meeting participants:

- Alicia Appel, City of Escondido: Undesirable Results: the matrix has "TBD" categories for interim milestones and projects/management actions. Will those be filled in at some point?
    - (JA) Yes, we will continue discussing the Undesirable Results for rest of the calendar year. We are looking for agreement on the Undesirable Results statements today.
- Alicia Appel, City of Escondido: From the notes for last AC meeting – many people expressed concern about water quality, but the Undesirable Results statements do not appear to distinguish between drinking, ground, and surface water quality. I would like more clarity in the statements.
    - (JA) Surface water is managed by the Regional Water Quality Control Board (RWQCB). SGMA has jurisdiction only over groundwater. We are tasked with managing the 6 sustainability indicators associated with groundwater. Another consideration is whether the GSAs can actively manage the topic (e.g., TDS)? We must consider the costs of implementation in comparison to the Undesirable Results.
- AC Member (FK): We are an advisory committee, but who do we advise?
    - (JA) The AC and TPR both advise the GSA Core Team (City and County together).
- AC Member (FK): As a member of the AC, I want to remind other members that a large landowner has a toe in our Basin and has refused to provide their well data. The City has provided all leasehold

data to the GSP team. The groundwater model needs a lot of estimation and our livelihood depends on that estimation. Please support me in advising the GSA Core Team to use the data from the two new monitoring wells so that we can better understand the interaction between the alluvium, residuum, and bedrock. This is critical for the GSP. It seems as if someone is trying to protect that single large landowner.

- AC Member (MWit): I agree with what Frank has said. Transparency is good for all of us. I am disappointed in the large landowner in that they have not been transparent with their data. I hope that lack of transparency would not benefit them in any way.
- AC Members (CB, TB, EL): I was unaware that our large landowner has been uncooperative and agree with Frank and Matt that we should all be as transparent as possible to create the best possible GSP for San Pasqual Valley.
- Jim Bennett, County of San Diego: Can John provide a summary of the data that Rancho Guejito has provided? I believe they have provided quite a bit of information including aquifer testing data, water level data, and possibly groundwater production well data. Also, there is data from DWR records on the fractured rock wells. I am not aware of any data the GSA is missing. John, can you elaborate?
    - (JA) Rancho Guejito gave us construction information for 5 wells at the south end of Guejito Creek, as well as aquifer testing for 2 of the 5 wells. Water level data for these 5 wells has been provided for levels collected from about the past three years. Peter Quinlan (TPR member) offered data at the May 14, 2020 TPR meeting (this morning) on a monitoring well farther upstream, though it has not been provided yet.
    - The City (SC) noted that no deep well information was provided.
    - The County (JB) noted that John should have the deep well information; they are publicly available on the DWR website.
- AC Member (FK): Notes from the January TPR meeting say, "Rancho Guejito representative will check with their Counsel on providing this data." Was it provided? I would like to revisit this discussion with more information from the Core Team for the AC members to weigh in.
- AC Member (FK): I care about the life and blood and water on this Valley. At the last TPR meeting, I felt that the majority of the professionals (TPR hydrogeologists) felt that we should include bedrock in the Basin definition. Since then, the Core Team has determined that we will follow Bulletin 118. But we have so many data points available to better understand the bedrock – why aren't we using them? Are data being withheld to hide something?

<< Errata – After the AC meeting, the following correction was sent to AC members by Sandra Carlson, City of San Diego, via email: "I have one correction from the AC meeting today, that I wanted you all to know sooner rather than later. The City and County do have three DWR well logs from Rancho Guejito that were drilled and sealed with cement through the alluvium/residuum. Each well is open to the fractured rock beneath the alluvium and residuum. The good news is that I was the only one who was mistaken on this information. John Ayres from Woodard & Curran used the information in the cross sections presented at the Technical Peer Review meeting this morning shown on the last page of Handout 2. So please forgive my mistake. >>

Next Steps

The next AC meeting is scheduled for Thursday, July 9, 2020 from 2:00 to 4:00 pm

The AC shall submit comments on today's meeting subjects by Thursday, May 28, 2020.

Please send any comments to Sandra Carlson at the City of San Diego using her email address at carlsons@sandiego.gov.

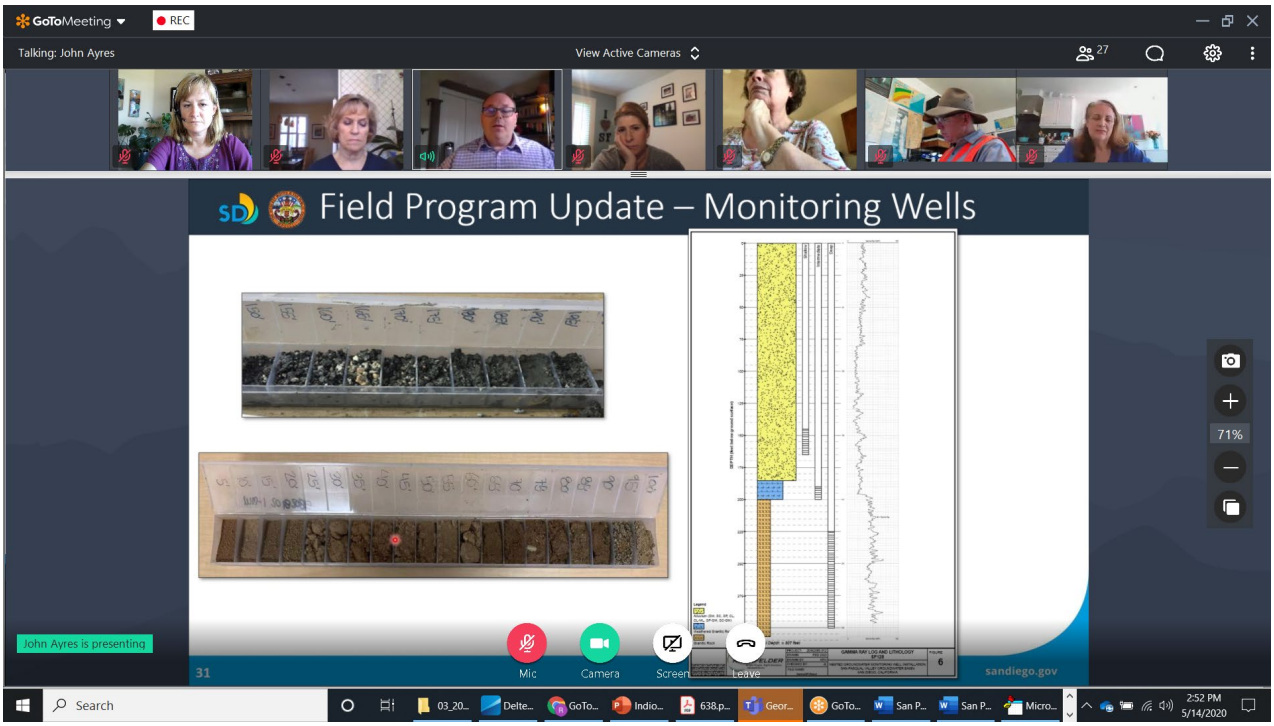
- AC Member (FK): When we do submit written comments, what happens with them?
    - The City (SC) explained that every comment is logged, and those comments will all go into a matrix in the GSP. How we will respond to those comments is still to be determined and is being discussed by the Core Team.

The AC meeting ended at 3:24 pm.

GoToMeeting Chat Log from AC Meeting

Nicole Poletto (to Everyone): 2:00 PM: If anyone is having technical difficulties, feel free to message me directly, or give me a call at 858-875-7405
Nicole Poletto (to Everyone): 2:05 PM: If you just joined us, feel free to contact me if you have technical difficulties. You can send me a message directly or give me a call at 858-875-7405.
Eric Larson (to Everyone): 3:14 PM: I'd like to comment
Patricia Tennyson (to Everyone): 3:14 PM: You are next
Lisa Peterson (to Everyone): 3:19 PM: That is a good idea
Carole (to Everyone): 3:24 PM: Thanks to all!

Image from AC Meeting



San Pasqual Valley Groundwater Sustainability Plan
Advisory Committee
Teleconference Meeting Agenda

Date: Thursday July 9, 2020 from 2:00 to 4:00 pm

Location: Teleconference Dial-In: +1 (571) 317-3122 Access Code: **439-612-349** #
GoToMeeting Link: https://global.gotomeeting.com/join/439612349

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	2:00 pm	Roll Call and Introductions	Patsy Tennyson (Facilitator), Consultant Team
2	2:05 pm	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout #1) • May 14 Technical Peer Review (TPR) Group Meeting Recap	Patsy Tennyson
3	2:15 pm	AC Comments • Overview and Responses	John Ayres, Consultant Team
4	2:25 pm	Groundwater Sustainability Plan (GSP) Content Review • GSP Development Process • Project Schedule	John Ayres, Consultant Team
5	2:35 pm	Basin Settings Updates • Cross Sections • Groundwater Dependent Ecosystems	John Ayres, Consultant Team
6	2:50 pm	Groundwater Model Update (Handout #2) • Model Domain • Land and Water Use • Climate Year Analysis and Historical Simulation Period	John Ayres, Consultant Team
7	3:05 pm	Sustainability Criteria – Levels and Quality • Minimum Thresholds • Measurable Objectives • Stakeholder Input Matrix • Additional Input	John Ayres, Consultant Team
8	3:40 pm	Field Program Update	John Ayres, Consultant Team

Item	Time	Description	Presenter
9	3:45 pm	Public Comments	John Ayres, Consultant Team
10	3:55 pm	Next Steps and Closing Remarks • Next Meeting Date (Handout #3)	Patsy Tennyson/All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Advisory Committee Meeting
Meeting Summary

The following is a summary of the Advisory Committee discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday July 9, 2020 from 2:00 to 4:00 pm

Location: GoToMeeting

Purpose: Advisory Committee Meeting

Attendees:	Advisory Committee (AC) • Carole Burkhard (CB) • Eric Larson (EL) • Frank Konyn (FK) • Lisa Peterson • Matt Witman (MWit) • Rikki Schroeder • Trish Boaz (TB)	City of San Diego (City) • Sandra Carlson (SC) • Niki McGinnis • Mike Bolouri • Keli Balo • Sarah Brower • Surraya Rashid • Ally Berenter, Mayors Office
		County of San Diego (County) • Leanne Crow • Jim Bennett (JB) • Nancy Karas
	Public • Anita Regmi, Dept of Water Resources • Raj Brown, San Diego Safari Park • Chris Brzezicki, San Diego Safari Park • Robyn Badger, San Diego Safari Park • Alicia Appel, City of Escondido • Brad Blaes, The Pinery • Dustin Meador, The Pinery • Hank Rupp, Rancho Guejito (RG) • Lani Lutar, Responsible Solutions, RG • Andres Monette, Best Best & Krieger (BBK), RG • Mark Stadler, San Diego County Water Authority • Charlie de la Rosa, San Diego Safari Park • Marc Lindshield, SPV City Leaseholder	Consultant Team • John Ayres (JA), Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Nicole Poletto, Woodard & Curran • Micah Eggleton, Woodard & Curran • Patsy Tennyson, Katz & Associates • Emily Michaelson, Katz & Associates

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted each of the participants as they signed onto GoToMeeting and asked all others participating via telephone and computer to identify themselves. Patsy Tennyson, Meeting Facilitator, welcomed the group and reviewed basic instructions for GoToMeeting user tools.

Review

Patsy reviewed the meeting agenda, meeting objectives, and previous meeting summary. No AC members had comments on the previous meeting summary.

AC Comments

John Ayres, Consultant Team, provided a summary of the AC comments that have been received from January 2020 to present. No AC members had comments or questions.

GSP Content Review

John provided an overview of the Sustainable Groundwater Management Act (SGMA) and reviewed the GSP schedule. No AC members had comments or questions.

Basin Settings Updates

John presented the cross sections prepared for the San Pasqual Valley (Valley), which were based on well completion reports (for geology) and groundwater elevation in Spring 2015. John also reviewed the analysis that has been completed to date on defining groundwater dependent ecosystems (GDEs) in the Valley, including the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset and biological surveys. Finally, John explained the analysis that was completed on the watershed's stream gauges. That analysis demonstrated that the United States Geological Survey (USGS) average daily flow data (which the City provides for three stream gauges just outside of the San Pasqual Valley Groundwater Basins (Basin)) and the City's instantaneous flow data (which the City also collects on a quarterly basis at these same three stream gauge location points as the USGS is monitoring), cannot be compared or correlated because they are different units of measurements.

- AC Member (MWit): In the Santa Ysabel sub-watershed, Lake Sutherland does affect flow in the Basin. Will you assume that the City will continue to operate the reservoir as it currently does? Historically, that reservoir spilled more often which recharged the Valley more.
    - JA: We will work with our modeler Nate Brown to determine an approach. We will likely use the historical period of recharge from Lake Sutherland.
- AC Member (FK): On stream gauge comparison – those are wonderful maps, but different scales. Do you have any acreage numbers for each sub-watershed?
    - JA: We can provide that data.
- AC Member (FK): On potential GDEs – on the east side of the Valley where its over 30 feet to groundwater, there are a lot of non-native invasive species (Arundo, salt cedar, etc.). Has there been any discussion of removal of those non-native plants?
    - JA: I will pass this along to our wetland biologist. We can address invasive removal in Projects & Management Actions, though we must take care those species are not providing habitat for Threatened and Endangered (T&E) species.

Groundwater Model Update

John provided an overview of the proposed groundwater modeling approach for this GSP. The Consultant Team is using the USGS One-Water model for the Basin area and the USGS Basin Characterization Model (BCM) for the outlying watershed areas. He reviewed the historical simulation period, how land use is used in the modeling process, and how production wells are bring assigned to parcels in the model. John noted that the Consultant Team is requesting comments on Handout 2 (land use and well assignments) within one week, by July 16, 2020.

- AC Member (EL): The number of wells and the size of this AC is a mis-match – how are you going to get accurate data about all the wells for this planning effort? Will you do a field survey?
    - JA: No, we do not have the resources to do a field survey. Assigning parcel irrigation to specific wells is the preferred approach, but sometimes you just assign pumping to a general region. Slide 41 map was developed based on the City's 2014 Salt and Nutrient Management Plan (SNMP) model data and is a good estimate.

Sustainability Criteria

John provided an overview of sustainable management criteria and how the team is going to monitor for them: essentially, we will be monitoring groundwater elevation and groundwater quality.

- AC Member (FK): You have seawater intrusion crossed off. Why?
    - JA: Because we are not near an ocean, bay, inlet, or Delta. This is the official definition from California Department of Water Resources (DWR) and so we do not qualify.
- AC Member (FK): For land subsidence, when you look at 515 groundwater Basins in California and the points that placed each Basin in the medium and high priority categories, land subsidence and groundwater quality were both ranked as "zero" by DWR for the Basin. So why have you removed land subsidence, but not groundwater quality?
    - JA: We are required to monitor for all these sustainability indicators. The monitoring data I have reviewed to date includes elevated total dissolved solids (TDS) levels, and I do not think a DWR reviewer will allow us to adopt a GSP that does not address this issue. We will address thresholds for groundwater quality with a detailed discussion later. TDS levels are high in surface water entering the Basin, so this will be sticky issue for Groundwater Sustainability Agencies (GSAs). AC members will get to weigh in on where the thresholds are set and how it affects you all. We are considering thresholds for TDS and Nitrate only because we don't want to try to regulate something in the GSP that the GSAs don't have the ability to manage. We are going to focus on things that are related to more or less manageable groundwater conditions.
- AC Member (FK): Doesn't the Regional Water Quality Control Board (RWQCB) already monitor and regulate TDS and Nitrates with stormwater and wastewater permits?
    - JA: I agree, though we are stuck with it because it's in the SGMA law. The "nexus of effect" for undesirable results allows us to limit our management actions to these specific constituents. And we can establish thresholds that may be higher than other agencies thresholds (e.g. maximum contaminant levels (MCLs)). We need to make a GSP that is implementable, rather than creating more trouble along the way.
- AC Member (FK): It was disheartening to hear public comments this morning about a "smoking gun" related to TDS loading in the Basin. There are a lot of things contributing to TDS in this Valley. High levels of TDS are a problem for both farmers and for my compost facility. Is there a "smoking gun" or how are we going to work around (mollify, remediate) the situation?
    - JA: I do not believe the thresholds will be problematic for Valley users. The water quality thresholds will require more detailed discussion.

John continued his presentation about the proposed monitoring networks. Each monitoring well will have an established minimum threshold and measurable objective. The groundwater level network could include all 10 of the City's monitoring wells and the three Rancho Guejito wells. John showed examples of the sustainability criteria and how they apply.

- AC Member (MWit): Why would we want to measure the wells below the alluvium? I believe we should measure all wells to fill in the basic math of what is going on with the groundwater in the Basin. It's important that we have access to data about all layers of the groundwater Basin.

- AC Member (FK): I second Matt's comments. We all know that knowledge is power and that if we gather information now, we will have a better understanding of the Basin. If we do not collect the data now, we will have data gaps moving forward. The sooner we start measuring all Basin inflows and outflows, the more knowledge we will have.
- AC Member (FK): Bottom of Slide 50: what are the undesirable results? Are those conceptual or actual?
    - JA: Slide 50 is a diagram and does not represent a specific well. I am not implying we are in an undesirable result in this Basin. My feeling is that we are going to be setting our minimum thresholds in a majority of the existing wells. If you do not have any wells that fall below the minimum thresholds, then you do not have an undesirable result.

Field Program Update

John provided an update on the field program. Available information from the field program will be included in the GSP in the Hydrogeologic Conceptual Model (HCM) section. There were no AC comments on the field program.

Public Comments

Public comments provided in the "Chat" during the meeting are listed in the GoToMeeting Chat Log below. The following public comments were provided verbally by meeting participants:

- Robyn Badger, San Diego Safari Park – I agree with Frank that there are lots of non-native invasive species in that channel that should be removed.
- Andre Monette, BBK for RG – There are a number of studies that have been done in the Basin for the City in the western portion of basin that show high TDS, Chloride, and Nitrogen levels, clearly showing that these are big issues in the Valley. These constituents greatly exceed the drinking water standards and water quality objectives and high groundwater levels in that portion of the Basin – all causing surface waters in basin to have high TDS. Suggest reviewing the 2015 State of the Basin Report.
- Hank Rupp, General Manager, RG – Thank you for highlighting that Bulletin 118 is the appropriate definition of the Basin and limits the jurisdiction of SGMA. Clearly, following the law will help avoid litigation.
- Marc Lindshield, Leaseholder – The Valley is a gathering spot. You have chosen 2005 – 2020 period as the calibration period. We had 2 large fires during that time (Cedar Fire and Witch Creek Fires). The 2009 Study from CCC addresses increased risk for wildfire.
    - JA: We looked at aerial photos, but missed the mark on our analysis. We will re-review. From the data that I have reviewed, the surface water that comes into the Basin is salty. There is a salinity problem and we need to come up with an approach to address it.
    - ML: Southern California Coastal Water Research Project, Technical Report 598 (August 2009) by the Southern California Stormwater Coalition released a detailed report on this topic. The Community Planning Group has long protested Ramona MWD's outfall to Bandy Canyon that carries pollutants into the Valley.
- Marc Lindshield, Leaseholder – On Slide 47, can you share the data available for the monitoring well up Rockwood Canyon? We need all data available from all wells, no matter what depth. This is an area of serious concern. My well is affected every time the well next to me blasts.
- Marc Lindshield, Leaseholder – We have very thirsty invasives that are throughout the Valley. Water is a precious commodity and we need to make sure to protect it for Valley users.

    - JA: I was not aware of invasive species issues until today. We could add a Projects & Management Actions to address this.

- Frank Konyn: In reference to the "smoking gun" comment, we need to look at the big picture. When animal operations are done right, they will not affect the Basin. My relationship with the RWQCB can justify this. We receive imported water from Colorado River that brings TDS into the Basin. Are there geological formations in the watershed that deliver TDS to the Basin? The quality of agricultural Bests Management Practices (BMPs) in this Valley by all leaseholders far exceeds the historical practices. There are lots of factors and what we're seeing today are likely a result of poor BMPs from several years ago. It may be that the levels we are seeing today are practices from 40 years ago, and it may be 40 years before we see the full implications of the BMPs being practiced today.
    - Andre Monette, BBK for RG: The 2015 State of the Basin report (CH2M Hill) that I mentioned previously reports that 90% of Nitrate loading in the Basin is a result of manure operations.
    - Frank Konyn: As a member of the advisory board that helped with that plan, I believe the statistics you are stating have been taken out of context.

<< Clarification Email 1 – After the AC meeting, the following clarification was sent to AC members by Frank Konyn, AC Member, via email: "In the Technical Peer Review Meeting this morning, and again this afternoon in the Advisory Committee Meeting there were references made to the nitrate and TDS levels in the groundwater of the San Pasqual Valley … Specifically he was attempting to quote from the September 2015, San Pasqual Groundwater Management State of the Basin Report Update, Page 2-6 … The actual language in the original report (found on page 3-18 and attached to this email) reads as follows, "With over 90 percent of the total nitrogen contributions to the Basin coming from fertilizer and manure use….." … The first sentence reads "The single largest contributing source of nitrogen is commercial crop fertilizer use at 56% of the Basin total followed by landscape fertilizer use at 14 percent." … on page 3-11 [is] the following statement. "The largest source of nitrogen contribution from fertilizer use was from avocado production due to the large area in production on hillsides surrounding the Basin but within the study area subcatchment." …">>

<< Clarification Email 2 – Additionally, Rikki Schroeder, AC Member, sent the following statement via email: "… The Salt and Nutrient Management Plan (SNMP 2014) stated that Konyn Dairy contributes 12% of the nitrogen load and 1% of salt load to basin. … It is also important to remember that the SNMP is forward looking and aims to mitigate future loading. It does not seek to directly improve historical impacts. … The problem is that legacy contributions of nitrogen and TDS continue to haunt the basin. … For example, the plan mentions the former Verger dairy that ceased operations in 2011, but does not include the historical, cumulative impact associated with the Verger or Konyn operations. … Avocado and citrus fertilization are assigned approximately 37.5% of the N loading in the SNMP. Again, this ignores historical contributions. When those are taken into account, the dairy loading goes up to 29.8% and the avocado and citrus loading goes down to 21.1%. … While groundwater quality is the purview of the Regional Water Quality Control Board (RWQCB), it is also the responsibility of the Groundwater Sustainability Agency (GSA). … Currently there are at least two major lawsuits involving cities in San Diego County and in Kings County where nitrate contamination of groundwater alleged to be caused by dairies are being litigated. The cases are about current and legacy contributions of nitrogen and phosphorous from dairy operations. …"

Next Steps

The next AC meeting is scheduled for Thursday, October 8, 2020 from 2:00 to 4:00 pm

Comments about the land use maps and well mapping (Handout 2) must be received by Thursday, July 16, 2020. All other comments about today's meeting must be received by Thursday, July 23, 2020.

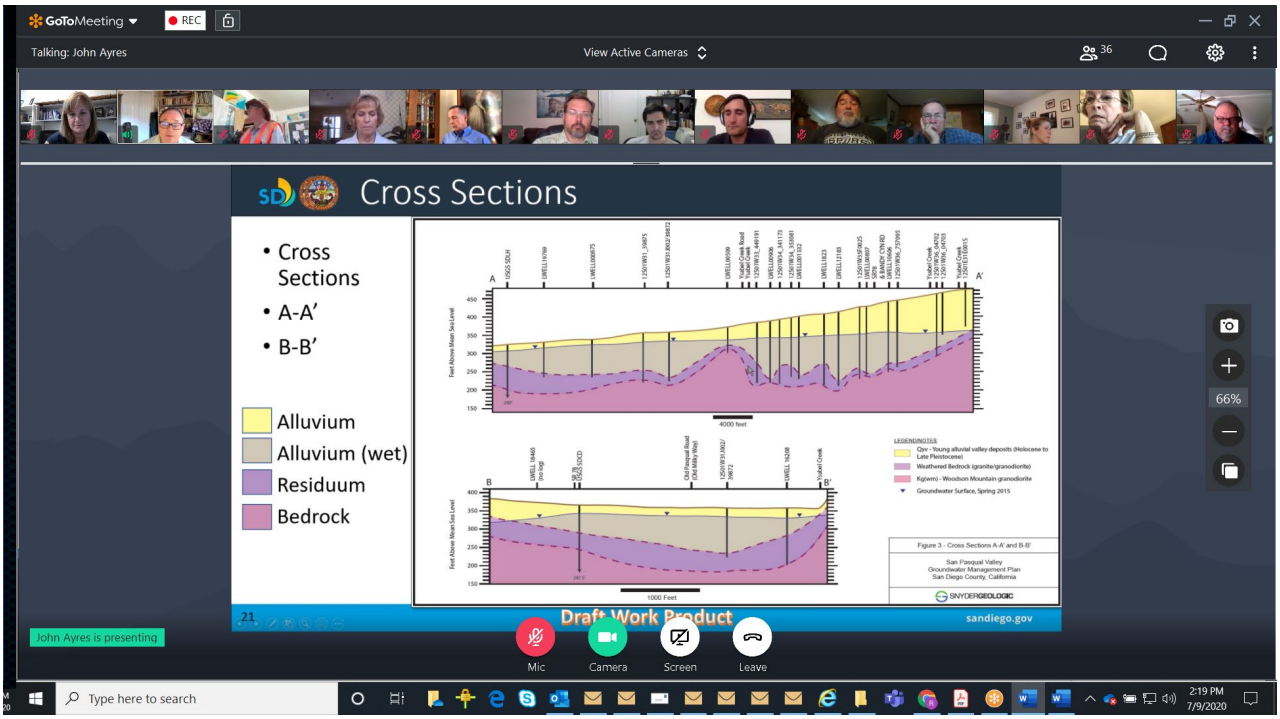
Please send any comments to Sandra Carlson at the City of San Diego using her email address at carlsons@sandiego.gov.

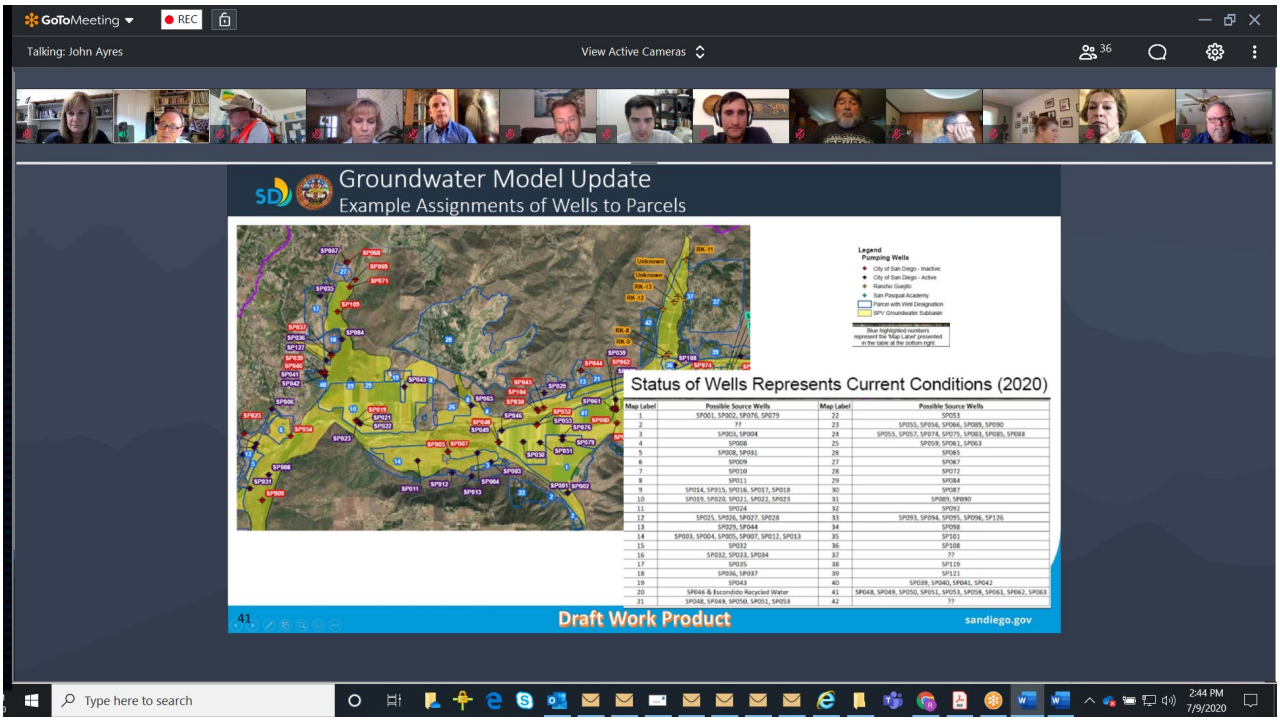
The AC meeting ended at 3:24 pm.

GoToMeeting Chat Log from AC Meeting

Rosalyn Prickett, Woodard & Curran (to Everyone): 1:56 PM: The meeting materials are on our website: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html
Nicole Poletto, Woodard & Curran (to Everyone): 2:06 PM: If you are having technical difficulties, feel free to chat me directly or give me a call at 858-875-7405
Matt Witman (to Everyone): 2:26 PM: i have a question
Eric Larson (to Everyone): 2:46 PM: have a question
Frank Konyn (to Everyone): 2:51 PM: i have a question on this slide
matt witman (to Everyone): 3:13 PM: I have a comment
Marc Lindshield (to Everyone): 3:24 PM: Marc Lindshield when I can
Dustin Meador (to Everyone): 3:35 PM: Should Irrigation efficiency consider some crops are being underirrigated if you compare Crop ET with Ref. ETo. The assumption is that Ag. is overwatering everything

Images from AC Meeting




GoToMeeting
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Talking: John Ayres
View Active Cameras
36
Groundwater Model Update
Example Assignments of Wells to Parcels
Legend
Pumping Wells
City of San Diego - Inactive
City of San Diego - Active
Rancho Guajito
San Pasqual Academy
Parcel with Well Designation
SPV Groundwater Subbasin
Blue highlighted numbers represent the 'Map Label' presented in the table at the bottom right.
Status of Wells Represents Current Conditions (2020)
Map Label
Possible Source Wells
41
Draft Work Product
sandiego.gov
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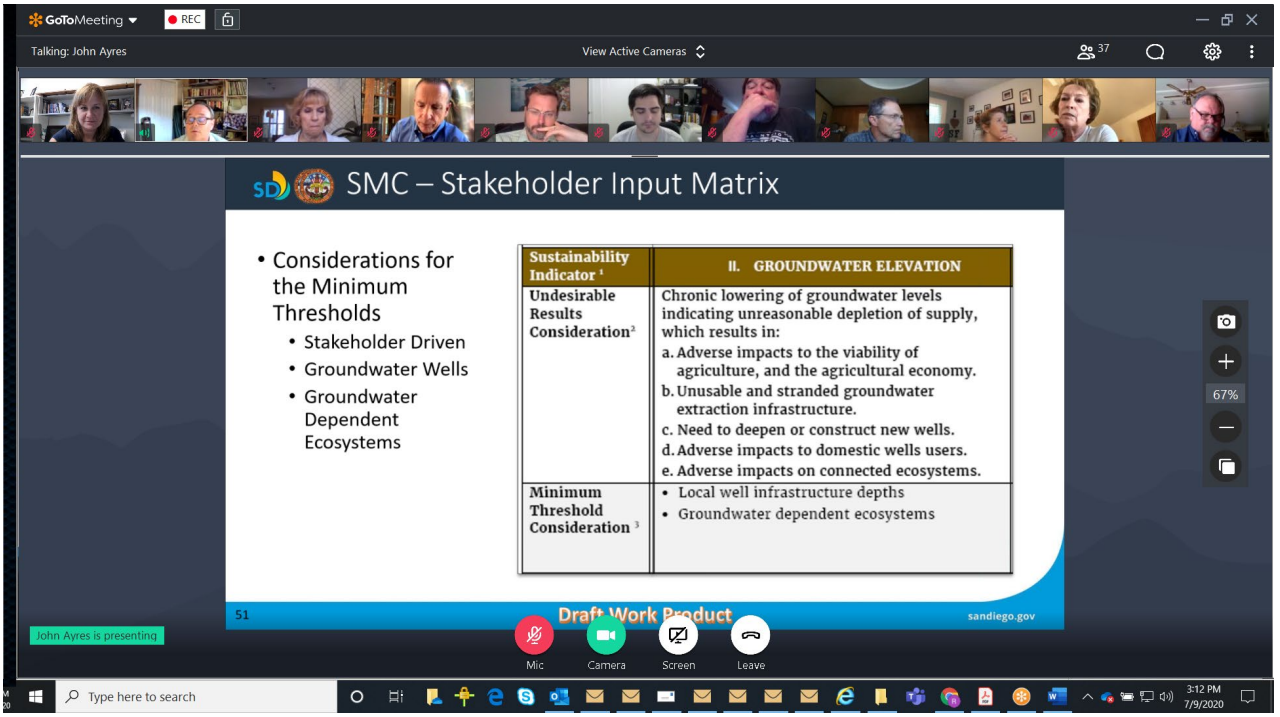
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Talking: John Ayres
View Active Cameras
37
SMC – Stakeholder Input Matrix
• Considerations for the Minimum Thresholds
• Stakeholder Driven
• Groundwater Wells
• Groundwater Dependent Ecosystems
Sustainability Indicator [1]
II. GROUNDWATER ELEVATION
Undesirable Results Consideration [2]
Chronic lowering of groundwater levels indicating unreasonable depletion of supply, which results in:
a. Adverse impacts to the viability of agriculture, and the agricultural economy.
b. Unusable and stranded groundwater extraction infrastructure.
c. Need to deepen or construct new wells.
d. Adverse impacts to domestic wells users.
e. Adverse impacts on connected ecosystems.
Minimum Threshold Consideration [3]
• Local well infrastructure depths
• Groundwater dependent ecosystems
67%
51
Draft Work Product
sandiego.gov
John Ayres is presenting
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7/9/2020

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Public Utilities

San Pasqual Valley Groundwater Sustainability Plan
Advisory Committee
Teleconference Meeting Agenda

Date: Thursday October 8, 2020 from 2:00 to 4:00 pm

Location: Teleconference Dial-In: +1 (224) 501-3412 Access Code: **979-473-053#**
GoToMeeting Link: https://global.gotomeeting.com/join/979473053

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	2:00 pm	Roll Call and Introductions	Facilitator, Consultant Team
2	2:05 pm	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1) • Summary of Comments Received (Handout 2) • Technical Peer Review (TPR) Meeting Recap • Review of Ground Rules • Updated Public Comment Format	Facilitator
3	2:15 pm	Groundwater Sustainability Plan (GSP) Content Review • GSP Development Process • Project Schedule	John Ayres, Consultant Team
4	2:20 pm	Groundwater Model Update (Handout 3) • Well-parcel and Land Use Maps • Water Budget Primer	John Ayres, Consultant Team
5	2:50 pm	Projects and Management Actions • Categories • Adaptive Management • Seeking AC/Public Input • Management Areas	John Ayres, Consultant Team
6	3:40 pm	Field Program Update	John Ayres, Consultant Team
7	3:45 pm	Public Comments	John Ayres, Consultant Team
8	3:55 pm	Next Steps and Closing Remarks • Next Meeting Date (Handout 4)	Facilitator/All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Advisory Committee Meeting
Meeting Summary

The following is a summary of the Advisory Committee discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday October 8, 2020 from 2:00 to 4:00 pm

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Purpose: Advisory Committee Meeting

Attendees:	Advisory Committee (AC) • Carole Burkhard (CB) • Frank Konyn (FK) • Lisa Peterson • Matt Witman (MWit) • Rikki Schroeder (RS) • Trish Boaz (TB)	City of San Diego (City) • Sandra Carlson (SC) • Niki McGinnis • Karina Danek • Mike Bolouri • Keli Balo • Sarah Brower County of San Diego (County) • Leanne Crow • Jim Bennett (JB)
	Public • Anita Regmi, Dept of Water Resources • Raj Brown, San Diego Safari Park • Chris Brzezicki, San Diego Safari Park • Robyn Badger, San Diego Safari Park • Alicia Appel, City of Escondido • Hank Rupp, Rancho Guejito (RG) • Lani Lutar, Responsible Solutions, RG • Andre Monette, Best Best & Krieger (BBK), RG • Marc Lindshield, SPV City Leaseholder • Pat McTigue, San Diego Safari Park • Elyse Levy, CDFW	Consultant Team • John Ayres (JA), Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Nicole Poletto, Woodard & Curran • Micah Eggleton, Woodard & Curran • Heidi Gantwerk, HG Consulting

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted participants as they signed onto GoToMeeting and reviewed basic instructions for GoToMeeting user tools. Rosalyn introduced the new facilitator for the SPV TPR and AC meetings, Heidi Gantwerk of HG Consulting, who has extensive experience with outreach and facilitation for non-profits and public agencies throughout the region.

Review

Heidi Gantwerk, Consultant Team, reviewed the meeting agenda and meeting objectives. She directed participants to Handout 1 with the last meeting summary, and Handout 2 with comments received following the last AC meeting. Heidi then reviewed the AC ground rules and explained how to

participate during the Public Comment agenda item. Heidi reminded the group that comments need to be provided directly via email to Sandra Carlson and that no other addresses should be cc'd in the emails to avoid serial meetings and violation of the Brown Act.

GSP Content Review

John provided an overview of the Sustainable Groundwater Management Act (SGMA) and reviewed the GSP schedule. No AC members had comments or questions.

Groundwater Model Updates

John provided an overview of the updates that were completed for the well figure and the land use figure prepared for the GSP. AC member comments were incorporated following the last meeting. John explained that the groundwater model update will be used to estimate historical, current, and projected water budgets; estimated change in groundwater storage; and estimate surface water and groundwater interaction.

A water budget is an accounting of the total groundwater and surface water entering and leaving a groundwater basin. A historical budget evaluates past use and aquifer response. We are doing 15-year timeline. A current budget quantifies current inflows and outflows. Projected budget estimates future conditions. Groundwater model gives us a better estimate of status and trends.

We are not required to manage to the water budget; it should be considered as a tool to identify what is needed to allow for data-driven monitoring and to ultimately achieve sustainable yield. Sustainability can be accomplished by responding to monitoring. The water budget helps us to identify projects and management actions (PMAs) to ensure basin is operated within its sustainable yield.

- AC Member (RS): What is difference between water budget and sustainable yield?
    - JA: Water budget is the detailed accounting of inflows and outflows; some are estimates and some are measured. Sustainable yield is the amount of water that can be pumped each year over a set of years that can be pumped without drying out the basin. We don't target sustainable yield as a specific number to target each individual yield, so we look to the levels monitoring to understand if the annual pumping is moving the basin toward an unsustainable level (as defined by minimum thresholds).

Projects and Management Actions

John provided an overview of the SGMA requirements for Projects and Management Actions (PMAs), including the need to be flexible when moving into implementation. In order to achieve this flexibility, an adaptive management strategy will be utilized to address any undesirable results. The GSA will evaluate GSP implementation actions, including continued monitoring, public meetings, annual reports, 5-year Plan Update, numerical model update, and pursuing funding opportunities. Adaptive management is "a structured, iterative process of decision making…via monitoring…". After receipt of monitoring results that are near or exceed sustainable management criteria, Core Team will investigate the issue, communicate with public, and determine a proposed project/management action. If pumping exceeds the sustainable yield of the basin, as demonstrated by monitoring, the GSA may inclement projects that focus on supply, such as recharging the Basin with stormwater, delivering recycled water from the cities of Escondido or San Diego, or delivering raw water from Ramona Municipal Water District. Less intensive management actions may also be considered, including water demand softening, making irrigation more efficient, completing a well inventory, basin-wide metering, or pumping restrictions.

- AC Member (RS): Is there enough storage area to justify the cost of piping in recycled water to use as recharge?

    - JA: The eastern side of the basin has depth to waters up to 80 or 90 feet. When we bring recycled water in, we are potentially meeting demand that might be above overall sustainable yield of the basin. Piping might be too expensive and not make sense, but we plan to make the list inclusive and evaluate all options.

- AC Member (TB): Have you incorporated items from the September 2020 San Dieguito River WQIP (Water Quality Improvement Plan; City of San Diego[1])?
    - RP: We will review the WQIP for management actions that might cross-over between the two efforts. This would leverage resources that the agencies will already be spending.
- AC Member (MWit): How do you assure that timeliness is built into this system? Basin reacts in quick fashion (fills in 1 rainy season or empties in 3-4 years). It seems like adaptive management approach needs to correlate with response time in the basin.
    - JA: We are thinking about establishing minimum thresholds, as well as adaptive management triggers for beginning the investigation and evaluation phases. This will allow the Core Team and stakeholders to consider timeliness of actions.
- AC Member (FK): John mentioned regrading San Dieguito River to allow for recharge. Historically, the river discharged to the Valley and meandered across the whole Valley. Now it is channelized. Given the land uses in the Valley, this doesn't seem to be a workable solution.

Heidi reminded AC members that the Core Team is looking for feedback and ideas for the PMAs. If anyone has any additional thoughts about this, please send them to Sandra Carlson.

John then explained that two management areas (on Slide 36) are being proposed in alignment with the City and County jurisdictions and that this is intended to illustrate that different portions of the Basin will be managed by public entities based on jurisdictional boundaries. He also explained that the same monitoring networks and thresholds will be utilized throughout the Basin and that they will not be developed based on jurisdictional boundaries. The ability to make this update is acceptable per the Memorandum of Understanding for the development of the GSP held between the City and County.

- AC Member (MWit): The GSP will be created without any regard to jurisdiction. Jurisdiction comes into play when City or County staff will need to implement management actions in their respective jurisdiction.
    - JA: Yes, this our proposal for use of these management areas. General implementation activities will be completed under the umbrella of the GSA.

Field Program Update

John explained that aquifer testing is still on hold.

- AC Member (FK): Have the issues been resolved on SV 129?
    - JA: We evaluated the well's construction and determined that there were problems with its construction.
    - KD: The City is still having discussions about that.

Final Thoughts by AC Members

- AC Member (TB): Please make sure to include management strategies in San Dieguito WQIP. It seems to be some missing projects that relate to SPV.
- AC Member (FK): I feel badly that AC members did not receive the TPR PPT early. I know that this was dealt with and look forward to seeing materials earlier in the future.

[1] http://www.projectcleanwater.org/download/san-dieguito-sdg-water-quality-improvement-plan-wqip/

- SC: Nobody got the PPT until the meeting started this morning.
- FK: Appeared that PQ had analyzed a few of the slides.

Public Comments

Public comments provided in the "Chat" during the meeting are listed in the GoToMeeting Chat Log below. The following public comments were provided verbally by meeting participants:

- Marc Lindshield, Leaseholder – Appreciate everyone's work on this. Going back to implementation slide, are we to assume that AC will cease to function during Plan implementation? This is concerning; I believe there should be public input.
- Marc Lindshield, Leaseholder – John also mentioned that it's unclear what public input might look like during Plan implementation. Can this be clarified?
    - HG: This question will be discussed by the Core Team and addressed in the GSP.
- Marc Lindshield, Leaseholder – The meandering San Dieguito River has been channelized with great difficulty. Not suggesting we go back to 1970s with sand mining, but we could mine out several ponds to catch and recharge storm flows.
- Elyse Levy, California Department of Fish & Wildlife – One quick question about the management areas, there seems to be an area that was not included in the City's jurisdiction, a circle in the middle? Maybe it was covered earlier, and I just missed it….
- Elyse Levy, California Department of Fish & Wildlife – Early coordination with CDFW is important for anything that affects the bed, bank, and stream channel. Any PMAs that affect the stream should initiate coordination with CDFW.
- Raj Brown, SD Zoo Safari Park – There is a Management Action bullet point about crop alternatives. How are these crop alternatives determined? Are crops focused on agricultural crops like sod grass or would they also include botanical collections? For future planning, we have botanical collections that are more tropical – crop rotation would affect our collections.
- Marc Lindshield, Leaseholder – Where are the historical recordings of these AC meetings?
    - HG: Those are all on the project website: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Next Steps

The next AC meeting is scheduled for Thursday, January 14, 2021 from 2:00 to 4:00 pm

Please send any comments to Sandra Carlson at the City of San Diego using her email address at carlsons@sandiego.gov.

The AC meeting ended at 3:11 pm.

GoToMeeting Chat Log from AC Meeting

Rikki (to Everyone): 2:41 PM: Is there enough storage area to justify the cost of piping in recycled water to use as recharge?

ACE (SDRVC) - Trish Boaz (to Everyone): 2:45 PM: Have you incorporated items from the San Dieguito River September 2020 Draft WQIP?

Marc Lindshield (to Everyone): 2:56 PM: Marc Lindshield - Leaseholder.... Several questions

Elyse Levy CDFW (to Everyone): 3:01 PM: Elyse Levy CDFW, one quick question about the management areas, there seems to be an area that was not included in the City's jurisdiction, a circle in the middle. Maybe it was covered earlier and i just missed it...

Raj Brown (to Everyone): 3:05 PM: Raj Brown SD Zoo Safari Park: There is a Management Decision bullet point about crop alternatives. How are these crop alternatives determined? Are crops focused on agricultural crops like sod grass or would they also include botanical collections?

AC - Frank Konyn, Lessee (to Everyone): 3:09 PM: i have another item

Marc Lindshield (to Everyone): 3:09 PM: Where can we find the historical recordings of these meetings?

Marc Lindshield (to Everyone): 3:10 PM: Thank you!

Rosalyn Prickett, Woodard & Curran (to Everyone): 3:10 PM: Historical recordings are all here: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html#:~:text=The%20San%20Pasqual%20Valley%20Groundwater,in%20central%20San%20Diego%20County.

Images from AC Meeting

Public Utilities

San Pasqual Valley Groundwater Sustainability Plan
Advisory Committee
Teleconference Meeting Agenda

Date: Thursday January 14, 2021 from 2:00 to 4:00 pm

Location: Teleconference Dial-In: +1 (571) 317-3122, Access Code: **235-957-237#**
GoToMeeting Link: https://global.gotomeeting.com/join/235957237

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	2:00 pm	Roll Call and Introductions	Heidi Gantwerk, Consultant Team
2	2:05 pm	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1) • Summary of Comments Received • Technical Peer Review (TPR) Meeting Recap • Review of Public Comment Format	Heidi Gantwerk, Consultant Team
3	2:15 pm	Groundwater Sustainability Plan (GSP) Content Review • GSP Development Process • Project Schedule	John Ayres, Consultant Team
4	2:20 pm	Groundwater Model Update • Intended Uses of Model • Model Construction Overview • Water Budget Primer	John Ayres, Consultant Team
5	2:40pm	Sustainable Management Criteria (Handout 2) • Minimum Thresholds • Adaptive Management Thresholds • Groundwater Levels • Groundwater Quality	John Ayres, Consultant Team
6	3:30 pm	Projects and Management Actions • Initial PMAs List • Adaptive Management Strategy	John Ayres, Consultant Team
7	3:45 pm	Public Comments	John Ayres, Consultant Team
8	3:55 pm	Next Steps and Closing Remarks • Next Meeting Date (Handout 3)	Heidi Gantwerk/All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Advisory Committee Meeting
Meeting Summary

The following is a summary of the Advisory Committee discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday January 14, 2021 from 2:00 to 4:00 pm

Location: GoToMeeting

Purpose: Advisory Committee Meeting

Attendees:	Advisory Committee (AC) • Carole Burkhard (CB) • Frank Konyn (FK) • Lisa Peterson • Matt Witman (MWit) • Rikki Schroeder (RS) • Trish Boaz (TB) • Eric Larson (EL) • Dave Toler	City of San Diego (City) • Sandra Carlson • Karina Danek (KD) • Mike Bolouri • Keli Balo • Surraya Rashid County of San Diego (County) • Leanne Crow • Jim Bennett • Nancy Karas
	Public • Anita Regmi, Dept of Water Resources • Raj Brown, San Diego Safari Park • Charlie de la Rosa, San Diego Safari Park • Chris Brzezicki, San Diego Safari Park • Robyn Badger, San Diego Safari Park • Alicia Appel, City of Escondido • Hank Rupp, Rancho Guejito (RG) • Lani Lutar, Responsible Solutions, RG • Andre Monette, Best Best & Krieger (BBK), RG • Pat McTigue, San Diego Safari Park • Greg Porter, San Diego Safari Park, Browse Team • Elyse Levy, CDFW • Brad Blaes, The Pinery • Charles Fleuret, San Diego Safari Park	Consultant Team • John Ayres (JA), Woodard & Curran • Rosalyn Prickett (RP), Woodard & Curran • Nicole Poletto, Woodard & Curran • Heidi Gantwerk, HG Consulting

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted participants as they signed onto GoToMeeting and reviewed basic instructions for GoToMeeting user tools. Rosalyn reviewed when and how members of the public can provide input.

Review

Heidi Gantwerk, Consultant Team, reviewed the meeting agenda and meeting objectives. She directed participants to Handout 1 with the last meeting summary. Heidi reminded the group that comments need to be provided directly via email to Karina Danek and that no other addresses should be cc'd in the emails.

John Ayres, Consultant Team, provided a recap of the last two TPR meeting topics. This included a December 17 TPR meeting focused on the groundwater model update, and the TPR meeting this morning that included the water budgets and hydrographs that will be included in the February AC Meeting.

GSP Content Review

John provided an overview of the Sustainable Groundwater Management Act (SGMA) and reviewed the GSP schedule. No AC members had comments or questions.

Groundwater Model Updates

John provided an overview of the updates that were completed for the groundwater model. The model was built to account for the rain and runoff from the greater watershed into the SPV Basin and the geology of the Basin in order to evaluate our Sustainable Management Criteria (SMCs) and prioritize data gaps. John explained that the Basin is about 13 square miles and model domain is about 42 square miles. He reviewed the cross sections that we developed a few months ago, which were used to construct the model (Layer 1 is alluvium, Layer 2 is residuum, and layers 3 and 4 are bedrock). Slide 20 shows model area with stream reaches, wells, and gages. In the February meeting, more model information will be provided for model calibration, forecast development, and water budgets.

- AC Member (RS): Is there a table for the various things on the map on Slide 20?
    - JA: Yes, the detailed information is in the December TPR PPT. All of those TPR materials are on the project website, available here: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html.

Sustainable Management Criteria

John explained what the sustainable management criteria includes: undesirable results (UR), minimum threshold (MT), and measurable objective (MO). Thresholds must be set for all six sustainability indicators: groundwater levels, groundwater storage, seawater intrusion, degraded groundwater quality, land subsidence, and depletion of interconnected surface waters. Seawater intrusion and land subsidence have been removed as SMC for the SPV Basin.

He provided an example of what groundwater levels thresholds might look like. There is no regulatory repercussions of achieving (or not) the MO, just the MT. Note that conditions are different on west side, which include GDEs. There are thresholds for the 15 wells in the monitoring well network. Adaptive Management Threshold (AMT) is an early warning signal. Thresholds need to consider nearby well infrastructure, GDEs, and historical changes in groundwater levels.

John explained "range of measurement" which is the range that groundwater levels (highest and lowest) and "percentage of range" which is the application of some percentage of the range of measurement (50% or 100%). Well depth percentiles are considered to make sure that thresholds aren't set below the 20th percentile of wells.

- AC Member (EL): Will the GSP contain the adaptive measures for a standalone program should the thresholds be exceeded.
    - JA: Yes, we'll explain the adaptive management process today.

- AC Member (TB): Is there a predictive "sustainability" modeling tool?
    - JA: Yes, we have a model that considers future conditions under climate changes. They will be compared with the thresholds here.
    - TB: Have you considered General Plan projections and habitats? The predictive model should include those considerations.
    - JA: We do show groundwater levels in the model outputs. SPV is considered an agricultural preserve, so we did not project future growth in the Valley.
    - TB: Not necessarily housing, but what if leases come up? Can we apply specific land use proposals and predict changes to land uses?
    - JA: We can do that with the model at the 5-year update; though we don't anticipate substantial land use changes based on current City policy.

The minimum threshold is regulatory and determines what is considered a significant and undesirable result. The MT is designed to be deeper than the historical low, above bedrock, and above 20th percentile of nearby wells. Western wells – 100% of range below minimum; Eastern wells – 50% of historical range. The AMT is an intermediate threshold used to inform the GSAs when they need to start investigations. The AMT is shallower than MTs. Western wells – 80% of range below minimum; Eastern wells – 30% of historical range. John acknowledged that we received a comment during the TPR meeting that the AMTs should be lower, to give the City more time to course correct.

The MO is above the MT and AMT and provides for 5-years of storage for drought. For wells near GDEs, set 10 ft below GSE; if not, set at 5-year decline above MT. The 5-year timeframe is intended to reflect the recent 5-year drought. He reviewed sample hydrographs with the thresholds on them (Slide 36) – brown line is ground surface, green is MO, orange is AMT, red is MT, grey dashed are bottom of the Basin, and pink lines are well screen intervals. Groundwater level information shows that western wells stay full, even in drought. Eastern wells are more variable and decline during droughts.

Adaptive management is triggered when 30% of wells concentration rises above AMT for 12 months (5 of 15 wells). UR is detected when 30% of wells rises above MT for 24 months. This format gives the GSA time to do some management before the undesirable result occurs.

- AC Member (MWit): In separation of AMT and MT, is there a time factor? If there is only one year between the AMT and the MT, how will adaptive management be implemented in time?
    - JA: The AMT is set so that the GSA has adequate time to implement management actions before the UR is triggered. If the levels dip below the AMT or MT for the summer and then bounce back up, that doesn't count and the timeline is started over. We established the 24 months trigger because we want to make sure that actions are triggered as a result of a real, long-term issue.
- AC Member (FK): Will there be only 2 groundwater level samples per year? What if there is a rainstorm right after a measurement and that isn't captured, then next sample isn't until following summer?
    - JA: We will be measuring for 12 consecutive months and the timing of those two measurements is flexible. Flexibility is built in so the GSA can make decisions on its management rather than have actions be prescribed. The GSP will include language about "12 consecutive months" – so the GSA could then do an investigation because they determine that we had 2 summer measurements and want to wait until the next winter measurement. Had a prior project where we did not include an AMT; learned from that mistake and are including the AMT so the GSA and stakeholders can work together to figure out best management actions moving forward. Requirements are about communication.

- AC Member (FK): The Core Team is City and County staff, but John also mentioned stakeholders. Can you explain further?
    - JA: We will address this in the PMAs portion of presentation.

John explained that the groundwater storage criteria will use groundwater levels as a proxy.

John explained groundwater storage levels and recommended using groundwater levels as a proxy for the groundwater storage criteria, which is consistent with other completed GSPs. Groundwater storage is a less important SMC because the levels are protective of groundwater storage. This means that no additional calculations or modeling work is required, reducing implementation costs in the future. This is standard across GSPs. John explained the groundwater quality criteria should consider high concentrations of TDS and nitrate in creek inflows. To set thresholds for groundwater quality, the Consultant Team was mindful to set thresholds on constituents that are reflective of the tools the GSA has that may affect groundwater quality. We want to set thresholds based on the GSA's ability to influence groundwater quality for constituents that can be affected by water volume management and within the range that the GSA can cost-effectively manage. John discussed the interaction of water quality with local streams based on the Nitrate and TDS chemographs for the Basin. For Nitrate, there were generally downward trends; except at Cloverdale Creek. For TDS, both downward and slight increasing trends. John also explained surface water quality trends for creek inflows. One well with increasing water quality is not "significant and unreasonable"; we need to focus on long-term, basin-wide trends. We cannot change water quality when surface water inflows are so high. The thresholds for nitrate and TDS differ, but can be higher than the MCL due to the poor water quality of incoming streams.

Nitrate MT has a Basin Plan Water Quality Objective of 45 mg/L; AMT is at historic high or MO, whichever is higher; MO is the SNMP objective of 10 mg/L. TPR raised issue of Nitrogen vs Nitrate objectives and making sure we're using correct one from SNMP. TDS MT is 10% range above historic high; AMT is historic high measurement; MO is 1,000 mg/L. Again, adaptive management is triggered when 30% of wells concentration rises above AMT for 12 months and UR is detected when 30% of wells rises above MT for 24 months. John showed some examples of sample chemographs with thresholds. He explained why the MTs and MOs are reversed, with MTs higher.

- AC Member (EL): As John says, it's the RWQCB that deals with water quality. They're creating a plan for every farmer developing a Nitrogen Management Plan. I just wanted to let everyone know that there are regulations coming.

John continued to explain other SMCs as it relates to subsidence. DWR provides INSAR measurements that calculate changes in ground surface over time. SPV has only seen extremely little subsidence, even after significant drought. Subsidence is unlikely to cause an UR because there are few clays in the alluvium, plus very little infrastructure to be damaged by subsidence. The team suggest removing subsidence as a sustainability indicator. The fall back plan is to point to groundwater levels as a proxy. There were no AC comments on the subsidence criteria.

John then explained the final indicator: interconnected surface water. The GSA Core Team recommends using levels as a proxy for interconnected surface waters. There are 6 wells in the surface water proxy monitoring network (each within 2,000 ft of a GDE). AMT trigger would be 30% of wells (2 of 6) for 12 months. John then noted that he noticed that the map shows 7 wells in the network, so need to revisit writeup.

To summarize, sustainability is set by the monitoring network and thresholds. The SPV is not currently within a UR situation, so the GSA doesn't need to take immediate action. This means that we don't have to take on costly projects to fix something right away. Instead, we've created a program to implement them when and how they are needed. There were no other AC comments on the SMCs.

Projects and Management Actions

SGMA regulations require GSPs to include a list of projects and management actions (PMAs) that can be used to avoid URs. John explained that because SPV is currently considered sustainable, no projects or management actions need to be implemented at this time for groundwater quality or groundwater levels. The implementation of the PMAs have been designed to be responsive to changes in the future through the adaptive management process. PMAs have been presented in two groupings – Plan implementation, and Adaptive management actions. GSP Implementation Tasks will be implemented regardless of basin conditions. Adaptive management allows for more local control, with adequate warning time prior to a minimum threshold. Management is triggered by monitoring.

The proposed AMTs provide warning time to GSAs so that management actions can be implemented before a UR occurs. This facilitates local control. Adaptive management is triggered when 30% of wells (5 of 15 for levels, 3 of 10 for quality) exceeds AMT for 12months; a UR is detected when 30% of wells (5 of 15 for levels, 3 of 10 for quality) exceed MTs for 24 months.

John presented an adaptive management cycle graphic to explain the steps in the process. If an exceedance occurs, the Core Team will investigate. If it's a localized issue, we go back to monitoring. If it is a long-term basin trend, the Core Team works with stakeholders to discuss and determine actions. Finally, the GSA needs to implement the selected management action. Public communication and coordination with stakeholders is an important part of this adaptive management cycle (in the investigation, action selection, and action implementation steps).

- AC Member (FK): 10-15 years from now, who is the Core Team?
    - JA: The Core Team is made up of folks from the GSA. The GSA MOU dictates that the Core Team is City and County staffers.
    - KD: John was correct. The GSA MOU defines the Core Team as staff from the City and County. There is no expiration to that MOU. Staff may change, but SGMA is a priority and there will always be staff involved.
- AC Member (FK): The Salt and Nutrient Management Plan (SNMP) that was used as a basis for thresholds said that the City will give stakeholders updates periodically. But it has been 7 years since the last update. How can we write the Plan to ensure that the Core Team follows through with their commitments to include stakeholders?
    - JA: SGMA is more robust than the SNMP requirements, and requires 5-year updates and Annual Reports following GSP adoption. The report is required by SGMA, but that will prompt the GSA to involve stakeholders. Based on my work with the Core Team, the City and the County are committed to this GSP process and will not let 7 years go by without a stakeholder meeting.
- AC Member (RS): Was the SNMP a State mandated plan? What are the requirements for this Plan?
    - RP: SNMPs are required by the state's Recycled Water Policy, though not sure about requirements in that Policy for ongoing stakeholder coordination.

John explained that the list of PMAs to be included in the GSP. Plan Implementation tasks include continued monitoring, public meetings, annual reports, 5-year Plan Update, numerical model update, and pursuing funding opportunities in addition to groundwater monitoring improvements, public outreach and website maintenance, and education and outreach for TDS and Nitrate loading. The plan is to hold a public meeting annually with the release of the Annual Report. There are eight proposed management actions and two projects that are proposed for inclusion in the GSP. Management actions include a well inventory, GDEs Study, basin-wide metering program, education and outreach, pumping restrictions, farming best practices, supporting WQIP activities, and coordination with other SPV entities. Projects include coordination on construction of an infiltration basin and coordination on implementation of invasive species removal.

Heidi invited AC members to comment on the PMAs. There were no additional comments.

Final Thoughts by AC Members

- AC Member (MWit): Your thresholds need to be our thresholds because the thresholds do not do any good if they're below the point that I can pump water. That is certainly a compromise. I want this group to be clear that under the proposed MTs, the output of my well has been decreased by about 2/3's. I would have had to do some company action to deal with the decline far before any action is mandated under SGMA. I want to make sure that we all don't fail prior to the GSP being implemented.
- AC Member (FK): What Matt did not chime in on is that bureaucracy moves slower than what the farmers need on the ground. There might be a planting window of 45 days, but farmers may not have information back from GSAs before that window closes. This would cause missing an entire year of crops until the next season. This is an issue that should be recognized. Farmers need to move faster than the folks that are just monitoring as part of their jobs.
- AC Member (FK): Slide 80 from the TPR meeting this morning showed a projected, gradual decline over time, going out until 2071. The cumulative groundwater storage was becoming less over time. It's only a model, but this is alarming. The TPR didn't appear to consider it alarming because it was only 100 AF. But up at the east end of the Valley, Matt will run out of water sooner than folks in the western portion of the Basin. As you look out long-term, are you concerned about the Valley?
    - JA: We will be reviewing the water budget slides with the AC next month in February. We wanted to check in with the TPR first, to confirm our modeling approach. If there is a gradual decline to groundwater of 100 AF, what can we do to resolve it? Can we remove invasive species? Can we implement other actions? This issue can be managed by the GSA. Each annual report will have a public meeting that will present monitoring results and how close we're getting to the AMTs at that time. There will also be 5-year updates of the GSP. If any of the wells trigger the AMTs, the Core Team will host a public meeting to talk about it. In other basins, they were below the MT and had to immediately implement actions. In SPV, we're one wet year away from being sustainable. With conscientious management, we'll be fine.
- AC Member (FK): How reliable is the predictive modeling of weather patterns and rainfall?
    - JA: We'll discuss in detail next month. We'll refine the discussion to address your questions at that time.
    - JA: Another thought on thresholds, we recognize that some AC members believe they are too low. We can implement a few PMAs to address issues. However, as suggested by Matt earlier, the Core Team will further discuss the AMTs. We want to get that right!

Public Comments

Public comments provided in the "Chat" during the meeting are listed in the GoToMeeting Chat Log below. The following public comments were provided verbally by meeting participants:

- Elyse Levy, California Department of Fish & Wildlife – Will the biological study that was conducted be available for review? What is the basis for the adaptive management 24-month threshold for interconnected surface water? Will there be ground truthing of impacts to GDE's when the adaptive management threshold is almost met? Could there be an intermediate threshold to look at GDE's at 12 months if the levels indicate a decline?

Next Steps

The next AC meeting is scheduled for Thursday, February 18, 2021 from 2:00 to 4:00 pm

Please send any comments to Karina Danek at the City of San Diego using her email address at kdanek@sandiego.gov.

The AC meeting ended at 4:02 pm.

GoToMeeting Chat Log from AC Meeting

Rikki (to Everyone): 2:19 PM: Is there a table for the various things on the map on pg. 20

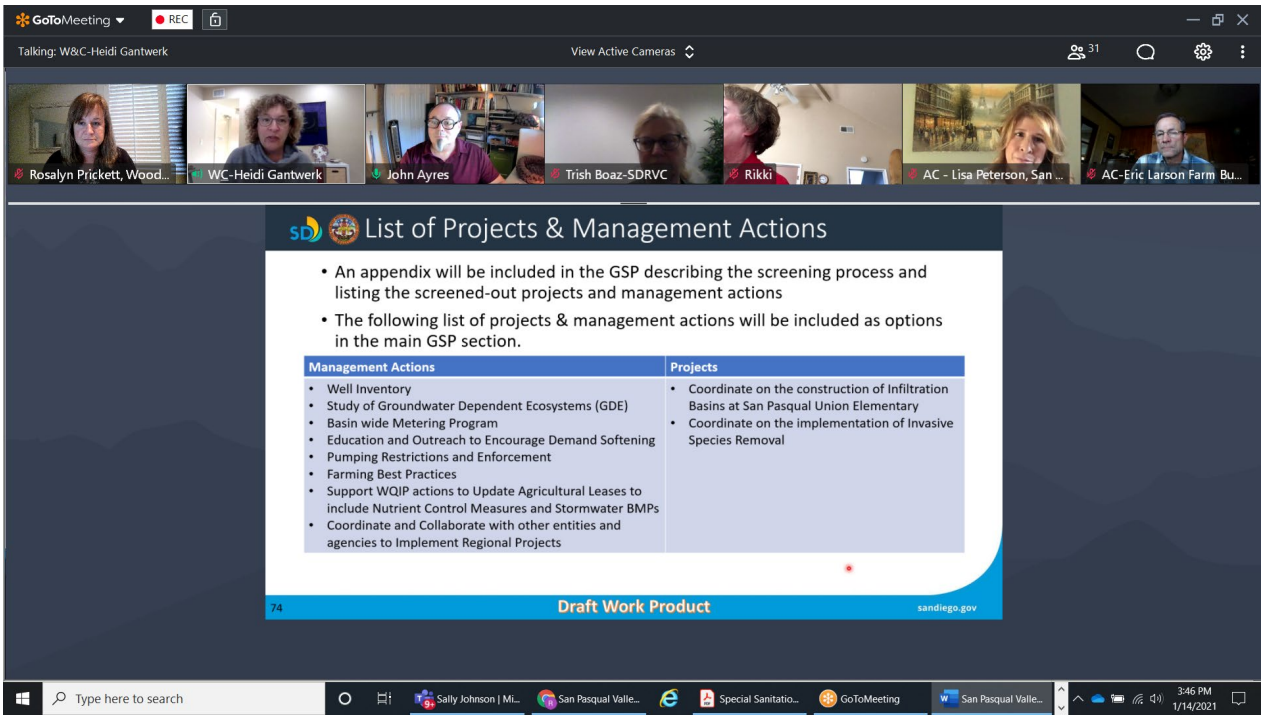
Rosalyn Prickett, Woodard & Curran (to Everyone): 2:20 PM: Project website: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Trish Boaz-SDRVC (to Everyone): 2:24 PM: Is there a predictive "sustainability" modeling tool?

W&C-Heidi Gantwerk (to Everyone): 3:37 PM: As a reminder, if you wish to speak during public comment, please place your name and organization into the chat.

Elyse Levy CDFW (to Everyone): 3:53 PM: Elyse Levy CDFW: Will the biological study that was conducted be avaiable for review? What is the basis for the adaptive management 24 month threshold for interconnected surface water? Will there be ground truthing of impacts to GDE's when the adaptive management threshold is almost met? Could there be an intermediate threshold to look at GDE's at 12 months if the levels indicate a decline?

Images from AC Meeting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WC-Heidi Gantwerk
John Ayres
Trish Boaz-SDRVC
Rikki
AC - Lisa Peterson, San ...
AC-Eric Larson Farm Bu...
List of Projects & Management Actions
An appendix will be included in the GSP describing the screening process and listing the screened-out projects and management actions
The following list of projects & management actions will be included as options in the main GSP section.
Management Actions
Well Inventory
Study of Groundwater Dependent Ecosystems (GDE)
Basin wide Metering Program
Education and Outreach to Encourage Demand Softening
Pumping Restrictions and Enforcement
Farming Best Practices
Support WQIP actions to Update Agricultural Leases to include Nutrient Control Measures and Stormwater BMPs
Coordinate and Collaborate with other entities and agencies to Implement Regional Projects
Projects
Coordinate on the construction of Infiltration Basins at San Pasqual Union Elementary
Coordinate on the implementation of Invasive Species Removal
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San Pasqual Valley Groundwater Sustainability Plan
Advisory Committee #7
Teleconference Meeting Agenda

Date: Thursday February 18, 2021 from 2:00 to 4:00 pm

Location: NEW INFO:
Teleconference Dial-In: +1 (646) 749-3122, Access Code: **493-028-013#**
GoToMeeting Link: https://global.gotomeeting.com/join/493028013

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	2:00 pm	Roll Call and Introductions	Heidi Gantwerk, Consultant Team
2	2:05 pm	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1) • Summary of Comments Received • Technical Peer Review (TPR) Meeting Recap • Review of Public Comment Format	Heidi Gantwerk, Consultant Team
3	2:15 pm	Groundwater Sustainability Plan (GSP) Content Review • GSP Development Process • Project Schedule	John Ayres, Consultant Team
4	2:20pm	Sustainable Management Criteria (Handout 2) • Minimum Threshold • Planning Threshold • Measurable Objective	John Ayres, Consultant Team
5	3:00 pm	Water Budgets • Historical • Current • Projected	John Ayres, Consultant Team
6	3:30 pm	Projects and Management Actions (Handout 3) • Adaptive Management • Tier Zero • Tier One • Tier Two	John Ayres, Consultant Team
7	3:45 pm	Public Comments	John Ayres, Consultant Team

Item	Time	Description	Presenter
8	3:55 pm	Next Steps and Closing Remarks • Next Meeting Date (Handout 4)	Heidi Gantwerk/All

San Pasqual Valley Groundwater Sustainability Plan
Advisory Committee #7
Teleconference Meeting **Summary**

Date: Thursday February 18, 2021 from 2:00 to 4:00 pm

Location: NEW INFO:
Teleconference Dial-In: +1 (646) 749-3122, Access Code: **493-028-013#**
GoToMeeting Link: https://global.gotomeeting.com/join/493028013

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Attendees:	**Advisory Committee (AC)** • Carole Burkhard (CB) • Frank Konyn (FK) • Lisa Peterson • Matt Witman (MWit) • Rikki Schroeder (RS) • Trish Boaz (TB) • Eric Larson (EL) • Dave Toler	**City of San Diego (City)** • Sandra Carlson • Karina Danek (KD) • Niki McGinnis • Mike Bolouri • Keli Balo • Surraya Rashid • Lourdes Bernhard **County of San Diego (County)** • Leanne Crow • Jim Bennett • Nancy Karas
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Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted participants as they signed onto GoToMeeting and reviewed basic instructions for GoToMeeting user tools. Rosalyn reviewed when and how members of the public can provide input.

Review

Heidi Gantwerk, Consultant Team, reviewed the meeting agenda and meeting objectives. She directed participants to Handout 1 with the last meeting summary. Heidi reminded the group that comments need to be provided directly via email to Karina Danek and that no other addresses should be cc'd in the emails.

GSP Content Review

John provided an overview of the Sustainable Groundwater Management Act (SGMA) and reviewed the GSP schedule. No AC members had comments or questions.

Sustainable Management Criteria

John reviewed the definitions of the terms in the Sustainable Management Criteria:

- Undesirable Results (UR) – Help us understand what conditions to avoid
- Sustainability Goal – statement that provides the overarching goal of the GSP
- Monitoring Networks – how we will monitor things to see if they are becoming or are undesirable
- Minimum Threshold (MT) – Point or limit that indicates the basin may be experiencing an undesirable result
- Measurable Objective (MO) – This is where the basin sets its goals to be
- Margin of Operational Flexibility (MoOF) – This is the amount of storage the Basin would like to have above the minimum threshold for use during droughts

John then introduced the proposed tiers for the projects and management actions – Tier 0 which may be implemented anytime after GSP adoption, Tier 1 which will be implemented after the Tier 1 trigger, and Tier 2 which will be implemented after the Tier 1 trigger to prevent undesirable results.

- RS: Can someone please address what the comment related to raising AMT threshold was?
    - JA: An AC member requested that we raise the AMT threshold. We have considered this comment and made some suggested changes to the thresholds and triggers – we'll talk about those changes today.

John explained the proposed triggers for the revised thresholds and tiers. No changes are proposed for the MTs. MoOF is estimated as 5 years of storage. MO is set to provide an estimated 5 years of storage during drought periods above the MT. Tier 1 Trigger (uses Planning Threshold [PT]) is set to provide an estimated 18 months of time for planning prior to reaching the MT. Tier 2 Trigger (uses MT) is set to provide at least 24 months to avoid reaching an UR. John provided a hydrograph example of how the MT was calculated.

- MWit: On the 5 well criteria, is that Basin-wide?
    - JA: Yes, Basin-wide. Our key well network is 15 wells, and the MT trigger is 30% = 5 wells for 24 months.
- EL: Is this MT approach acceptable across the state for GSPs?
    - JA: Yes, this is an approach that falls within the range of approaches used in the 2020 GSPs. W&C used this exact methodology in other regions.

John provided a hydrograph example of how the MO was calculated, followed by an explanation of how the PT was calculated.

- MWit: Are you saying that the western part of the basin holds that same water per foot as the eastern part of the basin?
    - JA: No, were using the historical trend line because were hoping that the way the GWL responded during the last drought is indicative of how its respond in the next drought.
- MWit: The basin is a V-shaped vessel. The amount of water in the lower part of the basin will be less than the same foot depth at higher elevations.
    - JA: Interesting question. We didn't see a steeper slope at lower levels in the historical record. Surely, if basin was dewatered, that might be an affect. We don't understand alluvium, residuum, and bedrock, so we don't know how they'll respond at lower elevations. Our modeling team tried to better understand and model this. What you're suggesting might be plausible, but we don't have a good way to estimate it. We didn't see a steeper slope at deeper levels anywhere.
- FK: Looking at a USGS hydrograph, the well behind Matt Wittman's office, 2011-current trend line did seem to get steeper in latter years. Matt has a good point, have to assume that this basin isn't a straight down, square bottom pool of water – need to recognize that pumping at a certain rate will go down faster at lower levels. Continue you to look at this more.
    - JA: We will take a closer look. Thank you.

John provided a summary of the threshold approaches, with calculation, trigger, and actions. John provided an example of one hydrograph from the West Valley and one from the East Valley. All representative wells are shown in Handout #2.

Water Budgets

John explain the general approach taken to the numeric modeling and development of water budgets. The model is only one line of analysis being used to help the GSA develop its GSP; monitoring data and our SMCs will determine whether the basin is being managed sustainably. The model used consumptive use, based on CalETA data, to project anticipated water use by the farms/vegetation in the basin. Precipitation was projected in accordance with climate change projections.

- FK: Is this graph for calendar year or water year?
    - JA: Im not sure, but I believe that we have used water year.

SGMA regulations require that we evaluate water budgets for 3 different systems: surface water, land systems, and groundwater. Surface water flows into and out of the basin in relatively equal amounts. The groundwater system water budget shows historical cumulative change in storage, along with projected cumulative change in groundwater storage. Although the cumulative change in storage is slightly low (-3%), this is within the margin of error for numerical models. Basins that are critically over drafted can have -60% change in storage. The water budget appears to mirror what we have seen in East Valley – there has been a drop in groundwater levels over drought and they've come up, but not all the way.

- FK: Do all of the state-wide GSAs use this same weather projections, or is there variability in how weather projections are applied?
    - JA: Not sure, though DWR did provide climate change conditions for use by
- FK: Only off 2.3%, but when were off 2.8% we can see those effects on the eastern side of the basin. That is most fertile agricultural lands and should be considered.
    - JA: Yes, we're set PT and MTs with that consideration. We don't have an issue currently, but if there is growth in the Valley, there may be a need to respond to lowering groundwater levels. This is why we've set PTs so that we can respond as needed.

The projected groundwater budget indicated potential for some depletion of groundwater storage, primarily in the eastern portion of the Basin. We're at a tipping point, which is why were proposing monitoring and adaptive management. Future groundwater levels in the eastern portion of the basin could go down to the MTs; implementation of adaptive management actions may be necessary in future Plan implementation. John reviewed the model forecast hydro

- FK: Historically, agriculture has made technological advances in conservation. We have to assume greater water conservation through mechanical applications.
    - JA: We did not include conservation assumptions in the forecast, so this is a conservative forecast.
- MWit: Some of the key monitoring wells are suspect, so they need to be replaced.
    - JA: Yes, the well that you said was collapsed does bottom out at that level. Those wells will be replaced as grant funding comes available.
- MWit: Yes, there are others that has collapsed as well.
    - JA: The GSA will pursue grant funds to allow installation of better monitoring facilities.

Projects and Management Actions

John reviewed the SGMA regulations for projects and management actions, and the proposed adaptive management approach. Tier 0 includes GSP implementation activities, as well as voluntary programs including education and outreach for TDS/nitrate loading, demand softening, and invasive species removal. Tier 1 includes planning and metering for well reductions. Tier 2 includes implementation of pumping restrictions.

- MWit: In Tier 1, well inventory – consider revision: current pumping well inventory?
- MWit: Basin-wide metering program applies to everyone in City. Move to Tier 0 since that's already mostly implemented and can contribute to basin conditions.
- MWit: In Tier 0, revision: temporary demand softening. Farmers need to be given credit for that reduction when evaluating pumping restrictions. Example: Matt took 30 acres of orchard out during last drought.
- FK: Row crops – if there happens to be a year that we don't plant row crops (3-4 year cycle versus Matt's 30 year cycle) – need credit that helps to offset loss of income when voluntary demand softening occurs.

John reminded the group that a long list of capital projects was considered, but deemed infeasible – those will be included in an appendix to the Plan.

Heidi asked for any final AC comments. There were no additional AC comments.

Public Comments

Heidi invited members of the public to comment:

- Andre Monet, BBK – on projects and management actions, look forward to seeing the Appendix. Wondering if recharging the basin through releases from Sutherland Reservoir was considered? The City of San Diego owns and operates that reservoir and dam releases should be considered before asking farmers to cut back.

GoToMeeting Chat Log from AC Meeting

Trish Boaz-SDRVC (to Everyone): 2:02 PM: Trish Boaz is in

Rikki (to Everyone): 2:18 PM: Slide 7 shows that a request was made to raise the adaptive management thresholds. This was skipped. Could someone please explain the request and why it was not discussed?

W&C-Heidi Gantwerk (to Everyone): 3:16 PM: As a reminder, if you wish to speak during public comment, please place your name and organization into the chat.

Andre - Best Best & Kreiger LLP (for Rancho Guejito) (to Everyone): 3:28 PM: Hi, this is Andre, I have a comment

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Public Utilities

San Pasqual Valley Groundwater Sustainability Plan
Advisory Committee #8
Teleconference Meeting Agenda

Date: Thursday July 8, 2021 from 2:00 to 4:00 pm

Location: Teleconference Dial-In: +1 (571) 317-3122, Access Code: **419-179-261#**
GoToMeeting Link: https://global.gotomeeting.com/join/419179261

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	2:00 pm	Roll Call and Introductions	Heidi Gantwerk, Consultant Team
2	2:05 pm	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1) • Summary of Comments Received	Heidi Gantwerk, Consultant Team
3	2:15 pm	Groundwater Sustainability Plan (GSP) Content Review • GSP Development Process • Introduction and Public Engagement • Physical Conditions • Water Budgets and Groundwater Flow Model • Monitoring Program and Data Management System • Sustainable Management Criteria • Projects and Management Actions and Plan Implementation	Rosalyn Prickett, Consultant Team
4	3:35 pm	Summary of Advisory Committee's Input on GSP	Rosalyn Prickett, Consultant Team
5	3:45 pm	Public Comments	Heidi Gantwerk, Consultant Team
6	3:55 pm	Next Steps and Closing Remarks • GSP Review (June 14 – August 11, 2021) • Adoption of GSP - City and County will be going to their respective governing bodies for adoption in the fall 2021	Heidi Gantwerk/All

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Attendees:	**Advisory Committee (AC)** • Carole Burkhard (CB) • Frank Konyn (FK) • Lisa Peterson (LP) • Rikki Schroeder (RS) • Trish Boaz (TB) • Eric Larson (EL) • Dave Toler (DT)	**City of San Diego (City)** • Sandra Carlson • Karina Danek • Keli Balo **County of San Diego (County)** • Leanne Crow
	Public • Alicia Appel, City of Escondido • Andre Monette, Best Best & Krieger (BBK), Rancho Guejito • Brandi Sanchez, San Dieguito River Valley Conservancy • Chris Brzezicki, San Diego Safari Park • Elyse Levy, California Department of Fish and Wildlife • Emily Kochert, San Dieguito River Valley Conservancy • Lani Lutar, Responsible Solutions, Rancho Guejito • Lesley Dobalian, San Diego County Water Authority • Mark Stadler, San Diego County Water Authority • Raj Brown, San Diego Safari Park • Robyn Badger, San Diego Safari Park	**Consultant Team** • Rosalyn Prickett, Woodard & Curran (RP) • Vanessa De Anda, Woodard & Curran • Jim Blanke, Woodard & Curran • Richard Sturn, Woodard & Curran • Heidi Gantwerk, HG Consulting

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted participants as they signed onto GoToMeeting and reviewed basic instructions for GoToMeeting user tools. Rosalyn noted that this is the last Advisory Committee meeting for the San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP), and the

Draft GSP has been uploaded to the project website. Rosalyn also announced changes to the Project's Consultant Team.

Review

Heidi Gantwerk, Consultant Team, reviewed the meeting agenda and meeting objectives. She directed participants to Handout 1 with the last meeting summary.

Rosalyn provided a summary of comments received since the last AC meeting in February, including concerns about pumping reductions during drought conditions and the potential for enhanced recharge from upstream watershed areas. All comments from the AC will be included in an appendix to the GSP. Heidi reminded the group that additional comments need to be provided directly via email to Karina Danek by August 13, 2021.

GSP Workplan

Rosalyn provided an overview of the six sections of the GSP and reviewed the GSP schedule. No AC members had comments or questions.

Introduction and Public Engagement

Rosalyn provided a summary of the Introduction and Public Engagement chapter. The purpose of the GSP is to understand and describe the conditions needed to sustainably manage the San Pasqual Basin (Basin) to comply with the Sustainable Groundwater Management Act (SGMA). The California Department of Water Resources (DWR) recommended that the GSP analyze six different sustainability indicators, including chronic lowering of groundwater levels, reduction of groundwater storage, land subsidence, degraded water quality, seawater intrusion, and depletions of interconnected surface water. The introduction also provides an overview of general Basin boundaries and jurisdictional boundaries within the Basin. It also includes an overview of the public engagement process, including the SPV Groundwater Sustainability Agency (GSA) that is comprised of San Diego County and the City of San Diego, the AC, the technical peer-review group comprised of three hydrogeologists that helped with technical components of GSP development, the stakeholder list, and the website. The website will remain active throughout the Plan implementation timeline.

- AC Member (FK): You mentioned that participants only have one opportunity to ask questions at the end. What happens if AC members have questions as they review the GSP, and what if the information in the GSP does not coincide with the slides?
    - RP: Members of the public will have one opportunity to comment during the public review period. AC members can ask questions throughout the presentation regarding specific chapters of the GSP. Heidi noted that AC members can also add questions to the meeting chat.

Physical Conditions (Plan Area, HCM, Groundwater Conditions)

Plan Area

Rosalyn provided a summary of the Plan Area chapter, which describes the conditions on the ground surface. The Plan Area chapter also includes information on well density of the Basin, Basin location within the watershed, and land uses in the contributing watershed area. The Plan Area chapter summarizes existing surface and groundwater monitoring programs, as wells as water management plans and programs.

Hydrogeologic Conceptual Model (HCM)

Rosalyn explained that the HCM chapter describes geology and aquifer characteristics and describes the materials that groundwater flows through. The HCM chapter also includes geologic maps with the San

Pasqual Narrows and Bandy Canyon faults and United States Geological Survey (USGS) geology maps. The HCM chapter includes a series of cross sections developed using compiled Well Completion Reports and data provided by AC members. Cross sections are useful to understand the Basin vertically. There are four cross sections throughout the Basin included in the GSP. The cross sections figures show the quaternary deposits (i.e., alluvium) and the depth of wells, the residuum, and the bedrock.

Rosalyn explained that the HCM chapter includes the lateral boundaries of the Basin. The HCM chapter also includes a definition of Basin statement as follows: "The SPV Basin is defined by Bulletin 118 and includes the Quaternary Deposits and Residuum. The interaction of groundwater between fractured bedrock beneath the Quaternary Deposits and the Residuum is not well understood and represents an area of potential improvements that may be investigated by the GSA to further the understanding of the Basin."

Groundwater Conditions

Rosalyn provided an overview of the Groundwater Conditions chapter. The chapter starts with a summary of data analyzed during the GSP development process. Historically, the Basin shows the groundwater conditions are consistently high or shallow in the western portion of the Basin. Groundwater levels fluctuate in the eastern portion of the Basin in response to dry periods, and can recover quickly to pre-drought levels. Total dissolved solids (TDS) concentrations in the Basin have generally increased since 1950, but have fluctuated since 2000. Nitrate concentrations in the Basin have generally increased from 1960 to 2000, and have declined or stabilized in most wells since 2000.

Rosalyn presented a review of historical groundwater level and quality data from DWR and USGS. A series of hydrographs are provided for monitoring wells throughout the Basin showing ground surface and data points for groundwater levels. The hydrographs in the western portion of the map with shallower groundwater levels tend to be relatively flat, whereas some of the hydrographs in the central and eastern portions of the Basin tend to be more variable.

Rosalyn presented an image with groundwater elevation contours. Groundwater elevation in the western portion ranges from 313 to 350 feet (ft), which is similar to groundwater elevation in the eastern portion of the Basin ranging from 318 to 350 ft. Depth to water contours are different than groundwater elevation contours. Even though groundwater elevation is similar, depth to water ranges from 87 ft on the eastside to about 10 ft on the westside due to topography.

Rosalyn presented a map depicting the monitoring locations for TDS in surface waters, as well as chemographs with TDS concentrations. On the eastern portion of the Basin, TDS tends to be below 1,000 milligrams per liter (mg/L) to significantly higher in the western portion of the Basin (e.g., Cloverdale Creek peaks at about >4,000 mg/L and Sycamore peaks at about 1,500 mg/L). TDS levels in these creeks likely contribute to TDS load in groundwater.

Rosalyn presented a map depicting the monitoring locations for TDS in groundwater, as well as chemographs with TDS concentrations. TDS levels on the eastern portion of the Basin tend to be stable below 500 mg/L and increase to > 1,000 mg/L in western and central portions of the Basin.

Rosalyn presented a map depicting the monitoring locations for nitrate in surface waters, as well as chemographs with nitrate concentrations. Nitrate levels in the eastern portion of the Basin tend to be low at > 2 mg/L and the central and western portions of the Basin tend to be higher up to 54 mg/L near Cloverdale Creek and Sycamore. Nitrate in groundwater is affected by nitrate in surface water.

Rosalyn presented a map depicting the monitoring locations for nitrate in groundwater, as well as chemographs with nitrate concentrations. Wells in the eastern portion of the Basin tend to be low and stable, and wells in the central and western portions of the Basin tend to be higher.

Rosalyn added that the Groundwater Conditions chapter also has information on interconnected surface waters that were analyzed through the SPV GSP Model developed for the groundwater budget analysis. The Model indicates that the surface waters are likely disconnected from the regional aquifer

if depth to water has been greater than 30 ft since 2015, and surface water may be interconnected to the regional aquifer if depth to water has been less than 30 ft since 2015 such as in the western portion of the Basin. This is a similar measure used for the groundwater dependent ecosystem (GDE) analysis.

To identify GDEs, a wetland biologist reviewed the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset and compared it to other datasets, aerial imagery, and USGS mapping. The wetland biologist then visited the sites in the Basin to verify the remote sensing analysis. Rosalyn presented a figure with Potential GDEs that are located along the interconnected surface waters (as identified through the modeling effort) in the western portion of the Basin that are wetland communities that depend on relatively shallow groundwater. Potential Non-GDEs are scattered throughout the Basin and are dry areas that were incorrectly mapped in NCCAG, human made structures such as channels and ponds, etc., and are not defined as GDEs under SGMA. The figure also shows Wetland & Riparian Vegetation which are valuable wetland habitats, but are not accessing the regional aquifer because of depth to water.

- AC Member (FK): On Table 2-5, well 13S2W has a datapoint from March 2005 that is way below the range, but well 33L3 that number is way above the range. Is that data going to be included in the GSP, or will it be excluded because there may be something going on with the testing? If included, is there validity to that data?
    - RP: All data provided is shown in the chemographs, but the project team will look into those two points.
- AC Member (FK): In Section 2.4.1, the last paragraph on this page discusses the northward gradient going into Rockwood Canyon for a certain amount of time. Please expand.
    - RP: In one of the maps with data from 2015, there seemed to be a northward gradient. In a second set of data, this issue was resolved.
    - FK: Was that an abnormality?
    - RP: Typically groundwater flow in that area is east to west.
- AC Member (FK): Figure 2-2 talks about the adjudication area. Will this be covered?
    - RP: There was a case in 1950 that resulted in a judgment. The judgment area was added to the jurisdiction map as best as is mapped at this point. There is a caveat on the map stating that the precise location of the parcels on the maps needs to be refined. The GSP acknowledges that there is a case that was related to the Sutherland Dam and ensuring that the plaintiffs had adequate water given the impoundment of the water upstream of the Basin. This is described in Section 2.
    - FK: In the text, it states that water should be within 20 ft of surface level at all times.
    - RP: The judgment from the courts based on the groundwater information they had at that time and yes, depth to groundwater was instructed to be within 20 ft of ground surface.
    - FK: How does this jeopardize the Plan? It appears that one property is owned by the County and three are owned by the City. This does not coincide with the thresholds of the varying levels of severity.
    - RP: The Sustainable Management Criteria (SMC) do not include minimum thresholds (MT) for 20ft below surface given that the Basin is currently sustainable. Our modeling has shown that continuing to operate Basin as it is now with the amount of forecasted pumping is sustainable. SGMA requires that we acknowledge any adjudication areas, but allows us to set SMCs and MTs based on local knowledge and analyis of Basin conditions.

Water Budgets and Groundwater Flow Model

Rosalyn presented the water budgets and groundwater flow model. A water budget accounts the total groundwater and surface water entering and leaving a groundwater basin. Two different models were used within the groundwater flow model. Within the Basin, the USGS One-Water Hydrologic Flow Model was used. In the watershed, the USGS Basin Characterization Model BCM was used as a companion rainfall runoff model. The water budgets include historical, current, projected water budgets for the Basin using the SPV GSP model with the combined codes of the two models.

Rosalyn presented a graph with annual precipitation data from 1980-2019. The last 15 years of the period (2005-2019) were selected for historical model calibration. She also presented a graph showing the precipitation projection period based on the *California Fourth Climate Assessment* RCP 8.5 Scenario. This projection includes climate change as part of the baseline scenario. The AC helped construct the model by providing well construction information and associated pumping and land use associated with parcels of those wells.

Rosalyn presented average annual and time series water budget graphs. In the land system, there is an average of just under 10 thousand acre-feet (TAF) of inflows and outflows. Inflows are comprised of precipitation and groundwater deliveries, and outflows are comprised of evapotranspiration (ET) and groundwater recharge. In the surface water system, the Basin has an average of 15 TAF in both historical and current conditions. In the projected conditions, the surface water inflow and outflow values are higher than existing conditions given the variability of wet weather flows in the climate change projections. In the groundwater system, there is an average of about 8 TAF of inflows and outflows. Inflows are composed of subsurface inflow, and outflows are comprised of pumping.

The time series shows the future projections through the year 2071. In the land system, the model projection assumes a similar water demand to historical with stable agricultural use over time. The surface water system shows the wet weather peaks and dry years, and the groundwater system shows inflows could be lower than historical conditions. The historical, current, and projected groundwater budgets all indicate a slight deficit in cumulative storage. The historical cumulative change is -245 acre-feet per year (AFY), approximately 3% of the water budget. The projected change is about -248 AFY, about 3% of the groundwater budget. This is a result of lower groundwater recharge rates given predicted precipitation patterns and increased ET in hotter and dryer years. Even with little to no change in projected pumping conditions, the water budget is close to stable. The modeling determined that the Basin's sustainable yield is at least higher than historical agricultural pumping (i.e., above the average of the modeled historical pumping rate in the Basin).

- AC Member (FK): TAF is an acronym that is not included in the list of abbreviations.
    - RP: TAF (thousand acre-feet) will be added to the list of abbreviations.
- AC Member (FK): On page 148, the land surface, surface water, and groundwater systems add to 40 TAF. In an earlier paragraph, the text indicates about 61 TAF of capacity in the system. What is this difference?
    - RP: This may be because 61 TAF is capacity versus actual storage. I will circle back after talking to the modeling team.
    - FK: The total storage capacity is calculated as 61 TAF. Is the status quo to operate the Basin at a 66% capacity?
    - RP: Suspect that 61 TAF is total capacity. In some of the hydrographs, groundwater is lower than the highest historical point recorded.
    - FK: Request that the project team reaches out to explain this issue one-on-one.

Monitoring Networks

Rosalyn presented the representative monitoring networks levels. There are 15 wells in the representative monitoring network for groundwater levels, six of which will also be a part of the representative monitoring network for the depletion of interconnected surface waters. These six wells are located within 2,000 ft of potential GDEs (i.e., in the shallow portion of the Basin). Rosalyn also presented 10 wells that serve as the representative monitoring network for groundwater quality.

- AC Member (FK): Page 110 of the GSP mentions three-nested wells. Through this process, the City put in two more nested wells. These two nested wells are not mentioned in the GSP
    - RP: The representative monitoring network includes wells that have a range of historical data because historical data needs to be compared against data being collected during the Plan implementation period. New wells were not selected as part of the representative well network because they have no basis for setting MTs. These can be added in future Plan updates.
    - FK: Why does the GSP not reference their existence?
    - RP: These wells will be added to the list of wells in the GSP.

Sustainable Management Criteria

Rosalyn reviewed the definitions of the terms in the SMC:

- *Undesirable Results (UR)* – Help us understand what conditions to avoid
- *Sustainability Goal* – statement that provides the overarching goal of the GSP
- *Monitoring Networks* – how we will monitor things to see if they are becoming or are undesirable
- *Minimum Threshold (MT)* – Point or limit that indicates the basin may be experiencing an undesirable result
- *Measurable Objective (MO)* – This is where the basin sets its goals to be
- *Margin of Operational Flexibility (MoOF)* – This is the amount of storage the Basin would like to have above the minimum threshold for use during droughts
- *Planning Threshold (PT)* - Point or limit that indicates the basin may be nearing an undesirable result and planning for additional management shall begin

Rosalyn presented an image that shows a representation of the SMC. For example, for groundwater elevation, the MT was established and anything below that is considered a UR. The MO is set higher in the hydrograph. The MoOF is the space between the MT and MO.

The GSP established a sustainability goal "To maintain a locally managed, economically viable, sustainable groundwater resource for existing and future beneficial use in the San Pasqual Valley Groundwater Basin by managing groundwater to avoid the occurrence of undesirable results." Based on the analyses, it is believed that the Basin is currently operating sustainably and can continue to operate sustainably in the future given the modeling that was completed.

DWR requires that UR and criteria are established for each of the six SMC indicators unless they do not apply. For the Basin, the GSP does not establish criteria for land subsidence and seawater intrusion because they do not apply and will not be monitored. Subsidence does not apply because there is no historical evidence of inelastic subsidence, there is no major infrastructure that could be damaged if there were to be subsidence, and there are a few clays present in the alluvium which limits the possibility of future subsidence. Seawater intrusion does not apply because the Basin is more than 20 miles from the Pacific Ocean.

Rosalyn defined a UR as a "significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP." In a previous AC meeting, the group developed a list of undesirable conditions for the Basin, which framed how the thresholds were established. Rosalyn presented a list of URs for each indicator that applies to the Basin.

Groundwater Levels

Rosalyn presented the SMC for groundwater levels. MTs were established using all of the Well Completion Reports used in the cross sections. MTs were designed to be deeper than historical low to allow for movement of groundwater levels given variability of levels especially on the east side of the Basin, above the bedrock, and above the 20th percentile of a nearby well. This resulted in an MT of 100% of the historical range below the historical low for the western wells (for wells within 2,000 ft of potential GDEs) and 50% of the historical range below historical low for the eastern wells (for wells further than 2,000 ft of potential GDEs). The MO for wells within 2,000 ft of potential GDEs is 10 ft below ground surface elevation (GSE) so the regional aquifer is accessible to GDEs. For wells further than 2,000 ft from potential GDEs, the MO is a 5-year drought buffer (100% of MoOF) above MT. The Planning Threshold is the point at which the GSA needs to start planning the Projects and Management Actions (PMAs) and is set at 30% of the MoOF. As a result, the western part of the Basin has an MT at 100% of the historical range with the Planning Threshold 30% above the MT, and the eastern part of the Basin has an MT at 50% of the historical range with a Planning Threshold 30% above the MT.

- Elyse Levy (CDFW): Is there a scientific rationale for using 100% and 50% below the historic minimum groundwater level? This is not consistent with The Nature Conservancy guidance, which suggests using a minimum threshold within or near the historical groundwater range.
    - RP: Public comments will be addressed later in the presentation.

Groundwater Storage

Rosalyn explained that groundwater storage will use groundwater levels SMCs as a proxy as permitted by SGMA. This assumes that if groundwater levels are maintained above the MT, there will be adequate storage. There is a 5-year storage buffer used to establish the MO and MT for groundwater levels.

Groundwater Quality

Rosalyn explained that the GSP needs to set thresholds in a manner that is reflective of the tools available to the GSAs. For areas where the GSA does not have authority or control, need to set thresholds that the GSA can be responsible for (e.g., the constituent has to be affected by water volume management). The MT for water quality was set for nitrate at 10 mg/L which is the maximum contaminant level (MCL) for nitrate as N, and for TDS was set at the historical high +10% or 1,000 mg/L, which is the upper secondary MCL. The MO for nitrate is 5 mg/L, which is half the MCL, and for TDS is 500 mg/L, which is the lower secondary MCL, or 1,000 mg/L for wells with historical concentrations above 1,000 mg/L (i.e., in the northwestern area of the Basin), which is SNMP target.

Interconnected Surface Waters

Rosalyn explained that the interconnected surface water indicator uses groundwater levels SMCs as a proxy as permitted by SGMA. This indicator uses six wells in the western portion of the Basin, which are the wells within 2,000 feet of a potential GDE. Monitoring these wells ensures groundwater levels are maintained within a depth to water that GDEs can access.

No AC members had additional comments or questions.

Projects and Management Actions and Plan Implementation

Rosalyn explained that the PMAs chapter shows the management areas that were identified for the GSA. The City will implement PMAs within City boundaries and the County will implement PMAs within County-only areas. The PMAs were grouped into three tiers.

- Tier 0 includes projects that may be implemented at any time after GSP adoption, including actions for GSP implementation (e.g., program management, procuring funding for monitoring, Annual Reports), and specific PMAs (e.g., coordinating on invasive species removal and water quality improvement actions).
- Tier 1 will be implemented if Planning Thresholds are exceeded, and these include PMAs like studying GDEs and well inventory. For interconnected surface waters, a GDEs Study may be initiated when 30% of representative monitoring wells in the western portion of the Basin (i.e., two of the six wells) exceed the Planning Threshold. For groundwater levels, actions may be initiated when 30% of the representative monitoring wells in the Basin (i.e., five of 15 wells) exceed the Planning Threshold.
- Tier 2 will be implemented if the MTs are reached, and this includes pumping reductions and enforcement. For groundwater levels, actions may be initiated when 30% of the representative monitoring wells in the Basin (i.e., five of 15 wells) exceed their minimum threshold.

Rosalyn presented a timeline for PMA implementation under various conditions. The current condition of the Basin is sustainable. She also presented a figure for the implementation process for Tier 1 and Tier 2 management actions. Step 1 is for the GSA to continue SGMA monitoring. If an exceedance occurs, the Core Team will investigate. If the issue is localized or data is incorrect, the GSA will go back to Step 1. If there is an issue, the GSA will discuss investigation and coordinate with stakeholders. After that, the GSA will proceed to step 5 to implement one of the Tier 1 or 2 actions along with public communication. Step 6 will assess the results of that implementation, and this will be discussed with the stakeholder group.

Rosalyn added that the Plan Implementation chapter also includes the estimated costs of implementation, including all the activities that need to continue to comply with SGMA.

- AC Member (DT): Who monitors the GSP and when does the State come in?
    - RP: The GSP will be submitted to DWR at the end of the year, and an Annual Report will be submitted to the State with the monitoring data and a comparison of the monitoring data to the SMCs. Annual Reports also include outreach conducted throughout the year, other monitoring data that may be added, and so forth. Each basin has a representative at DWR.
- AC Member (FK): Going back to the nested wells created by the City – was there any thought of adding them to the PMAs to study the relationship between the alluvium, the residuum, and the bedrock?
    - RP: There is no project in PMAs specifically related to this. There will be data collected at each of the nested wells.
- AC Member (FK): Is there any intent to further study the interconnectability between the various levels.
    - RP: This has been identified as a topic in the GSP that could be evaluated further.
- AC Member (FK): Santa Ysabel Creek did not exist in the 1960s as a riparian habitat. Riparian habitats did not appear until the late 1990s or early 2000s. The GSP conveys a concern about not wanting to run short on water to sustain this riparian habitat, but this riparian habitat is impeding the flow of water through the center of the Valley. This causes erosion, which causes

problems in Lake Hodges downstream. The GSP focused on the groundwater in San Pasqual Valley, but it missed the opportunity to protect Lake Hodges.

Summary of AC input

Rosalyn expressed gratitude to the AC for their time and commitment to the development of the GSP. There were many significant changes made to the GSP as a result of AC feedback through the planning process. These included increasing hydrologic knowledge of the Basin, defining undesirable results, helping complete the well inventory and parcel land uses for hydrologic modeling, refining SMCs to include a planning threshold, and changing initiation of PMAs at planning and minimum thresholds to occur when wells exceed thresholds simultaneously. The AC members also contributed to the PMAs section, including ensuring a GDE study was included in the GSP, coordinating on implementation of invasive species removal, ensuring integration with other regional programs, and the evaluation of Initial Surface Water Recharge as a potential source of recharge to the Basin.

- AC Member (EL): What has happened to other plans going to the State? Can they bounce back?
    - RP: Each GSA submits a Plan to DWR, which then reviews and provides feedback. DWR will either approve the GSP or provide recommendations to improve the GSP. DWR has released letters for four of the 20 plans submitted in 2020. Between the four sets of letters, two were approved and two require additional changes.
    - Jim Blanke, Consultant Team: DWR also opens a public comment period during their review. We prefer that public comments are received by the Core Team to address before the GSP goes to DWR.
- AC Member (DT): Expressed gratitude to be able to participate in the planning process. No additional comments.
- AC Member (CB): Expressed gratitude to be able to participate in planning process. No additional comments.
- AC Member (TB): Expressed gratitude to be able to participate in the planning process. No additional comments. Currently looking for letters of support to apply for a grant with the Wildlife Conservation Board to remove invasive species in the SPV.
- AC Member (FK): Expressed gratitude to be able to participate in the planning process. When will the AC see the changes suggested (e.g., typos)?
    - RP: There will not be an interim version of the GSP. All edits will be incorporated in a final GSP. AC members will get a notification when the final GSP is uploaded to the website.
- AC Member (LP): Expressed gratitude to be able to participate in the planning process. No additional comments.
- AC Member (RS): Expressed gratitude to be able to participate in the planning process. No additional comments.

Karina Danek, City, expressed gratitude to the AC members on behalf of the City of San Diego for providing support with the GSP development process.

Public Comment

Heidi reminded everyone that written comments will be accepted through August 13th, 2021. All written comments and comments provided during this meeting will be considered in the final GSP.

- No additional public comments were made.

Next Steps and Closing Remarks

Rosalyn reminded attendees the public Draft of SPV GSP is available online at https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html. All comments must be directed to Karina Danek before August 13, 2021, at kdanek@sandiego.gov. The GSA is anticipated to adopt the GSP in the October/November timeframe, and the final GSP will be submitted to DWR in December.

GoToMeeting Chat Log from AC Meeting

AC Trish Boaz - SDRVC (to Everyone): 1:59 PM: hi Karina and all!
Sandra Carlson, City (to Everyone): 2:37 PM: what was the page no. for franks last question?
Elyse Levy CDFW (to Everyone): 2:41 PM: The TNC guidnace is more complex than simple depth to ground water, and can be greater than 30 feet in some cases. Riparian and wetland ecosystems in the eastern portion of the Basin may be connected at some points in time. Some of the hydrographs show that some of the wells in the eastern portion of the Basin were at or around 30 feet in 2019.
Sandra Carlson, City (to Everyone): 2:58 PM: Let's do that.
Elyse Levy CDFW (to Everyone): 3:09 PM: Is there a scientific rationale for using 100% and 50% below the historic minimim groundwater level? This is not consistent with TNC guidance, which suggests using a minimum threshold within or near the historical groundwater range.
W&C-Heidi Gantwerk (to Everyone): 3:24 PM: A reminder if you would like to speak during the public comment period please put your name and organization in the chat
Rikki (to Everyone): 3:32 PM: Will public comment letters be available to the public?
Elyse Levy CDFW (to Everyone): 3:32 PM: Sorry those previous comments were from Elyse Levy from CDFW
AC - Trish Boaz-SDRVC (to Everyone): 3:36 PM: Thanks so much everyone...

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Technical Peer Review
Principles of Participation

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San Pasqual Valley Groundwater Sustainability Plan
Technical Peer Review

♦ ♦ ♦

Mission

The San Pasqual Valley Groundwater Sustainability Plan (GSP) Technical Peer Review (TPR) will provide expert review and advice to aid in the preparation of a scientifically sound GSP for the San Pasqual Valley Groundwater Basin (Basin). The TPR will provide comments that substantively improve the understanding and analysis of the Basin and its management.

♦ ♦ ♦

Principles of Participation

Role of TPR
The TPR is a non-partisan, non-sectarian, advisory organization. The TPR is not empowered by ordinance, establishing authority, or policy to render a binding decision of any kind.

The TPR is advisory to the Core Team, composed of City of San Diego (City) and County of San Diego (County) staff (the Basin Groundwater Sustainability Agencies [GSAs]) tasked with coordinating the activities of the TPR process for the Basin GSP. The Core Team will develop a GSP that is technically sound, meets the requirements of the Sustainable Groundwater Management Act (SGMA), and is acceptable to the City and to the County.

Composition
Two qualified specialists (independent technical reviewers) who are independent of the GSP development, but with expertise to perform the work, will be hired by the Core Team and shall meet the following qualifications:

- Be a professional Geologist in a State of the United States of America,
- Be a Professional Engineer in the State of California, and/or
- Have a PhD in Hydrogeology, Hydrology, Geology, or related field

The qualified specialists should also have appropriate expertise in hydrogeologic water supply investigations and/or related modeling and research. In addition to the two specialists hired by the Core Team, Advisory Committee (AC) members may also hire one qualified specialist that meets the criteria above to serve as a TPR member, assuming all fees are borne by the AC member.

Responsibilities of TPR Members

To accomplish the mission described above, TPR members are being asked to:

- Review and provide constructive comments to the Core Team and consultant team where technical concerns may arise during the development of the GSP
- Commit to attend and participate in TPR public meetings during the development of the GSP (see Meeting Agenda section below)
- Review all agenda and background materials distributed prior to each TPR meeting by the TPR point of contact
- Provide information in a timely manner in response to data requests
- Work cooperatively with the Core Team, consultants, and other TPR members
- TPR members shall provide technical contribution to the GSP, not to advocate for a particular interest or outcome.
- TPR members shall explore/verify the conclusions and recommendations from other TPR members, in addition to reviewing the consultant team's work.

Discussion Process

TPR members agree to abide by the following discussion process during the TPR meetings:

- A neutral third-party will facilitate the meetings
- One person speaks at a time
- No side conversations
- TPR members will treat each other with respect
- All comments will be constructive
- Focus on the topic(s) planned for each meeting

Meeting Attendance
In order for the TPR process to work effectively, full participation of members will be essential. TPR members are asked to commit to attend all TPR meetings.

Support
A neutral third-party facilitator from the consultant team will facilitate all TPR meetings. The facilitator shall convene and oversee the meeting to insure the timely completion of the published agenda. If for any reason, the facilitator cannot facilitate at a particular meeting, a Core Team member shall assume the facilitation responsibilities assigned above to the facilitator.

The consultant team will provide technical and logistical support, including making presentations, answering questions, and helping to coordinate meetings.

Meeting Agendas
The CORE Team and consultant team will be responsible for preparing the meeting agendas. Agendas and assigned reference materials will be distributed by email in advance of each meeting. Preliminary TPR meeting discussion topics include:

- **Meeting 1:** TPR Schedule, Data Collection, Hydrogeologic Conceptual Model, Groundwater Conditions – November 7, 2019
- **Meeting 2:** Undesirable Results, Groundwater Model Approach – January 9, 2020
- **Meeting 3:** Groundwater Model Check In, Sustainable Management Criteria – April 9, 2020
- **Meeting 4:** Water Budgets, Sustainable Management Criteria – July 9, 2020
- **Meeting 5:** Projects and Management Actions, Water Budgets – October 8, 2020
- **Meeting 6:** Effectiveness of Projects and Management Actions, Feasibility/Cost – January 14, 2021

Open Meetings
The TPR meetings will be open to the public and a meeting summary will be available for public review. Members of the AC will be allowed three (3)

minutes per member to ask questions and provide comments after each agenda item. The public will be asked to refrain from commenting during the proceedings until the open comment period at the end of the meeting.

Information Sharing
TPR members may want to share information and documents with other TPR members during the TPR process. To ensure that all members have the same information available to them, all documents are to be distributed only through the established point of contact:

Sandra Carlson
City of San Diego Project Manager
619-533-4235
carlsons@sandiego.gov

Technical Peer Review Meeting
Agendas and Summaries

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Sustainable Groundwater Management Act 2014 (SGMA)
San Pasqual Valley Groundwater Basin
Technical Peer Review Meeting #1 Agenda

November 7, 2019 9:00 – 11:00 am

County Operations Center

5510 Overland Avenue, 3rd Floor, San Diego, CA 92123

NOTE: Public comment period will be accommodated at the end of meeting. Advisory Committee members may ask up to a three-minute question after each agenda item. The duration of the public comment period will be at the discretion of the meetingFacilitator.

#	TIME	ITEM	PRESENTER
1	9:00 am	**Roll Call and Introductions**	Patsy Tennyson, Facilitator, Consultant
2	9:10 am	**Review** • **Agenda** • **Meeting Objectives** • **DRAFT Mission Statement and Principles of Participation** *(Handout 1)* • AC Comments	Patsy Tennyson

3	9:40 am	**Technical Input**
		• **Overall GSP Outline**
		• **Meeting Schedule/Topics**
		• **Draft Section Outlines** *(Handout 2)*
		  ○ **Plan Area**
		  ○ **Hydrogeologic Conceptual Model**
		  ○ **Groundwater Conditions**
		  ▪ **Aquifers**
		  ▪ **Water Quality**
		• **Proposed Monitoring Well Sites**
		• **Call for Data Request (*Handout 3*)**
		• AC Comments
			John Ayres, Consultant Team

4	10:45 am	**General Public Comment** *(3-minute limit each commentator)*	All
5	10:55 am	**Next Steps and Closing Remarks** Next Meeting Date (*Handout 4*)	Patsy/All
6	*11:00 am*	*Adjourn*	

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www.sandiego.gov/publicutilities

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Technical Peer Review (TPR) Meeting #1

Meeting Minutes

Date: Thursday November 7, 2019, 9:00 to 11:00 am

Location: County Operations Center
5510 Overland Drive
San Diego CA 92123

Purpose: Technical Peer Review Group Meeting #1

Attendees:	Technical Peer Review Group • Will Halligan, Luhdorff & Scalmanini • Peter Quinlan, Dudek, Rancho Guejito • Matt Wiedlin, Wiedlin & Associates	City of San Diego (City) • Sandra Carlson • Karina Danek • Amy Dorman • Delaney Sisk
	Advisory Committee • Frank Konyn • Rikki Schroeder • Matt Witman	County of San Diego (County) • Leanne Crow • Jim Bennett
	Public • Hank Rupp, Rancho Guejito	Consultant Team • John Ayres, Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Patsy Tennyson, Katz & Associates

Welcome and Introductions

Patsy Tennyson, the meeting facilitator, welcomed the group, made introductions, and reviewed the agenda.

Review

Mission Statement and Principles of Participation

Patsy reviewed the draft Technical Peer Review (TPR) Mission Statement and Principles of Participation. All TPR members were comfortable with the Mission and Principles of Participation that will guide the work of this group.

As of Meeting #1, the TPR is composed of two members who were hired via the Consultant Team and one TPR group member nominated by Advisory Committee (AC) member Rikki Schroeder, Rancho Guejito.

AC Comments

It was noted that if a TPR member provides information to Sandra Carlson, City of San Diego, that information is considered public.

Technical Input

John Ayres, the Consultant Team, provided an overview of the *Groundwater Sustainability Plan* (GSP) outline, described the three-phase approach to TPR group meeting topics (i.e., outline/approach, analysis results, refined analysis), and then discussed GSP sections with the group.

GSP Overview, TPR Meeting Topics, and Draft Section Outlines

TPR member asked if there was a planned date for circulating draft materials.

- Typically, content will be available 2 weeks in advance of all meetings, but since the next meeting is close to the holidays, the team will try to circulate draft materials before Christmas. The TPR group will also be able to submit written comments 2 weeks after a TPR group meeting.

TPR member noted that another consultant is working on monitoring and aquifer testing, but did not appear to be on schedule, and wanted to know how that information would be included in the GSP.

- John said he knew that work was ongoing, but the team can't know exactly when well installation permits will be granted.

TPR member noted that it might be worth slowing down the GSP development schedule to wait for monitoring and aquifer testing data.

- John replied that, with a 2022 deadline for GSP, there were few opportunities to delay work. However, if information from field studies are contrary to what the team knows, the information will be incorporated. For example, the schedule could be update with likely times field data results could be provided to the TPR group.
- Sandra Carlson, City of San Diego, noted that City processing of contracts takes time, so the team may not be able to have that data in time enough to integrate to the GSP.
- Leanne Crow, County of San Diego, noted that the GSP will proceed as scheduled, and field data will be used if possible. If it is too late, the data will be used in the GSP's 5-Year Update.

TPR group members will not be involved in field work, and will focus on the GSP and related content. Before the next AC meeting, TPR group members will have an opportunity to review GSP content before the AC reviews contents.

A TPR group member noted that a 1985 work by John Izbicki of the U.S. Geological Survey (USGS) should be integrated to the GSP (https://pubs.er.usgs.gov/publication/wri854032).

TRP member asked about historical water budget information, and whether it would be used to calibrate the hydrogeologic conceptual model (HCM) for the GSP.

- John told the group he would present information about the HCM at the next TPR meeting.

John also noted that the GSP's HCM section will discuss background/natural constituents, while the GSP's Groundwater Conditions section will discuss anthropogenic sources (such as nitrate or totals dissolved solids [TDS]) in groundwater.

TPR member noted that natural communities commonly associated with groundwater (NCCAG) information needed revisions. For example, the groundwater dependent ecosystem (GDE) plot along Bandy Canyon is actually Arroyo Toad habitat and is dry most of the year.

Proposed Monitoring Well Sites

John gave an overview of a Kleinfelder siting study for two nested monitoring wells in the basin. Sandra summarized the two key goals of this field program, which were to 1) evaluate surface/groundwater interaction, and 2) better understand water in alluvium versus water in residuum vs water in the wells' basement.

In 2013, the City installed three monitoring wells (three nested piezometers monitored by USGS) and want to add two more now.

- Sandra noted that the California Department of Water Resources (DWR) also has four monitoring wells with pressure conductors and TDS monitors. The City's EMTS also collects data, but the sampling was irregular, and there was an inconsistent list of analytes, so those wells do not appear on maps.
- Sandra explained the City selected Well MW-3 on the west side of the basin to help fill a data gap associated with groundwater quality (i.e., nitrate and TDS). The City also selected Well MW-5 on the east side of basin to collect northeastern information; they currently have no data for the Rancho Guejito area.

TPR group discussed wanting to better understand the hydraulic connectivity between bedrock and alluvium. TPR member asked if there were any wells in bedrock.

- AC member explained that Well MW-9 in the Bandy Canyon/County area may be in bedrock.

John noted that the Consultant Team would be reporting on pumping well data, seal depth, well construction, and screen intervals once the monitoring well was installed.

- Sandra noted that the 2013 USGS wells were installed specifically to better understand this data.
- Leanne also noted that the County will provide well logs for wells under County jurisdiction, but Bandy Canyon was not in the County's jurisdiction.

Karina Danek, City of San Diego, noted the City is only permitted to drill outside of bird nesting season, which begins in February; field work (drilling for the monitoring wells) needs to be completed as soon as possible.

John reviewed the data request; there are no available data in Rancho Guejito area. Consultant Team will be using a *Salt and Nutrient Management Plan* (SNMP) model with solute transport capabilities to evaluate this issue, since groundwater quality is a key concern in the basin.

TPR member offered additional comment related to water quality – that Nitrate does break down in groundwater and can be measured via Nitrate-reducing bacteria. Relatively inexpensive sampling can be done to understand whether Nitrate is being consumed in the subsurface.

- John explained that we will be using the existing SNMP model with solute transport capabilities to evaluate this issue, since groundwater quality is a concern in the basin.

TPR member also noted that the San Pasqual Valley is a very well-studied basin, and that we need to make sure to integrate the objectives/information already available in the basin into this GSP.

- John agreed, noting that the GSP will consider goals/targets from other plans in establishment of the GSP sustainability criteria, as well as recommendations from other plans in GSP projects and management actions.
- Another TPR member noted that this GSP may have different focus from other Statewide GSPs – this basin empties out and fills back up, which is different from other basins, and may focus more on water quality (Nitrate and TDS) than water elevation.

AC Comments

AC member asked if the GSP process would address the presence of alluvium, residuum, and bedrock in wells, and how would the City and County ensure this process complies with the provisions of *Bulletin 118* and the law.

- Leanne noted that SGMA requires managing the basin as defined by *Bulletin 118*, which does not include bedrock in its description of a basin. The new monitoring wells should help understand bedrock in wells, and what level of mountain-front recharge is received into the basin.

- John explained that DWR may have to determine, via policy, how SGMA might regulate a well that is screened only in bedrock. For the GSP, the team would give this issue a good faith answer with input from TPR and AC members, and that it may be possible to have a DWR representative meet with the team to discuss the issue.

AC member asked if TPR members would receive individual chapters during the TPR process or at the end.

- John explained that initial review of GSP content will occur via handouts and presentations as the GSP is developed, and the TPR will review the full GSP once complete. The TPR group will have three opportunities (phases, above) to discuss approach/analysis along the way.

Next Steps/Actions

Consultant Team action items include:

- Extend meeting time—Since the TPR will be reviewing more information in the future, meetings will be extended to 3 hours.
- Share presentation—The Consultant Team will distribute a copy of the presentation shared at this meeting. The presentation will also be added to the County's GSP website in a couple of days.

The TPR meeting ended at 10:20 am.

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Sustainable Groundwater Management Act 2014 (SGMA)
San Pasqual Valley Groundwater Basin
Technical Peer Review Meeting Agenda

January 9, 2020 9:00 – 11:00 am

County Operations Center

5510 Overland Avenue, 3rd Floor, San Diego, CA 92123

NOTE: Public comment period will be accommodated at the end of meeting. Advisory Committee members may ask up to a three-minute question after each agenda item. The duration of the public comment period will be at the discretion of the meeting Facilitator.

#	TIME	ITEM	PRESENTER
1	9:00 am	**Roll Call and Introductions**	Patsy Tennyson, Facilitator
2	9:10 am	**Review** • **Agenda** • **Meeting Objectives** • **Meeting Summary for TPR Meeting #1** (Handout 1)	Patsy Tennyson

3	9:30 am	**Technical Input – Approach** (Handout 2)
		• **Undesirable Results**
		• **Groundwater Model Approach**
		  ○ **Code**
		  ○ **Data**
		• AC Comments
			John Ayres, Consultant Team

4	10:00 am	**Preliminary Analysis Results** (Handout 3)
		  ○ **Plan Area**
		  ○ **Hydrogeologic Conceptual Model**
		  ○ **Groundwater Conditions**
		• **Bottom of Basin Discussion**
		  ○ **Bulletin 118**
		  ○ **DWR Staff input**
		  ○ **Best Management Practices**
		  ○ **Water-Code/Regulations**
		  ○ **Technical Considerations**
		• **Data Request Check In**
		• AC Comments
			John Ayres

#	TIME	ITEM	PRESENTER
4	10:45 am	**General Public Comment** *(3-minute limit each commentator)*	All
5	10:55 am	**Next Steps and Closing Remarks** Next Meeting Date (Handout 4)	Patsy/All
6	*11:00 am*	*Adjourn*	

**times are subject to change*

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Technical Peer Review (TPR) Meeting
Meeting Summary

The following is a summary of the TPR discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday January 9, 2020 from 9:00 to 11:30 am

Location: County Operations Center
5510 Overland Drive
San Diego CA 92123

Purpose: Technical Peer Review Meeting

Attendees:	Technical Peer Review • Matt Wiedlin, Wiedlin & Assoc • Will Halligan, Luhdorff & Scalmanini • Peter Quinlan, Dudek	City of San Diego (City) • Sandra Carlson • Karina Danek • Mike Bolouri • Delaney Sisk
	Advisory Committee • Frank Konyn • Matt Witman	County of San Diego (County) • Leanne Crow • Jim Bennett
	Public • None	Consultant Team • John Ayres, Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Patsy Tennyson, Katz & Associates • Nate Brown, Jacobs (by phone)

Roll Call and Introductions

Patsy Tennyson, meeting facilitator, welcomed the group and invited everyone to introduce themselves.

Review

Patsy reviewed the meeting agenda and meeting objectives.

TPR members reviewed the previous meeting's summary. Adjustments will be made as follows:

- The Project Team (City, County, Consultant Team) will correct the spelling of L&S and Wiedlin.
- Well construction and screen intervals were noted in the last paragraph of page 3.
- "Seal depth" will be added to the summary's first paragraph.

Technical Input—Approach

John Ayres, Consultant Team, explained that the group would start with a discussion about technical approach, and then move on to preliminary results. John explained the interactive exercise that the Advisory Committee (AC) would complete later in the day about undesirable results. He gave a brief overview of the GSP sustainability indicators.

Undesirable Results

TPR members discussed their thoughts on undesirable results in the SPV Groundwater Basin (Basin). Remarks from TPR members are summarized below.

Water Quality

TPR members discussed water quality and salinity in the Basin. Much of the discussion centered around a question one TPR member asked: Does groundwater quality (i.e., a mass flux of salts and nutrients from the valley into Lake Hodges) affect water quality in the lake; if so, what criteria do we need to establish to manage/mitigate that?

- (PQ) Would need to look at surface water flux and contributions of these constituents to the lake.
- (MW) Need to focus on whether/how groundwater affects the lake. And we need to be mindful of surface water/groundwater flux into the Lake.
- (WH and John Ayres) Need to constrain things to SGMA. John reminded the TPR members that SGMA requires that conditions that were present on January 1, 2015 are maintained, and the Basin already had elevated salt concentrations at that time.
- (MW) Want to advocate for the agricultural community and be thoughtful when setting water quality criteria.
- (MW) It appears that salinity is highest at the downstream end of Basin. Is that significant?
- (PQ) Should this subject be addressed in a Coordination Agreement between adjacent Basins? (e.g. San Dieguito Basin is downstream of San Pasqual Valley Basin) In response, it was agreed that the San Dieguito Basin is a very low priority basin and a coordination agreement wouldn't be necessary.
- (PQ) Is the Project Team going to model flux in water quality as water leaves the Basin to Lake Hodges? If so, they may want to conduct a simple analysis of Basin salinity vs. lake salinity.
- (MW) The Project Team should try to understand whether water quality over maximum contaminant levels (MCLs) are a problem for the Lake.
    - The City has completed modeling of sources upstream of Lake Hodges, but the modeling focused on nitrogen and not total dissolved solids (TDS). The field testing will give us water quality data.

Groundwater Levels

Next, TPR members discussed groundwater levels in the Basin:

- (PQ) Chronic lowering of groundwater levels and loss of storage is a problem. This Basin historically empties out and fills up in El Niño years. Hydrographs for the GSP should be as complete as possible and date back to the 1950s to capture this action over time. Historically, the Basin has seen 80-100 foot swings in water levels which are important to capture to develop thresholds for undesirable results. The Basin has recovered from much lower lows than seen in current/recent data sets.
- (WH) Is the Project Team doing a cumulative departure from the mean, so we can pick a representative historical period? They should use a period that shows overall average historical conditions.
- County staff is concerned that water levels are lowered in wells at San Pasqual Academy.
- (County staff and MW) For historical salinity information, County staff encouraged use of the 1983 USGS report by Izbicki. In 1957, concentrations of salinity were not elevated with only one pocket of higher salinity, but the rest of the Basin was relatively good quality. By the 1980s, salinity had increased. In the 1983 report, there are wide swings in salinity that should be reported. It was suggested to compare the 1957 vs 1983 data.

- (WH) Be careful how far back in time you calibrate the numerical model, because that is a big effort and may require assumptions for other inputs the Project Team don't have. You still need to consider older data especially for establishing undesirable results for the basin, but not in the numerical model. County staff suggested that reviewing 1983 USGS report data to help us better understand historical lows (for undesirable results).

Groundwater Model Approach

The TPR members then discussed the approach for developing the groundwater model. Nate Brown, Consultant Team member, gave a brief introduction and overview of groundwater model approach. The Consultant Team recommends using MODFLOW-NWT with MT3D-USGS code. TPR members discussed the groundwater modeling approach:

- (WH) How would the MODFLW-SURFAC model from the Salt and Nitrate Management Plan (SNMP) need to be modified to make it viable for a GSP? The model is not open-source, so we need to change modules.
    - Nate explained that the water quality aspects of the Basin are key. Fate and transport components will drive model code selection. Fate and transport information is generated when a model tracks solutes through a basin; this is necessary to understand how management actions might affect concentrations in the Basin.
- (PQ) Will the model be a fully integrated surface water/groundwater model, or a groundwater model with stream package?
    - Nate explained that the Project Team is still trying to determine that. We do need to anticipate changing boundary conditions for the stream network if a model with a stream routing package is selected. This type of model can simulate streamflow and solutes in surface water. With that approach, we could assess the contribution of salinity to Lake Hodges.
- (WH) Are there historical data sets of adequate frequency to establish a reasonable baseline?
    - Nate responded yes, all data are collected and available through the SNMP timeline, but that will need to be refreshed as the model is developed.
- City staff reminded the group that the City has streamflow data on three San Pasqual Valley streams, and these data include some water quality.
- Nate stated that the recommended model code can dynamically route water from wells to cells that represent irrigation. That limitation is resolved with this new model code.
- (PQ) Does the model concentrate evapotranspiration?
    - Nate explained that salinity will concentrate, and other nutrients will need a little more calibration due to plant uptake characteristics.
- (WH) Does the Project Team have data on land use applications?
    - Nate explained that we are starting with a good dataset from the SNMP. Ultimately, we will need to make assumptions about loading based on well data concerning changes in concentrations under crops. Per SGMA, the model is only required to be calibrated to the last 10 years. The addition of historical data is based on data availability and reliability only. The model needs data that goes far back enough to capture hydrologic variability. It is important that we not get too pre-occupied with historical data.
- (PQ) Is the Project Team planning to hold back years of data to use for validation to characterize uncertainty, or calibrate a subset of data?
    - Nate responded no, the philosophy for building the model would be to use all available historical data.
- (PQ) The model may then render a non-unique realization for the Basin. Will the Project Team develop additional realizations to help quantify uncertainty?

    - Nate explained that sensitivity analysis would be completed, but only to the extent required by SGMA regulations; no static/probabilistic approach would be developed.
- (PQ) What do you propose for sensitivity analysis (i.e., local or global), which are required according to U.S. Environmental Protection Agency (EPA) guidance for numerical modeling?
    - Nate explained that details aren't available yet. The Project Team wanted to focus on a practical approach to forecasting. California Department of Water Resources (DWR) cares more for forecasting than history matching, and the model needs to focus on information to help establish realistic management actions.
- (PQ) If decisions are made that result in a reduction in pumping and have associated economic impacts, need to know that sustainable yield = X +/- Y, not just X.
- (WH) What calibration period was used for the SNMP model?
    - Nate explained that a steady-state solution was used for a non-hydraulic condition, transport component for the 1990s to current. The GSP model will be expanded to a full fate and transport model with monthly inputs.

AC Comments About Groundwater Model Approach

Attending AC members provided comments on the modeling approach:

- AC member noted that San Pasqual Basin is unique in its east/west salt gradient and export to Lake Hodges, and that it also swings in groundwater levels. On the east end of the Basin, levels have become more pronounced over the last 45 years. Ultimately, more recent uses are affecting the Basin on the eastern end and degrading water quality on the west end.
- AC member stated that well recovery doesn't seem to be as good as it used to; once the Basin recovers, the wells don't pump as well as they used to.

Land Subsidence

John explained that there is no documented evidence of land subsidence, and the Basin geology doesn't support the likelihood of subsidence. Following are TPR and AC member comments:

- (WH) Should the land subsidence criteria be based entirely on geology? Basin geology is not conducive to land subsidence, plus we lack available data indicating that subsidence is occurring.
    - John explained that our tentative approach for the GSP would be to use historical lows as a proxy for land subsidence. Historical lows did not result in observed subsidence, so that seems reasonable.
- AC member noted that Old Milky Way seemed to be flatter when he was a kid. Just an observation – a couple of dips on the roadway that weren't there historically.

Preliminary Analysis Results

John reviewed the mapping and analysis results for the Plan Area, the Hydrogeologic Conceptual Model (HCM), and Groundwater Conditions sections of the GSP. He also noted that he would add the 2014 to 2016 land use data from the SGMA Portal to the current mapping and analysis. TPR member discussion is summarized below:

- (PQ) Will the San Diego Association of Governments (SANDAG) land use be used as the basis for estimating historical pumping? This is the biggest data gap in the Basin.
    - Nate responded that the SANDAG land use maps would be used, along with crop types to estimate demands. We may also use DWR's Integrated Water Flow Model Demand Calculator (IDC). Additionally, the team may contract with California Polytechnic State University for a few years of metric study.

- (PQ) Is there a distinct difference in water use for field crops vs orchards? There are a few parcels where the land use needs to be corrected. For example, on a map shown, the green rectangle to the west of Rockwood Canyon (outside of Basin) is planted in avocado trees, not field crops.
- (WH) A comparison of the SANDAG maps to Google Earth does show some differences; this is important because this information will also be used to estimate solute loading.
    - City staff explained that AC members may be able to provide land use/crop data about the leased lands.
- (PQ) Will the Project Team be soliciting projected water demands from growers for the forecasts?
- (PQ) DWR well infrastructure maps are also incorrect; TPR members will provide comments (e.g., DWR's count of 22 wells in Rockwood Canyon must include data from wells outside of the Basin).
- (MW) Suggest adding the San Pasqual Valley fault to the geologic maps.
- (MW) What data were used for hydrographs?
    - John explained that data were collected from the DWR Water Data Library, the City's dataset, three U.S. Geological Survey multi-completion wells, and Rancho Guejito wells. The datasets go back to 2007 with monthly timestamp, though there are some gaps.
- John explained that the hydrographs tell us that the Basin's west end maps are shallow and relatively stable, and the east end shows clear decline through drought, but recovery during wet years.
- (PQ) The vertical gradients of the three multi-completion wells may be showing that all three layers are responding to the same climatic conditions, and they may not necessarily be inter-connected. These wells show clear rainfall and summer conditions, not necessarily a response to pumping.
- (WH) They suggest there is a uniformly downward gradient (i.e., from alluvium to bedrock), and that sometimes reverses at the downgradient end of a Basin, but this information did not imply that reversal.

John asked the TPR members for their thoughts on what months should be contoured for groundwater quality? Project team recommends the 2014-15 water year to document January 2015 conditions per SGMA, as well as the 2018-19 water year for current conditions.

- (MW) Should 2019 data be included? 2019 groundwater elevations are likely to be relatively high due to above average rainfall and this data set should be used to help develop the conceptual model.
- (WH) Will the Consultant Team use groundwater contours in the groundwater model? Additional contour plots may be needed for model calibration.
    - Nate responded that the Consultant Team prefers to use point locations data since these are actually available.
    - John explained that data collected since 2007 shows that groundwater quality concentrations are flat for both TDS and for nitrogen.

AC Comments About Preliminary Analysis Results

Attending AC members comments on preliminary results are listed below:

- AC member suggested that TPR also consider well flow; most wells pump at 100 gallons per minute, but one of the TDS hydrographs is a 5-gallon per minute well, which is an extremely low flow well. This may affect concentrations.

Bottom of the Basin

John explained that the bottom of the SPV Basin is defined by Bulletin 118. He further explained SGMA guidance that pertains to determining the bottom of the Basin and discussed the pertinent DWR Best

Management Practices (BMP) Manual which suggests that the bottom of Basin could be the bottom depth of usable water. TPR member discussion is summarized below.[1]

- (WH) Even if the TPR called the bottom of the Basin "residuum", the group should not exclude the influence of pumping directly outside the Basin on Basin groundwater conditions.
    - (PQ) The boundary condition is firm as defined by Bulletin 118, and no pumping from outside the defined Basin should be considered in the analysis.

  (WH) We could define some amount of flux around the boundary condition that goes between the two units (residuum and underlying bedrock).
    - (PQ) We could use some general head (i.e., pressure) or specified flux.
    - (MW) In the model, the cells at the bottom of Basin could include a condition that assumes constant inflow/head.
- (PQ) On the boundary examples shown in the PowerPoint (pg. 37), the left image would produce water from the Basin and should be considered, the middle image may or may not affect Basin, and the right image needs to prove that pumping actually does affect Basin.
    - John suggested that we would want to see some type of barrier between residuum and fractured bedrock (for example, a clay layer) to confirm that pumping does not affect the Basin.
- (PQ) If, when drilling a well, a driller goes through 700 feet of granite before hitting fractured bedrock that supports pumping, then that indicates a barrier does exist. In general, fractured rock aquifers , sometimes people have drilled dry wells to 1,000 feet because they don't catch a fractured pocket.
- (MW) The best way to assess this is to get the aquifer tests completed, but the timeline does not appear to allow this.
    - The City is only aware of one deep well in the Basin.
    - The County has looked at Rancho Guejito wells and only found one well similar to the middle image. The County has no well log records in which Rancho Guejito wells are screened only in bedrock per the right image.
- (PQ) Rancho Guejito released well data for their alluvial wells and did not provide additional well logs for any wells that fell within the right image shown on the PowerPoint (pg. 37). DWR well completion reports for those other logs are available for wells in the third category. Rancho Guejito's TPR member will check with Counsel on release of those reports.
    - The Project Team will search for DWR well completion reports.
    - The County will look again within the County database.
- (PQ) Those wells are beneath the Basin boundary (not within).
- John explained that DWR may request the GSA to provide information for wells that may be impacting the Basin. For example, well logs must show that a well is sealed to below granite. If the TPR decides that the Basin bottom is at residuum/fractured bedrock, then the team needs to provide evidence that some wells are out. The burden of exemption would be on the people wanting the exemption.
- (WH) Shall we look at well logs to estimate what "bottom of Basin" is? There will be average range of well depth.

  Nate asked if the issue is pumping volumes for the water balance? DWR may require additional data collection over the next 5 years.
- (PQ) It will be difficult to model bedrock; some wells produce high and some low. If the granite beneath the Basin were incorporated, would that go laterally all the way to the Elsinore Fault?

- (MW) We currently do not know how important pumping in underlying bedrock is to Basin water balance. A well inventory of key fractured rock wells is needed. Is it possible to make a site visit to see if those wells are active and, if they are, what volume they might be pumping?
    - John explained that GSP success will be demonstrated through the monitoring program. Whether the wells were included or not, monitoring will indicate how the Basin is doing. GSP implementation could include a more thorough well survey to better document the location and pumping volumes of all Basin wells.
- (WH) The Consultant Team should develop a contour map of well depths.
    - The City doesn't have drilling logs for all City wells; some were drilled too long ago.
    - The County believes that a preliminary step would be to collect and document well depths; no field investigations would be necessary at this time.
- John asked TPR members if this a valuable use of TPR time now, or should this be included in the GSP's implementation?
    - The Project Team will look at well log data and consider how much time this will take.
    - The Project Team will present to TPR a recommended approach at next meeting.

AC Comments About Bottom of the Basin

- AC member noted that there is an obvious deficiency in the SANDAG land use maps, and that data would need to be improved to better estimate/project water demands.
- AC member suggested that there is substantial edge-to-edge water quality variation across the Basin; how will the model estimate this variability? How do you model the effect of pockets of more saline water?
- AC member explained that a farmer on the west end of the Basin recently drilled a deep well to get better water quality (BeWise). This seems to indicate that alluvium and residuum don't interrelate strongly. He knows that some farmers also drill more wells to get better flow rates.
- (MW) TPR member contributed that the west end is the stagnant end of the Basin and that with time, the lower aquifer layer is likely to degrade, and maps should be reviewed carefully.

Data Request Check In

John explained that any additional water quality data and well construction data is requested from TPR members.

Next Steps

The next TPR Group meeting is scheduled for Thursday, April 9, 2020 from 9 to 11:30 am.

Comments about today's meeting must be received by Thursday, January 23, 2020.

The TPR meeting ended at 11:25 am.

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Public Utilities

San Pasqual Valley Groundwater Sustainability Plan
Technical Peer Review Group
Teleconference Meeting Agenda

Date: Thursday May 14, 2020 from 9:00 to 11:00 am

Location: Teleconference Dial-In: +1 (224) 501-3412, Passcode 181-241-181 #
GoToMeeting Link: https://global.gotomeeting.com/join/181241181

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	9:00 am	Roll Call and Introductions	Patsy Tennyson (Facilitator), Consultant Team
2	9:10 am	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1)	Patsy Tennyson
3	9:20 am	Refined Analysis • Basin Definition • Advisory Committee Comments	John Ayres, Consultant Team
4	9:40 am	Technical Input on Approach • Groundwater Model – Fate and Transport Change – Model Code – Land Use • Monitoring Networks • Advisory Committee Comments	Nate Brown, Consultant Team
5	10:00 am	Preliminary Analysis Results (Handout 2) • Undesirable Results • Cross Sections • Groundwater Contours • Groundwater Quality • Advisory Committee Comments	John Ayres, Consultant Team
6	10:20 am	Field Program Update (Handout 3) • Monitoring Well Installation • Isotope Sampling	John Ayres, Consultant Team
7	10:40 am	Public Comments	Patsy Tennyson, Consultant Team
8	10:55 am	Next Steps and Closing Remarks • Next Meeting Date (Handout 4)	Patsy Tennyson/All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Technical Peer Review (TPR)
Meeting Summary

The following is a summary of the TPR discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday May 14, 2020 from 9:00 to 11:30 am

Location: GoToMeeting

Purpose: Technical Peer Review Meeting

Attendees:		
	Technical Peer Review • Matt Wiedlin (MW), Wiedlin & Assoc • Will Halligan (WH), Luhdorff & Scalmanini • Peter Quinlan (PQ), Dudek	**City of San Diego (City)** • Sandra Carlson (SC) • Niki McGinnis • Mike Bolouri
	Advisory Committee • Frank Konyn (FK) • Matt Witman (MWit) • Rikki Schroeder	**County of San Diego (County)** • Leanne Crow • Jim Bennett
	Public • Anita Regmi, Dept of Water Resources • Dustin Meador, The Pinery • Brad Blaes, The Pinery • Lani Lutar, Responsible Solutions • Alicia Appel, City of Escondido • Hank Rupp, Rancho Guejito • John Flores, San Pasqual Tribe	**Consultant Team** • John Ayres (JA), Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Nicole Poletto, Woodard & Curran • Micah Eggleton, Woodard & Curran • Patsy Tennyson, Katz & Associates • Emily Michaelson, Katz & Associates • Nate Brown (NB), Jacobs • Paula Silva, Jacobs

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, reviewed the list of participants signed onto GoToMeeting and asked all other phone participants to identify themselves. Patsy Tennyson, meeting facilitator, welcomed the group and reviewed basic instructions for GoToMeeting user tools. Sandra Carlson, City of San Diego, announced that Karina Danek's baby boy was born on April 27th, and introduced Niki McGinnis as the City's replacement on the Groundwater Sustainability Agency (GSA) Core Team (consisting of the City and the County).

Review

Patsy reviewed the meeting agenda and meeting objectives.

Refined Analysis – Basin Definition

John Ayres, Consultant Team, presented the definition of basin statement that was developed for the San Pasqual Valley Groundwater Basin (Basin). We are using the DWR Bulletin 118 definition of the Basin. It

was also acknowledged that we do not understand the interaction of the Basin with underlying granitic rock. If groundwater conditions require the implementation of management actions, additional data collection, studies, aquifer testing and/or surveying may be recommended to improve understanding of this interaction, TPR members discussed the Basin definition:

- (PQ) Investigations would occur in coming 5 years, following Plan adoption, but only if the GSP determines that management actions are needed.
- (MW) Looking at water level data in the USGS monitoring well piezometer station on west side of Basin, there is an indication that there is a small downward vertical gradient between alluvium and bedrock. I presume that new monitoring wells will help us assess this condition as well. We do have some information to help us make this determination. We do not have vertical conductivity values, but we do have the basis for developing an approximation of whether this is important enough to build into the model. I have a question for Nate – is this something that could be addressed in the modeling?
    - (NB) Yes, water level data and water level difference between different depth intervals would help as calibration targets. That way, the model can help with not only water levels, but also help show if it produces those water level differences in the different completions.
- (MW) What about the head differences between the alluvium and bedrock?
    - (NB) The model will include layers that go into the bedrock; however, we are only required to report water budget information for the Bulletin 118 Basin. The model domain extends past the Basin boundary including laterally and down into the bedrock. We can compare water levels in the two different units.
- (PQ) Knowing that we do not have horizontal or vertical hydraulic conductivity, how are you going to approach that in the model?
    - (NB) Through the calibration exercise, there will be some guidance from observations of mismatches between the water levels in different model layers to help with the calibration. Initially, the horizontal and vertical hydraulic conductivity values will be based on literature review, and as we move further into calibration, we will use the head differences in the different completions.
- (PQ) Thinking about boundary conditions for flow in those lower layers. How far out are you extending the model domain?
    - (NB) The model domain used for the Salt & Nutrient Management Plan (SNMP) is being used for GSP modeling. The model domain is the surrounding watershed catchment. We will compute inflows into the Basin, except for where we have stream gage data. Streamflows at the gages represent runoff and baseflow from the sub-watershed upstream of that gage.
- (SC) In understanding the vertical gradient, if we completed the aquifer testing, would we have the information we need? How would we get that information?
    - (NB) Aquifer testing with observation wells screened in different depth intervals would provide the opportunity for better starting guesses of subsurface properties in the vicinity of the test. Calibration will help us to identify the best and most cost-effective data gaps to fill.
- (PQ) Could the isotope studies help guide you?
    - (NB) I am not familiar with that study, so I am not sure.
- (MW) Will you develop a water balance for the fractured rock?
    - (NB) The model domain extends beyond the Bulletin 118 boundary to simulate the interaction of flow between the Basin and surrounding watershed. We will isolate the Bulletin 118 areas for the GSP water-budget reporting.

- (MW) If these nested wells provide years of data on the interaction between the 3 aquifers, wouldn't it be easier to just use those head differences for the term of the model? What we really want to know is how much water is going out of the Basin. If there is consistency in the gradient in areas that are not being pumped, we just need to figure out what the flux is out of the bottom of the alluvial aquifer over the course of roughly 10 years.
    - (NB) We need to be careful not to generalize. This does not mean that the Bulletin 118 Basin doesn't receive water from the bedrock. It is a valley, a low point in the catchment, it must receive some water from the surrounding bedrock.
- (MW) We have multiple locations with nested wells (three USGS plus two City) that we can study. From a regional flow perspective, I am not sure there is water discharging from bedrock into the Basin.
    - The City (SC) noted that we can provide water level data for new City wells, but there is no history on those wells.
    - (NB) We're not starting from scratch with the SNMP model. These are important data and we will certainly use them in the model process.
- (PQ) By going out to the Basin boundary, you get to the "no flow" boundary. You are having to estimate how much flow goes into the fractured rock. How much does the SNMP model do that?
    - (NB) We have lots of streamflow data and we will use the gage data. Recharge estimates in upland areas need to be estimated and defensible as they relate to the transient groundwater response. Calibration helps us to refine this and needs to match basic observations over time.
- (MW) The Basin boundary leaves out a chunk of alluvium in Cloverdale Ranch in the north (Cloverdale Road/San Pasqual Valley Road and up that canyon). The Basin is terminated before the alluvium ends. It appears that there is probably pumping going on above that Basin boundary.
    - The City (SC) explained that DWR redefined the lateral Basin boundary in 2017. We can check with them on why they established the Basin as they did.
    - (MW) It would be nice to understand that rationale.
- (JB) I wanted to clarify that the model would extend beyond the basin boundary to understand how the Basin connects to the watershed. The Basin definition will be consistent with Bulletin 118.
- (WH) The Basin definition should be consistent with DWR. That is not to say that flux between alluvium and fractured bedrock will not be accounted for in the water budget development.

AC Comments on Basin Definition

AC members provided the following comments:

- AC member (FK) voiced general concern about not including bedrock wells in the modeling process. TPR members appeared to support including those wells in the analysis. AC members had sent letters to John expressing concern about this issue and those were not addressed. I wanted to state that there is a mysterious turn-around in the TPR group about whether to include bedrock wells or not – it has not been proven that those wells are NOT connected to the Basin.
    - (JA) We are following the formal definition in Bulletin 118 and the Water Code. The follow-up language gives us the option of doing investigations if Basin management is needed. Performing an inventory of wells in the Basin is not in the scope or required by SGMA. Analyzing the Basin in modeling (vertical gradients, as MW suggested) will allow us to better understand the Basin functionality.
    - (JA) We need to park this topic for now, to continue with GSP process, and then re-visit it once we've gotten a little farther down the road. Things that are not specifically required in the regulations can be included in the GSP as implementation. For example: in the Cuyama

GSP, where water cuts are needed, determining how those cuts will be done and who they impact will be handled after Plan adoption so there is time to really dig in.

- (WH) In my opinion, there is a Basin definition provided by DWR in Bulletin 118. But that does not mean that we shouldn't account for the various stresses on the Basin, regardless of the formal definition. We should still account for all the stresses, including bedrock wells, assuming you have data available. There will be uncertainties and you address those in Plan implementation.

Technical Input – Approach

Groundwater Model

Nate Brown, Consulting Team, explained that the groundwater model code selected for this GSP has changed. The consulting team is now recommending that a solute transport model NOT be used, because it is not required for GSPs. The consulting team is instead proposing to use the USGS "One-Water" model code (MODFLOW). In this Basin, groundwater is responsive to wet/dry cycles and this model code can estimate those swings well. This code can also estimate agricultural pumping flow rates based on irrigation-demand-driven land uses. TPR members discussed the model approach slides during Nate's presentation:

- (WH) We used One-Water for Westlands Subbasin GSP. It is a fairly complex code, but it is nice because it considers ground surface and groundwater budget. You use pumping data as calibration targets.
    - (NB) Yes, we've used predecessors of One-Water, but this is a more integrated code now.
- (WH) One drawback: if you are considering folding in a solute transport element in future, you would need to do some code enhancements for the output or flux terms (for Mt3D). Keep that in mind in case solute transport modeling is desired in the future.

Nate continued his presentation with a discussion of how land use data and crop coefficients will be incorporated into the modeling process. The consulting team has developed a water year index to establish Wet, Above Normal, Normal, Dry, and Critical years for the San Pasqual Valley and recommends a 2005-2020 calibration period.

- (WH) Did you do a cumulative departure from the main on this rainfall data? With that, how does the 2005-2020 calibration period relate to the cumulative departure? Is it similar to an annual average?
    - (NB) Yes, we did. This recommended range is on the drier side; there was more precipitation in the 1980s than in recent two decades.
- (WH) If it is an overly dry period, you will need to keep that in mind when interpreting historical water budget results.
- (PQ) Would be good to see the cumulative departure curve. It should include a wet and dry period and average around mean. The period you are selecting does emphasize the dry years. The Basin fills up during wet years, so we do not want to be pessimistic in the GSP.

Nate reviewed how the team selected precipitation data for this analysis. There are 2 rain gages within the model domain, and with data for an area outside of the Basin. PRISM is based on a climate-elevation regression model in 4-Kilometer blocks based on the precipitation data.

Monitoring Networks

John provided an overview of the proposed approach to the monitoring networks: we propose to monitor groundwater levels and quality (TDS and Nitrate), then use those as a proxy for storage, subsidence and

surface water depletion. Existing monitoring well network is pretty robust, though he asked Peter Quinlan for help identifying a well site in Rockwood Canyon.

- (WH) Has the Project Team looked at satellite data or UNAFCO ground-based stations in the Valley to look at subsidence?
    - (JA) No, we haven't been able to find either one of those.
- (PQ) There is an observation well (100 feet deep) in Rockwood Canyon, but it is dry. I can provide that data.
    - (NB) Was there a time when it wasn't dry?
    - (PQ) Yes, but that observation well and domestic well both went dry in the canyon.
    - (NB) It would be helpful to have that data to help calibrate the model.
- (MW) I am struck by the lack of monitoring wells between Well 19 and Well 154, There are extensive agricultural operations there, which means there is probably pumping.
    - (JA) Based on DWR guidance, the current monitoring density is sufficient. There are not monitoring wells in the area. There are production wells, but production wells are not ideal because of their pumping impacts. The GSP will include an evaluation of the adequacy of the monitoring network. We might include this recommendation in the GSP.
- (MW) It appears there are several groundwater quality monitoring sites that are not also groundwater level sites. Why? Can we include a recommendation to sample levels with quality?
    - (JA) The groundwater quality wells are NOT City wells, as the City just takes sample from private wells. The City wells are used for level monitoring.
    - The City (SC) explained that it is a separate PUD division that goes out to sample groundwater quality vs. levels.

AC Comments on Technical Approach

AC members provided the following comments:

- AC member (FK) asked what the source is for precipitation data. PRISM data appears to match my data tracking. CIMIS station that was originally installed in a cow pasture with no irrigation and is now in irrigated field. There is a concern the data may be contaminated; but since the correlation seems strong, it is okay.
- AC member (FK) asked if it is correct that One-Water modeling will also incorporate irrigation returns from the different types of crop use and irrigation methods.
    - (NB) Correct.
    - (PQ) I want to reiterate that land use maps for the watershed area need to be as accurate as possible, since that will be the basis for the agricultural pumping projections.

Preliminary Analysis Results

Undesirable Results

John explained how the information from the January AC meeting breakout groups and January TPR meeting discussion was used to develop the Undesirable Results matrix in Handout 2. The undesirable results matrix explains the "bad" Basin conditions and defines how they can be measured. We are recommending a detect threshold of 25-35% (4 or 5 wells) for the undesirable result trigger for groundwater levels. TPR members discussed the Undesirable Results matrix:

- (PQ) 25-35% and 2-3 years sounds right and is consistent with what is being done in other GSPs.
- (WH) I echo what Peter just said; it is consistent with other GSPs.

- (MW) That sounds reasonable to me too.

Cross Sections, Contours, Groundwater Quality

John requested the TPR members to review all the maps and cross-sections in Handout 2. The consulting team will generate total of four groundwater contour maps and depth to water maps, each. TPR members discussed the figures:

- (MW) I am familiar with the monitoring well by Hwy 78 and Cloverdale Creek and the groundwater elevation doesn't appear to be correct for that area. The groundwater elevation appears to be 9 ft off, but depth to water is correct.
    - (JA) We will look into this.

John explained that surface water quality data is available from stream gages. Nitrate does not appear to be correlated with stream flows. TDS levels are more correlated, but not strongly. The western portion of the Basin appears to have higher concentrations. Stream gage data is also available from USGS gages.

- (MW) For high spikes, is there a correlation with wildfire in the watershed during that season?
    - (JA) That would be something to consider, especially for 4,000 mg/L TDS spike.
- (MW) Are the USGS stream gage charts for each of 3 gages, or 3 types of data for 1 gage?
    - (JA) We will look into this.

John reviewed the draft cross-sections using the well completion reports and groundwater levels in Spring 2015. He requested any additional geologic data from TPR members that could help refine the cross-sections.

- (MW) The elevation of bedrock contact at A-A at Well 00509 is shallow. In the model, it may have low transmissivity. You may want to look over well logs again to confirm that is real.
- (MW) At the last meeting, you showed a fault map and there was a fault along Santa Maria Creek. That may be the source of that very shallow area in the cross section.
- (MW) Lastly, you should show nested completions in the monitoring wells and show vertical gradient on the cross-sections.
    - (JA) We will look closer at Well 00509 and add screens on the cross sections.

AC Comments on Preliminary Analysis Results

AC members provided the following comments:

- AC member (FK) stated that he was not aware of a well in that location (where Well 00509 is mapped) and feels the data point is skewed. There may be a "dam" underlying Ysabel Creek Road. I have a well to the north of that point, so if Well 00509 were being pumped, my well would be lateral supply.
    - (JA) We will look into this. It appears to be a saddle in the bedrock. We will add the Basin boundary to this map.
- AC member (FK) stated that he may have recently tried to put a well there and that he attempted to put a well there five to seven years ago, but it came up dry.
    - (JA) I will coordinate with Frank offline to discuss this issue.
- AC member (MWit) asked about the thresholds statements. He observed there is much more stability in groundwater levels in the west end than the east end. He suggested a 25% or lower threshold and that it be limited to two years.
- AC member (FK) asked about the USGS stream gage charts. He would like information on the watershed area that contributes to each of the gages, plus the timeline (average over how many years).

    - (JA) We will revise the stream gage charts for next time.
- (MW) In most cases, wells are only in one geologic unit, but some penetrate deeper rock. I would like to understand if the wells are completed in multiple units.
- (MW) We don't have a good handle on stream flow leaving the Basin. How will we handle this?
    - (NB) I agree we do not have this data, but previous studies may help us estimate it.
- (MW) Hodges Reservoir managers may have data on surface flows entering from that stream channel. This may be difficult because there is more than one stream the feeds into Lake Hodges, but it may be worth looking into. Is Sandra familiar with any of this data for Hodges?
    - The City (SC) will check to see what data is available.

Field Program Update

John provided an update on the field program. Two monitoring wells were installed as part of the DWR grant. The Well Installation Report was circulated to the TPR as Handout 3. Isotope sampling for groundwater and stream gages has already occurred. One TPR member commented on the field program:

- (MW) Only two wells were put in Well SP129. Why not add a third one in the residuum aquifer?
    - (JA) I suspect that there was not enough wetted residuum, and/or it was too close to bedrock.
    - (SC) Yes. When the well was drilled, it was discovered that the residuum was too thin.

Public Comments

Public comments provided in the "Chat" during the meeting are listed below. No public comments were offered verbally by meeting participants.

Next Steps

The next TPR Group meeting is scheduled for Thursday, July 9, 2020 from 9 to 11:30 am.

Comments about today's meeting must be received by Thursday, May 28, 2020.

The TPR meeting ended at 11:28am.

GoToMeeting Chat Log from TPR Meeting

Rosalyn Prickett (to Everyone): 9:00 AM: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html
Nicole Poletto (to Everyone): 9:09 AM: If you are having technical difficulties, please call 858-875-7405
Hank Rupp (to Everyone): 9:13 AM: Who issued the final approval for this PowerPoint?
John Ayres (to Everyone): 9:31 AM: That's my understanding
Lani Lutar (to Everyone): 9:31 AM: Convenience is a not a reason to go outside of Bullet 118.
Lani Lutar (to Everyone): 9:37 AM: The following is policy decision that has already been made by the City and County: The SPV Basin is defined by Bulletin 118 and includes the Alluvium and Residuum. The GSP will not make a determination as to whether or not specific wells are "in" or "out" of the Basin.
Lani Lutar (to Everyone): 9:37 AM: I have this in writing and I
Lani Lutar (to Everyone): 9:37 AM: I'm concerned about mission creep that I'm hearing through this discussion.
Patricia Tennyson (to Everyone): 9:39 AM: As a reminder, we will be responding to questions from members of the public attending during that part of the agenda, but I am keeping track of comments as they arrive. Thanks
Will Halligan (to Everyone): 9:43 AM: Basin definition should be consistent with DWR. That is not to say that flux between alluvium and franctured bedrock will not be accounted for in the water budget development, correct?
Anita Regmi (DWR) (to Everyone): 9:45 AM: The Basin boundary was field checked and revised couple years ago. I was part of the revision team and I can look at the Basin boundary you are working on or provide you with the revised Basin boundary.
Will Halligan (to Everyone): 9:47 AM: response from will
John Ayres (to Everyone): 9:54 AM: ill be right back
Frank Konyn (to Everyone): 10:07 AM: so it includes irrigation return flows?
Will Halligan (to Everyone): 10:10 AM: question after Nate is done on this slide
Frank Konyn (to Everyone): 10:13 AM: what is the source for this data?
Will Halligan (to Everyone): 10:23 AM: question on subsidence monitoring when John is finished
Peter Q (to Everyone): 10:25 AM: There is a observation well in the northern part of Rockwood that is dry
Matt (to Everyone): 10:25 AM: I have a comment regarding water level monitoring well network.
matt Witman (to Everyone): 10:36 AM: CIMIS station
John Ayres (to Everyone): 10:41 AM: I am aware of the DWR Land-IQ data.
John Ayres (to Everyone): 10:42 AM: They did a good job, and we're looking into using them. I need to coordinate with Nate further on that
Patricia Tennyson (to Everyone): 10:42 AM: Almost ready to start the mtg again!
Peter Q (to Everyone): 10:44 AM: I'm back
Will Halligan (to Everyone): 10:53 AM: comment

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Public Utilities

San Pasqual Valley Groundwater Sustainability Plan
Technical Peer Review Group
Teleconference Meeting Agenda

Date: Thursday July 9, 2020 from 9:00 to 11:30 am

Location: Teleconference Dial-In: +1 (571) 317-3122 Access Code: **439-612-349** #
GoToMeeting Link: https://global.gotomeeting.com/join/439612349

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	9:00 am	Roll Call and Introductions	Patsy Tennyson (Facilitator), Consultant Team
2	9:10 am	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1)	Patsy Tennyson
3	9:20 am	TPR Comments • Overview and Responses • Advisory Committee Comments	John Ayres, Consultant Team
4	9:40 am	Technical Input on Approach • Groundwater Model (Handout 2) – Model Domain – Land and Water Use Update – Ag pumping Estimate Approach • Monitoring Networks • Sustainability Criteria – Levels and Quality (Handout 3) – Minimum Thresholds – Measurable Objectives • Advisory Committee Comments	John Ayres, Nate Brown, Consultant Team
5	10:20 am	Preliminary Analysis Results • Groundwater Model – Climate Year Analysis and Calibration Period – Pumping wells and Parcels (Handout 2) • Advisory Committee Comments	John Ayres, Consultant Team
6	10:40 am	Refined Analysis • Groundwater Dependent Ecosystems • Advisory Committee Comments	John Ayres, Consultant Team
7	11:00 am	Field Program Update	John Ayres, Consultant Team

Item	Time	Description	Presenter
8	11:10 am	Public Comments	Patsy Tennyson, Consultant Team
9	11:20 am	Next Steps and Closing Remarks • Next Meeting Date (Handout 4)	Patsy Tennyson/All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Technical Peer Review (TPR) Meeting
Meeting Summary

The following is a summary of the TPR discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday July 9, 2020 from 9:00 to 12:00 am

Location: GoToMeeting

Purpose: Technical Peer Review Meeting

Attendees:	Technical Peer Review (TPR) • Matt Wiedlin (MWied), Wiedlin & Assoc • Will Halligan (WH), Luhdorff & Scalmanini • Peter Quinlan (PQ), Dudek	City of San Diego (City) • Sandra Carlson (SC) • Niki McGinnis • Mike Bolouri
	Advisory Committee (AC) • Frank Konyn (FK) • Matt Witman (MWit) • Rikki Schroeder (RS) • Dave Toler	County of San Diego (County) • Leanne Crow (LC) • Jim Bennett (JB)
	Public • Anita Regmi, Dept of Water Resources • Dustin Meador, The Pinery • Brad Blaes, The Pinery • Alicia Appel, City of Escondido • Hank Rupp, Rancho Guejito (RG) • Lani Lutar, Responsible Solutions, RG • Andres Monette, Best Best & Krieger (BBK), RG • Geoffrey Vanden Heuvel, Milk Producers Council	Consultant Team • John Ayres (JA), Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Nicole Poletto, Woodard & Curran • Micah Eggleton, Woodard & Curran • Patsy Tennyson, Katz & Associates • Emily Michaelson, Katz & Associates • Nate Brown (NB), Jacobs • Paula Silva, Jacobs

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted participants as they signed onto GoToMeeting and asked all others participating via telephone and computer to identify themselves. Patsy Tennyson, Meeting Facilitator, welcomed the group and reviewed basic instructions for GoToMeeting user tools.

Review

Patsy reviewed the meeting agenda and meeting objectives. She directed participants to Handout 1, the summary of the last meeting; no one had any comments or revisions.

TPR Comments

John Ayres, Consultant Team, reviewed the comments we have received to date from TPR members, along with how the Consultant Team is planning to respond.

AC Comments on TPR Comments

AC members provided the following comments/questions:

- RS: What do the construction problems with Monitoring Well 129 mean?
    - JA: The well is constructed and there are only 2 sub-well completions, which is contrary to the recommended three sub-wells. When Frank pumps his well, this monitoring well would have given us data on aquifer properties in the 3 formations. Without the alluvium completion, we cannot learn as much about the relationship between all 3 layers. Also, because the gravel pack is high in one of the layers, it could allow crossflow between formations and the results from an aquifer test will be less than ideal. We can still use the lithology and geology information; but the aquifer tests will not be as helpful.
- MWit: High total dissolved solids (TDS) in 2011 was likely a result of the 2007 Witch Creek fire. That year was the first high flow event we had in the Valley after the fires. There was easily 2 feet of sand and ash deposited in the Valley. This was the last time that Lake Hodges spilled.
    - JA: This is noted and we will look into more detail on this.

Technical Input – Approach

Groundwater Model

Nate Brown, Consultant Team, provided an overview of the flow model domain and model inflow points. Consultant Team is using the One-Water flow model code for the SPV Groundwater Basin (Basin) and the USGS Basin Characterization Model (BCM) for the outlying watershed. TPR members discussed the model approach:

- PQ: BCM is great for understanding general characterization of the watershed, but it is not calibrated. When using it, USGS needs to do post-processing and change the data to use it. Since the recharge term is over the entire watershed and not really flow into/out of sub-watershed, how are you going to use BCM for the GSP?
    - NB: We have historical streamflow data at three USGS gauges over our 15-year calibration period, so we plan to compare actual historical streamflows at these gauges against BCM estimates at the same locations as these gauges. Based on our preliminary assessment, it would appear that the BCM tends to over-estimate streamflows. We plan to use the historical comparisons at these three gauges to develop factors to reduce the mismatch between BCM estimates and historical streamflow data.
    - PQ: For Year 2005, BCM gives runoff for January and February, but not the rest of the year. But the RG gauge shows flow for the rest of the year. You not only need to reduce streamflow volumes, but also may need to adjust timing of BCM flows.
- PQ: How will you deal with recharge term for entire Santa Ysabel sub-watershed for example?
    - NB: We would expect the recharge term to be relatively small, given the low-permeability material outside of the Basin. We will rachet down subsurface inflow terms, and possibly eliminate them if the model calibration guides us there. Unfortunately, it is not possible to get field estimates of subsurface inflow. This must be estimated as part of the calibration effort.
    - PQ: We are not looking at well data in outer watershed areas. If BCM says 23% recharge, we not looking at well data to correlate. There is a lot of uncertainty. Seems reasonable for Cloverdale and Sycamore, but is not eliminating uncertainty – you still have a lot of it
- WH: Sounds like there will be some calibration to existing flow gauges. You will need to scale up and down, and there will be impacts to the overall watershed budget. At some point, will there be watershed information provided?

- NB: Model will have the watershed budget and regression factors. We can, if requested, share that information with the TPR members as it is developed; however, water budget information outside of the Basin is not a requirement for GSP reporting.

Nate continued his presentation on the planned model domain and codes. He noted everything we have been talking about to this point is history matching, but that model projections that incorporate climate change are more important. A benefit of using BCM to estimate runoff from the surrounding watershed is that the USGS will have already run the relevant global climate models for California. Therefore, we can use the same BCM approach for the projection simulations, which will already incorporate climate change.

- PQ: You are using One-Water to get a runoff and infiltration. You should do a cross-check on what BCM gives you for runoff in that Basin model area to see how One-Water and BCM compare.

Nate discussed land use in the groundwater model and requested feedback. He also reviewed consumptive use approach in the numerical model.

- WH: In the farm process, are you assuming that there is applied water only during times of consumptive use or is there applied water during months when there is very little consumptive use?
  - NB: Applied water demand is based on land use, California Actual Evapotranspiration (CalETa) Mapping Program, reference evapotranspiration (ET), and crop coefficients.
  - WH: I understand that demand is based on land use, but if you have farming practices that apply water in the off-season, that off-season application can have a large influence on groundwater level calibration. Examples would include groundwater pumping for frost protection.
  - NB: We will keep that in mind if during model calibration there are obvious mismatches among boundary conditions, water-use assumptions, and calibration targets.
  - NB: Slide 21 shows the interrelationship between the different model blocks (surface water system, land system, and groundwater system). This will allow the model to calculate ag pumping and we can compare pumping rates with metered pumping data where and when such comparisons are appropriate. Where we have CalETa data, that will give us a direct picture of where crops consumed groundwater each month.
  - WH: On groundwater pumping data – if there is a situation where pumping data for a particular area is greater than ET demand, what are you going to do in that situation? Folks are pumping groundwater for a reason.
  - NB: Irrigation efficiencies will also be considered to account for additional water used beyond consumptive use. We will respond on a case-by-case basis.
- WH: Where demands appear high, look at uptake and rainfall, then groundwater left to make up difference. But what if it does not make sense when compared to metered data?
  - NB: In those cases, we would look at whether that portion of the domain has lower groundwater elevations, so the crops aren't accessing groundwater within their rooting depths. If there are remaining irrigation deficits for a given month in some subarea, then we would review the assumed rooting depths and, if justified, deepen them to get access to subsurface water. First, we are trying to build work flow ("the plumbing"). Once the model is running and converging, then we'll revisit the assumptions/parameters and move forward. Currently we are still trying to build the farm process and land use from a workflow perspective.

- MWied: Will brings up a good point. Your inquiry is premised on the basis that we have flow meters for groundwater pumping. John said earlier that we have some metered data. How comprehensive is that data?
    - SC: We have monitoring back to 2017, monitored every 6 months, which covers half of the City's leased land.
    - JA: Coverage is maybe 45% of the Valley (the City owns 90% of Valley).
    - WH: That is pretty recent data, as compared to the calibration period.
- PQ: There is groundwater pumping to spray citrus and avocado trees during the winter that will not show up in crop demand for ET. It may be a small amount, but they will pump through the night sometimes to protect the crops.
- PQ: You check the meters every 6 months. Are they totalizers? Or do they record pumping by day/month?
    - SC: No, the City just reads the meters every 6 months. It is a simple process.

Monitoring Networks

John provided an overview of the proposed monitoring networks. He briefly reviewed sustainable management criteria and how the monitoring networks will help us to address those criteria. Two new monitoring wells will be included in the GSP monitoring network, but we will not establish thresholds on them since we have no data.

Sustainability Criteria

John provided an overview of the terms for sustainability criteria – undesirable results, measurable objectives, minimum thresholds, and interim milestones. SGMA requires that we meet the measurable objective by 2042 – we want to target the measurable objective so there is adequate storage in the case of a future drought. Today, we are seeking input from TPR members on setting minimum thresholds. The Consultant Team reviewed groundwater elevations at January 1, 2015 (SGMA baseline), historic low, number and depth of well completions near each monitoring well, and Groundwater Dependent Ecosystems (GDEs) (evaluated separately). John walked the TPR members through several hydrographs with potential minimum thresholds analysis – considering 2015 groundwater level, historic low, shallowest nearby well, and 10th and 25th percentile of nearby wells. It is difficult to evaluate what is "significant and unreasonable" in the western Valley with its extremely shallow groundwater. The Margin of Operational Flexibility (MoOf) is the buffer of storage above the minimum threshold to set the measurable objective. For this draft, 5 years of storage is shown. TPR discussion follows:

- PQ: This is good work. 2011 was our high in this record, but that was a 140% rainfall year. 2008 was a 200% rainfall year. By using the 5-year storage, we are not seeing just how much the Basin fills up in really wet years. I prefer the comfort of the 25% percentile to make sure we are not considering old abandoned shallow wells that are still lingering in the DWR database. We need to take actions to avoid the minimum threshold, not pursue actions to get to the measurable objectives.
    - JA: Agree – whichever approach we take will depend on input from the TPR and AC members. I have seen this tackled in a variety of ways in other GSPs. In this draft analysis, we are more focused on the draw-down that occurs in dry years, rather than the recharge that happens in the wet years.
    - PQ: In another GSP, we tentatively set measurable objective at where we are above it 50% of the time. We need to have adequate storage to stay above the minimum threshold.
    - JA: Agree – this hydrograph is tough because we do not know if there is a discharge point above some hydrographs, so we do not know if they can even achieve the measurable

objective. If there is a 5-year decline in the record, we will use that. In wells with only 1-year decline, we will use that and multiply by 5. We need input from TPR and AC members – we want to make sure people can live with it and meet SGMA requirements. There is also the option to include "if/then" statements when setting thresholds strategies: "If a strategy needs to be refined for a particular kind of well condition, then use this modified approach for calculating the threshold." That way we can apply this methodology for all wells in the proposed monitoring network.

- JA: Will makes great point in the Chat – the measurable objectives and minimum thresholds may be easier to develop once we see water budget results and sustainable yield information and what is needed to be sustainable in the future. That information will be useful in developing/finalizing methodologies in developing thresholds. This is intended to be the start of this conversation. At the next meeting we will talk about the Projects & Management Actions, and how those relate back to these thresholds.
- MWied: With respect to the 5-year period of storage, my comment is directed more to AC members: in my experience looking at rainfall records and hydrographs, a 5-year drought covers most periods of drought over the last 40 years, though some extend 6-7 years (1997-2004).

AC Comments on Technical Approach

AC members provided the following comments:

- MWit: For 10% percentile, why was depth below the alluvium being used?
    - JA: The brown line on the hydrograph represents the ground surface, not the alluvium. Some wells extend below the alluvium and some do not. We are not deciding at this time about what wells are in or out of the Basin – we are focused on geographic inclusion in the Basin. We went through the available well completion reports (WCRs), but we do not have the ability to determine if a well is active or abandoned. We are not focused on whether they are in the alluvium or not.
- MWit: The differences between east and west portions need to be worked into these discussions. The west portion of the Valley is more stable and less frequently recharges; the east is less stable and more frequently recharged. These differences need to be considered in margin of flexibility.
    - JA: Agree, we need to do something different about the west Valley conditions. The well in the hydrograph shown did recede over the drought, but only 20 feet over 5 years.
- RS: When looking at different hydrographs, if there differences in various locations throughout the Valley, how do you pull all of this together in a comprehensive program?
    - JA: We might use "if/then" statements in setting the thresholds. "If depth to water is less than 30 feet, then we'll do this." This will give us flexibility, without having to delineate separate management areas.
- PQ: Do we have an undesirable result from having water within 1 foot of ground surface in the west Valley in terms of liquefaction?
    - JA: We have not established an undesirable result for this, as this is not specified as a required in the regulations. However, if this could be an issue, we are looking for input from stakeholders in western end.
- JB: On 10% and 25% thresholds, those are pulled from WCRs and we do not know if they are active or abandoned, or if they are in the Basin. Is that correct?
    - JA: Yes, that is correct. In another GSP, we wanted to set the threshold at 25% and said we are willing to dewater up to 25% of wells before taking action. In this case, by including all wells and if we do pick 10%-25%, we are not necessarily dewatering shallow wells because some of those wells may be old and destroyed. And those wells are not necessarily near the

monitoring wells (that are up to ½ mile away). But we need to take a stab at it, which is why we are presenting the data we have even if it is not perfect.

  - JB: When the County provided Department of Environmental Health (DEH) well log data, we went through information and removed wells that are considered outside the Basin. It did not take a tremendous amount of effort. When looking at using 10% or 25% thresholds, we want to make sure we are protecting wells inside the Basin. The County recommendation is to work through well logs to remove wells not in the Basin.
  - JA: We can discuss this at next Core Team meeting.

- JB: Does the City have good inventory of who is actively producing on City-owned land in the Basin? That would cover 90% of Basin.
  - SC: The City does have information about which wells are active. I am not sure we have well logs for all wells. There are domestic wells in the Basin too.
- LC: Have you considered just using key indicator wells instead of percentiles? Do we want to set thresholds at percentiles?
  - JA: The monitoring wells in the monitoring well network are the key indicators. The purpose of the percentiles is to better understand where the surrounding wells fall. If all of the wells are shallow, we need to set minimum thresholds higher so that we're not dewatering too many wells. If surrounding wells are deeper, then the minimum thresholds can be deeper. We will also update the GSP in 5 years and will have better/more data then.
- PQ: I agree with Jim and Leanne. In the presence of uncertainty – if we are not sure if wells are inside or outside of the Basin – that argues for a higher percentile. We will give feedback on the Rockwood Canyon wells. One of the Rockwood Canyon monitoring wells may be destroyed for infrastructure; its redundant anyway.
- MWied: Matt Witman's comment about wells below the alluvium is good. We should use cross sections to consider where the bottom of the alluvium is and use the granite layer as the deepest depth.
  - JA: We have not determined if wells completed in all 3 layers are not affecting the Basin, so I would prefer to include them in this analysis.
- PQ: It skews the analysis if wells are only completed in the fractured granite. We should only include the wells completed in the Basin. Taking those out will probably raise the minimum thresholds. Including the deep wells will allow for a minimum threshold that could make all of the shallow alluvium wells run dry.

Preliminary Analysis Results

Groundwater Model

Nate reviewed the climate year analysis that was completed for the calibration period. He presented the cumulative departure from the mean annual precipitation. TPR members discussed the model results:

- WH: The climate analysis indicates a slightly downward trend, which indicates a slightly dry period.
  - NB: Yes, that is also indicated in the table above. If you start to extend back further beyond 2005, there is another long dry period.
  - WH: We want to get a sense on how the selected period looks: does it represent the long-term annual average versus a dry period? This will affect the water budget results. What you may come up with for Basin storage may not be indicative of the long-term historical

average, but rather it is representative of the 2005-2020 drier conditions. This should inform how we interpret the result.

- PQ: I agree with Will. We should look at this with caution. This is a drier period that does not have the years that will fill up the Basin. We may want to focus more on 2009-2019 which starts at mean, goes wet and then dry, and then ends up back at mean. In prior years, there has been more amplitude.
- MWied: This seems like a reasonable selection of time for calibration.

Nate continued with discussion of how the Consultant Team is mapping wells to parcels and requested feedback on Handout 2.

- PQ: I do not see parcel numbers for the floor of Rockwood Canyon. Parcels 27 and 37 are outside of the Basin; they are Gidachi property. I will provide feedback.
- PQ: How are septic leach fields addressed; are they considered return flow?
    - NB: Yes. This is why we are asking for clarification of domestic vs. irrigation pumping. We want to have a better sense of indoor vs. outdoor water use.
- JA: We are asking for input on Handout 2 from TPR members in one week, that is by July 16th.

AC Comments on Preliminary Analysis Results

No AC members provided comments.

Refined Analysis

Groundwater Dependent Ecosystems (GDEs)

John reviewed the site surveys completed for GDEs. The Consultant Team reviewed the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset, aerial imagery, and USGS mapping. Site surveys identify a broad array of riparian and wetland habitats throughout the Valley. Those habitats may be fed by surface water, shallow perched aquifer, or mountain-front recharge and not the groundwater Basin. TPR members discussed the GDEs analysis:

- WH: What is the time snapshot of the depth to water map for GDEs?
    - JA: Timeframe for depth to groundwater is 2018.
    - WH: Should we use a different year, such as January 1, 2015, for this analysis?
- MWied: I worked on a site south of Cloverdale Creek where there appears to be wetland species in the drainage, but groundwater levels vary from 10 ft to 40 ft and they still survive. Are these species groundwater dependent? They use groundwater when it's there, as the levels fluctuate over time. Can we provide the biologist with data on how often the Basin refills over the historical period?
    - WH: Could this be a factor in "significant and unreasonable" regarding undesirable results?
    - JA: The GSP commits the Groundwater Sustainability Agency (GSA) to doing management for any undesirable results. I am reluctant to do this if the GSA does not have effective authority to manage this issue. GSAs have authority to manage pumping and implement projects to import water into the Basin. They do not have ability to manage land uses outside of the Basin. If there are areas that are labeled as GDEs in the east Valley where groundwater levels are far below surface, GSAs could be held accountable for habitats they cannot effectively manage. We can monitor GDEs in the east Valley (e.g., shallow piezometers) and consider how we might try to manage those areas over time.
- PQ: I agree that we should not commit GSAs to managing something they do not have the tools to manage. If shallow piezometers were to confirm the theory of mountain-front recharge, the GSA

does not have tools to manage that. Stay focused on the west Valley where the GSAs can manage groundwater levels.

  - JA: This issue is similar to groundwater quality, where we are only going to establish thresholds on constituents where GSAs have ability to manage loading.

- MWied: You did not incorporate topography into depth to water maps. You should do so.
  - JA: The result ends up looking more like a topographic map than anything else. Is not productive to show in a presentation.
  - MWied: If this becomes criteria, you should take caution in using this approach.
- PQ: Is the model farm package how we simulate direct transpiration of groundwater from these riparian plants in the western end of the Basin?
  - NB: Yes.

AC Comments on Refined Analysis

AC members provided the following comments:

- RS: It's worth explaining to the AC that just because GSAs are not managing these habitats, it doesn't mean they aren't important habitats and still subject to state and federal laws.
- RS: When you talk about managing groundwater levels for GDEs, what does that mean?
  - JA: We could use the habitat's rooting depth as the minimum threshold for the areas that underly the GDES (30 feet is considered rooting depth for GDEs). This would be a different approach from using well infrastructure as the basis for thresholds.
- MWit: There is a fundamental flaw in the GDE mapping: the difference between elevation of ground surface and the creek is closer to 30 feet. They are much closer to surface than shown. Water runs from winter into July to allow for those plants to establish. The riparian plants root into the creek bank and rob irrigation water from the crops. It is clear that those are NOT GDEs; nothing grows in the center of the channel where irrigation water cannot be used.
  - JA: Plants that use irrigation return flows are not GDEs.
  - MWit: In wet years, more plants get established and then they die off in the dry cycle.

Field Program Update

John provided a brief update on the field program.

- PQ: I wrote comments last time about Monitoring Well 128.
  - JA: We did not get comments from Kleinfelder that their stabilizers are pipes. We can send you a photo as follow-up.
  - PQ: The proof is going to be if they have different water levels or if they installed seals that allowed for leaking. If they are the same, it will call into question the relationship between the 3 layers.

Public Comments

Public comments provided in the "Chat" during the meeting are listed in the GoToMeeting Chat Log below. Public comments provided verbally by meeting participants follow:

- Andre Monette, BBK for RG – I want to offer clarification on the Basin boundary. We agree that Bulletin 118 is the appropriate legal basis for the GSP. Future actions to try to regulate areas outside of the Basin will be as illegal then as they are now. The reason DWR has defined the Basin the way they have is because fractured bedrock behaves very differently from alluvium; it is not as

predictable. DWR has removed bedrock layers from other Basins too (e.g., Jamul). I caution this group against using wells screened in bedrock to establish thresholds.

- Andre Monette, BBK for RG –On measuring TDS in the GSP: there was a slide early on related to fire runoff after Witch Creek Fire and study after study documents very high TDS levels in this Basin. There is a smoking gun that needs to be investigated further. SGMA requires a closer look at groundwater quality.
- Andre Monette, BBK for RG –The 25% percentile approach to setting the minimum thresholds makes sense. We support this approach, as it allows for at least 75% of wells to continue operating. Operators can plan ahead and drill wells at an adequate depth.
- Hank Rupp, General Manager, RG – I am glad that Bulletin 118 is being proposed to define the Basin boundary. That is established by DWR and limits the overreach of the managed area. This is not the forum to expand on the definition.
- Hank Rupp, General Manager, RG – There is high TDS in the western portion of the Basin. Multiple RWQCB reports document this. I am concerned about how that will be addressed, as TDS is not good for agriculture.

Next Steps

The next TPR meeting is scheduled for Thursday, October 8, 2020 from 9 to 11:30 am.

Comments about the land use maps and well mapping (Handout 2) must be received by Thursday, July 16, 2020. All other comments about today's meeting must be received by Thursday, July 23, 2020.

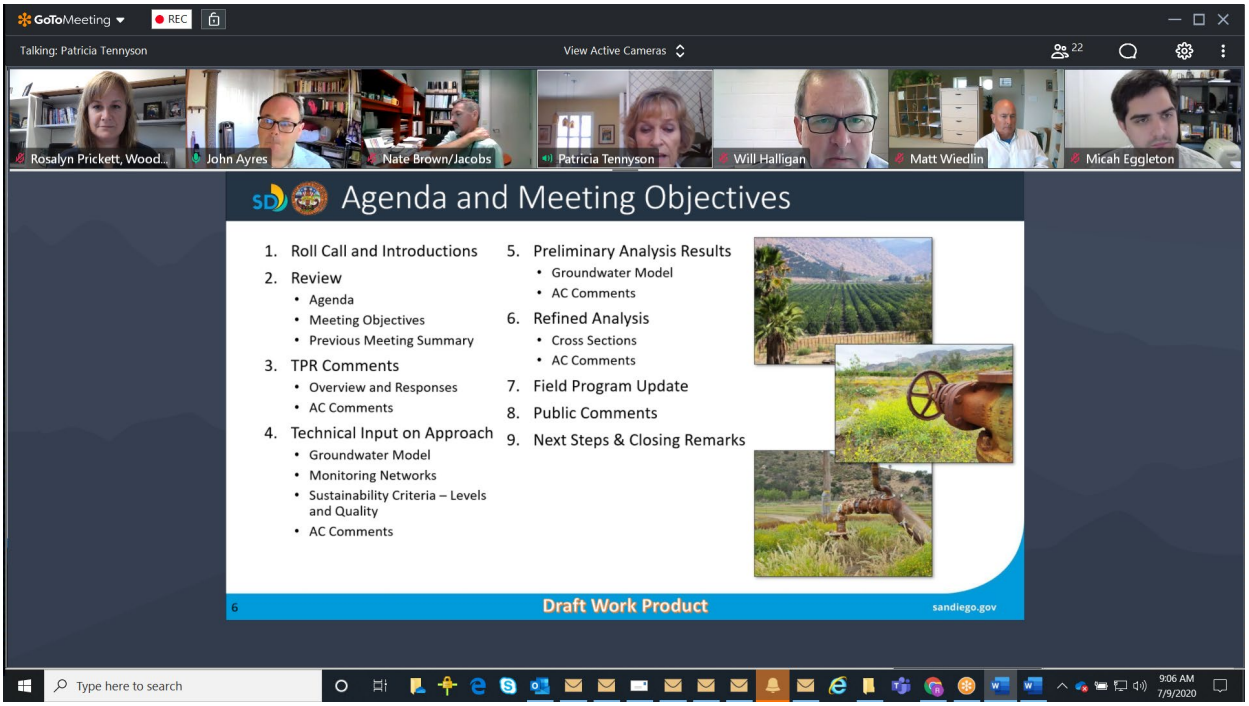
The TPR meeting ended at 11:53am.

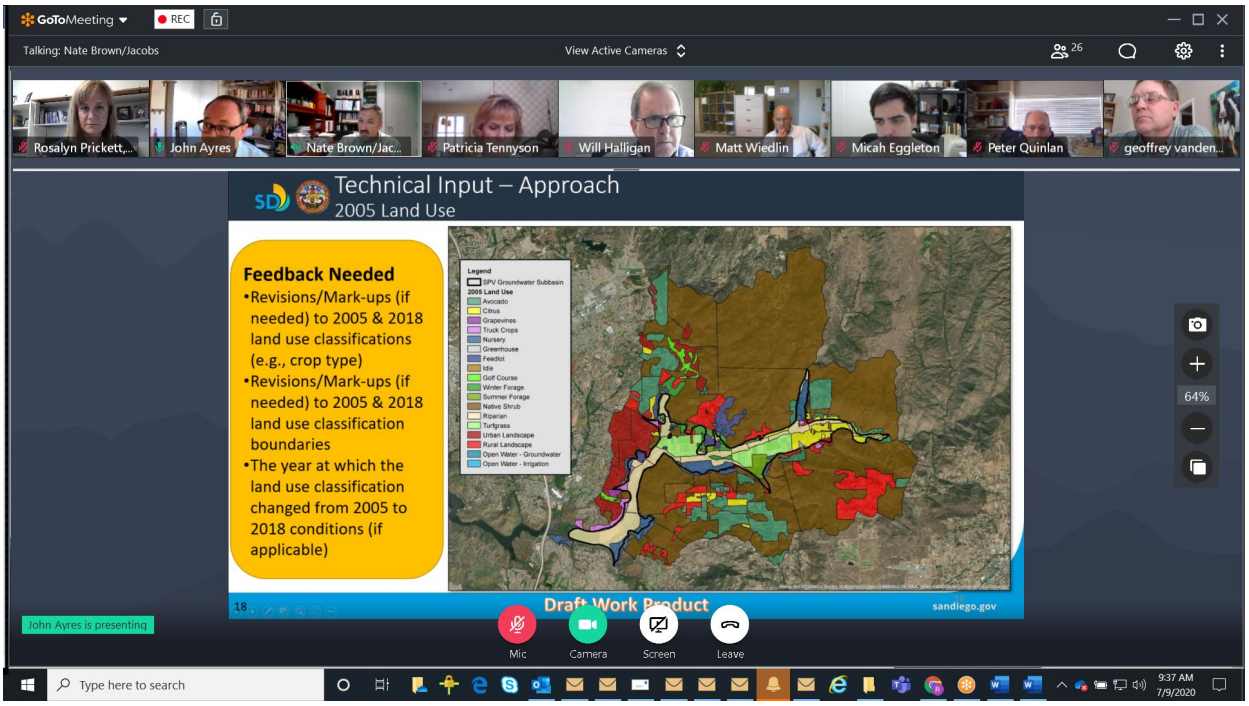
GoToMeeting Chat Log from TPR Meeting

Rosalyn Prickett, Woodard & Curran (to Everyone): 8:52 AM: All handouts are located on our website: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html
Rikki (to Everyone): 9:13 AM: What do these problems mean?
Will Halligan (to Everyone): 9:15 AM: No comments yet from Will on responses to comments
Matt Witman (to Everyone): 9:15 AM: 2011 was the first high flow event in the watershed after the Witch creek fire. Huge amounts of sediment washed in during that event. This is the last time that lake Hodges spilled
Will Halligan (to Everyone): 9:22 AM: How come this slide is not included in the handout?
John Ayres (to Everyone): 9:23 AM: Will, we had a few last-minute updates to the powerpoint
Will Halligan (to Everyone): 9:24 AM: Thanks
Will Halligan (to Everyone): 9:28 AM: Will watershed budget data be provided for review
Matt Wiedlin (to Everyone): 9:51 AM: Nate and John, Will brings up a good point. But it is based on having measured groundwater production data. How much of the Basin do we anticipate having metered data at this point?
Geoffrey Vanden Heuvel (to Everyone): 9:55 AM: I think your approach is very valid. Crop ET as the indicator of ag consumption is the best approach at this point.
Peter Quinlan (to Everyone): 9:55 AM: There is pumping to spray trees for frost protection.
Peter Quinlan (to Everyone): 9:56 AM: Are the City meters totalizers, or do they record pumping by day or month?
Geoffrey Vanden Heuvel (to Everyone): 9:56 AM: whatever water the crop doesn't use either goes back into the ground or finds its way as runoff into the surface water system.
Dustin Meador (to Everyone): 9:57 AM: Irrigation efficiency should consider some crops are being underirrigated if you compare Crop ET with Ref. ETo.
Dustin Meador (to Everyone): 10:04 AM: Is there an interest among the Technical experts regarding Ag. Water Quality and an interest in helping farmers ensure they have access to appropriate sources of better quality water?
Matt Witman (to Everyone): 10:16 AM: why is depth below the alluvium being used?
Patricia Tennyson (to Everyone): 10:21 AM: A reminder: Advisory Committee members will have an opportunity to ask questions after this section of slides is complete. Members of the public in attendance will have an opportunity to provide comments at the end of the meeting (approximately after slide 61).
Will Halligan (to Everyone): 10:25 AM: MOs and MTs may be easier to develop once we see water budget results and sustainable yield info and what is needed to be

sustainable in the future. That info will be useful in developing/finalizing methodologies in developing MOs and MTs
Will Halligan (to Everyone): 10:56 AM: I switched from computer audio to my phone.
Will Halligan (to Everyone): 11:22 AM: What is the time snap shot of the depth to water map for GDEs?
Rikki (to Everyone): 11:26 AM: it's important to note that just because GDE may not be managed, it is still covered under State and Federal wetland regulations.
Matt Witman (to Everyone): 11:39 AM: i have some comments

Images from TPR Meeting




GoToMeeting
REC
Talking: Nate Brown/Jacobs
View Active Cameras
Rosalyn Prickett,...
John Ayres
Nate Brown/Jac...
Patricia Tennyson
Will Halligan
Matt Wiedlin
Micah Eggleton
Peter Quinlan
geoffrey vanden...
Technical Input – Approach
2005 Land Use
Feedback Needed
•Revisions/Mark-ups (if needed) to 2005 & 2018 land use classifications (e.g., crop type)
•Revisions/Mark-ups (if needed) to 2005 & 2018 land use classification boundaries
•The year at which the land use classification changed from 2005 to 2018 conditions (if applicable)
Legend
SPV Groundwater Subbasin
2005 Land Use
Avocado
Citrus
Grapevines
Truck Crops
Nursery
Greenhouse
Feedlot
Idle
Golf Course
Winter Forage
Summer Forage
Native Shrub
Riparian
Turfgrass
Urban Landscape
Rural Landscape
Open Water - Groundwater
Open Water - Irrigation
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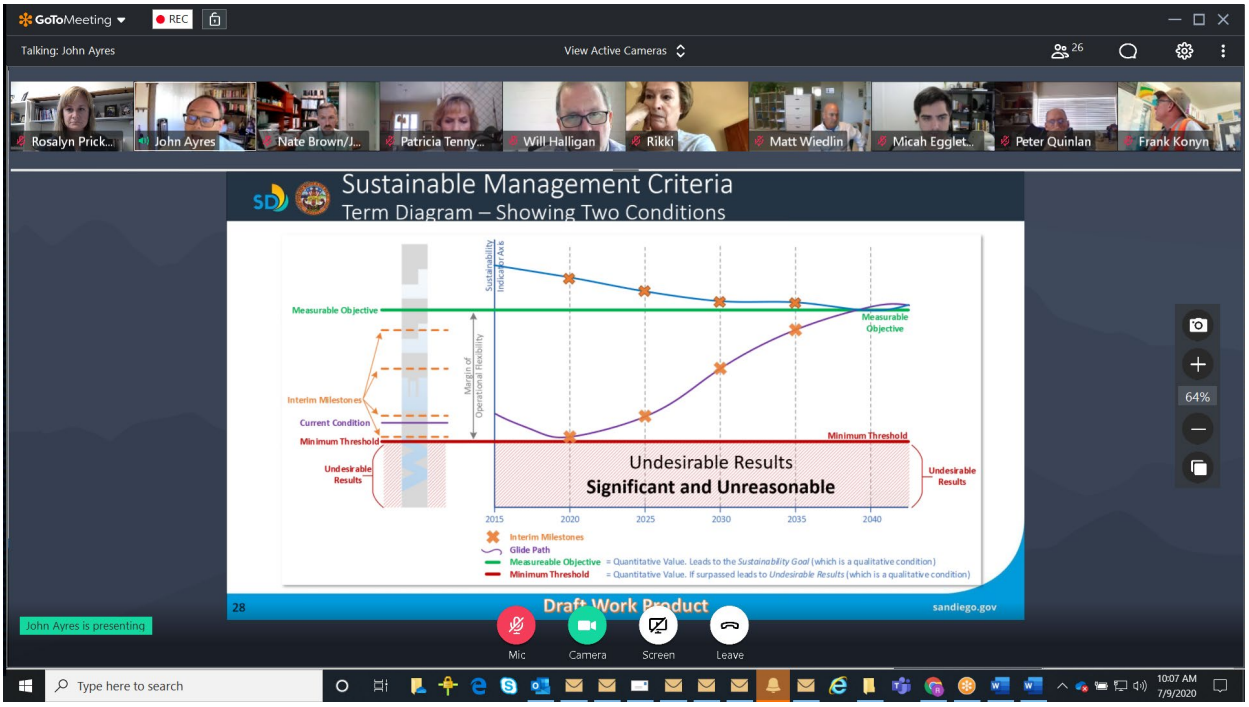
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Rosalyn Prick...
John Ayres
Nate Brown/J...
Patricia Tenny...
Will Halligan
Rikki
Matt Wiedlin
Micah Egglet...
Peter Quinlan
Frank Konyn
Sustainable Management Criteria
Term Diagram – Showing Two Conditions
Sustainability Indicator Axis
Measurable Objective
Interim Milestones
Current Condition
Minimum Threshold
Undesirable Results
Margin of Operational Flexibility
Undesirable Results
Significant and Unreasonable
2015
2020
2025
2030
2035
2040
Interim Milestones
Glide Path
Measureable Objective = Quantitative Value. Leads to the Sustainability Goal (which is a qualitative condition)
Minimum Threshold = Quantitative Value. If surpassed leads to Undesirable Results (which is a qualitative condition)
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John Ayres is presenting
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San Pasqual Valley Groundwater Sustainability Plan
Technical Peer Review Group
Teleconference Meeting Agenda

Date: Thursday October 8 from 9:00 to 11:30 am

Location: Teleconference Dial-In: +1 (224) 501-3412 Access Code: **979-473-053#**
GoToMeeting Link: https://global.gotomeeting.com/join/979473053

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	9:00 am	Roll Call and Introductions	Facilitator Consultant Team
2	9:10 am	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1) • Updated Public Comment Format	Facilitator
3	9:20 am	TPR Comments • Overview and Responses (Handout 2) • Advisory Committee Comments	John Ayres, Consultant Team

4	9:40 am	Technical Input on Approach
		• Groundwater Model
		  ○ Model Layering
		  ○ Calibration
		  ○ Water Budgets
		  ○ Projections (Handout 3)
		• Advisory Committee Comments
			Nate Brown,
			Consultant Team

5	10:00 am	Technical Input on Approach
		• Projects and Management Actions
		  ○ Initial list
		  ○ TPR Input
		• Management Areas (Handout 4)
		  ○ Connection to MOU
		• Advisory Committee Comments
			John Ayres,
			Consultant Team

6	10:30 am	Preliminary Analysis Results
		• Groundwater Model
		  ○ Lake Hodges Water Levels
		  ○ Bias-corrected Stream Inflows (Handout 4a)
		  ○ Consumptive Use Calculations
		• Advisory Committee Comments
			John Ayres, Nate Brown, Consultant Team

Item	Time	Description	Presenter

7	10:50 am	Refined Analysis
		• Groundwater Model (Handout 5)
		  ○ Well-to-parcel Map
		  ○ Land Use Maps
		  ○ Active vs Inactive Pumping Wells
		• Advisory Committee Comments
			John Ayres, Nate Brown, Consultant Team

8	11:10 am	Field Program Update	John Ayres, Consultant Team
9	11:15 am	Public Comments	Facilitator, Consultant Team
10	11:25 am	Next Steps and Closing Remarks • Next Meeting Date (Handout 6)	Facilitator/All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Technical Peer Review (TPR) Meeting
Meeting Summary

The following is a summary of the TPR discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday October 8, 2020 from 9:00 to 11:30 pm

Location: GoToMeeting

Purpose: Technical Peer Review Meeting

Attendees:	Technical Peer Review (TPR) • Eddy Teasdale (ET), Luhdorff & Scalmanini • Will Halligan (WH), Luhdorff & Scalmanini • Peter Quinlan (PQ), Dudek	City of San Diego (City) • Sandra Carlson (SC) • Karina Danek (KD) • Niki McGinnis • Mike Bolouri
	Advisory Committee (AC) • Frank Konyn (FK) • Matt Witman (MWit) • Rikki Schroeder (RS) • Dave Toler (DT)	County of San Diego (County) • Jim Bennett (JB) • Leanne Crow • Nancy Karas
	Public • Anita Regmi, Dept of Water Resources • Lani Lutar, Responsible Solutions, on behalf of Ranch Guejito • Hank Rupp, Rancho Guejito (RG) • Andre Monette, Best Best & Krieger, on behalf of Ranch Guejito • Alison Vargas, TetraTech • Elyse Levy, California Department of Fish & Wildlife • Jeremy Burns, Wood	Consultant Team • John Ayres (JA), Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Nicole Poletto, Woodard & Curran • Micah Eggleton, Woodard & Curran • Heidi Gantwerk, HG Consulting • Nate Brown (NB), Jacobs • Paula Silva, Jacobs

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted participants as they signed onto GoToMeeting and reviewed basic instructions for GoToMeeting user tools. Rosalyn introduced Eddy Teasdale of Luhdorff & Scalmanini, who will be sitting in on the TPR while Matt Weidlin is out on leave. She also introduced the new facilitator for the SPV TPR and AC meetings, Heidi Gantwerk of HG Consulting, who has extensive experience with outreach and facilitation for non-profits and public agencies throughout the region.

Review

Heidi Gantwerk, Consultant Team, reviewed the meeting agenda and meeting objectives. She directed participants to Handout 1 with the last meeting summary, and Handout 2 with comments received following the last TPR meeting.

- WH: The summary of comments received did not include all of Will's comments.
    - JA: John/Sandra will follow up with Will after this meeting to make sure we have them all.
- PQ: I would like to see all of the comments submitted by other TPR members. I request to have the other TPR members cc one another in their submittals.
    - SC: We will determine the process for this and let you know.

Groundwater Model

Technical Input – Approach

Nate Brown, Consultant Team, provided an overview of the proposed conceptual approach to model layering. He anticipates 5 to 6 model layers, and will try to have interfaces that generally coincide with stratigraphic boundaries within the Basin, but will generalize them for mathematical stability outside the Basin. The model calibration period runs from water year (WY) 2005 through WY 2019, with monthly stress periods. Calibration will include groundwater-elevation (head) targets at 19 monitoring well locations and vertical-head-difference targets at three multi-completion monitoring wells. Nate provided an explanation of water budgeting for surface water, land, and groundwater systems. TPR members discussed the model approach:

- WH: What is your rationale for the layer thickness in the alluvium, Layer 2 vs Layer 3?
    - NB: In this example, we are looking to simulate groundwater conditions in all three screened intervals of the multi-completion monitoring wells and have greater spatial resolution around the alluvium/residuum and bedrock contacts.
    - WH: I am concerned about the steepness of model layers.
    - NB: The conceptual graphic in Slide 13 is vertically exaggerated, making it look much steeper than it really is.
- WH: Are you trying to calibrate to Model Layers 2, 3, and 4? Is there a way to convey the assignment of these calibration wells by model layer to have a better sense of spatial calibration details?
    - NB: Calibration wells will be assigned based on the midpoints of their well screens. Most calibration wells will likely be assigned to one or two model layers. We plan to summarize the model layers to which each well is assigned later in the development process.
    - WH: We want to be able track which portions of the basin and which layers we have better or lesser calibration.
    - NB: We will be showing spatial plots to demonstrate the degree of calibration throughout the modeling domain later in the process.
- PQ: Model layering concept looks fine.

Nate explained the parameter assumptions for GSP Model projections.

- PQ: Regarding the time series of wet and dry years, who generated them?
    - NB: The global climate models (GCMs) were generated by independent climate experts (technical references were provided in Handout 2).
    - PQ: Were the series of wet and dry years randomly generated? When I compared 1980-2010 to graphs shown at previous TPR meeting, these are biased to be drier.
    - NB: The series was not randomly generated. It was developed by independent climate experts based on assumed future greenhouse gas emissions and other input variables.

The recommended GCM is indeed on the drier side. Handout 2 provides the rationale for selecting the HadGEM2-ES RCP8.5 climate scenario. Given the GSP is a planning document associated with long-term water availability and supply, it makes sense to use a GCM that indicates drier future conditions to facilitate setting SMC that provide an adequate margin of operational flexibility.

- PQ: It would be more reassuring to see an even distribution of dry and wet years. The calibration period had slightly more dry years and is already conservative.
- NB: Faced with multiple GCMs, we had to select one that seemed most appropriate for a water-supply planning document. This one is on the drier side, but not an extreme-dry scenario.

Preliminary Analysis - Results

Nate explained how the Lake Hodges water levels are being incorporated into the GSP Model as a boundary condition.

- PQ: On Slide 21, you said you would set the general head boundary based on water year type. It would be important to recognize the ranges of lake levels in a given water year.
  - NB: Yes, we agree and plan to use the average historical lake stage for a given water year type in the projection simulations.

Nate explained how bias corrections were done for Basin Characterization Model (BCM) inflows. They will use the measured flowrates in Guejito and Santa Maria Creeks, where there are gages with reliable data during the calibration period. For the three ungauged creeks, they will use bias-corrected BCM runoff estimates. As Peter noted last meeting, BCM is not calibrated to local conditions. Since then, they have implemented monthly and annual bias corrections with the BCM runoff to make such estimates more consistent with local conditions.

- PQ: So the only inflow information taken from BCM is surface runoff?
  - NB: Yes. The modeling team feels the groundwater recharge estimates from the BCM are not appropriate for use with the GSP Model.
- Nate explained how consumptive use is computed in the numerical flow model. CalETA data is being used for years it is available; crop coefficients are being used in lieu of CalETA data in years where it is not. WH: On consumptive use, are you also accounting for any non-ET related uses of water as part of farming practices? Such as off-season uses of water for soil moisture management, frost protection, etc?
  - NB: The only additional water use in the model outside of consumptive use is built into the assumed irrigation efficiency input variable. We do not have any data on other on-farm water uses.
  - WH: With the various stakeholders on AC, is there local data that could be available on water application processes that aren't directly related to consumptive use? (none provided)
  - NB: No, I haven't seen any.
- PQ: Consumptive use varies from 37 to 45 inches for orchard on your graph in Slide 27– will you use an average of this historical for the projections?
  - NB: No, we plan to use crop coefficients from the end of the calibration simulation and the reference ET to compute future consumptive use. The reference ET is computed by BCM and then bias-corrected by the modeling team using the local CIMIS station. The crop coefficient and reference ET estimates will be used to compute future monthly consumptive use for the projection simulations.

Refined Analysis

Nate described the assignments of wells to parcels in Handout 5. One outstanding question is how the Guejito area (Parcels 42 and 43) will be irrigated in the future.

- PQ: Wells 3 and 5 have been destroyed; they have been replaced with wells RK 10, 12, and 13, which are used to irrigate Parcel 42.
- PQ: Parcel 43 is irrigated by wells outside of the basin.
- NB: We requested information on Parcel 43 pumping wells from the City and County, but were ultimately directed to go with what we have (which is nothing for Parcel 43, in terms of pumping well construction or locations)
- JB: County understanding is that Parcel 43 is irrigated by wells outside of the basin (wells pumping from fractured rock).

Nate further described how the modeling team assigned pumping locations over time during the calibration period.

Nate indicated having 2005 and 2018 land use layers available, but it is preferrable to have independent estimates of consumptive use at the parcel level for the modeling with the CalETa data.

AC Comments on Groundwater Model

- MWit: On Lake Hodges water levels slide, the City has decided that Lake Hodges cannot be filled as high in the future as it has been in the past, so those averages of historical ranges for the projection simulations need to account for this.
- MWit: The consumptive use charts being used take place in a vacuum. The team needs to consider rainfall; otherwise, the model will be not true to the actual amount of groundwater pumped. In wet years, permanent crops use much less water.
- MWit: There are a lot of assumptions built into the plan and groundwater modeling. How is actual data on pumping and groundwater levels being used; how will the plan be updated with that data?
    - JA: Every 5 years, the GSP will need a review and update. One of the implementation items you will see later on in PMAs portion of this agenda is a model update every 5 years. In this basin, the land use does not change much; but we can change assumptions in the model projections based on new data as they become available.
    - NB: Agree with John.

Projects and Management Actions

Technical Input – Approach

John provided an overview of the proposed approach to projects and management actions (PMAs). GSP implementation actions will include continued monitoring, public meetings, annual reports, 5-year Plan Update, numerical model update, and pursuing funding opportunities. Adaptive management is "a structured, iterative process of decision making…via monitoring…". SPV Basin does not appear to be experiencing undesirable results related to levels; may need management for groundwater quality (e.g., nitrates) – projects and management actions will be discussed more next meeting. This meeting is intended as a high-level introduction to the adaptive management process as shown on slide 41. After receipt of monitoring results that are near or exceed SMC, Core Team will investigate the issue, communicate with public, and determine a proposed project/management action. Example projects that may be considered: stormwater recharge, recycled water from Escondido or San Diego, or raw

water from Ramona. Example management actions that may be considered: demand softening, irrigation efficiency, well inventory, basin-wide metering, or pumping restrictions.

- WH: An earlier slide stated the quality, not quantity, is the main basin issue. The proposed management actions seemed to address both concerns. Is this a catch-all list that will be refined?
    - JA: First three projects listed import cleaner water into the basin, so those address both issues. It is difficult to remediate poor groundwater quality. We could add "operate pump and treat facility" to just address the quality issue.
    - JA: We worked with several local engineers to identify infrastructure projects that can address both issues, which is how we could be specific on adjacent agency pipelines. We want to be able to address both quality and quantity. That will provide a list of projects that are available to implement in different future scenarios to avoid undesirable results.
- WH: Could we potentially add "outreach and education" regarding ongoing land use practices, to explain efficiencies or changes that could be incorporated to reduce nitrate loading?
    - JA: Great addition, will add to the list.
- PQ: Ramona has spray fields near the airport where they are getting rid of recycled water. May be a longer pipeline that in Escondido, but "recycled water from Ramona" would be downhill and could be added to the plan.
    - JA: Great addition, will add to the list.
- ET: Agree that additional PMAs that specifically target groundwater quality should be added in.

John polled TPR members and they all agree with using an adaptive management approach.

John then explained that two management areas are being proposed in alignment with the City and County jurisdictions.

- WH: I'm confused about term "management areas" because it has a distinct definition in SGMA that is not consistent with the way it is conveyed on Slide 44. Seems like these proposed management areas are defined strictly based on jurisdiction. Are you planning on having an actual management area discussion per SGMA, or is this more in terms of governance?
    - JA: This is a reflection of the MOU and we want to clearly diagram which portions of the basin will be managed by which entity. Regulations say we may use different monitoring networks and thresholds in different management areas, but that it is not required.

Heidi let the TPR members know that the Core Team's intent is to upload the meeting presentations to the project website at least 72 hours in advance of meetings (on the Monday prior to Thursday meetings), but that this month QA took a bit longer than anticipated and the team was not able to upload the files as planned. Next time, the meeting presentation will be available for TPR review in advance.

AC Comments on Projects and Management Actions

No comments.

Field Program Update

John explained that aquifer testing is still on hold.

AC Comments on Field Program Update

- RS: Why is the field program on hold?

- SC: It is on hold because of the Coronavirus.
- RS: How does the virus affect testing?
- KD: The City is putting lower-priority SGMA items on hold, because of staffing and resource limitations associated with the virus.

Final Thoughts from TPR or AC

- WH: Thanks to John and Nate. As we are progressing into more substantive topics. There are more comments from Peter and I. Can there be more opportunity to discuss or revisit some of the prior topics that may be more contentious or require follow-up?
- DT: Very interesting discussion today, compliments to the consultant team.

Public Comments

Public comments provided in the "Chat" during the meeting are listed below. Public comments provided verbally by meeting participants follow:

- Andre Monette, BBK, Counsel for RG – Peter already made our concerns clear about the model, specifically about where rainfall data came from that will be used to project future groundwater levels. The model appears to be flawed and we will submit more comments in writing. This raises concerns about how model will be used – it shouldn't be used to set minimum thresholds.
- Andre Monette, BBK, Counsel for RG – Any comments connected to this process should be public record.
- Andre Monette, BBK, Counsel for RG – We fully support the proposed management areas, as they support the MOU. There is a technical basis for separate management areas for side canyons, such as Rockwood Canyon and Bandy Canyon. This group should be prepared for separate management actions in those side canyons.
- Lani Lutar, Responsible Solutions (RG) - I would like to ask that an item addressed earlier be revisited at the appropriate time. Ms. Carlson noted that it has not been decided whether TPR written comments/input would be shared with all committee members. For complete transparency, it would seem most appropriate for everyone to have access to the same information. Submitted comments are also Public Record by law. But more importantly, this is a matter of good governance to encourage transparency. *Note, this comment was submitted as a typed comment at 9:28am – please see the meeting Chat Log.*
    - Heidi Gantwerk (Facilitator) - The team is committed to transparency and are discussing the best way share TPR comments.

Next Steps

The next TPR Group meeting is scheduled for Thursday, January 14, 2021 from 9 to 11:30 am.

Comments should be sent directly to Sandra Carlson at carlson@sandiego.gov.

The TPR meeting ended at 10:46am.

GoToMeeting Chat Log from TPR Meeting

TPR - Peter Quinlan (to Everyone): 9:26 AM: I can't hear Will

W&C-Heidi Gantwerk (to Everyone): 9:28 AM: Can you not hear him at all Peter?

Lani Lutar (to Everyone): 9:28 AM: I would like to ask that an item addressed earlier be revisited at the appropriate time. Ms. Carlson noted that it has not been decided whether TPR written comments/input would be shared with all committee members. For complete transparency, it would seem most appropriate for everyone to have access to the same information. Submitted comments are also Public Record by law. But more importantly, this is a matter of good governance to encourage transparency.

Rikki (to Everyone): 10:33 AM: why is it on hold?

Rikki (to Everyone): 10:33 AM: Really? how does virus affect the testing?

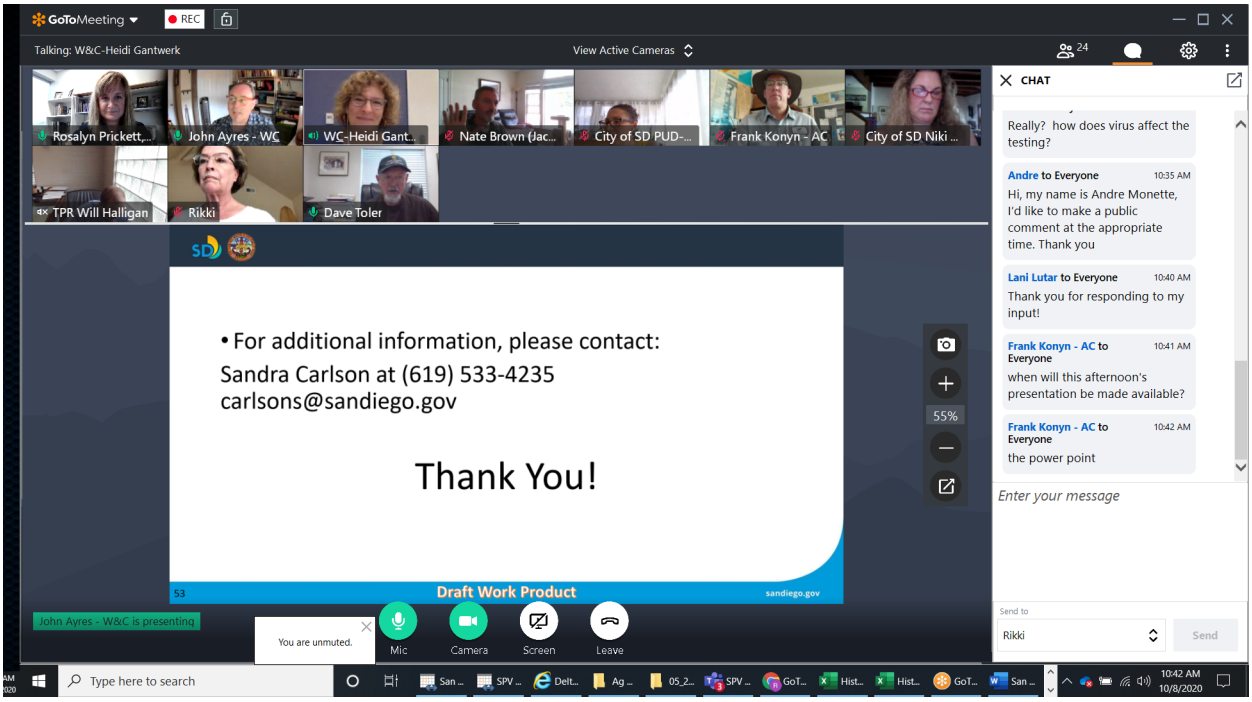
Andre (to Everyone): 10:35 AM: Hi, my name is Andre Monette, I'd like to make a public comment at the appropriate time. Thank you

Lani Lutar (to Everyone): 10:40 AM: Thank you for responding to my input!

Frank Konyn - AC (to Everyone): 10:41 AM: when will this afternoon's presentation be made available?

Frank Konyn - AC (to Everyone): 10:42 AM: the power point

Images from TPR Meeting



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San Pasqual Valley Groundwater Sustainability Plan
Technical Peer Review Group
Special Meeting on Groundwater Modeling
Teleconference Meeting Agenda

Date: Thursday December 17 from 9:00 to 11:30 am

Location: Teleconference Dial-In: +1 (872) 240-3412 Access Code: **727-750-917#**
GoToMeeting Link: https://global.gotomeeting.com/join/727750917

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	9:00 am	Roll Call and Introductions	Facilitator Consultant Team
2	9:10 am	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1)	Facilitator
3	9:20 am	TPR Comments • Comments and Responses (Handout 2) • Advisory Committee Comments	Nate Brown, Consultant Team
4	9:40 am	Groundwater Model Update • Intended Uses of Model • Model Construction Overview • Historical Model Approach and Selected Results • Projection Model Approach and Selected Results • Advisory Committee Comments	Nate Brown, Consultant Team
5	11:15 am	Public Comments	Facilitator, Consultant Team
6	11:25 am	Next Steps and Closing Remarks • Next Meeting Date (Handout 3)	Facilitator/All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Technical Peer Review (TPR) Meeting
Meeting Summary

The following is a summary of the TPR discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday December 17, 2020 from 9:00 to 11:30 pm

Location: GoToMeeting

Purpose: Technical Peer Review Meeting

Attendees:	Technical Peer Review (TPR) • Will Halligan (WH), Luhdorff & Scalmanini • Peter Quinlan (PQ), Dudek	City of San Diego (City) • Sandra Carlson (SC) • Karina Danek (KD) • Niki McGinnis • Mike Bolouri
	Advisory Committee (AC) • Frank Konyn (FK) • Matt Witman (MWit) • Rikki Schroeder (RS) • Eric Larson (EL)	County of San Diego (County) • Jim Bennett (JB) • Leanne Crow
	Public • Anita Regmi, Dept of Water Resources • Lani Lutar, Responsible Solutions, on behalf of Ranch Guejito • Hank Rupp, Rancho Guejito (RG) • Andre Monette, Best Best & Krieger, on behalf of Ranch Guejito • Mark Stadler, San Diego County Water Authority • Brad Blaes, The Pinery	Consultant Team • John Ayres (JA), Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Nicole Poletto, Woodard & Curran • Heidi Gantwerk, HG Consulting • Nate Brown (NB), Jacobs • Craig Cooledge, Jacobs • Armin Munevar, Jacobs • Jason Smesrud, Jacobs • Paula Silva, Jacobs

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted participants as they signed onto GoToMeeting and reviewed basic instructions for GoToMeeting user tools. Rosalyn reviewed when and how members of the public can provide input.

Review

Heidi Gantwerk, Consultant Team, reviewed the meeting agenda and meeting objectives. She directed participants to Handout 1 with the last meeting summary. There were no TPR comments on Handout 1.

Nate Brown, Consultant Team, reviewed how the Consultant Team has addressed the modeling comments submitted by TPR members. Those responses were sent out, then additional responses were circulated on Monday December 14, 2020.

Groundwater Model Update - Historical

Nate provided an overview of the areal characteristics of the San Pasqual Valley (SPV) GSP Model domain, which is the same as that used for the SPV Salt and Nutrient Management Plan (SNMP). He then described the vertical characteristics of the model domain and how they were updated from the SNMP based on geologic cross sections developed by Snyder Geologic.

- WH: Underlying the alluvium, there is bedrock (shown as lavender on the cross section). How was the dashed line that separates the residuum and bedrock developed? Seems like there isn't as much control from the well logs for development of that dashed line.
    - NB: In the well logs, there appeared to be fractures above the more competent zone. This was based on the lithologic descriptions.
    - PQ: People don't tend to go very far into the weathered bedrock. Weathering isn't uniform at all, so it's tough to know where that is. Sometimes we drill below the weathered bedrock to get to the granite to set the steel.
    - WH: Drilling through materials such as that (like large boulders) can get expensive and if there isn't much return, then you don't want to go deeper than you need to.

Nate explained the thickness of the 4 layers as established in the model. He then reviewed the selected model codes – One-Water Hydrologic Flow Model (One-Water) within the model domain and Basin Characterization Model (BCM) for watershed inputs. Boundary conditions for the historical simulations (WY2005 through WY2019) were described in detail.

- PQ: No flow boundaries – in the bottom 2 layers of granite. Where we have gages, the model doesn't extend into the watershed; whereas, there is recharge from rainfall in the northern portion of the watershed. We have surface water inflows from the stream gages, but no groundwater. So when modeled in this manner, it shows bedrock wells getting water from Layers 1 and 2. We know we have water coming into the basin from the catchment above in the granite. By having no flows, the model is missing recharge in the lower layers. There isn't good, measured data, but this will cause the results to be that pumping in Layers 3 and 4 have to get water from Layers 1 and 2.
- WH: In prior slides, when you described thicknesses of Layers 3 and 4, seemed like Layer 3 was relatively thin and Layer 4 was over 1,000 ft thick. Are there wells that are actually penetrating Layer 4 or do the granite wells predominantly stop in the Layer 3 interval? Maybe the focus of recharge question should be focused on Layer 3.
    - PQ: We have drilled a number of wells that are over 1,000 ft deep. Not necessarily in Rockwood Canyon, but up on the ranch itself.
- WH: Are they sealed through the residuum and alluvium?
    - PQ: Yes. Its good practice, and the driller was worried about caving. Set steel caging all the way through alluvium and residuum.
    - WH: One of the key pieces of information is the annular seal, when we discuss these really deep wells in the granite rock. If they're sealed through the alluvium and residuum, that helps a lot to not having contributing water percolating to the underlying zones.
- NB: These are complicated questions. We're making good use of stream gage data where and when it's available. We do not have good data on the importance of subsurface inflow from the contributing catchments.
- PQ: Agree. Issue is that when we incorporate into the model domain the pumping from Layers 3 and 4, that pumping can't be served by the missing recharge in the granite, so it takes from

the water available in Layers 1 and 2. It's the incorporation of that pumping in Layers 3 and 4 that is the issue – that's tilting the table. Hard to put a general head boundary, I know.

  - NB: How would you handle this issue if this were your tool? What kind of boundary condition would you use?
  - PQ: Have already commented on the BCM recharge values. Suggest adding in the BCM recharge into Layers 3 and 4.
  - WH: Other regions in California have encountered similar issues with mountain-front recharge. In Antelope Valley adjudication, there was a phase of the trial that tried to estimate mountain-front recharge from hard rock. Look at other basins with similar issues?

- NB: What complicates things is the degree, nature, and interconnectedness of fracturing, which is unknowable. We don't know with certainty how pumping in each layer affects the others. It is possible that the bedrock wells do induce some vertical groundwater flow from the SPV Basin.
  - PQ: You're making a decision that its only coming from the alluvium. Including a specific flux, guided by the BCM, along the boundaries with the larger upper watershed would be reasonable. Maybe you do 2 model runs – one with and one without. You're not deciding what the answer is. It's possible that there may be one suggestion.
  - WH: Is this the sensitivity analysis that Nate was planning on doing?
  - NB: Yes. It's all about the water budgets here -that's why we built this tool. The rock is tight except for the fracture zones and we don't know the regional patterns of fracturing. We will look at the effect of mountain-front recharge on ag pumping in the alluvium and residuum.

Nate explained that at downgradient end of basin (at Hodges Reservoir), there is an outflow boundary assigned to the Hodges Reservoir stages.

- PQ: Agree this is reasonable approach.

Nate explained the basins of parameter assumptions for the historical simulations, broken out into surface and subsurface.

- WH: On soils, where did you get information on capillary fringe?
- NB: We used One Water manual assumptions.

Nate reviewed the calibration period selected for the model. The calibration targets are quantitative (measured head) and qualitative (vertical head difference targets, general flow patterns).

- PQ: What wells is calibration being done on?
- NB: Calibration is being done on 15 single wells and 3 multi-completion wells.

Nate shows some example head hydrographs and vertical head difference (VHD) for East SPV.

- PQ: Middle hydrograph on bottom – seems to be more fluctuation in simulated heads than in the observed data. Why is that happening?
- NB: I would have to look at the model in that specific area to answer that.
- WH: Nice to look at those periods of time when you don't have as much measured data, but you have a sense of climatic variations, to assess if you think the model is capturing those climatic trends.
- NB: I focused more on capturing the general trends for the purposes of the GSP.

Moving down the basin, Nate presented example head hydrographs and VHDs for Rockwood Canyon and SDSY (USGS multi-well completion near Santa Ysabel). Model tends to overestimate the SDSY levels in later years.

- WH: On these, I'm wondering if we better understood water demand and pumping in those later years, we'd have a better outcome.
- NB: We have the same thoughts. There appears to be more pumping in late 2016 and after that is missing.
- PQ: In the calibration, are you adjusting hydraulic conductivity and storage?
- NB: Bedrock hydraulic connectivity around the basin has a substantial impact on the modeled hydrographs.
- PQ: That is probably the bedrock recharge, rather than no flow boundary.
- NB: Normally, we'd see upward gradients in portions of valleys. But at the USGS multi-completion sites, we typically see downward hydraulics gradients. That is more likely than not from bedrock pumping.

  PQ: That is also discharge to Hodges Reservoir.

Model has pretty good fits in the West SPV and Cloverdale Canyon. They both have small residuals. In the SDCD (USGS multi-completion well in Cloverdale area) area, the model does not fit downward hydraulic gradients as well as the other locations. If we had a better understanding of the well construction in some of the bedrock wells, that would create the opportunity to improve the calibration in the Cloverdale area from a VHD perspective.

The final USGS location at SDLH (near Lake Hodges), we're not well aligned in the deeper layers. In the VHD plots at SDLH, there are huge downward gradients (up to 14 ft).

- PQ: Blue line here is the simulated head vs observed?
- NB: Yes, in the model, the difference between the alluvium and residuum is small, but the observed data shows large variability. You would think it should look more similar to alluvium, but it doesn't. Model jives with lithologic log. If that log did not exist, I would tend to tighten up the residuum to look more like the bedrock.

Nate provided a scatterplot showing all results for head target locations and times. A majority of points fall within one standard deviation. Model trends match the observed data, but appear to project low in the eastern end of the Basin.

- WH: There is special indication of low on one end and high on the other end.
- NB: Once we let more water into the front end of the Basin, we then push the points up in the middle portion of the Basin as well, which increases residuals at those locations.
- WH: Appears that the hydraulic gradient is flatter than observed. Usually when you have lower-permeability materials, that results in steeper gradient as compared to higher-permeability materials.
- WH: On this scatterplot, this is grouping all layer and aquifer zone information onto one graph. Are you separating the data and looking at it by layer?
    - NB: Good idea, can symbolize by color for different layers. Good comment.

Nate described the groundwater level contour map for May 2016. Curious what you think of this depiction of a water table?

- PQ: These are layer 1 heads? Appears to be 395 ft in upper Rockwood, but that is higher than what we observed in the Rockwood observation wells.

- NB: We will check that out, Slide 35.

Nate showed example streamflow plots for three different water year types. This is a flashy, dynamic basin; dry much of the time with flashy events.

Nate reviewed the consumptive use approach for the historical simulations, then provided example plots of agricultural supply and demand calibration.

- WH: On the first source of water, that's where the capillary fringe comes into play?
    - NB: Yes.
- WH: Earlier, you mentioned how your adjusting hydraulic connectivity for calibration. Are you tweaking rooting depth and capillary fringe too?
    - NB: Yes, working with internal soils expert to adjust these. But appears the model is more sensitive to bedrock K.

Nate provided status of streamflow routing package calibration parameters.

- WH: Vegetation in stream channel – are there any locations in basin that there is periodic channel maintenance that would clear out vegetation?
    - NB: Not that I am aware of. We have not made transient roughness coefficients. They're left static.
- PQ: Were streambed hydraulic connectivity's adjusted in calibration?
    - NB: Yes, we did make some adjustment to better match where streamflow was available.
    - PQ: What did you start with? 1 ft/day?
    - NB: started with 10 ft/day and adjusted from there.
    - PQ: Some of these numbers seem off – Santa Ysabel Creek is steep and silty, which would indicate lower hydraulic conductivity.
    - NB: Tried to address losing and gaining stream flows. The distribution of hydraulic conductivity of streambed material is complicated by several factors in reality. It's just a lumped parameter in the model.

Nate described status of crop calibration parameters and ranges of hydraulic conductivity. Layers 3 and 4 are modeled as confined.

AC Comments on the Historical Model

Heidi invited comments from AC members on the historical model calibration.

- FK: Nate was asking for feedback on Slide 36 – the Santa Maria Creek for August (critically dry) image appears correct. Santa Maria Creek is usually the last creek to dry up.
- FK: Around 9:27/9:28am – Peter reiterated twice that pumping in Layers 3 and 4 need to get their water from Layers 1 and 2. <<*Clarification – This comment was attributed to PQ when he had stepped away from the meeting.*>>
- MW: On hydrographs targets (Slide 24), you're using Well SP072 and SP086 – the City has gotten bad readings on those wells for years.
- MW: Agree with Frank's comments on the streamflow slides (Slide 36)
- MW: There has been zero channel maintenance over the last 15 years.

John explained how the numerical modeling fits into the GSP. We will not manage to the water budget; the water budget information acts as a guide. The GSAs will manage to the observed/monitoring data for levels and quality. The SMCs will set thresholds for those monitoring wells. The groundwater model

will help us assess if we'll need management, but the decision to initiate projects or management actions will be made based on monitoring data.

Nate added that SPV GSP Model and models like it are central to the GSP process; but these are not modeling projects. The models only need to be good enough to serve as a guide to alert the GSA to future conditions that might require adaptive management. There are always improvements that could be made to these tools – some could be done now, and some could be done later. This is the first GSP for this Basin. Additional data collection will occur during GSP implementation. Ultimately, it's the monitoring data compared with SMCs along with adaptive management actions that will demonstrate to DWR whether the Basin is being managed sustainably.

Groundwater Model Update - Projection

Nate explained that DWR requires that the groundwater modeling include a projection period of at least 50 years from 2022 through 2071. Historical calibration is based on last 15-years (2005-2019). We'll use monthly stress periods throughout. The parameter assumptions for projection simulations include input from the TPR members. He used projections of reference ET based on global climate model via BCM, along with HadGEM2-ES RCP 8.5 precipitation projections. Boundary conditions will be largely left unchanged, with the exception of some pumping wells that will no longer be used, according to stakeholder feedback.

Hodges Reservoir stage projections for 2020-2071 are based on averages by water year type. Division of Safety of Dams has set a maximum pool elevation of just under 300 ft, which means there will be increased releases until the dam is improved. General head boundary will be capped at that level. There is no known schedule, so left this assumption through projection period.

Nate then explained the approach to water budgets. He reminded TPR members of the model domain and explained that we're using stream gage data at the SPV basin boundary. Laterally, ag pumping will only be reported for Layers 1 and 2 in the basin. Any pumping from Layers 3 and 4 do not get reported in the water balance, but the modeled influence of that pumping on the Basin water budget will be reported.

Run times are really long, so we don't have water budget projections for this call. Results will be presented at the January TPR meeting.

- WH: On groundwater pumping, are you going to report the groundwater budget for Layers 1 and 2 combined or separated? Reason I'm asking is that when you get into groundwater pumping, you have influence of inter-borehole flow, and with downward gradients, you may show initially a lot for groundwater pumping in model layers that have pull from other layers.
    - NB: Yes, with the One water code, we can slice and dice the outputs. If there is a multi-layer wells (from Layers 1 and 2 and 3, the only pumping that will be reported is for the top 2 layers. We're not going to show separate water budgets for Layers 1 and 2. Nate showed image from model of spatial model domain.
    - WH: Pumping from layers 1 and 2, plus subsurface outflow from those 2 layers into Layer 3 and 4 that reflect influence of pumping. Wondering if there is a way to differentiate what portion of subsurface flow is from inter-borehole flow and compared to other subsurface flow components.
    - NB: GSP regulations don't require that much granularity.
    - WH: Want to make sure there isn't double counting. If you have outflow from Layers 1 and 2 from pumping, initial budget term includes water leaving those 2 layers whether it leaves from surface discharge vs inter-borehole flow.

    - NB: With deep wells, there will be some flows that come out of legal basin and down into the lower levels, that is captured. The well itself will be a conduit for downward flow – that occurs even when wells aren't pumping.
    - WH: This is complicated, and we've had to develop our own python scripts. You might get a sense that Layer 1 and 2 pumping is much greater than what it actually is. If you want a sense of what is being pumped from Layers 3 and 4, may be undercounting.
- PQ: For that to happen, don't you need to show that well has perforations in each of those layers?
    - WH: No, if you have a well that penetrates, you can still get the model to simulate borehole flow from non-perforated layers.
    - PQ: In 100 square foot grid, talking about less than 1 square foot. Would have to assign hydraulic connectivity to that annulus.

AC Comments on the Projection Model

Heidi invited AC members to comment on the projection model. No comments were offered.

Final Thoughts from TPR

Heidi invited TPR members to provide any final thoughts. No comments were offered.

Public Comments

Public comments provided in the "Chat" during the meeting are listed below. Public comments provided verbally by meeting participants follow:

- Andre Monette, BBK, Counsel for RG – Thanks to the team for this presentation. On the model construction and no flow boundaries, want to reiterate that model has bias that only shows recharge from coming from Layers 1 and 2. This is a flaw in the model. Need to acknowledge that this model can't be used to demonstrate outflow to Layers 3 and 4, because it's constructed in a way that will always show outflow from Layers 1 and 2.
- Andre Monette, BBK, Counsel for RG – Looks like there is data in head levels that show outflow. But conclusions are being made that aren't supported by the evidence (e.g., caused by pumping). Could be other regional issues at play here – work done by USGS looking at regional flow from fractured bedrock from mountains to ocean. Need to evaluate this to find out causes before jumping to conclusions.
- Andre Monette, BBK, Counsel for RG – Model is about groundwater flow and water budgets. But no discussion about trying to model water quality. Need to make sure that we're keeping an eye on that -nitrate and salinity. This is something that the GSP should be looking at.

Next Steps

The next TPR Group meeting is scheduled for Thursday, January 14, 2021 from 9 to 11:30 am.

Comments should be sent directly to Sandra Carlson at carlson@sandiego.gov.

The TPR meeting ended at 11:28am.

GoToMeeting Chat Log from TPR Meeting

Rosalyn Prickett, Woodard & Curran (to Everyone): 8:40 AM: Good morning!

W&C-Heidi Gantwerk (to Everyone): 10:40 AM: AC members-if you have comments on what has been presented so far, we can take a few minutes when we get back before going into projections.

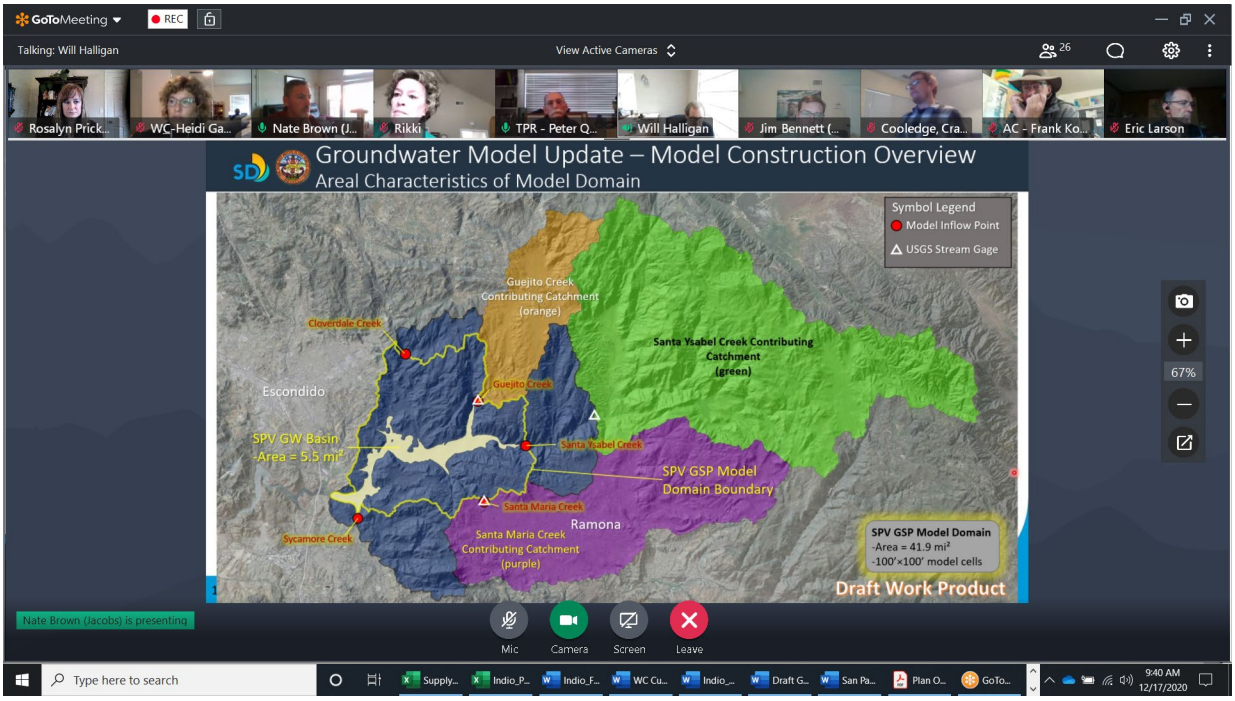
W&C-Heidi Gantwerk (to Everyone): 11:06 AM: A reminder for those watching who wish to comment at the end of the TPR and AC discussion; please put your name and organization into the chat

Andre - Best Best & Kreiger LLP (for Rancho Guejito) (to Everyone): 11:07 AM: Hi, I would like to make a comment during the public comment period. Thanks!

W&C-Heidi Gantwerk (to Everyone): 11:08 AM: Thanks Andre.

Cooledge, Craig (to Everyone): 11:26 AM: Thank you!

Images from TPR Meeting



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San Pasqual Valley Groundwater Sustainability Plan
Technical Peer Review Group
Teleconference Meeting Agenda

Date: Thursday January 14, 2021 from 9:00 to 11:30 am

Location: Teleconference Dial-In: +1 (669) 224-3412, Access Code: **521-675-389#**
GoToMeeting Link: https://global.gotomeeting.com/join/521675389

Handouts: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Item	Time	Description	Presenter
1	9:00 am	Roll Call and Introductions	Heidi Gantwerk, Consultant Team
2	9:10 am	Review • Agenda • Meeting Objectives • Previous Meeting's Summary (Handout 1) • Review of Public Comment Format	Heidi Gantwerk, Consultant Team
3	9:20 am	TPR Comments • Comments and Responses (Handout 2) • Advisory Committee Comments	Nate Brown, Consultant Team

4	9:30 am	Preliminary Analysis Results
		• Review of Monitoring Network
		• Sustainable Management Criteria (SMCs) (Handout 3)
		  ○ Minimum Thresholds
		  ○ Adaptive Management Thresholds
		  ○ Groundwater Levels
		  ○ Groundwater Quality
		• Projects and Management Actions (PMAs)
		  ○ Refined PMAs List
		  ○ Adaptive Management Strategy
		• Advisory Committee Comments
			John Ayres, Consultant Team

5	10:15 am	Refined Analysis
		• Groundwater Model
		  ○ Sensitivity Analysis (Handout 4)
		  ○ Hydrographs
		  ○ Water Budgets
		• Advisory Committee Comments
			Nate Brown, Consultant Team

6	11:10 am	Field Program Update • Follow-up on City Well 129 (Handout 5) • Advisory Committee Comments	John Ayres, Consultant Team

Item	Time	Description	Presenter
7	11:15 am	Public Comments	Heidi Gantwerk, Consultant Team
8	11:25 am	Next Steps and Closing Remarks	Heidi Gantwerk /All

San Pasqual Valley (SPV) Groundwater Sustainability Plan (GSP)
Technical Peer Review (TPR) Meeting
Meeting Summary

The following is a summary of the TPR discussion, comments, and questions. This summary reflects the general content and spirit of each discussion point, but is not a verbatim recording.

Date: Thursday January 14, 2021 from 9:00 to 11:30 pm

Location: GoToMeeting

Purpose: Technical Peer Review Meeting

Attendees:	Technical Peer Review (TPR) • Will Halligan (WH), Luhdorff & Scalmanini • Peter Quinlan (PQ), Dudek • Matt Wiedlin (MWed), Wiedlin & Associates	City of San Diego (City) • Sandra Carlson (SC) • Karina Danek (KD) • Mike Bolouri
	Advisory Committee (AC) • Frank Konyn (FK) • Matt Witman (MWit) • Rikki Schroeder (RS)	County of San Diego (County) • Jim Bennett (JB) • Leanne Crow • Nancy Karas
	Public • Anita Regmi, Dept of Water Resources • Rania Amen, Santa Fe Irrigation District • Lani Lutar, Responsible Solutions, on behalf of Ranch Guejito • Hank Rupp, Rancho Guejito (RG) • Andre Monette, Best Best & Krieger, on behalf of Ranch Guejito • Brad Blaes, The Pinery • Ally Berenter, City of San Diego Mayors Office • Elyse Levy, CA Dept of Fish & Wildlife	Consultant Team • John Ayres (JA), Woodard & Curran • Rosalyn Prickett, Woodard & Curran • Nicole Poletto, Woodard & Curran • Heidi Gantwerk, HG Consulting • Nate Brown (NB), Jacobs • Craig Cooledge, Jacobs • Paula Silva, Jacobs

Roll Call and Introductions

Rosalyn Prickett, Consultant Team, greeted participants as they signed onto GoToMeeting and reviewed basic instructions for GoToMeeting user tools. Rosalyn reviewed when and how members of the public can provide input.

Review

Heidi Gantwerk, Consultant Team, reviewed the meeting agenda and meeting objectives. She directed participants to Handout 1 with the last meeting summary. There were no TPR comments on Handout 1.

Nate Brown, Consultant Team, reviewed how the Consultant Team has addressed the additional modeling comments submitted by TPR members since the December 17, 2020 TPR meeting.

- MWed: Concerns about no flow boundary seem valid; look forward to hearing Nate's presentation.

Sustainable Management Criteria

John explained how the sustainable management criteria thresholds were established. This included a discussion of the groundwater level representative monitoring network, which is made up of 15 wells. The hydrographs of the representative monitoring network were used to create the thresholds: minimum threshold, adaptive management threshold, and measurable objective. The minimum threshold (MT) is regulatory and determines what is considered a significant and undesirable result (UR). This threshold is designed to be deeper than the historical low, above bedrock, and above 20th percentile of nearby wells. Western wells – 100% of range below minimum; Eastern wells – 50% of historical range. The Adaptive Management Threshold (AMT) is an intermediate threshold used to inform the GSAs when they need to start investigations to avoid future URs. The AMT is shallower than MTs. Western wells – 80% of range below minimum; Eastern wells – 30% of historical range. The Measurable Objective (MO) is above the MT and AMT and provides for 5-years of storage for drought. For wells near GDEs, set 10 ft below ground surface; if not, set at 5-year decline above MT.

At this point, TPR members were asked if they had any questions about what was being presented.

- PQ: I did my homework and figured out what the lines are on the hydrographs.
- WH: Still trying to understand the basis for the percentages for MTs and AMTs, especially in the western portion of the SPV Basin. Given lack of historical variability in the west, we might want to leave additional storage opportunity for groundwater resource development in order to provide flexibility for future water resource management.
    - Western percentile is more protective of GDEs. We picked a percentage that results in roughly 30 ft, which is the rooting depth of riparian and wetland plants.
- WH: Would be good to have a sense for how things look into the future – how do these percentiles play out into the future model scenarios? Is there zero tolerance for GDE impact by setting the threshold at 30 feet?
    - JA: GDEs come in a variety of rooting depths (a few feet to 30 feet for trees rooting depth). We went with 30 ft because that's what The Nature Conservancy lists as typical GDE rooting depth and is a protective guideline. Another driver was to avoid setting thresholds below bedrock (bedrock is located at 40 feet in SP106).
- WH: To trigger MT, what timeline or # number of wells are being considered? Is it a single event or multiple events over years? How is it triggered?
    - JA: We'll address this during the adaptive management triggers portion of the presentation. The trigger is 30% of monitoring wells for 24 consecutive months in exceedance.
- PQ: Thanks to Will for bringing this up. Historically, City has looked at SPV as place to store water; but west is salty so only desal projects have been considered. The GSP should have flexibility to accommodate a desalter project if one is determined feasible.
    - JA: Almost all of the physical projects did not pencil out economically under SGMA because the cost per AF to bring a relatively small amount of water into this Basin was too high. The City has not expressed interest in using the Basin as part of recharge for their municipal supplies. Potential projects will be discussed later in the presentation.

John explained that the groundwater storage criteria will use groundwater levels as a proxy for storage, which is consistent with other completed GSPs.

John explained the groundwater quality criteria should consider high concentrations of TDS and nitrate in creek inflows. John described the Nitrate and TDS chemographs for the Basin. For Nitrate, there were generally downward trends. For TDS, both upward and slight increasing trends. John also explained surface water quality trends for creek inflows. For Nitrate, there were generally downward trends;

except at Cloverdale Creek. For TDS, both downward and slight increasing trends. John also explained surface water quality trends for creek inflows. One well with increasing water quality is not "significant and unreasonable"; we need to focus on long-term, basin-wide trends. We cannot change water quality when surface water inflows are so high.

Nitrate MT has a Basin Plan Water Quality Objective of 45 mg/L (as NO3); AMT is at historic high or MO, whichever is higher; MO is the SNMP objective of 10 mg/L. TDS MT is 10% range above historic high; AMT is historic high measurement; MO is 1,000 mg/L. Adaptive Management is triggered when 30% of wells concentration rises above AMT for 12 months. UR is detected when 30% of wells rises above MT for 24 months. John showed some examples of sample chemographs with thresholds. He explained why the MTs and MOs are reversed, with MTs higher.

- PQ: Was SNMP Nitrate thresholds set as Nitrate or Nitrogen? These are different. Thought I remember historical Nitrate concentrations well above 45 mg/L.
- MWed: I'm well aware that there are historical concentrations of nitrate well over 45. The MO of Nitrate NO3 may actually be meant to be N.
    - JA: We will double check.
- WH: Glad you looked at GSPs in other areas with water quality concerns. The Westlands Water District GSP had marine sediment geologic materials in their Basin that produce an unnaturally high TDS concentration. The GSA struggled with balancing thresholds that battled natural conditions. The Farmers Water District GSP was concerned about a saline plume impacting their wells that is being governed by RWQCB Cleanup and Abatement Order. It is a good approach to look at other GSPs that are wrestling with naturally occurring constituents.
- MWed: Comment on levels thresholds – All of the data on those hydrographs are from after 2004, but we had a significant drought between 1997 and 2004. It would be interesting to confirm that water levels at end of that drought compare to the thresholds that were plotted. This would require a comparison with other wells. That was a very extreme drought. That may change the thresholds, as you consider that criteria.
    - JA: Thanks, we'll look into that data.

John continued to explain other sustainable management criteria as it relates to subsidence. DWR provides INSAR measurements that calculate changes in ground surface over time. John explained that SPV has only seen extremely little subsidence, even after significant drought. Subsidence is unlikely to cause an UR because there are few clays in the alluvium, plus very little infrastructure to be damaged by subsidence. The team suggest removing subsidence as a sustainability indicator. The fall back plan is to point to groundwater levels as a proxy.

- WH: It seems like you focused on infrastructure that may be affected if subsidence were to occur. Have you also looked at historical flooding or local flooding factors?
    - JA: The subsidence that has the potential to occur is less than 1 foot (historical is 0.25 inch). No, did not look at DEMs to understand potential impacts.
    - WH: Be cautious – by omitting the sustainable management criteria, you're grouping with seawater intrusion sustainability indicator and it is a different issue.
    - JA: The primary reason is that the geology of the Basin isn't susceptible to subsidence. The Basin has course alluvium material which doesn't provide a large possibility of subsidence.
    - WH: All good arguments, but I want to make sure that DWR agrees with that and that we have a strong enough argument for no thresholds or monitoring.
    - PQ: Be bold and remove the sustainability indicator. Lead with geology. Compare the declines in water levels and how that led to negligible changes in land surface using

INSAR data. From a geologic basis, I don't believe that there is a possibility for subsidence here. Lack of infrastructure would be the last argument.

- JA: We have a three-pronged argument; we believe this will fly with regulators.
- MWed: If we set levels at historical lows, and that did not result in subsidence, we should be good so long as we can stay within our established MTs.

John then explained the final indicator: interconnected surface water. The GSA Core Team recommends using levels as a proxy for interconnected surface waters. There are 6 wells in the surface water proxy monitoring network (each within 2,000 ft of a GDE). AMT trigger would be 30% of wells (2 of 6) for 12 months.

- MWed: In northwest corner of Basin, along the 78, a GDE is present.
    - JA: There may be GDEs that are outside of NCAGG dataset, but that was the basis for our GDEs assessment. If we trigger the surface water AMT, then we may implement a GDEs Study to better understand local GDEs and their needs.

Heidi re-confirmed that the TPR members are comfortable with the levels thresholds that were discussed previously, even though there were some concerns raised and John suggested that we could revisit if the TPR members thought they were too conservative. TPR members all noted that they agree with the SMCs as presented.

AC Comments on SMCs

Heidi invited AC members to comment on the SMCs.

- MWit: Well SP086 is a defective well; it is an old abandoned well that has caved in and there are problems with the casing. Any readings are dubious at best. Historically, the City uses old abandoned wells for monitoring. In the future, additional high-quality monitoring wells need to be constructed.
- MWit: AMT threshold in eastern end of valley needs to be higher. At a point in 2016, we reduced crop acreage because there wasn't enough water available. The levels are set too low and will affect farmers.
    - JA: Matt just asked for the AMT in the eastern Valley to be set higher (maybe 70%) – any suggestions from TPR members?
    - WH: No objection if you want to reduce percentage. It is important to obtain local stakeholder feedback on how they've been impacted by groundwater levels in the past. There is enough flexibility in percentages and multi-year criteria to where Matt's situation may not be a one size fits all.
    - PQ: I see flexibility in the AMT but not in the MT. In the areas that I've looked, the MTs look good. RG has had to adjust in the past when their wells went dry. They're in a good position now.
    - MWed: I feel same way that Will does. Some flexibility is a good idea, but also need to consider stakeholder input from western end of Basin.
- FK: No comments.
- RS: No comments.

Projects and Management Actions

John explained that because SPV is currently considered sustainable, no projects or management actions need to be implemented at this time for groundwater quality or groundwater levels. The implementation of the projects and management actions (PMAs) have been designed to be responsive

to changes in the future through the adaptive management process. PMAs have been presented in two groupings – Plan implementation, and Adaptive management actions. GSP Implementation Tasks will be implemented regardless of basin conditions. Adaptive management allow for more local control, with adequate warning time prior to a minimum threshold. Management is triggered by monitoring. AMTs provide warning time to GSAs so that management actions can be implemented before a UR occurs. This facilitates local control. Adaptive management is triggered at 30% of wells (5 of 15 for levels, 3 of 10 for quality) exceeds AMT for 12 months; UR is detected when 30% of wells (5 of 15 for levels, 3 of 10 for quality) exceed MTs for 24 months.

John presented an adaptive management cycle graphic to explain the steps in the process. If an exceedance occurs, the Core Team will investigate. If it is a localized issue, we go back to monitoring. If it is a long-term basin trend, the Core Team works with stakeholders to discuss and determine actions. Finally, the GSA needs to implement the selected management action. Public communication and coordination with stakeholders is an important part of this adaptive management cycle (in the investigation, action selection, and action implementation steps).

- WH: I agree with the approach, but I see hiccups in the timing of the process. If based on monitoring data, there should be an action in place that could be implemented once an undesirable result is seen. You've discussed identifying funding and CEQA, but once you identify the options, you have to actually implement them and that could be a multi-year implementation process. I am worried about the timeline and that it may not be proactive enough for URs.
    - JA: Intent is to give the GSAs a head start on addressing URs. GSAs are going to do what they need to do to avoid MTs. This is an early warning system. AMTs are 12 months, so there is a built in year for planning and environmental. Can't build a water treatment and recharge facility in one year, but the GSA would be able to point to progress made when talking with DWR. Intent isn't to have AMTs so high that any issue is completely resolved.

John explained that the list of PMAs to be included in the GSP. Plan Implementation tasks include continued monitoring, public meetings, annual reports, 5-year Plan Update, numerical model update, and pursuing funding opportunities in addition to groundwater monitoring improvements, public outreach and website maintenance, and education and outreach for TDS and Nitrate loading. There are eight proposed management actions and two projects that are proposed for inclusion in the GSP that may be implemented through adaptive management. Management actions include a well inventory, GDEs Study, basin-wide metering program, education and outreach, pumping restrictions, farming best practices, supporting WQIP activities, and coordination with other SPV entities. Projects include coordination on construction of an infiltration basin and coordination on implementation of invasive species removal.

Heidi reminded the group that all meeting materials are uploaded on the Monday prior to our Thursday meetings for review. The website is located in the Chat and can be found here: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html. There were no TPR member comments.

AC Comments on PMAs

- RS: Are the costs associated with each of the management actions and projects being included in the GSP?
    - JA: Yes, there will be high level cost estimates in the Plan.
- RS: Are you going to discuss funding options and sources for each action? Such as setting up a water district or charging water users?
    - JA: We will include general estimates, but no detail as that will be addressed in implementation.

- MWit: Same as with AMTs, timing is critical to farmers livelihoods who depend on the groundwater. When we talk about taking years to implement, that could make farmers go out of business. Need to consider those businesses when setting AMTs.
- FK: No comments, other than Matt just made a very passionate appeal that I agree with! When dealing with any type of bureaucracy, simply waiting a month or two will make us miss a season of getting crops in the ground, and then we miss an entire year of cropping.

Groundwater Model and Water Budgets

John reminded the TPR members that the model results do NOT determine sustainability; planned monitoring and compliance with the sustainability thresholds are what determines sustainability. The water budget from the model is a tool that helps us discuss potential future conditions. Nate reiterated this point that the model is a tool but doesn't determine sustainability.

Nate acknowledged that the TPR members raised a concern about the lack of subsurface inflow in the model. Handout 4 presented a sensitivity analysis which assessed 0, 25, 50, 75, and 100% of the BCM GW recharge in contributing catchments during the historical 15-year calibration period. Outcome of sensitivity analysis was that ag pumping rates were not sensitive to subsurface inflows. 25% BCM inflows could be tolerated and reasonably fit inflows to Hodges Reservoir from Basin outflows. Modeling team will move forward with 25% BCM recharge as subsurface inflow in Layers 3 and 4.

- PQ: As we move into next 5 years and the Core Team evaluates updating the model, I recommend adjusting the amount of BCM recharge to better calibrate with wells in the eastern Valley. This is a good approach for the limited well information; glad we incorporated some subsurface inflow.
- MWed: Helpful to hear from Nate. It does not surprise me that only fraction of recharge that makes it into the SPV alluvial basin. I am familiar with pumping activity in the fractured rock. Given the limited information that we have, it seems like a reasonable approach.

Nate then explained the changes made to the SPV model during QA/QC process. Mass balance errors between inflow and outflows were larger than we wanted. USGS suggested updating the streambed Kv value and well "skins". Doing so helped reduce mass balance errors and provide for more precise water budgets. Also noticed that a small number of parcels weren't linked to streamflow (SFR) nodes as intended; corrected that as well. Also added 25% BCM recharge as subsurface inflow as discussed previously.

Nate showed the calibration target locations and reminded the group of the climate projection period and global climate model on which projected precipitation and projected reference ET is based. Long drought projected in later years (2060-2070) of simulation. Average precipitation is 14 inches, which is similar to historical average; but the annual variability is different. Nate introduced the refined analysis hydrographs. John acknowledged that some of the wells "flirt" with the MTs and some wells dip below MTs for 24 months generally between 2060-2070. Nate continued to review hydrographs throughout the Basin for future modeling if climate reacts in a certain manner. Future GW levels in the east could be lower than thresholds and adaptive management actions may be necessary.

- WH: On those runs, do they incorporate future climate change?
    - NB: Yes, they do.
- MWed: I have some musings that may be interesting to include in the plan because they tie back to things people already know and understand. The scary, end of time simulation where we are in extreme drought – how does that hydrograph compare to the most recent drought we had in 1997-2004? How do the water levels predicted in that timeframe compare? What does it take in terms of changing pumping in that area, to bring us back to the MTs we've identified?

    - JB: On 1997/98-2004 drought, there were 3 exceptionally wet years in the 1990s (93, 95, and 97/98) where groundwater levels would be favorable (high) at that time. I don't know that we would have seen historically worse conditions in the 1997/98-2004 drought even though it was one of the worst droughts on record.
    - NB: I agree with Jim's comment. The potential 2060-2070 drought shows a number of critically dry years and looks unlike anything seen in the last couple decades in the SPV. Climate model projects nearly a decade of dry and critically dry years (Slide 70).
- MWed: What would it take in terms of reduction of pumping to bring us back to thresholds in plan?
    - PQ: This model was used for water budget purposes. I'm not sure I'm on board with it being a tool for looking out 70 years for adjustments in pumping. We should go back in future model update to add in subsurface inflow, recalibrate, and make other adjustments based on 5 more years of data; that would give me more confidence.
- WH: Should use model to do prediction simulations – agree that pumping restrictions should be included in list of PMAs.

Nate moved into explaining the water budget projected for the surface water system from the refined flow model with predicted inflows and outflows that tends to correlate with annual precipitation. The historical cumulative change in groundwater storage was about -240 AFY, 2.8% of the groundwater budget. The projected cumulative change in groundwater storage is about -270 AFY, 3.2% of the groundwater budget. The proportions are slightly different depending on averaging period, but consistently show a minor deficit (overdraft) in model.

- MWed: Looks like this could be managed.
- PQ: Showing historical groundwater budget is 8,400 AFY; but previous slide was about 6,000 AFY in historical period. The rest is outflow to Hodges Reservoir?
    - NB: Yes, and evapotranspiration and other factors.

AC Comments on Water Budget

Heidi invited AC members to comment on the water budgets. No comments were provided.

Field Program Update

Karina explained that Kleinfelder has responded about what happened in the monitoring well construction (see Handout 5). Two nested wells were installed, but the one on the east side was only installed with two completions. The contractor encountered a perched aquifer zone and decided to not screen in that layer. There was a borehole collapse on top of sand filter pack; this may have created a conduit for groundwater to move between perched zone and bedrock zone. The City will conduct aquifer testing after the GSP is completed, and will not do further work at this time. There is more information in the memo about this decision.

Final Thoughts from TPR

Heidi invited TPR members to provide any final thoughts. This is the last scheduled TPR meeting, so if there is anything TPR members would like to comment on, please offer it now.

- MWed: I will have comments on the Kleinfelder response. There are some things the City can do to assess whether an alluvial monitor can be installed there. If information supports it, a single completion well could be installed to fill out that data gap.
- PQ: I got confused when reading Handout 5. 129 and 128 might be reversed in text.

- WH: This has been a great process and want to congratulate the team. Will submit comments on Kleinfelder Report later.
- PQ: As someone who has prepared GSPs, this group has functioned better and been more collaborative than many others. Thank you all.
- JA: When we started this process and learned we'd have TPR that is also public, we thought this would be problematic. It wasn't. Pleased with the input we got from TPR members. Thanks to all members – your input has been great and valuable to Plan development. Look forward to working with you all again some time.

Public Comments

Public comments provided in the "Chat" during the meeting are listed below. Public comments provided verbally by meeting participants follow:

- Anita Regmi, DWR – In SMCs, how do MOs compare with historical lows? In the handout, it looks like the MOs are above the historical low and 2015 groundwater levels.
- Anita Regmi, DWR - During today's discussion I did not hear anything about how beneficial users are considered as part of the Sustainable Management Criteria. How is domestic well user interests considered in the establishment of SMCs (MTs and MOs)? How will those impact domestic well users? Are MOs above observed levels?
- Anita Regmi, DWR – Difference between modeled groundwater levels and measured groundwater levels (possibly on Slide 71)? Interested in knowing difference?

Next Steps

Comments should be sent directly to Karina Danek at kdanek@sandiego.gov. She can also be reached at (619) 533-7402. Rosalyn reminded members that written comments are due in two weeks (January 28 if possible), but comments are welcome at any time.

The TPR meeting ended at 11:39am.

GoToMeeting Chat Log from TPR Meeting

Will Halligan LSCE TPR Member (to Everyone): 9:04 AM: Will Halligan LSCE TPR member

Berenter, Ally (to Everyone): 9:10 AM: I'm with Mayor Gloria, the City of San Diego

W&C-Heidi Gantwerk (to Everyone): 9:12 AM: Thanks Ally, welcome!

Peter Quinlan TPR (to Everyone): 9:20 AM: CQ is Peter Quinlan. I am using my daughter's computer

W&C-Heidi Gantwerk (to Everyone): 9:21 AM: Thanks Peter.

Rosalyn Prickett, Woodard & Curran (to Everyone): 9:24 AM: Callers - I muted all phone callers. If you want to speak, please press *6 on your phone keypad.

Peter Quinlan TPR (to Everyone): 9:49 AM: Was the SNMP level set for NO3 as N?

AC Matt Witman (to Everyone): 10:08 AM: i have a comment

Andre Monette (to Everyone): 10:23 AM: Hi, were these power point presentations sent out in advance of the meeting? Are they available for public review? Thank you!

Leanne Crow (County) (to Everyone): 10:24 AM: Meeting materials can be found here: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

Rikki (to Everyone): 10:24 AM: We did not receive this power point and would very much like to have it.

Rosalyn Prickett, Woodard & Curran (to Everyone): 10:24 AM: Can "loaner" please identify yourself? Name and organization? Thank you!

Andre Monette (to Everyone): 10:25 AM: Andre Monette, Best Best & Krieger LLP - thanks!

Rikki (to Everyone): 10:26 AM: Got it. Thank you, Leanne.

Rosalyn Prickett, Woodard & Curran (to Everyone): 10:27 AM: Thanks Andre!

Karina Danek (City of SD, PUD) (to Everyone): 10:31 AM: Rikki, I'll send everything to you shortly. I sent the materials for the TPR to your old email address.

Rikki (to Everyone): 10:32 AM: Thanks

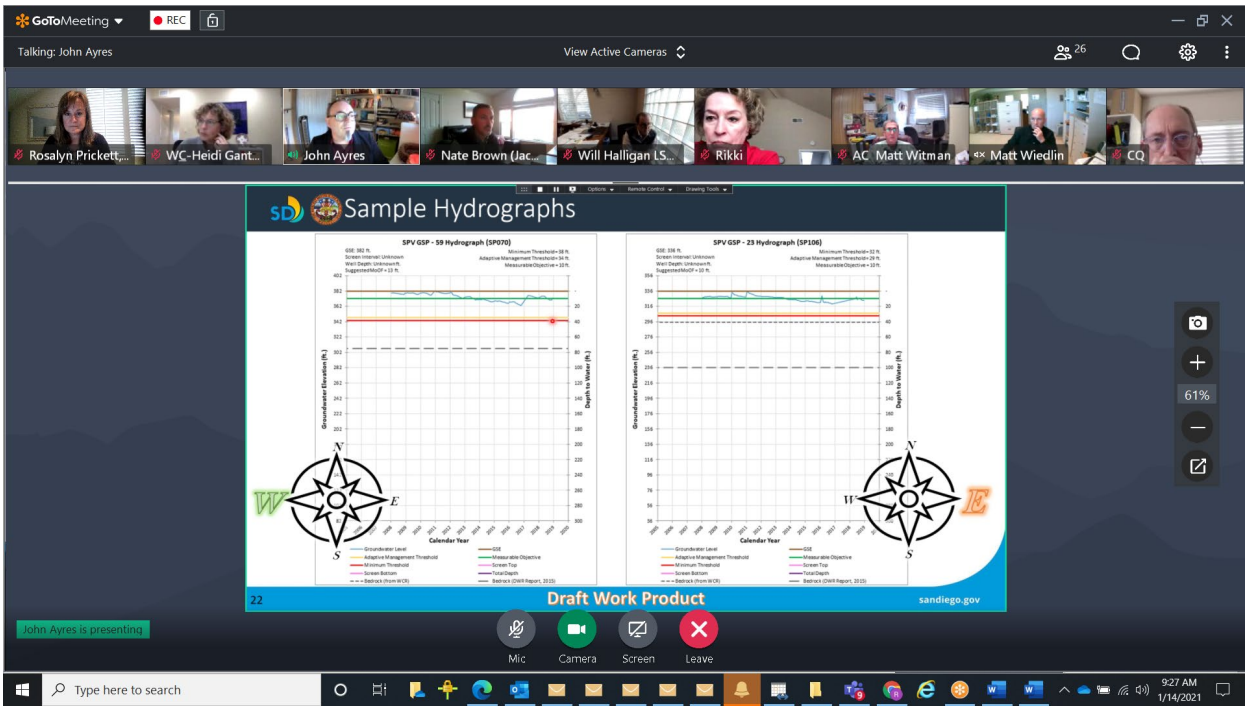
Rikki (to Everyone): 10:35 AM: I have question

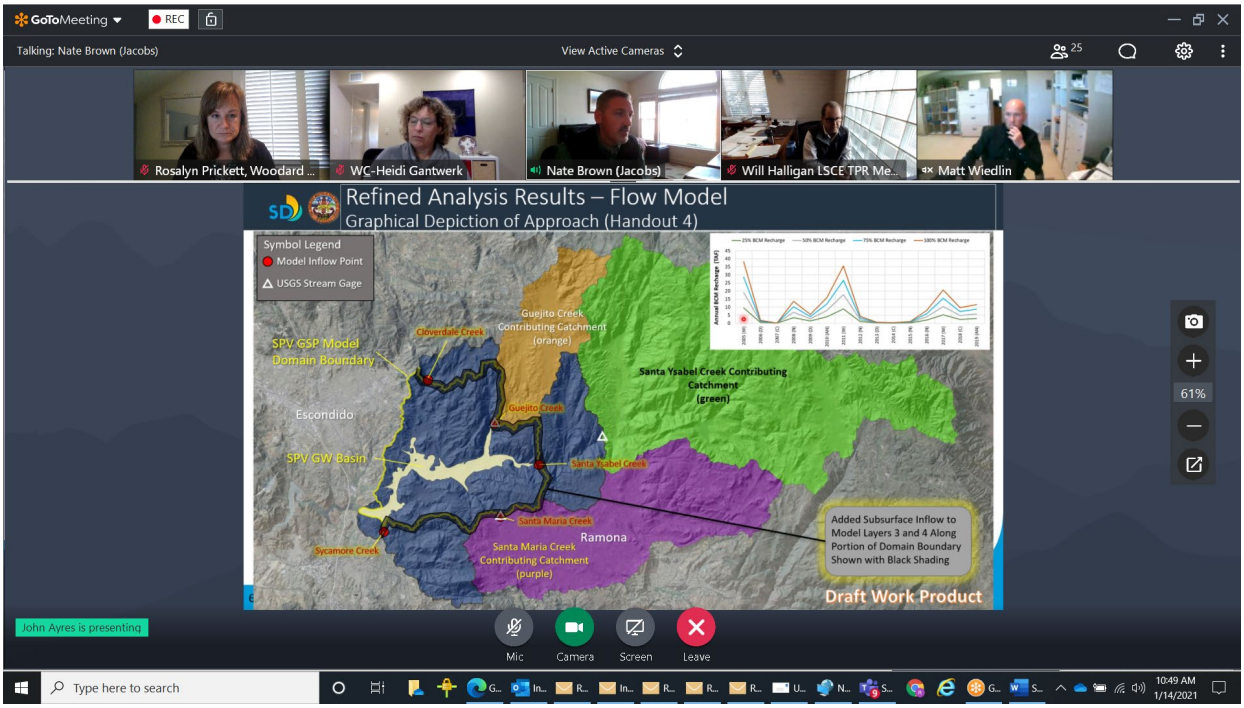
Regmi, Anita@DWR (to Everyone): 10:52 AM: I will appreciate if the handout number and the page number can be read out because I am experiencing GoToMeeting outages. I have been disconnected multiple times and not able to connect back.

W&C-Heidi Gantwerk (to Everyone): 11:05 AM: As a reminder, if you wish to speak during public comment, please place your name and organization in the chat.

Regmi, Anita@DWR (to Everyone): 11:25 AM: Anita Regmi (DWR)- I have some questions.

Images from TPR Meeting





Appendix F
Stakeholder Comment Matrix

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Advisory Committee Comments

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San Pasqual Valley Groundwater Sustainability Plan

Advisory Committee Meeting #1 June 6, 2019

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Lisa Peterson	Safari Park Zoo	6/10/2019	Advisory Committee By-Laws	Article 1, Section C	Include "Membership on the AC shall not waive or preclude comment or participation, formally or informally, on any related decisions or process."
Lisa Peterson	Safari Park Zoo	6/10/2019	Advisory Committee By-Laws	Article 3, Section 2	Add "member's own" before "stakeholder consitutents" in "assisting in communicating concepts requirements to the stakeholder consituents that they represent;"
Lisa Peterson	Safari Park Zoo	6/10/2019	Advisory Committee By-Laws	Article 5, Section D	Include "Members should receive adequate training on Brown Act requirements." at the end of the section.
Lisa Peterson	Safari Park Zoo	6/10/2019	Advisory Committee By-Laws	Article 6	Address process and expectations for how the AC members' own qualified specialists, if any, will be vetted and permitted to participate (i.e., do they automatically become technical peer reviewers?

Advisory Committee Meeting #2 October 10, 2019

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
None					

Advisory Committee Meeting #3 January 9, 2020

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Rikki Schroeder	Rancho Guejito	1/9/2020	Land Use Map	Fig 1-8 through 1-15	Land use map is incorrect. See "SGMA, land use corrected".

Advisory Committee Meeting #4 July 9, 2020

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP084 serves two residences in this location. Add #29 Desigantion. See pipeline sketch
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP084 Domestic Only
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP043 Agriculture and domestic
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP065 Agcriculture only
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP043 Provides to residences here. Add #8 designation. See pipeline sketch.
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP011 Agricultural and domestic
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP013 does not service parcel #14. SP013 services a 10 acre parcel. Not shown. See approx. parcel boundary drawn in.
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP001 is inactive
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP076 & SP079 agriculture only
Frank Konyn		7/8/2020	Comments on Handout #2	Handout #2 Modeling Maps	SP002 agriculture & domestic
Peter Quinian	Rancho Guejito	7/16/2020	Information Request by Jacobs Engineering about land use changes		The floor of Rockwood Canyon was used for nursery operations from 2004 to 2009. In 2010 the use transitioned from nursery to citrus. Approximately half the valley was planted in citrus by August 2010 and all of it by the end of 2010 to the best of our recollection.
Peter Quinian	Rancho Guejito	7/16/2020	Information Request by Jacobs Engineering about land use changes		Rancho Guejito Wells Used in Rockwood **Well ID** / **start** / **last year used** / **Well Completion Report Number** Well 3 / 2004 / 2019 / WCR1991-018980 Well 4 / 2004 / 2011 / Well 5 / 2004 / 2019 / Well 6 / 2004 / 2016 / WCR1976-005011 RK-8 / 2015 / 2019 / WCR2018-000598 RK-9 / 2016 / 2019 / RK-10 / 2017 / 2019 / WCR2014-012001 RK-Dom (Domestic) / 2004 / 2015 / WCR1989-018199 RK-Dom 2 (Domestic) / 2016 / 2019 / WCR2015-001438 The following wells were used between 2004 and 2019. As new wells came on line, older wells were idled as indicated in the table below. (Please see the memo send for full map: Information requested for San Pasqual Model 7-16 edit.pdf)

Advisory Committee Meeting #4 July 9, 2020

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Carole Burkhard		7/14/2020	Comments on Handout #2	Handout #2 Modeling Maps	(1) It appears this parcel (36 on the map), lumps together two or more parcels as one parcel. We (me and my husband, Charlie Burkhard) believe that possibly three separate parcels have been lumped together in this space on this map. We own 8 acres and when comparing the size of the purple parcel to our neighbor across the street (Rancho Guiejto with 20k+ acres), the purple area may include more than one parcel because a minuscule 8 acres would be a smaller spot on this map.
Carole Burkhard		7/14/2020	Comments on Handout #3	Handout #2 Modeling Maps	(2) We are guessing that the well numbered SP108 is our well, but it could, instead, be our neighbor's.
Carole Burkhard		7/14/2020	Comments on Handout #4	Handout #2 Modeling Maps	(3) To the east of our property line is our neighbor, Tyson Short. He, too, has an 8acre parcel and he has a separate well. His property may be the land to the east of the purple area labeled 36 that is designated in red and labeled "Rural Landscape." If so (if that is his correct parcel on this map), his well does not appear to be identified on this map.
Carole Burkhard		7/14/2020	Comments on Handout #5	Handout #2 Modeling Maps	(4) To the west of our property line is our neighbor, the San Dieguito River Valley Conservancy (Trish Boaz on this committee) and they have 23 acres and they, too, have their own well. Their 23acre parcel may be part of the area identified as "Riparian" on this map, however, if so, there is no well identified on this map for them. Their well is very near the south side of our property line, very near our own well. When you visited our property many months ago, I pointed out their well to you. Their well was drilled sometime after December 2008 (I don't remember exactly, but they would know).
Carole Burkhard		7/14/2020	Comments on Handout #6	Handout #2 Modeling Maps	(5) As respects the map called "Preliminary Working Draft, 2005 Land Use," the purple designation (Truck Crops), was correct in 2005 but is not correct for today (so is not correct on the "Preliminary Working Draft, 2018 Land Use"). In 2005, the land was owned by the estate of Justine Fenton and was leased to a small farmer who raised cantaloupe and watermelon. In late September 2007, we purchased 8 acres of the 40acre parcel from the estate. On October 22, 2007 (less than a month later), we lost that home in the Witch Fire. We rebuilt our home (the one standing today) and moved back to the property in midDecember 2008. At that time (continuing to this day), our homeowner's insurance carrier will not allow us to raise crops nor lease our land to others to raise crops. So, there have been no "Truck Crops" on this property since late 2007. As such, using the Legend on the map, our parcel and Tyson Short's parcel should be reclassified as "Rural Landscape."
Carole Burkhard		7/14/2020	Comments on Handout #7	Handout #2 Modeling Maps	(6) As I have stated in earlier emails, I do not know the other small private landowners in our valley, so I can't provide any information as respects their wells.

Advisory Committee Meeting #5 January 14, 2021

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Matt Witman	Stakeholder	1/26/2021	Thresholds- general comment		I would like to see the adaptive management threshold criteria changed so that the adaptive threshold would be reached sooner (at higher groundwater levels) than was presented in the last meetings. My logic is for water users to have more time to adapt and potentially make management decisions over how best to adapt to lower levels to delay potential restrictions on water use. This extra time also gives the Core Team more time to decide on what is the best way to modify use if use restrictions become necessary, and potentially find Adaptive measures that might delay any future restrictions. (Comment is also for the TPR)

Advisory Committee Meeting #6 February 18, 2021

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Rikki Schroeder	Rancho Guejito	3/4/2021	General Comment	Reiteration of Andre Monette in meeting comment	The last GSP Citizens Advisory Committee meeting covered the proposed minimum thresholds and management measures that will be used in the GSP for the Basin. We are concerned that the proposed management measures will require farmers in the Basin to curtail pumping during times of drought. Farming is a struggling industry in San Diego County, in large part because water is expensive and obtaining access to adequate supplies can be difficult. The San Pasqual Basin generally contains sufficient groundwater to supply agricultural operations – provided there is appropriate management by farmers in the Basin. But, the Basin is not immune from drought and the GSA's projections indicate that prolonged drought could cause groundwater levels to fall to levels that put farming at risk. The GSA has failed to address one of the primary reasons that water levels would fall under any scenario – the City of San Diego has blocked natural recharge to the basin from a massive portion of the upstream watershed. The City's Sutherland Reservoir impounds flows from Santa Ysabel Creek approximately 11 miles upstream of the Basin. All potential natural recharge from upstream of the reservoir is blocked from flowing down to the Basin. Drought compounds the lack of stream flow and means that much less water is available to recharge the Basin. It is worth noting that the surface level of Santa Ysabel Creek is the same elevation as water levels in many wells in the Basin. If there is water in the Creek, it is very likely to be recharging those wells. Because the City's actions in constructing the Reservoir would be a major contributor to the shortfall, it is appropriate to consider whether releases from the Reservoir would relieve low water levels in the Basin. The projected shortfall in the Basin in years of severe drought is on the order of several hundred acre feet. This is a very small volume in comparison to the 10,000+ acre feet of water that is typically stored in the Reservoir and the 29,000 acre feet that it was designed to hold.
Rikki Schroeder	Rancho Guejito	3/4/2021	General Comment	Reiteration of Andre Monette in meeting comment (cont.)	Continued: There are multiple reservoir systems in San Diego County that can provide a model. For example, the Sweetwater Authority releases water from the Loveland Reservoir for storage and treatment in the Sweetwater Reservoir. The Helix Water District releases water from the Cuyamaca Reservoir that ultimately flows to El Capitan Reservoir. The City owns the Lake Hodges Reservoir immediately downstream of the Basin, and thus any overage or irrigation returns would be captured by the City.We therefore request that the GSP include releases from Sutherland Reservoir as the primary management measure for the Basin. Rather than force farmers to reduce their water use, and potentially create economic hardship, the City should make water that is native to the Santa Ysabel Creek available for their use. If farmers are forced to cut back, they may not recover and agriculture will leave the San Pasqual Valley. Coincidentally, this would have a direct impact on the City because most farmers in the Valley lease their land from the City, and many pay rent based on the gross receipts of their production. Reduced agriculture in the Valley would mean less revenue for the City. Most importantly, it is patently unfair to ask those farmers who are not beholden to the City to cut back on their water production to benefit the City's interests in the Basin, when the City has already extracted a massive volume of water via operation of Sutherland Reservoir. Continued operation of the Reservoir raises serious legal questions that may be avoidable if the Reservoir is used as the primary management measure for sustainable management of the Basin.

Advisory Committee Meeting #7 July 8, 2021

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Frank Konyn		7/8/2021	Groundwater Conditions Section		On Table 2-5, well 13S2W has a datapoint from March 2005 that is way below the range, but well 33L3 that number is way above the range. Is that data going to be included in the GSP, or will it be excluded because there may be something going on with the testing? If included, is there validity to that data?
Frank Konyn		7/8/2021	Groundwater Conditions Section		In Section 2.4.1, the last paragraph on this page discusses the northward gradient going into Rockwood Canyon for a certain amount of time. Please expand.

Advisory Committee Meeting #7 July 8, 2021

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Frank Konyn		7/8/2021	Groundwater Conditions Section		Figure 2-2 talks about the adjudication area. Will this be covered?
Frank Konyn		7/8/2021	Water Budget & Groundwater Flow Model		TAF is an acronym that is not included in the list of abbreviations.
Frank Konyn		7/8/2021	Water Budget & Groundwater Flow Model		AC Member (FK): On page 148, the land surface, surface water, and groundwater systems add to 40 TAF. In an earlier paragraph, the text indicates about 61 TAF of capacity in the system. What is this difference?
Frank Konyn		7/8/2021	Monitoring Networks		Page 110 of the GSP mentions pre-nested wells. Through this process, the City put in two more nested wells. These two nested wells are not mentioned in the GSP
Elyse Levy	CDFW	7/8/2021	Sustainable Management Criteria		Is there a scientific rationale for using 100% and 50% below the historic minimum groundwater level? This is not consistent with The Nature Conservancy guidance, which suggests using a minimum threshold within or near the historical groundwater range.
Dave Toler		7/8/2021	PMAs and Plan Implementation		Who monitors the GSP and when does the State come in?
Frank Konyn		7/8/2021	PMAs and Plan Implementation		Going back to the nested wells created by the City – was there any thought of adding them to the PMAs to study the relationship between the alluvium, the residuum, and the bedrock?
Frank Konyn		7/8/2021	PMAs and Plan Implementation		Is there any intent to further study the interconnectability between the various levels.
Frank Konyn		7/8/2021	PMAs and Plan Implementation		Santa Ysabel Creek did not exist in the 1960s as a riparian habitat. Riparian habitats did not appear until the late 1990s or early 2000s. The GSP conveys a concern about not wanting to run short on water to sustain this riparian habitat, but this riparian habitat is impeding the flow of water through the center of the Valley. This causes erosion, which causes problems in Lake Hodges downstream. The GSP focused on the groundwater in San Pasqual Valley, but it missed the opportunity to protect Lake Hodges.
Eric Larson		7/8/2021	Other/Meeting Summary		What has happened to other plans going to the State? Can they bounce back?
Dave Toler		7/8/2021	Other/Meeting Summary		Expressed gratitude to be able to participate in the planning process. No additional comments.
Carole Burkhard		7/8/2021	Other/Meeting Summary		Expressed gratitude to be able to participate in planning process. No additional comments.
Trish Boaz		7/8/2021	Other/Meeting Summary		Expressed gratitude to be able to participate in the planning process. No additional comments. Currently looking for letters of support to apply for a grant with the Wildlife Conservation Board to remove invasive species in the SPV.
Frank Konyn		7/8/2021	Other/Meeting Summary		Expressed gratitude to be able to participate in the planning process. When will the AC see the changes suggested (e.g., typos)?
Lisa Peterson		7/8/2021	Other/Meeting Summary		Expressed gratitude to be able to participate in the planning process. No additional comments.
Rikki Schroeder		7/8/2021	Other/Meeting Summary		Expressed gratitude to be able to participate in the planning process. No additional comments.

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Technical Peer Review Comments

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San Pasqual Valley Groundwater Sustainability Plan

Technical Peer Review Meeting #1 November 7, 2019

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Peter Quinlan	Dudek, Rancho Guejito		GDE determination	Pg 25 of meeting presentation	We discussed having a wetlands biologist confirm DWR GDE mapping. While the biologist will be useful for identifying habitat, the determination of whether the habitat is sustained by groundwater should involve the hydrogeologists working on the GSP and be informed by depth to water measurements. Infiltrating dry weather base flow derived from irrigation tail waters and other sources can sustain riparian habitat even if the water table is greater than 50 feet below land surface.
Peter Quinlan	Dudek, Rancho Guejito		Basin Boundaries	Pg 17 and 21 of meeting presentation	I would like to reiterate that DWR Bulletin 118 defines the basin as the alluvium and the residuum. Slide 21 might be interpretted as showing the Basement as one of the principal aquifers of the basin rather than a boundary condition as discussed in the meeting.
Matt Wiedlin	Wiedlin & Associates	11/18/19 email	Nov 7 2019 Handout #3, Attachement A Preliminary Outline, Table of Contents	Section 2.6	The most recent State of the Basin Report that I have seen (CH2MHill, 2015) indicates that the GW Management Plan Objectives include installing flow meters on groundwater production wells in the basin with a Phase 1 Target Date of 2017. A subsection to Chapter 2.6 for groundwater production monitoring is recommended. The section should provide an update on efforts to measure pumping and identify the opportunities, constraints, and schedule for documenting gw production in the basin over time.
Matt Wiedlin	Wiedlin & Associates	11/18/19 email	Nov 7 2019 Handout #3, Attachement A Preliminary Outline, Table of Contents	Section 3	Salt and nutrient contamination of the alluvial aquifer is likely one of the primary undesirable groundwater conditions in the basin. It is not clear to me where in the outline characterization of salt and nutrient sources will be described. A solute transport model will require this type of characterization. The 2014 SNMP provides estimates of TN and TDS loading for many of the sources in the basin and also discusses improved management of fertilizer & manure applications as promising strategies. The SNMP has a target completion date of mid-2016 to define a nutrient management planning approach and a similar date to promote the adoption of bmp for nutrient management. Have changes in agricultural management practices been made in the five years since? If changes in source terms have occurred through implementation of bmp's this will need to be documented so it can be incorporated in the solute transport model.

Technical Peer Review Meeting #2 January 9, 2020

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Peter Quinlan	Dudek, Rancho Guejito	1/24/2020 email	TPR Meeting #2	Pages 8-15	Land use maps aren't accurate. Some orchards are mapped as field crops. See area to west of Rockwood Canyon which is irrigated from wells in the alluvial basin. Before estimating historical pumping from land use, these maps should be verified by using Google Earth at a minimum, or requesting verification by the farmers through the Advisory Group.
Peter Quinlan	Dudek, Rancho Guejito	1/24/2020 email	TPR Meeting #2	Pages 16-17	These maps show 22 wells in the section containing Rockwood Canyon, not counting the 4 monitoring wells. At least 6 of the wells are laterally outside of the basin and 5 of the wells are constructed to isolate them from the alluvium and residuum. Others are abandoned.
Peter Quinlan	Dudek, Rancho Guejito	1/24/2020 email	Numerical Model Discussion	Slides 7-10	SGMA Emergency Regulations repeatedly call for addressing uncertainty. In the context of minimum thresholds , they raise the issue of uncertainty including model uncertainty:"§ 354.28. Minimum Thresholds (a) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26. (b) The description of minimum thresholds shall include the following: (1) The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting." Quantifying uncertainty in model predictions is important for providing context to management decisions. If the model-estimated sustainable yield that avoids undesirable results is less than current groundwater production, it may require unnecessary reductions in

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
					pumping and have negative economic consequences for groundwater users. The GSA should be aware of the confidence interval bounding the estimated sustainable yield before acting to limit production beyond what I necessary, so as to avoid unnecessary economic disruption. Uncertainty associated with numerical models can be addressed a number of ways. ASTM D5447-04 (2010) specifies validation or verification against historical observations held back from the data used for calibration: "6.6.5 Calibration of a groundwater flow model to a single set of field measurements does not guarantee a unique solution. In order to reduce the problem of nonuniqueness, the model calculations may be compared to another set of field observations that represent a different set of boundary conditions or stresses. This process is referred to in the groundwater modeling literature as either validation (1) or verification (14, 15). The term verification is adopted in this guide. In model verification, the calibrated model is used to simulate a different set of aquifer stresses for which field measurements have been made. The model results are then compared to the field measurements to assess the degree of correspondence. If the comparison is not favorable, additional calibration or data collection is required. Successful verification of the groundwater flow model results in a higher degree of confidence in model predictions." Verification enables quantitative assessment of model error / uncertainty. Uncertainty can also be characterized qualitatively through sensitivity analyses. Again from ASTM D5447-04 (2010): "A calibrated but unverified model may still be used to perform predictive simulations when coupled with a careful sensitivity analysis (15). 6.7 Sensitivity analysis is a quantitative method of determining the effect of parameter variation on model results. The purpose of a sensitivity analysis is to quantify the uncertainty in the calibrated model caused by uncertainty in the estimates of aquifer parameters, stresses, and boundary conditions (6). It is a means to identify the model inputs that have the most influence on model calibration and predictions (1). Perform sensitivity analysis to provide users with an understanding of the level of confidence in model results and to identify data deficiencies (16). 6.7.1 Sensitivity analysis is performed during model calibration and during predictive analyses. Model sensitivity provides a means of determining the key parameters and boundary conditions to be adjusted during model calibration. Sensitivity analysis is used in conjunction with predictive simulations to assess the effect of parameter uncertainty on model results."
Peter Quinlan	Dudek, Rancho Guejito	1/24/2020 email	TPR Meeting #2	Page 42	The hydrograph for SPV GSP 199 is plotted upside down.
Peter Quinlan	Dudek, Rancho Guejito	1/24/2020 email	TPR Meeting #2	Slides 35-36	DWR Bulletin 188 defines the San Pasqual Basin as being comprised of the alluvium and residuum. The BMP guidance cited in the presentation the bottom of the basin may be defined as the depth to bedrock also recognized as the top of bedrock below which no significant groundwater movement occurs. The City of San Diego expressly recognized the lower boundary of the basin as granite bedrock in its 2007 Groundwater Management Plan for the San Pasqual Valley. There is no new information available to suggest that classification should change. It is the responsibility of the GSA to provide evidence that the 2007 characterization was incorrect and to justify expanding the basin boundaries beyond what is specified in Bulletin 118.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Fig 1-5	The depection of the extent of the County outside the basin boundary is uneven and it is unclear as to the approach taken as to how much to show. Some areas show a lot of the County whereas others do not show any county area outside the basin boundary. Also, The location of the City of San Diego label is on top of the County area. Suggest either moving the label to overlay where the City is located or add an arrow that points to the dark blue City area. Another option is to remove both the City and County labels since the Legend already identfies what portion of the map is City versus County.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Fig 1-6 through Fig 1-15	We discussed the crop type labels already at the meeting. For modeling puirposes, it will be difficult to assign a water demand to some of these designations. I would suggest that if Nate develops a land use map for modeling that depicts crop types (perhaps consistent with LandEQ and/or DWR) and if there are any years where you have DWR land use and SanGIS then you change the legend.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Fig 1-16	There are some labels located along the north and east boundary of the figure that are cut off. The southeast portion of the basin (and other portions of the figure where there is a relatively large number of wells) inlcudes a darker color inside the basin and a lighter blue color outside the basin. This creates confusion as to what densties/number of wells are located inside vs. outside the basin within a particular section. In these cases, where the label says 8 or 10 wells in that section, does that mean there is that number of wells inside the basin or does that number represent the entire section, including both inside and outside the basin? Without having text to read, it is difficult to interpret whether the density refers to what is inside the basin or in the entire section. As shown, the 8 or 10 wells area conveys that there is actually 8 or 10 wells within the basin where the darker color represents a certain number of wells. Suggest that the source:DWR be a bit more useful and include a reference citation so it can be included in the references such as (DWR, DATE). This is a gloabal comment for all figures where you use or show data from other sources that should be cited. This will be useful as part of the uploading and compilation of references when the GSP is submitted to DWR.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Fig 1-17	Same comment as for Figure 1-16. Font size for "# Wells" is smaller than Figure 1-16. Suggest having consistent font size on well density maps.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Fig 1-18	Same comment as for Figure 1-16. Font size for "# Wells" is smaller than Figure 1-16. Suggest having consistent font size on well density maps.

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Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Fig 3-1	The label of this figure does not fit the content since there is only structural (faluts) shown but no Geology.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 21, 23	Why not use the same base map as page 23 so each figure shows the whole basin rather than a portion. I understand the desire, perhaps, for wanting to show as much resolution as possible but I would suggest using the same basemap as you have used for other figures showing basin features.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 27, 28	I know you did not want comments on the color scheme, but I am not a fan of a dual color flood scheme. I prefer a sincle range from light to dark or vice versa..
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 29	This figure is confusing without having text to describe shat is being shown. I believe this is a watershed map, even thought it is referred to as a drainage map. Drainage is a term that can be misinterpreted to also describe a drainagesystem for agriculture in areas where there is high groundwater and potential for root zone damage. I do not think that is the case with this figure thought.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 30	Recommend changing the title on this figure to replace "Hydrology" with the particular soil property that is being presented. Is this figure supposed to convey soil permeability, soil unsaturated conductivity? Also, it seems as if the scale ranges represent log cycles. If so, then I suggest not showing a 0.0 since that is not possible for a log cycle. Instead, I would use a less than0.01.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 31	Suggest not using an acronym for a figure title.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 32, 33	Seems as if this figure and page 33 figure should be the first ones and be before the page 30 figure.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 35	The numbering scheme for the wells does not fallow a sequential pattern which is fine but not inherently understandable and may convey that there are at least a couple hundred wells in the basin. Also, is there a mix if actual monitoring wells, inactive and active supply wells that are monitored, domestic wells, etc. that are all grouped under the "monitoring well" designation. Did you want to consider differentiating the well types because this may provide DWR with an impression that all wells being monitrred are actually monitoring wells rather than wells that were designed for supply.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 36	Global Comment: If data are available, show the entire period of record and adjust the date range on the hydrographs to reflect that if possible. I like your approach in having the same y axis span for all hydrographs to allow for comparison, although I noticed that some spans are 120 feet or 140 feet and the intervals vary between 20 feet or 40 feet.If these hydrographs are planned for the body of the report as compared to an appendix, it may be helpful to imbed a basin map insert showing the well location for easy reference. I noticed that the single wells do not have any well construction related informatio compared to the monitoring wells. Is this because that information is not available? Some appear to have some anomalous data points that are abnormally high or low comapred to the other data points (generally this is observed in a few of the single well hydrographs). I wonder whether it would be useful to add trendlines to the hydrographs if they will be used to describe pemporal trends in the HCM/Basin Setting/GW conditions section of teh GSP.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 39	Is there a reason why the size of this and the following hydrographs are smaller than the previsous three?. Well construction to total depth info would be nice.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 40	2014 data point seems anomalously high, otherwise no comment.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 42	2014 data point seems anomalously low, otherwise no comment.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 43, 50	Multi year line between 2014 and 2018 should be removed however, if these are generated from an Access database, that can be a difficult task to develop a query for.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 44	Last data point seems anomalously high.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 45	Next to last data point seems anomolously high. Remove it??
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 53	Not sure I would include this hydrograph as the dataset seems suspect. Is there more information on this well that would be useful to share in order to interpret this dataset. I would definitely not use this well for model calibration.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 54	Another dataset that looks suspect and definitely needs some QA/QC or notes included (similar to GSP 199 on page 53). If this is transducer data,from 2017 on, it appears as if the consultant did not deploy the transducer deep enough as it appears as if the gw levels went below the transducer and whoever developed the daaset chose to select the depth of teh transducer as teh gw level. Again, this datset needs additional clarification if it is to be used.

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Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 57, 58	No comment, except that if I were to use the count of wells with measurements as a guide for selecting which periods of time to countour, I would first select only Spring periods to contour and to select years which represent a wet, dry, and maybe normal year type to conoutr. I suppose if you want to select years to contour "seasonal lows" then I would try to use the same years as selected for teh Spring contours.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 59	I like the panel map approach, however, the font sizes for the graph axes lables need to be much larger to be readable. Generally, the trends of TDS over time look generally stable throughout the basin perhaps with the slight exceptions of wells 120 and 118 to the souteast of the basin. Is there a reference/citation for the TDS data in this panel map? You reference a source for page 60.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 60	The charts are easier to read than page 59, therefore, the actual concentrations are readable. Since it is difficult to read the x and y axis labels in page 59, it is difficult to compare the charts, although it seems as if this panel map only has one well with an upward trend (SP065) which is different than the two wells in page 59.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 61	Same comments about readability as page 59. Generally on ly one well shows an upward trend in nitrate (SP006). Unless there is a desire to use the GSP to be a restoration program, I do not see trends in nitrate that are worrisome for the most part.
Will Halligan	LSCE	1/23/2020 email	TPR Mtg No 2	Page 62	Better figure to read, however, similar to the figures for TDS, there are different wells in this figure that show upward trends than are shown on page 61. Seems odd. Again what are the data sources for the gw quality charts for pages 59 throuhg 62? Seems like some QA/QC is needed because the differences will invite comment and criticism.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Figure 1-7 & 8	Big change in ag use from field crops to intensive ag between 1990 and 1995 This will require follow up.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Figure 1-12	Comparing 2013 Land Use Map to Google Earth Images for the same time frame shows error in classification where undeveloped areas are classified as field crops, orchards classified as field crops, former poultry ops, abandoned decades ago, classified as intensive agriculture. See attached Figure 1-12, with annotations.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Figure 3-1	This is not really a depiction of the Regional Geologic Setting. It is a depiction of regional faulting. You do show the regional geologic setting in Figures 3-3 & 3-4. I think these three maps should be integrated into one map. Simpler, more comprehensive, and allows the reader and author to better assess regional geologic relationhships. I also recommend including the water shed divide on the geologic map. That would eliminate another map. Is the entire drainage area is characterized here? Wouldn't that be a logical presentation?
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 27, Figure #-#	Include the watershed divide on this map and provide more color/shading resolution to the topography.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 29 1-X	The purpose of this map should be to readily identify the exten of the area that drains into San Pasqual Valley. It does a poor job of depicting that. It's hard to see San Pasqual Valley and the other hydrologic basins, as presented, distract the reader from understanding what area drains into San Pasqual Valley.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 31, Figure #-#	Define the acronym SAGBI in the legend.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 34, Figure #-#	Is it necessary or useful to have a separae map for surface water. This information could be included in a regional map or topo map, right?
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Figure WF-7	The project could use some wells in the middle of the basin. There are/were wells in this area used by Izbicki in the early 1980's. He used the State Well ID nomenclature to label them (see Izbicki page 94-95).
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 39, Hydrograph SPV GSP-19	Vertical and horizontal scale inconsistent with other hydrographs. Scale needs to be large enough to readily depict changes in head over time. This well is in the same location as Izbicik'is 5A which has heads for 1977 (much lower than depicted on the present record) and 1982 (near peak high on the present record).
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 40, Hydrograph SPV GSP-22	Same as page 39. Izbicki 32M3?
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 42, Hydrograph SPV GSP-29	Same as page 39. Izbicki 6M3? Spring 1982 head greater than presented record.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 42, Hydrograph SPV GSP-43	Same as page 39. Izbicki 35F1/F2? Spring 1982 head greater than the presented record.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 46, Hydrograph SPV GSP-44	Same as page 39. Izbicki 36D3 or 35A1.

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Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 49, Hydrograph SPV GSP-45	Same as page 39. Izbicki 29D1?.
Matt Wiedlin	W&A	1/21/20 email	TPR Handout #3	Page 49, Hydrograph SPV GSP-70	Same as page 39. Izbicki 34J1? Spring 1982 greater than the presented record.
Frank Konyn	Konyn Dairy	1/23/2020 email	TPR Meeting #2	Basin definition	I believe that at the last TPR meeting you threw out an opportunity for anyone to send in comments after the meeting if they had any. As a second generation resident and leaseholder in this valley, I am concerned by the overt bias that [ ] is exerting on the TPR committee. Up until the last meeting everything had seemed very fair and level for all parties involved. I was proud of the team that had been assembled to dissect this GSP. Then, at the last meeting, [ ], a specific representative of the Rancho Guejito, began throwing around words like "legal counsel released this…." Or "I would need to consult with council." Is Peter here as a hydrology engineer with an intent to provide unbiased professional opinion, or is he an extension of the legal arm of the Rancho Guejito? It appears that [ ] was trying very hard to have the wells of the Rancho Guejito excluded from the GSP, however he was not providing any supporting evidence of those particular wells to justify that opinion. I believe John warned the group that if solid evidence of well construction, and testing of hypothesis were not present in the final report, it would most likely be rejected by DWR. I believe that John also said that the burden of proof should lie on the party requesting such exemption. As someone who sits on the Advisory Committee, and has also attended all of the Technical Peer Review meetings, I would like to voice my concern regarding [ ]'s conduct. Although I admit I am not a geologist, water that is in the bedrock needs to begin its journey there from somewhere, and I believe that water usually moves in a downward direction. Why can there not be areas with very little residuum in that area of the Valley that would allow water to move into fractures from the alluvium above? Just as easily as water can move through small rock fractures, why can water not move through areas surrounding well casings into bedrock from areas above? Unless the Rancho Guejito is prepared to provide studies proving there is no connection between the alluvium water and the bedrock water, I feel it would be safer for the committee to view this bias as a water grab from a single landowner and continue with the majority consensus that until proven otherwise there may be a connection between the alluvium and the fractured bedrock.
Frank Konyn	Konyn Dairy	1/23/2020 email	TPR Meeting #2	Basin definition	I would also like to further express my concern that if [ ] is acting on the defense of the Rancho Guejito now, he may just as likely become offensive in attacking other water users in the Valley in the future as part of that same defense of the Rancho Guejito. I repeat that actions such as this will not yield a workable plan that proves itself through its implementation.
Frank Konyn	Konyn Dairy	1/23/2020 email	TPR Meeting #2	Basin definition	Any decent minded farmer that drills for water is not going to seal off large sections of a well reducing the possible inflows into that well unless it is strictly for purposes of shutting off poorer quality waters. The area of the basin that Peter is referring to does not seem to have those types of poorer quality waters in my opinion. Further, as a student of "Old Timers with more experience than me," I have heard that efforts to drill deeper wells in other parts of the Valley and shut off the top alluvium portion, only work as a temporary fix. This is indicating that "old timers" felt that water from the alluvium eventually replaced the fractured bed rock water that was being removed. One of those "old timers" would have been the very man that sold the portion of land to Rancho Guejito that now make Rancho Guejito a land owner in the basin.
Frank Konyn	Konyn Dairy	1/23/2020 email	TPR Meeting #2	Basin definition	As you will recall, I installed a City suggested water meter on my own dime, and you have access to all of the information it provides. Actions like this are going to help everyone come together to create a fair workable plan for all stakeholders. Water grabs for the purposes of exporting to areas outside of the basin boundary will not achieve a workable plan for all stakeholders.
Matt Witman	Witman Ranch	1/22/2020 email	TPR Meeting #2	Basin definition	The purpose of my email is to express some concerns that I have with what I observed at the most recent TPR meeting that I attended. It is clear to me that the consultant hired by Guejito Ranch has a different opinion than the other TPR consultants regarding the connectivity of the bedrock under the groundwater basin. The Guejito consultant believes that there is no connectivity between the two zones. The other consultants believe that there may or may not be, it needs to be studied. It is imperative that this be determined. The Guejito Ranch consultant said that he was leaving it up to the lawyers as to whether or not well drilling reports that they have are released. The fact that they are withholding this information would appear to support the case that there is some evidence of connectivity in their possession. The county of San Diego should also have these drilling reports. Their inability to find them causes suspicion of their motives in the Sustainable Groundwater Plan. This deep well information needs to be found, or in its' absence, there needs be an assumption of connectivity in order to protect the basin from being overpumped.
Matt Witman	Witman Ranch	1/22/2020 email	TPR Meeting #2	Basin definition	As a leaseholder in the San Pasqual Valley it has long been a worry the Guejito Ranch has the ability to remove large amounts of water from the groundwater basin and export them to their properties upstream of the basin. If connectivity between the alluvium and bedrock exist, their pumping will reduce the available water in the groundwater basin for city agricultural use. This would damage the leaseholders and diminish the value of the city of San Diego's investment in the San Pasqual Valley. It is conflicts of interest such as this that caused me to want to observe and be part of the process of crafting the GSP.

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Matt Witman	Witman Ranch	1/22/2020 email	TPR Meeting #2	Basin definition	As a long term lessee of the city I have been very transparent with our activities and have provided the necessary drilling reports. We have allowed for water meters to be installed on our wells. This information has to be provided by all users in the groundwater basin, not just city lessees.
Matt Witman	Witman Ranch	1/22/2020 email	TPR Meeting #2	Basin definition	In the coming months we will begin to talk about water budgets and the actual data that will need to be collected in order to make the groundwater basin sustainable. Without the necessary background information, any decisions on future allowable water use will be making assumptions that would not need to be made if the proper background information was made available.
Matt Witman	Witman Ranch	1/22/2020 email	TPR Meeting #2	Basin definition	I strongly urge you to proceed with the assumption of connectivity between the alluvium and the bedrock if new information is not presented that proves that the connectivity does not exist.
Peter Quinlan	Dudek, Rancho Guejito	3/9/2020 call to County	Aquifer Testing	N/A	Peter Quinlan reached out this morning and stated Rancho Guejito (RG) wants to cooperate with the City's request but needs clarification. Peter is requesting advanced notice and coordination for water level monitoring of RG wells during any aquifer testing Kleinfelder is planning to do offsite of RG. This will require RG to shut off their irrigation wells ahead of Kleinfelder's aquifer test. Coordination with RG is needed so that they can top off their storage tanks to have adequate water to irrigate during the aquifer testing. The request to perform an aquifer test on the RG site using MW-3 or other well needs clarification. Please provide the following: 1. The rationale for another well test on the RG site that would provide any data needed for the GSP above and beyond what has already been collected. RG has already performed two aquifer tests in the immediate vicinity of well MW-3. Aquifer testing of MW-3 or another nearby well may be redundant to previous efforts. 2. Detail what is needed for an aquifer test on their property. This may require outfitting the well with a sounding tube, pump, discharge piping, and power source may be needed…if it's not already outfitted. They'd also have to account for where to put the pumped water. These tests are typically over a 24-hour period plus recovery time so they'd have to be onsite overnight. The consultant would also need to do a step test for a few hours the week before so they'd know what rate to run the test and then let the well recover before the longer test.

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Peter Quinlan	Dudek, Rancho Guejito	Email 5/29/20	Monitoring Well Construction	-	Draft Power Point page 49. Field Program Update – Monitoring Wells The photo on the right (Photo 3 in the Kleinfelder Well Installation Report) appears to show two casing strings and a short spacer pipe bundled together with a centralized around all being lowered into the borehole. Is this how the casing strings were installed in the borehole? The well construction schematics in the report and power point appear to show the mode traditional approach of installing the casing strings individually and sequentially following placement of filter pack and annular seals to isolate the nested screens from one another. If the casing strings were installed as a bundle and filter pack and annular seals between the wells were installed afterwards, there is a greater possibility that the annular seals will not reach the spaces between the casing strings resulting leaky seals. Leaky seals may yield unrepresentative depth discrete water levels.
Matt Weidlin	Weidlin Assoc.	Email 5/29/20	Monitoring Well Construction	-	Top of shallow screen comes right to the alluvium-DG contact. Filter pack extends 2' into alluvium, the top of the borehole collapse extends a total of 10' into alluvium. The seal, meant to keep alluvial water from entering DG well screen, starts 10' above the contact & goes 20' into alluvium.
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 1		As part of the 2nd TPR meeting it was evident that the initial compilation of landuse mapping was inadequate. Will Woodard-Curran be providing an update on how they are characterizing landuse?
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 2	WF-13	1)What is the status on obtaining groundwater elevations at Rancho Guejito. This is a necessary part of the basin characterization in order to estimate how much groundwater flow is coming into or out of that subarea of SPV. 2) USGS online records indicate that groundwater elevations at the USGS Monitoring Well, Site 33055511701010103, from 3/22/15 to 6/22/15 ranged between 353 and 355 ft NAVD88. Figure WF-13 reports an elevation of 347. DTW values reported by W-C are generally consistent with USGS records, suggesting an error in W-C's ref. point elevation. This suggests that RP elevations should be double checked at all wells. 3) A northward gradient at the upstream end of Cloverdale Creek would not be expected under static conditions and therefore implies pumping at the basin boundary. This elevation should be double checked to confirm this. 4) Include flow direction arrows and hydraulic gradient values where gradients are different in the basin.
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 2	WF-14	How was the DTW contour map prepared?
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 2	WF-16	Northward gradient depicted in WF-13 is not occuring in this data set, but error in gw elevation at the USGS monitoring well does persist inthis figure.

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Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 2	Page 7	1) The same USGS Stream Gauge data is presented three times, just in different units. Better to show stream flow values at all gaging stations serving the basin. 2) Recommend getting in touch with City of SD hydrographers on their estimates of surface water inflow into Lake Hodges as a means to estimated surface water flow out of SPV. Will need to separate San Dieguito River flow from SPV flow entering Lake Hodges. 3) BTW there is no figure no. on this one.
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 2	Page 10	There is a spike in surface water TDS in all 6 charts presented here someime in 2011. Suggest that W-C check to see if a wildfire in the watershed the previous fall occurred. If so, consider rescaling the charts to better show more normal TDS variation
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 2	Page 12/Fig 2	In cross referencing this figure to other SPV maps, it is difficult to identify geographic features on this map because the masking is too strong.
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 2	Page 13/Fig 3	1) General comments, A) The cross section should tell the story of how transmissivity/well yield decreases from east to west. This could be done by plotting transmissivity values on the cross section or using Izbicki's Figure 26 map (provided in my email). B) Driller's logs frequently provide well yield estimates that are admittedly gross over -estimates. However, it may still be possible to use the estimates in a generalized fashion to demonstrate the change in well yield across the basin. C) If the USGS monitoring wells are multiple completions, that should be shown. If there is a head difference between wells, that should be indicated. D) Recommend re-visiting the DG thickness estimates by reviewing the multiple well completion logs that pass thru DG and with that understanding going back to the driller's log and possibly adjusting DG thickness estimates. E) The wells should show the depth interval that they are open to the aquifer. F) This is a fairly well studied basin, there is more useful information to present than is actually presented. Cross Section A-A' specific comments 1) There are professional geologist logs and geophysical logs available to you at the beginning and end of X-Section A-A'. Why not show the sediment texture at these locations? Does it get finer-grained at the downstream end of the valley? W&A provided geophysical logs, geologist logs, aquifer test, and water quality data for well 12S01W35_0943645, it could easily be incorporated into Section A-A'. 2) LWELL00509 shows a huge rise in the elevation of the bedrock-alluvium contact. This effectively eliminates the aquifer at this location in the center of the valley. Verify the well log and well location before including it in the cross section. 3) Note the location of the fault on the X-section. You probably don't know the dip, so you can't really plot in the vertical view, but you can show where it's surface trace is.
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 2	page 14 Fig 4	1)Where's the water table? If the wells depicted have not been measured, utilize your groundwater elevation contour map. State the water table date. 2) The general comments from Fig 3 apply here as well.
Matt Wiedlin	Weidlin Assoc.	5/29/2020	TPR-05-14-20 Handout 3		I have a significant concern with the monitoring well installation report. At location SP-129, the failure to install a monitoring well in the allluvial aquifer, all but defeats the purpose of the project. While there was some discussion that the reason well screen was not installed in the alluvial aquifer was because the alluvium was unsaturated, this seems unlikely. Based on the surveyed ground elevation of 380 ft and W-C's gw elevation map indicating a gw elevation 340 feet, DTW should be roughly 40 feet. In fact the geologist's log at SP-129 indicates that the groundwater was observed at 42 feet bgs during drilling. The alluvium-decomposed granite contact was reported at 95 feet. Based on this information the alluvial aquifer is 53 feet thick. Kleinfelder reports that the borehole collapsed on top of the filter pack for the DG well screen (95-105 ft) from 93 to 85 feet and a 10 foot bentonite-sand seal was placed on top of the collapsed debris. For reasons not explained, the remaining annulus was filled with Portland Cement, rather than installing a well screen in the alluvial aquifer. The primary purpose of the well installation is to measure the head difference between the alluvium and bedrock. That objective was not met.
Matt Weiedlin	Weidlin Assoc.	5/29/2020	Meeting summary for TPR		believe the point I was likely trying to make here did not pertain to groundwater quality, but to groundwater elevation. It is likely that my point was that 2019 groundwater elevations are likely to be relatively high due to above average rainfall and this data set should be used to help develop the conceptual model.

Technical Peer Review Meeting July 9, 2020

Comment Tracking Table

Commenter Name	Commenter Organization	Comment Received	Subject	Line #s or Figure #	Comment
Frank Konyn	Frank Konyn Dairy, Inc.	7/9/2020	Follow up to the "Smoking Gun" comment		In the Technical Peer Review Meeting this morning, and again this afternoon in the Advisory Committee Meeting there were references made to the nitrate and TDS levels in the groundwater of the San Pasqual Valley. An individual by the name of Andrei took some language out of context. I called him out for misrepresenting the information, however, I could not provide the correct language as I did not have it in front of me. Specifically he was attempting to quote from the September 2015, San Pasqual Groundwater Management State of the Basin Report Update, Page 2-6. https://www.sandiego.gov/sites/default/files/state_of_the_basin_report_september_2015.pdf This document was developed to comply with a mandate