

minor inelastic subsidence, they may provide evidence of significant, inelastic land subsidence in the unlikely event that it were to occur. These are measured monthly to investigate if such inelastic subsidence were to occur between Zone 7's semiannual surveying events.

- Sites A1-13.0 and B1-5.0, which were both destroyed during the construction of Zone 7's groundwater demineralization plant, were replaced by Sites A1-13.1 and B1-5.1.

Table 3.4-2 shows the most recent (Fall 2009) measurements and includes the elevation changes since the Fall 2008 and Spring 2009 measurements. Figure 3.4-7 shows that during the 2009 Water Year, most of Zone 7's survey benchmarks have dropped slightly from Fall 2008 to Fall 2009 (to 0.070 ft). The slight drop in land surface elevation, which corresponds with small groundwater elevation decrease observed in the Bernal and West Amador Subbasins during the 2009 Water Year, is within the range of elastic subsidence observed over the life of the monitoring program. Elevation changes from Spring to Fall 2009, which varied from -0.001 to -0.096, were also within the range of elastic movement.

3.5 Mining Area Monitoring Program

3.5.1 Program Description

Gravel pits in the Chain of Lakes area have been excavated and operated by the following entities:

Table: Mining Operators

Pond Names*	"K" Ponds	"R" Ponds	"C" Ponds	"P" Ponds
Original Owner	Kaiser Sand & Gravel	Rhodes & Jamieson	Cal Rock	Pacific Coast Aggregates
Other Owners	Hanson Aggregates	Calmat		RMC/Lonestar
Current Owner	PGC Legacy EBRP (SC) Zone 7 (Lake I)	Vulcan PGC	PGC	Cemex

* Prefix for pond names (e.g., K37, also known as Lake I) as shown on Figure 3.5-1

PGC Pleasanton Gravel Company

EBRP East Bay Regional Parks

SC Shadow Cliffs

Zone 7 monitors conditions and activities in the Chain of Lakes area because the gravel mining operations have an appreciable effect on groundwater levels, groundwater quality and salt loading in the Main Basin. Many of the quarry pits have been dug deep into the Upper Aquifer, creating 'windows' into groundwater basin, and exposing groundwater to large evaporative losses. Groundwater is also pumped from some of the pits and discharged to others or to the arroyos to facilitate the gravel mining occurring in the active pits. The Mining Area Monitoring Program includes water level measurements and water quality

sampling of the mining area pits. The program also maps and documents current mining activities, locations of discharge lines, the filling of old pits and progress as the future Chain of Lakes is being constructed for water management by Zone 7 and to identify the locations of flow barriers created by the pits that are lined or backfilled with silty-clay mining spoils.

The current monitoring program consists primarily of monthly and semi-annual monitoring events. The monthly monitoring events include water surface elevation measurements and electrical conductivity (EC) readings from 12 major pits. Shadow Cliffs (owned by East Bay Regional Parks) and the two water-filled pits owned by Zone 7 (Lake I and Cope Lake) are included in this group. In addition, monthly observations include recording any change in mining operations. TDS concentrations from the pits are calculated based on the monthly EC readings. The semi-annual monitoring events include water surface elevations measurements from all the mining area pits, sampling of 21 pits, and analysis of these samples for a general mineralogical analysis by the Zone 7 laboratory.

Zone 7 compiles maps outlining the locations of pipes, pumps and ponds within each mining area. This allows Zone 7 staff to know the source ponds for any water being discharged into the arroyos. All stream discharges are metered, and the volume of water discharged from the Valley is computed by prorating the flows after accounting for any repercolation back into the groundwater basin.

This program also includes the tracking of pond evaporative areas, total monthly evaporative losses for the ponds, and an estimate of groundwater lost due the export of moist gravels. Mining area evaporation accounts for a large portion of the ‘Demand’ component for the annual hydrologic inventory calculation; second only to ‘Municipal Pumping.’

3.5.2 2009 Results

Mining activities continued for Vulcan Materials (formerly Calmat) and Cemex (formerly RMC and Lonestar). Vulcan Materials continued their mining in R28 (future Lake D), utilizing the tunnel and conveyor line built under Stanley Boulevard in 2006, and continued limited operations in R24 (future lake E). Cemex continued mining in P42 (Figure 3.5-1). A summary of all mining pit conditions, including their use, areal extent, and elevations are shown on Table 3.5-1.

For the 2009 Water Year Vulcan Materials discharged 2,417 AF into the Arroyo Mocho, of which 1,075 AF re-percolated back into the groundwater basin and 1,342 AF was lost as basin outflow. Cemex discharged 204 AF into the Arroyo Valle where 53 AF re-percolated and 151 AF was lost as outflow. Zone 7 resumed its cooperative off-site recharge program with East Bay Regional Parks District and diverted approximately 800 AF to Shadow Cliff’s lake in 2009. As a result, water levels in Shadow Cliffs were maintained at around 300 ft in elevation through most of the year.

Zone 7 staff began preliminary to investigate the feasibility of capturing Vulcan Materials’ portion of the mining area stream export by allowing to discharge their excess water either directly or indirectly into Lake I for subsequent recharge. Staff also continued to work on plans for a future diversion facility from the Arroyo Mocho to allow Zone 7 to fill Lakes H and I with State Water Project (SWP) water to augment its artificial recharge abilities. This project is anticipated to be completed in 2014 (Section 5.4.1).

Water elevations were measured in most of the pits that contained water during the 2009 Water Year, and the results are shown on Figure 3.5-1 and Table 3.5-1. The water elevations measured in the mining area ponds that are in direct communication with the upper aquifer are included in the Groundwater Monitoring Program's dataset used for the upper aquifer groundwater elevation contour maps (Figure 3.2-4, and Figure 3.2-11)

Water quality was also monitored in certain mining ponds as well (Table 3.5-2). Salt concentrations, measured as TDS, in the mining area pits ranged from about 300 mg/L in the pits along the Arroyo Valle to over 900 mg/L in Cope Lake [K30]. The high TDS in Cope Lake is due to evaporation which concentrates the salts in this clay-lined pond. The TDS, nitrate and boron concentrations measured in the mining area ponds that are in direct communication with the upper aquifer are included in the Groundwater Monitoring Program's dataset used maps for the upper aquifer concentration maps (Figure 3.2-9, Figure 3.2-10, and Figure 3.2-11).

3.6 Land Use Monitoring Program

3.6.1 Program Description

Zone 7 monitors land use changes in the Valley as part of the long-range groundwater basin management program. The purpose of the program is to identify changes in land use with emphasis on impervious areas and the volume and quality of irrigation water that could impact the volume or quality of water recharging the Main Basin. There are about 18 specific land use types divided into five general categories. Critical elements identified within each specific type include the type and quality of water used for irrigation, the percent of pervious surface, and the presence of water or irrigated crops subject to evaporative loss (the main mechanism for the concentration of salts). The general categories in the program are:

- **Urban** - includes residential and commercial areas, which typically are irrigated. Small vacant lots, non-irrigated fields, and other undeveloped areas are included as urban land if they are smaller than about 20 acres and are located in urban areas.
- **Irrigated/Agriculture** - consists of irrigated farmland such as vineyards, field crops, vegetable crops and pastures.
- **Gravel Mining Area** - includes all lands that have been mined or are scheduled to be mined in the Chain of Lakes area. Mining area "ponds" include all areas of ponded water or wet silt.
- **Golf Courses** - includes the golf courses overlying the Main Basin (i.e., Castlewood Golf Course, Tri-Valley Golf Center, and Las Positas Golf Course).
- **Unclassified** - land which is generally not irrigated and generally does not fit into any of the categories above (including undeveloped or natural land).

Land use data are derived from aerial photography (annual), interviews with landowners, and field observations. In addition, all areas receiving untreated water from Zone 7 are mapped. The program quantifies Main Basin land use changes for rainfall and applied water recharge calculations.

3.6.2 2009 Results

For the 2009 Water Year land use areas were mapped and quantified for each of the 18 land use types in each of the nodal areas. The map (Figure 3.6-1) shows the geographic information system (GIS) layers produced in 2009 and the data table (Table 3.6-1) provides a summary of the land use data used in the Groundwater Program. For the 2009 Water Year land use over the Main Basin remained relatively unchanged from the 2008 Water Year. Development continues to be slow due to the poor economy effect on real estate. Due to the limited number of crops, the irrigated/agriculture was not differentiated by crop types.

3.7 Groundwater Production Monitoring

3.7.1 Program Description

Zone 7 collects and compiles data for all large capacity pumping wells within the Main Basin. This includes daily and monthly pumping totals from the retailers and 15-minute totals from the Zone 7 production wells. The relative locations of these municipal supply wells are shown in Figure 3.7-1. All Zone 7 production wells are metered. All retailer wells have discharge meters as well, which are read by retailer staff and reported periodically to Zone 7 as required by their treated water contracts with Zone 7. The treated water contracts also allow each retailer to pump a certain volume of groundwater each calendar year from the Main Basin without charge. These volumes are called their Groundwater Pumping Quota [GPQ]. Zone 7 charges the retailers a 'recharge fee' for all groundwater they pump over the annual GPQ unless it is less than the amount carried-over from their previous year's unpumped GPQ allocation.

Records of other pumping wells are obtained from well owners when available. Pumping records from significant wells without meters are estimated from utility records or from the associated land use (e.g. number of acres irrigated). Zone 7 obtains these records as part of the Groundwater Monitoring, Land Use and Untreated Water Contracts programs.

3.7.2 2009 Results

For the 2009 Water Year about 18,200 AF of groundwater was pumped from the Main Basin. Production volumes from the municipal wells (total pumped minus the pumped-to-waste volume) for the 2009 Water Year are shown on Table 3.7-1 and discussed in Section 5.1.3. In addition to the seven municipal wells operated by Zone 7 in Pleasanton, CWS operated 12 wells in the Livermore area, and the City of Pleasanton operated three wells in Pleasanton in 2009.

Zone 7 produced approximately 9,958 AF of groundwater for the 2009 Water Year (about 129% of average), and 10,911 AF for the Calendar Year. This includes the 968 AF of water (2,079 AF for Calendar Year) that was sent through the membranes of the demineralization plant, which went online in July 2009 (Section 5.2.3).

For the 2009 Calendar Year (January to December), CWS, which has a GPQ of 3,069 AF, pumped 3,064 AF. Pleasanton, which has a GPQ of 3,500 AF (plus a carryover of 680 AF from 2008), pumped 3,505 AF and carried-over 675 AF into the 2010 Calendar Year. All other groundwater production was about normal for the basin.

3.8 Wastewater and Recycled Water Monitoring Program

3.8.1 Program Description

Zone 7 compiles and reviews data on the volume and quality of wastewater collected and recycled water used within the watershed from the City of Livermore Water Reclamation Plant (LWRP), DSRSD Water Reclamation plant, and the Veterans Hospital sewage treatment plant.

Zone 7 also reviews Septic Tank Use Applications located within the Valley for compliance with Zone 7's Wastewater Management Plan. Zone 7 must approve all onsite disposal systems for new commercial developments or any residential system that will potentially exceed the loading allowed for the site. See Section 5.3.2 for a summary of Zone 7's 2009 Water Year activities relating to individual onsite wastewater treatment/disposal systems.

3.8.2 2009 Results

The results of the Zone 7 Wastewater Monitoring Program for the 2009 Calendar Year are presented in the following table. The two largest wastewater collection and treatment agencies (LWRP and DSRSD), which treat over 99% of the wastewater in the Valley, are listed first, followed by the much smaller Veterans Hospital and the Main Basin Septic Tanks. The third row ('Volume Recycled') shows the volume recycled within the watershed. The fourth row ('Main Basin') shows the total volume of effluent that is applied over the Main Basin. The final two rows present average nitrogen (as Total Kjeldahl Nitrogen) and TDS concentrations in recycled water.

Table: Wastewater Monitoring Results for 2009 Water Year

	Livermore (LWRP)	DSRSD	VA Hospital	Septic Tanks in MB	Total
FLOW VOLUMES (AF)					
Total Influent	7,462	11,401	48	80	18,991
Volume Exported	5,027	8,871	0	0	13,898
Volume Recycled	1,240	2,221	0	0	3,461
Applied to MB	591	0	48	80	719
RECYCLED WATER CHEMISTRY (mg/L)					
TKN	29-42	24-36	13-18	30-40*	
TDS	610	680	560	500-700*	

* Not monitored due to large number of tanks and diverse quality. Estimated.

MB Main Basin

TKN Total Kjeldahl Nitrogen

TDS Total Dissolved Solids

In 2009, 18,991 AF (19,860 AF in 2008) of wastewater was produced, about 18% of which was recycled. About 20% of the recycled water was applied over the Main Basin. The table helps illustrate the relative magnitude of different sources of recycled water use and wastewater disposal on the basin and watershed. In total, less than one percent of groundwater supply is from wastewater or recycled water origin.

The DSRSD and LWRP wastewater treatment plants performed well, and their effluent water quality, including metals and organics, was within acceptable standards. Recycled water use by the City of Livermore over the Main Basin is increasing (from 406 for 2008 Water Year to 591 AF for 2009 Water Year). Nitrates and elevated salinity were historically the primary groundwater quality concern, but nitrate levels have remained very low since LWRP discontinued nitrifying their effluent in 1995. Recycled water use by DSRSD, which is currently applied only over the fringe subbasins, decreased slightly (from 2,484 AF in 2008 to 2,221 AF in 2009). Over 90% of all wastewater is exported from the watershed via the Livermore-Amador Valley Water Management Agency (LAVWMA) export pipeline. No changes occurred with the Veterans Hospital. Septic tank use is not monitored, so accordingly, no results are available.

**TABLE 3.5-1
ZONE 7 WATER AGENCY
MINING AREA MONITORING PROGRAM
WATER LEVEL DATA
2009 WATER YEAR**

PIT NUMBER	Monitoring	Contact	ORIGINAL GROUND ELEVATION	DEEPEST MINED DEPTH		MINING USE	POND ELEVATION (ft MSL, NAVD88)		PIT AREA (acres)	WATER AND WET CLAY AREA IN ACRES	
				Elev	Depth		2009	SPRING 09		FALL 09	FALL 09
CALROCK/RHODES & JAMIESON/VULCAN/PLEASANTON GRAVEL COMPANY/CALMAT											
C 1	SA	C	410	360	50	UNUSED	376	375.8	32	4	
C 2			410	360	50	CLAY STORAGE			6		
C 3			410	360	50	CLAY STORAGE			10		
C 4			400	390	10	CLAY STORAGE			2		
C 5			400	290	110	CLAY STORAGE			19		
C 6			400	385	15	UNUSED			12		
C 7			400	330	70	CLAY STORAGE			26		
C 8A		C	410	330	80	UNUSED			20		
C 8B		C	410	340	70	UNUSED			19	1	
C 9			410	310	100	UNUSED			21		
C10			410	330	80	REMINED AS R28			11		
R 1			370	240	130	RENUMBERED R12					
R 2			370	240	130	RENUMBERED R12					
R 3	SA	CP	370	240	130	WATER & CLAY	330	329	15	10	
R 4	M	CP	380	240	140	WATER STORAGE	306.7	306.7	16	11	
R 5			380	240	140	CLAY STORAGE			31		
R 6			370	270	100	RENUMBERED R13					
R 7			370	270	100	RENUMBERED R13					
R 8	SA	CP	365	260	105	WATER STORAGE	358	354	46	39	
R 9			370	280	90	RENUMBERED R17					
R10			380	370	10	CLAY STORAGE			2		
R11			390	370	20	CLAY STORAGE			3		
R12			370	240	130	CLAY STORAGE			39		
R13			370	270	100	CLAY & DEBRIS			28		
R14			400	380	20	UNUSED			11		
R15			380	360	20	RENUMBERED R16					
R16			380	270	110	RENUMBERED R23/24					
R17			370	300	70	RENUMBERED R27					
R18			380	290	90	RENUMBERED R22					
R19			380	300	80	RENUMBERED R27					
R20			390	320	70	RENUMBERED R22					
R21		N	380	280	100	WATER & CLAY			44	36	
R22	SA	CP	380	290	90	WATER STORAGE	358	354	79	66	
R23	SA	CP	380	270	110	WATER STORAGE	353.5	353	27	21	
R24	M	C	390	280	110	WATER STORAGE	320.7	317.7	143		
R25			395	300	95	INACTIVE MINING			38	4	
R26			390	310	80	INACTIVE MINING			6	1	
R27		N	380	300	80	WATER STORAGE			59		
R28	M	CP	400	320	80	ACTIVE MINING	319.7	318.4	134	3	

M = Monthly
SA = Semiannual
C = in contact with GW levels
CP = GW contact but subject to pumping
N = no contact with GW.

Table 3.5-1
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**TABLE 3.5-1
ZONE 7 WATER AGENCY
MINING AREA MONITORING PROGRAM
WATER LEVEL DATA
2009 WATER YEAR**

PIT NUMBER	Monitoring	Contact	ORIGINAL GROUND ELEVATION	DEEPEST MINED DEPTH		MINING USE	POND ELEVATION (ft MSL, NAVD88)		PIT AREA (acres)	WATER AND WET CLAY AREA IN ACRES	
				Elev	Depth		2009	SPRING 09		FALL 09	FALL 09
KAISER GRAVELS/HANSON											
K 1			350	325	25	CLAY STORAGE			3		
K 2			350	325	25	CLAY STORAGE			4		
K 3			350	315	35	RENUMBERED K 4					
K 4			350	315	35	CLAY STORAGE			13		
K 5			350	315	35	CLAY STORAGE			10		
K 6			350	325	25	CLAY STORAGE			13		
K 7			350	320	30	CLAY STORAGE			12		
K 8			350	320	30	CLAY STORAGE			18		
K 9			360	305	55	CLAY STORAGE			57		
K10			370	355	15	CLAY STORAGE			4		
K11			370	315	55	CLAY STORAGE			24		
K12			370	275	95	CLAY STORAGE			38		
K13			370	275	95	CLAY STORAGE			15		
K14			370	275	95	CLAY STORAGE			6		
K15	M	C	360	265	95	WATER STORAGE	329.65	329.87	142	88	
K16			360	325	35	RENUMBERED K15					
K17			360	330	30	RENUMBERED K18					
K18	SA	C	360	330	30	UNUSED	345.91	346.01	10	11	
K19			350	335	15	CLAY STORAGE			10		
K20			370	255	115	RENUMBERED K30					
K21			370	240	130	RENUMBERED K30					
K22			370	260	110	RENUMBERED K30					
K23			360	260	100	RENUMBERED K30					
K24			360	220	140	CLAY STORAGE			88	1	
K25			360	230	130	RENUMBERED K30					
K26			360	230	130	RENUMBERED K30					
K27			350	300	50	RENUMBERED K31					
K28	M	C	360	220	140	WATER STORAGE	299.8	293.2	90	59	
K29			360	230	130	RENUMBERED K30					
K30	SA	N	370	240	130	WATER & CLAY			292	181	
K31			360	220	140	RENUMBERED K36					
K32			360	335	25	CLAY STORAGE			34		
K33			360	335	25	UNUSED			13		
K34			350	215	135	RENUMBERED K37					
K35			360	200	160	RENUMBERED K37					
K36			360	220	140	RENUMBERED K37					
K37	M	C	360	220	140	WATER STORAGE	299.8	293.2	326	239	

M = Monthly
SA = Semiannual
C = in contact with GW levels
CP = GW contact but subject to pumping
N = no contact with GW.

TABLE 3.5-1
ZONE 7 WATER AGENCY
MINING AREA MONITORING PROGRAM
WATER LEVEL DATA
2009 WATER YEAR

PIT NUMBER	Monitoring	Contact	ORIGINAL GROUND ELEVATION	DEEPEST MINED DEPTH		MINING USE 2009	POND ELEVATION (ft MSL, NAVD88)		PIT AREA (acres) FALL 09	WATER AND WET CLAY AREA IN ACRES	
				Elev	Depth		SPRING 09	FALL 09		SPRING 09	FALL 09
PACIFIC AGGREGATE/RMC/LONESTAR/CEMEX											
P 1			380	360	20	CLAY STORAGE			1		
P 2		CP	380	360	20	WATER STORAGE			1	1	
P 3			400	360	40	CLAY STORAGE			8		
P 4			400	360	40	CLAY STORAGE			8		
P 5			390	350	40	RENUMBERED P38					
P 6			380	280	100	CLAY & DEBRIS			29		
P 7			380	280	100	CLAY & DEBRIS			17		
P 8			380	270	110	RENUMBERED P22					
P 9			400	380	20	CLAY STORAGE			3		
P10	SA	C	400	340	60	UNUSED	372.53	372.8	34	18	
P11	SA	C	380	340	40	UNUSED	349.6	349.7	7	1	
P12	M	C	360	330	30	UNUSED	346.05	346.02	16	16	
P13	M	C	380	300	80	WATER STORAGE	329.65	329.87	2	1	
P14			390	310	80	RENUMBERED P22					
P15			390	340	50	RENUMBERED P19					
P16			390	250	140	RENUMBERED P43					
P17			390	240	150	RENUMBERED P23					
P18			390	240	150	RENUMBERED P23					
P19			390	260	130	RENUMBERED P27					
P20			390	280	110	RENUMBERED P33					
P21			380	240	140	CLAY STORAGE			21	9	
P22			380	270	110	RENUMBERED P34/35					
P23			390	240	150	RENUMBERED P43					
P24			390	250	140	RENUMBERED P30					
P25			390	270	120	RENUMBERED P30					
P26			390	210	180	RENUMBERED P31					
P27	SA	C	390	250	160	WATER STORAGE	314.4	309.4	31	19	
P28	SA	CP	420	360	60	WATER STORAGE	409.8	404.4	35	9	
P29			430	420	10	UNUSED			42		
P30			390	240	150	RENUMBERED P32/33					
P31			390	210	180	RENUMBERED P36/37					
P32			390	290	100	RENUMBERED P36					
P33			390	240	150	RENUMBERED P43					
P34			380	270	110	CLAY & DEBRIS			46	2	
P35			380	270	110	RENUMBERED P42					
P36			390	220	170	RENUMBERED P43					
P37			390	210	180	RENUMBERED P43					
P38			390	250	140	RENUMBERED P44/45					
P39			410	380	30	INACTIVE MINING			35	0	
P40	SA	C	390	260	130	WATER STORAGE	328.4	323.4	15	3	
P41	M	CP	410	370	40	WATER STORAGE	377.82	383.8	85	11	
P42	M	CP	380	310	70	ACTIVE MINING	276.63	277.3	100	4	
P43		N	390	240	150	WATER & CLAY			114	111	
P44	M	CP	390	250	140	WATER STORAGE	323.1	323.8	23	10	
P45	SA	CP	380	310	70	WATER STORAGE	323.1	323.8	25	14	

M = Monthly
SA = Semiannual
C = in contact with GW levels
CP = GW contact but subject to pumping
N = no contact with GW.

TABLE 3.5-2
ZONE 7 WATER AGENCY
WATER QUALITY RESULTS FOR MINING AREA WATER SAMPLES
2009 Water Year

SITE ID	DATE	TEMP. °C	EC umhos/cm	pH	Mineral Constituents (mg/L)									Select Metals (mg/L)				TDS mg/L	Hard mg/L
					Ca	Mg	Na	K	HCO3	SO4	Cl	NO3	SiO2	B	As	Fe	Mn		
MA-C01	15-Oct-08	18.3	1162	8.5	28	65	137	4.1	336	76	183	<0.44	7.7	0.92	<0.005	0.15	0.018	676	338
MA-C01	24-Sep-09	24.7	1289	8.7	22	72	130	3.6	334	86	198	<0.44	8.0	0.82	0.01	0.055	<0.01	700	350
MA-K15	9-Oct-08	23.3	783	8.6	34	35	72	3.5	217	52	97	<0.44	9.0	0.58	0.0036	0.11	<0.01	417	227
MA-K15	23-Apr-09	19.7	760	8.4	36	34	68	3.2	224	53	94	<0.44	7.8	0.48	0.0022	0.069	<0.01	412	231
MA-K15	24-Sep-09	25.9	765	8.5	31	36	66	3.3	217	56	97	<0.44	8.3	0.47	0.0036	0.084	<0.01	411	228
MA-K18	9-Oct-08	21.9	664	8.1	41	21	60	2.9	193	35	83	<0.44	7.0	0.27	<0.002	<0.05	0.023	347	190
MA-K18	24-Sep-09	24.5	547	8.6	32	20	50	2.4	161	29	71	<0.44	7.5	0.26	0.0012	0.09	0.019	297	160
MA-K28	8-Oct-08	22.7	872	0.0														497	
MA-K28	9-Oct-08	22.7	894	8.7	33	48	82	2.3	268	51	113	<0.44	10.3	0.73	0.002	0.14	0.014	484	281
MA-K28	23-Apr-09	19.6	916	8.4	40	50	78	2.1	300	50	111	1.28	6.6	0.69	0.002	0.12	0.012	494	305
MA-K28	17-Sep-09	23.6	925	8.6	32	54	82	2.4	289	66	124	<0.44	8.4	0.75	0.0025	1.5	0.041	522	303
MA-K30	9-Oct-08	22.7	1673	8.8	29	85	195	2.9	299	142	293	<0.44	3.0	1.81	0.0086	0.053	0.017	915	424
MA-K30	17-Sep-09	24.0	1696	8.8	26	93	192	3.0	305	153	325	<0.44	1.8	1.87	0.0087	0.079	<0.01	962	447
MA-K37	8-Oct-08	22.7	973	0.0														555	
MA-K37	9-Oct-08	22.7	959	8.8	33	55	100	2.4	278	62	134	<0.44	3.0	0.86	0.0046	<0.05	<0.01	543	309
MA-K37	23-Apr-09	21.0	967	8.7	35	54	91	2.3	289	60	129	<0.44	2.4	0.97	0.0041	<0.05	<0.01	529	310
MA-K37	17-Sep-09	23.6	962	8.7	25	57	84	2.2	272	72	141	<0.44	2.1	0.86	0.0039	<0.05	<0.01	530	297
MA-P10	15-Oct-08	17.8	628	8.0	42	20	64	3.1	176	35	92	<0.44	14.4	0.31	<0.005	<0.05	0.029	359	188
MA-P10	24-Sep-09	23.8	604	8.2	34	17	54	2.5	153	29	91	<0.44	12.1	0.23	0.0013	<0.05	0.018	317	156
MA-P11	15-Oct-08	17.4	682	0.0														389	
MA-P12	8-Oct-08	21.5	665	0.0														379	
MA-P12	9-Oct-08	21.5	695	7.9	46	22	62	3.3	202	32	84	<0.44	11.2	0.32	<0.002	0.17	0.13	361	204
MA-P12	23-Apr-09	20.3	649	8.1	46	21	55	2.2	186	48	79	<0.44	8.8	0.27	0.0011	<0.05	0.04	354	203
MA-P12	24-Sep-09	24.2	592	8.4	37	19	49	2.6	174	26	76	<0.44	9.0	0.25	0.0013	0.51	0.078	308	173
MA-P27	15-Oct-08	20.4	699	8.6	35	34	52	2.2	186	56	86	<0.44	8.8	0.49	<0.005	0.29	0.021	372	226
MA-P27	24-Sep-09	25.1	670	8.7	30	34	49	1.8	170	58	90	<0.44	6.5	0.40	0.0023	0.23	0.02	361	217
MA-P28	9-Oct-08	16.3	888	8.2	32	42	84	2.9	219	41	131	<0.44	9.8	0.37	<0.003	0.069	0.021	454	252
MA-P28	17-Sep-09	24.7	834	8.7	28	44	70	2.5	200	57	134	<0.44	5.7	0.33	0.0033	0.051	0.011	449	250
MA-P40	23-Apr-09	20.7	680	9.3	18	41	67	1.2	189	36	88	<0.44	<1.1	0.58	0.0023	0.09	<0.01	380	214
MA-P41	8-Oct-08	23.5	835	0.0														476	
MA-P41	9-Oct-08	23.5	877	8.5	46	38	74	2.8	239	39	120	<0.44	13.8	0.32	0.002	0.58	0.16	458	272
MA-P41	23-Apr-09	18.1	888	8.0	67	38	58	1.8	272	41	118	3.59	21.6	0.25	0.0038	1.8	0.68	485	323
MA-P41	17-Sep-09	24.5	983	8.5	37	50	87	1.5	211	72	169	<0.44	11.6	0.33	0.0028	<0.05	0.054	538	300
MA-P42	8-Oct-08	19.8	698	0.0														398	
MA-P42	9-Oct-08	19.8	735	8.0	55	26	53	2.0	234	41	74	<0.44	14.0	0.38	<0.001	<0.05	0.082	382	245
MA-P42	23-Apr-09	20.7	686	8.3	52	26	51	1.5	213	44	78	0.71	13.9	0.35	0.0013	0.49	0.077	376	239
MA-P42	17-Sep-09	23.0	672	8.2	50	26	53	1.5	268	49	77	<0.44	15.4	0.29	<0.001	0.084	0.059	408	232
MA-P43	9-Oct-08	18.3	675	0.0														385	
MA-P43	23-Apr-09	21.3	656	8.5	48	22	53	2.3	170	52	86	<0.44	8.9	0.35	<0.001	0.21	<0.01	361	211
MA-P44	8-Oct-08	22.5	670	0.0														382	
MA-P44	9-Oct-08	22.5	697	8.4	43	24	60	2.2	174	53	87	<0.44	11.3	0.43	<0.001	0.11	<0.01	370	206
MA-P44	23-Apr-09	20.1	656	8.6	48	26	52	2.2	186	49	84	<0.44	10.7	0.36	0.0013	1.9	0.046	370	228
MA-P44	17-Sep-09	25.9	656	8.5	34	28	50	1.8	157	60	92	<0.44	9.6	0.34	<0.001	0.23	<0.01	357	200
MA-P45	9-Oct-08	18.1	675	0.0														385	
MA-R03	9-Oct-08	18.2	791	0.0														451	
MA-R03	23-Apr-09	21.1	748	8.7	34	44	55	3.0	215	50	93	0.71	8.4	0.38	<0.001	0.93	0.034	404	267
MA-R04	8-Oct-08	21.6	795	0.0														453	
MA-R04	9-Oct-08	21.6	830	8.5	43	48	55	2.3	258	49	91	6.95	19.9	0.42	0.0016	0.48	0.026	450	304
MA-R04	23-Apr-09	21.1	742	8.6	35	44	54	2.1	228	50	92	2.08	6.7	0.38	<0.001	0.057	0.034	407	271
MA-R04	17-Sep-09	23.7	812	8.5	37	50	52	2.3	252	61	105	<0.44	13.7	0.39	0.0032	0.066	0.067	452	298
MA-R08	9-Oct-08	20	1165	0.0														664	
MA-R08	23-Apr-09	22.0	970	8.7	40	58	81	2.7	279	65	132	1.24	6.3	0.56	0.0024	0.47	0.02	537	339

TABLE 3.5-2
ZONE 7 WATER AGENCY
WATER QUALITY RESULTS FOR MINING AREA WATER SAMPLES
2009 Water Year

SITE ID	DATE	TEMP. °C	EC umhos/cm	pH	Mineral Constituents (mg/L)									Select Metals (mg/L)				TDS mg/L	Hard mg/L	
					Ca	Mg	Na	K	HCO3	SO4	Cl	NO3	SiO2	B	As	Fe	Mn			
MA-R22	9-Oct-08	19.5	820	0.0															467	
MA-R23	9-Oct-08	19.3	846	0.0															482	
MA-R23	23-Apr-09	21.7	780	8.9	32	49	57	2.3	225	51	99	1.24	3.9	0.40	0.0015	0.13	0.078	423	280	
MA-R24	8-Oct-08	22.3	797	0.0															454	
MA-R24	9-Oct-08	22.3	823	9.8	15	44	82	1.1	93	67	135	<0.44	3.8	0.56	0.0039	0.25	0.012	449	219	
MA-R24	23-Apr-09	24.3	833	9.0	30	48	73	2.1	215	61	117	<0.44	1.0	0.46	0.0018	0.34	0.016	458	273	
MA-R24	17-Sep-09	23.9	964	9.7	12	53	98	<0.5	108	87	182	<0.44	2.3	0.52	0.004	0.09	0.014	538	249	
MA-R28	9-Oct-08	19.8	684	8.2	43	25	60	1.7	163	54	91	<0.44	15.1	0.47	<0.001	0.15	0.011	372	211	
MA-R28	23-Apr-09	17.2	649	8.0	44	24	53	1.5	172	52	84	<0.44	11.2	0.35	<0.001	0.096	0.015	356	209	
MA-R28	17-Sep-09	23.9	589	8.6	32	29	39	1.4	173	34	78	2.44	17.1	0.24	<0.001	0.28	<0.01	325	200	

TABLE 3.6-1
ZONE 7 WATER AGENCY

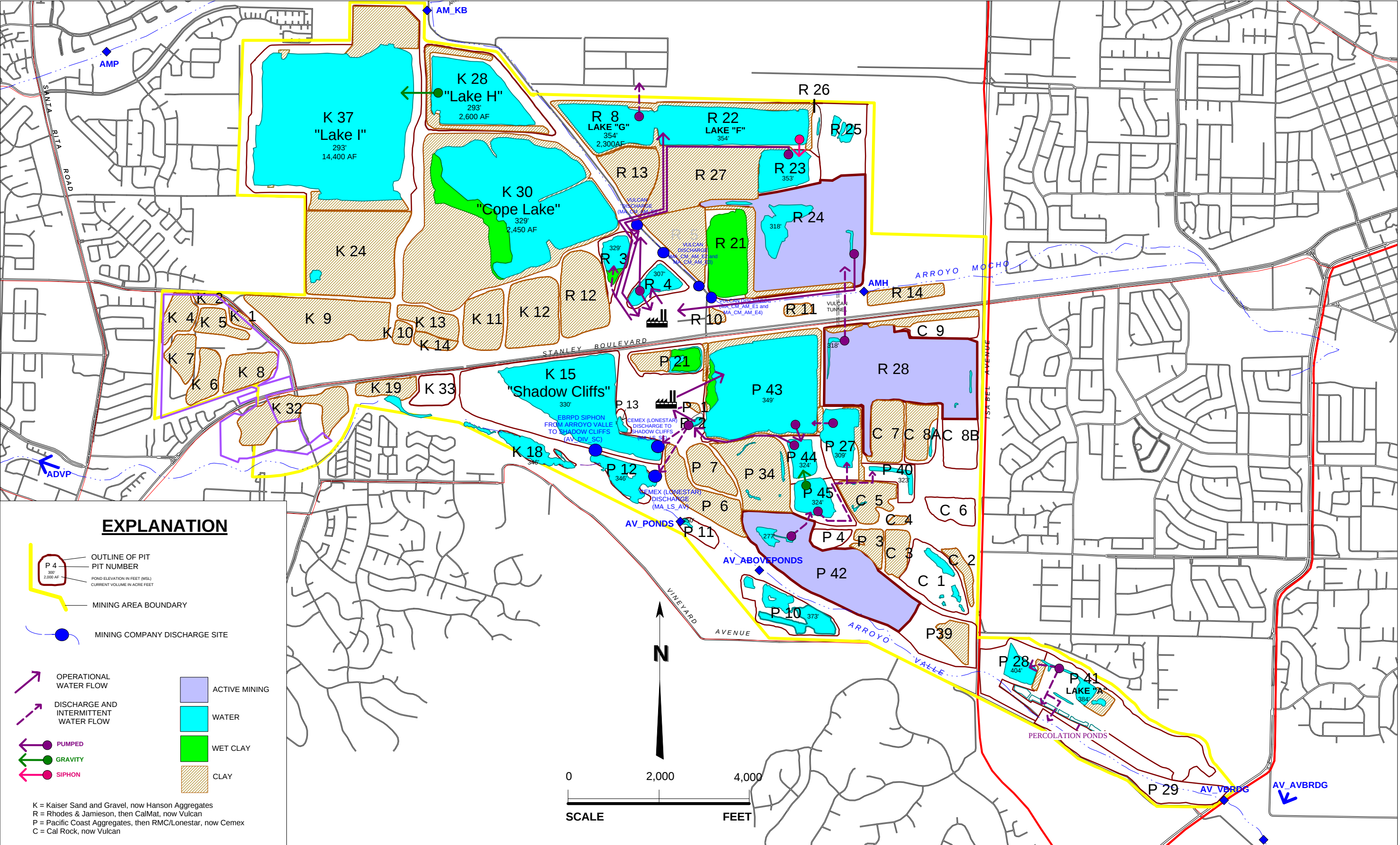
LAND USE ACREAGE BY MAIN BASIN NODE
AND LAND USE TYPE
2009 WATER YEAR
NEAREST 10 ACRES

LAND USE TYPE NUMBER	1	1.1	2	3	4	5	6	7	7.1	7.2	8	9	10	11	12	13	14	15		
NODE	URBAN		IRRIGATED/AGRICULTURAL				Non Irrigated	GRAVEL MINING AREA							GOLF COURSES				TOTAL NODE	
	POTABLE WATER Urban	RECLAIMED WATER UrbanRec	METERED GROUNDWATER AgMetGW	UNMETERED GROUNDWATER AgUnMGW	METERED SURFACE WATER AgMetSW	RECLAIMED WASTEWATER AgRec	UNCLASSIFIED LAND NonIrr	TOTAL WET MAPonded	PONDED WATER (subset)	PONDED WET SILT (subset)	RECLAIMED MAREc	URBAN MAUrban	AGRICUL- TURAL MAAg	OTHER MAOther	METERED GW GolfMetGW	UNMETERED GW GolfUnMGW	METERED SW GolfMetSW	RECLAIMED WASTEWATER Golf Rec		
15	410		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	410	
16	470		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	470	
17	280		0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	300	
18	680		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	680	
19	460		0	0	0	0	240	0	0	0	0	0	0	0	0	0	0	0	700	
20	270		0	0	0	0	180	0	0	0	0	0	0	0	80	0	0	0	530	
23	410		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	410	
24	500		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	
25	550		0	0	0	0	20	0	0	0	60	160	0	90	0	0	0	0	880	
26	670		0	0	0	0	60	150	150	0	20	0	0	50	0	0	0	0	950	
29	20		0	0	0	0	270	0	0	0	0	0	0	0	0	10	0	90	390	
30	30		0	10	0	0	150	260	250	10	120	0	0	140	0	0	0	10	720	
31	40		0	0	0	0	0	330	270	60	330	0	0	510	0	0	0	0	1210	
33	100	10	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	30	160	
34	190	40	0	0	0	0	260	70	70	0	20	0	0	100	0	0	0	0	680	
35	930	10	0	0	70	0	30	210	200	10	250	0	0	850	0	0	10	0	2360	
36	530		0	20	430	0	530	50	50	0	0	0	0	140	0	0	50	0	1750	
38	660	10	0	30	0	0	170	0	0	0	0	0	0	0	0	0	0	0	870	
39	1840		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1840	
40	240		0	0	270	0	400	0	0	0	0	0	0	0	0	0	0	0	910	
41	0		0	10	230	0	1380	0	0	0	0	0	0	0	0	0	0	0	1620	
42	570		0	0	60	0	60	0	0	0	0	0	0	0	0	0	0	0	690	
TOTAL	9850	70	0	70	1060	0	3790	1070	990	80	800	160	0	1880	80	10	60	130	19030	
% AREA OF TOTAL	52%	0%	0%	0%	6%	0%	20%	6%	5%	0%	4%	1%	0%	10%	0%	0%	0%	1%	100%	
Urban: Potable & Recl	9,920 acres		AgMetSW + GolfMetSW: Main Basin				1289 acres								TOTALS					
Golf	280 acres		AgMetSW + GolfMetSW: Outside Main Basin				2875 acres								Urban & Golf				10200 acres	54%
Mining Area: Urban	160 acres		Total Metered SW Area				4164 acres								Irrigated Ag				1130 acres	6%
TOTAL URBAN	10,360 acres		Ratio: Met. SW Main Basin/Total Met. SW				31%								Unclassified				3790 acres	20%
															Mining Area				3910 acres	21%

Table 3.7-1
Groundwater Production From Municipal and Other Supply Wells
2009 Water Year (in Acre-feet)

Station ID	Well	Common Name	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	WY*	CY**
Owner: Zone 7																
HOP 6	3S/1E 18A 6	Hopyard 6	303.5	118.8	1.8	34.7	11.0	9.5	98.8	264.5	256.0	287.6	131.4	1.8	1519.5	1143.5
HOP 9	3S/1E 17D12	Hopyard 9	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	6.1	0.0	0.0	8.3	8.3
MOCHO 1	3S/1E 9M 2	Mocho 1	74.3	104.3	38.1	85.3	83.5	26.1	101.3	111.4	125.2	200.7	141.5	175.5	1267.2	1543.4
MOCHO 2	3S/1E 9M 3	Mocho 2	0.0	0.0	0.6	16.0	58.6	0.0	86.2	50.6	49.7	112.9	119.4	170.3	664.4	855.3
MOCHO 3	3S/1E 9M 4	Mocho 3	0.0	20.6	35.9	23.6	182.0	190.9	206.5	16.3	166.3	333.0	290.0	317.3	1782.5	2716.4
MOCHO 4	3S/1E 8H18	Mocho 4	55.5	3.7	9.5	83.2	63.8	0.6	49.7	8.3	123.4	351.4	372.0	432.7	1553.8	1957.4
STONERIDGE_1	3S/1E 9B 1	Stoneridge	297.7	217.3	190.9	188.1	112.9	146.1	295.9	400.5	448.4	460.0	236.6	170.0	3164.4	2687.8
TOTALS															9960.1	10912
Owner: Pleasanton																
PLEAS #5	3S/1E 16L 5	Pleas 5	100.0	30.9	0.4	0.0	0.0	0.0	0.0	54.6	163.0	142.5	272.0	208.6	972.1	956.7
PLEAS #6	3S/1E 16L 7	Pleas 6	105.2	31.9	0.4	0.0	0.0	0.0	0.0	55.8	167.3	145.8	278.6	212.6	997.6	979.2
PLEAS #8	3S/1E 16A 2	Pleas 8	228.6	43.6	119.8	0.0	0.0	2.8	172.0	192.9	193.9	173.5	334.5	229.1	1690.7	1569.4
TOTALS															3660.3	3505.2
Owner: Other																
GWP_3S1E1P3	3S/1E 1P 3	New airport well	0.0	0.0	0.0											
GWP_3S1E20B2	3S/1E 20B 2	Fairgrounds Potable	26.0	13.1	10.1	7.6	7.4	12.0	28.8	29.5	29.7	37.1	30.1	42.0	273.3	250
GWP_3S1E20C3	3S/1E 20C 3	Fairgrounds Potable Backup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	19.1	18.8	18.7	0.0	61.6	81.1
TOTALS															334.9	331.1
Owner: California Water Service																
CWS# 5(16B1)	3S/2E 16B 1	CWS STA 5	6.4	0.0	0.0	0.0	0.0	0.0	0.0	17.0	19.0	19.4	11.2	0.0	73	66.6
CWS# 8(8P 1)	3S/2E 8P 1	CWS STA 8	1.6	0.0	0.0	3.8	3.5	13.0	30.5	32.1	34.4	34.0	35.2	29.3	217.5	216.3
CWS# 9(9Q 1)	3S/2E 9Q 1	CWS STA 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.7	25.5	30.8	34.4	34.9	152.4	158.3
CWS#10 (8F1)	3S/2E 8F 1	CWS STA 10	16.0	17.3	21.1	29.7	29.8	29.3	27.0	35.1	36.6	33.5	35.8	30.0	341.3	301.8
CWS#12 (9P1)	3S/2E 9P 1	CWS STA 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	13.4	45.9	45.8	41.1	152	152.4
CWS#14 (8N2)	3S/2E 8N 2	CWS STA 14	39.7	42.8	47.3	66.1	60.4	42.5	71.8	71.2	62.5	62.7	64.9	63.3	695.3	759.6
CWS#15 (16C1)	3S/2E 16C 1	CWS STA 15	0.1	0.0	0.0	0.0	0.0	0.0	0.0	41.0	47.8	45.5	42.1	39.0	215.4	223.5
CWS#17 (9L1)	3S/2E 9L 1	CWS STA 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
CWS#19 (8G1)	3S/2E 8G 1	CWS STA 19; Key_Mo2_L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2
CWS#20 (18B1)	3S/2E 18B 1	CWS STA 20	8.4	0.0	0.0	0.0	0.0	0.0	0.3	0.1	16.1	41.9	40.0	40.8	147.6	140.4
CWS#24 (7P3)	3S/2E 7P 3	CWS STA 24	28.2	43.4	48.1	36.8	13.0	28.6	22.2	70.8	69.6	68.8	59.9	58.7	548.1	500.3
CWS#31 (7R3)	3S/2E 7R 3	CWS STA 31	30.9	27.3	0.0	0.8	0.6	47.1	71.2	73.2	78.0	86.0	85.2	80.2	580.5	545.4
TOTALS															3123.3	3064.7

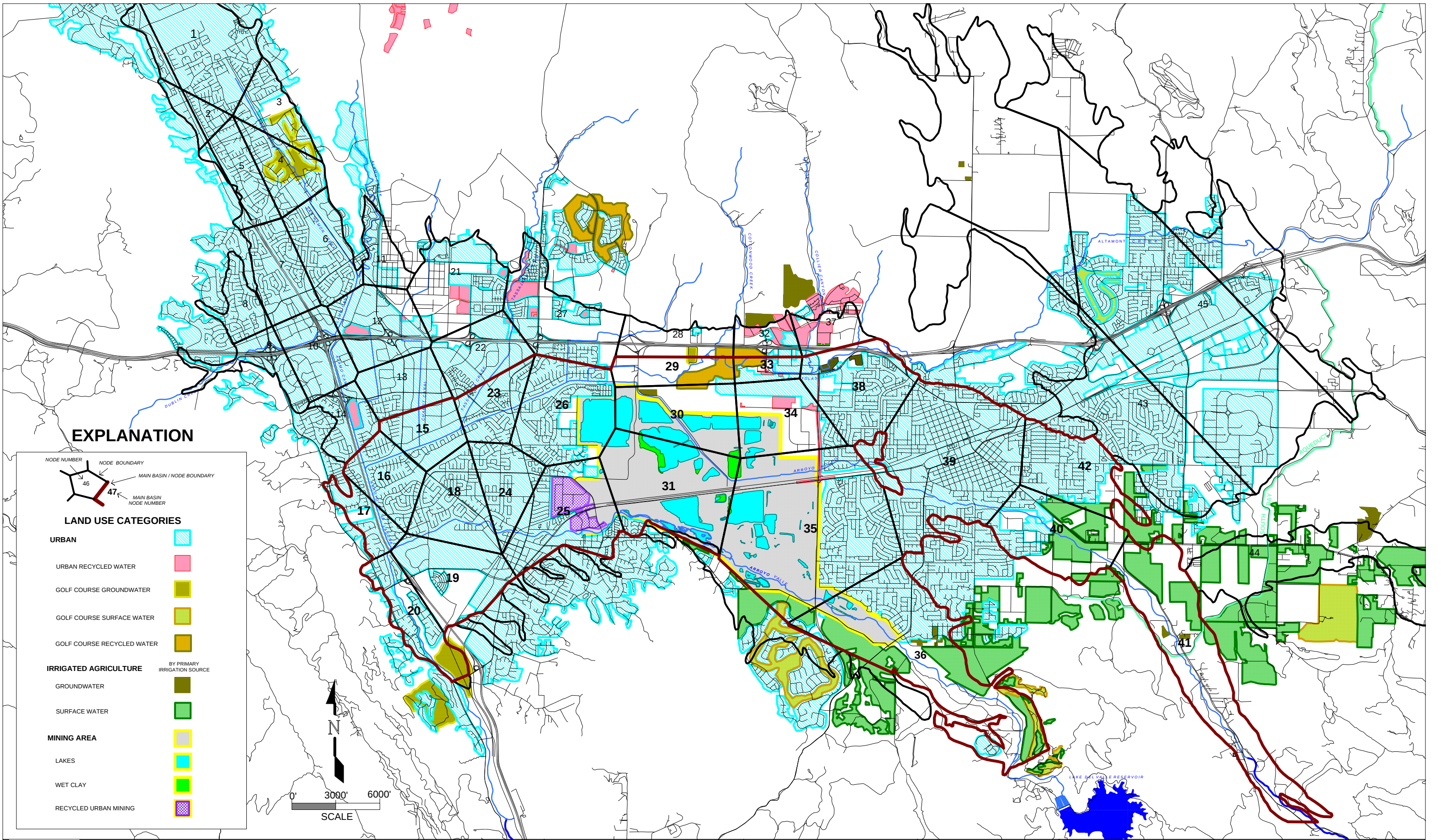
* Water Year - from October 2008 to September 2009;
 ** Calendar Year - from January 2009 to December 2009;
 Does not include pumped volume to waste.



ZONE 7 WATER AGENCY
100 NORTH CANYONS PKWY, LIVERMORE, CA

DRAWN	TW/TR	SCALE	1" = 2,000'
DESIGNED	T.WENDLER	DATE	April 5, 2010
CHECKED		FILE:	H:/MA/2009CY/ GWMPcopyMa09circ.WOR
APPROVED			

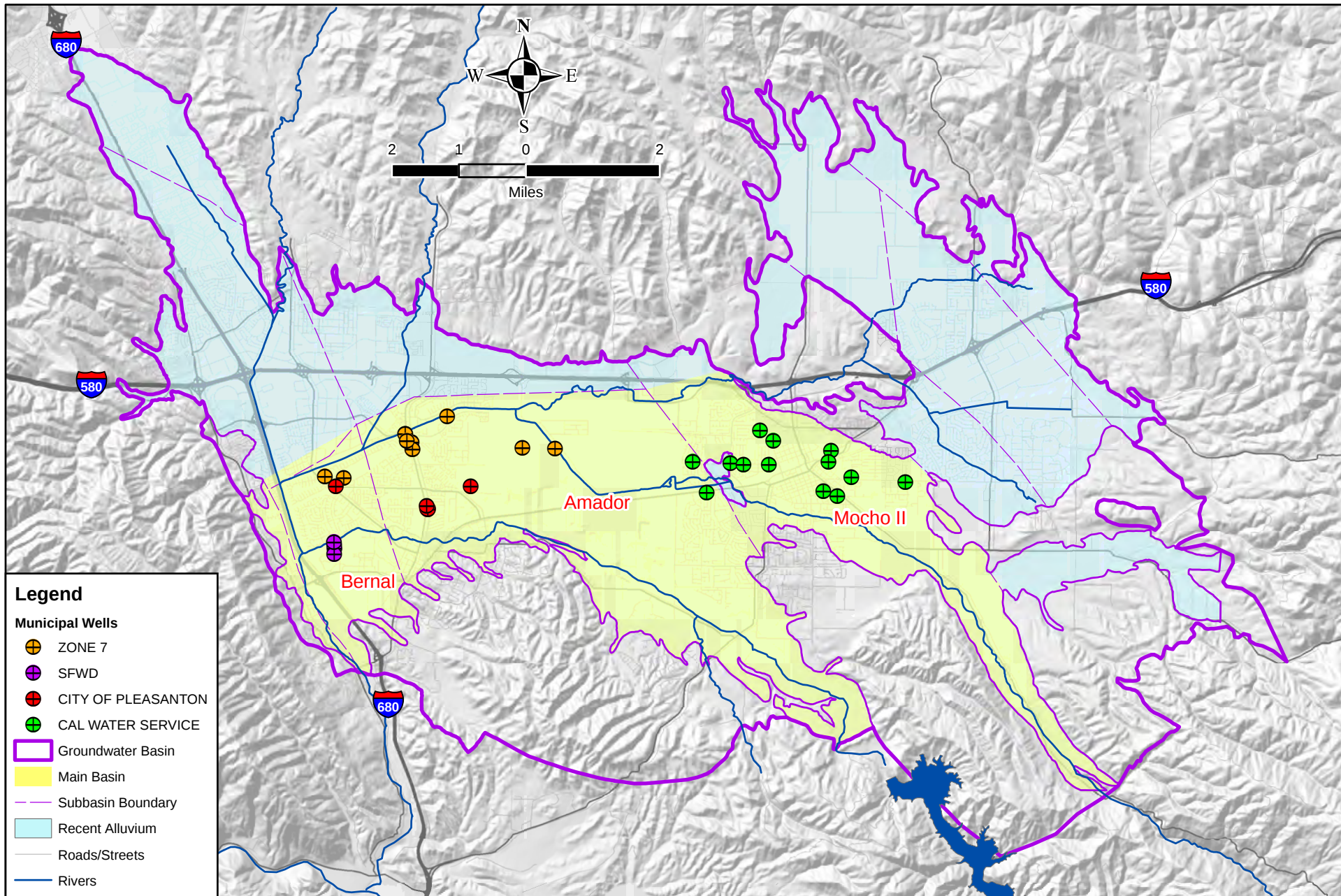
FIGURE 3.5-1
LOCATION OF GRAVEL MINING PITS &
WATER CIRCULATION PATTERNS - 2009 WATER YEAR



ZONE 7 WATER AGENCY
100 NORTH CANYONS PKWY, LIVERMORE, CA

DRAWN	TODD WENDLER	SCALE	1" = 6000'
DESIGNED	TODD WENDLER	DATE	May 7, 2010
CHECKED	Tom Rooze	FILE NO.	E:\MONITOR\Land Use\2009WY\Fig3.6-1-LUMap2009.wor
APPROVED			

FIGURE 3.6-1
LIVERMORE VALLEY LAND USE
2009 WATER YEAR



ZONE 7 WATER AGENCY
 100 North Canyons Parkway, Livermore, CA

DRAWN: TR

REVIEWED: TR

File: P\WRE\GWP\2009AnnRpt\Figures
 Fig3.7-1BasinSubbasins.mxd

**LOCATIONS OF
 SUB-BASINS AND
 MUNICIPAL WELLS**

Scale: 1" = 2 Miles

Date: May 6, 2010

FIGURE 3.7-1