

2.1.2 2013 Results

In the 2013 Water Year (October 2012 through September 2013), rainfall in the Valley was only 78% of the calculated average water year. Rainfall totals from individual stations ranged from 8.73 inches at Station 24 (Patterson Pass Water Treatment Plant) to 17.25 inches at Station 44 (Mt. Hamilton). Evapotranspiration (ET_o) was 47.33 inches (111% of normal) at the Lake Del Valle Station. ET_o was 52.73 inches at the CIMIS station (the station is too new to have established a “normal”).

A graph of cumulative rainfall from Station 15E, presents data for the 2013 Water Year (October 2012 through September 2013), along with the driest water year (1977 [October 1976 through September 1977]), the calculated average water year, the wettest year (1983 [October 1982 through September 1983]), and the 2012 Water Year (October 2011 through September 2012) for comparison (*Figure 2.1-3*). The monthly precipitation totals for each of Zone 7's precipitation stations for the 2013 Water Year are shown in *Figure 2.1-4*. *Figure 2.1-5* shows historical monthly data from Station 15E in Livermore, the station with the longest historical record (1871-2013). Daily and 15-minute data are archived in Zone 7's database.

Figure 2.1-6 provides the monthly ET_o for each of the three monitoring stations during the 2013 Water Year (October 2012 through September 2013), and *Figure 2.1-7* shows monthly pan evaporation measured at Lake Del Valle (LDV-EV) data going back to the 1969 Water Year (October 1968 through September 1969).

2.2 Surface Water Monitoring

This section describes the Surface Water Program, which focuses on the four main gaining and losing streams that impact the groundwater basin (i.e., Arroyo Valle, Arroyo Mocho, Arroyo Las Positas, and Arroyo De La Laguna), and the diversions and accretions that affect the flows into or from each of them. Stream recharge volumes for the 2013 Water Year (October 2012 through September 2013) are described in Chapter 3, Section 3.1.2.2.

2.2.1 Program Description

The objectives of Zone 7's Surface Water Monitoring Program are:

- **Surface Water Flow Monitoring** – Quantify inflow and outflow of surface water to/from the Livermore-Amador Valley. These data are used for hydraulic modeling of the watershed for flood control management purposes. Also, to quantify the portions recharging the groundwater basin's aquifers and the amounts being discharged from the groundwater basin as a result of the gravel quarries' dewatering operations;

- **Surface Water Quality Monitoring** - Provide a record of water quality for the basin's recharge and discharge waters with which the groundwater basin's annual salt loading is calculated;
- **Del Valle Water Rights** - Satisfy the requirements of Zone 7's and Alameda County Water District's (ACWD) existing water rights permits on the Arroyo Valle. This involves quarterly sampling and continuous flow monitoring at two surface water stations; and
- **NPDES Permitting** - Monitor Zone 7's water discharges, if any, at the Del Valle Water Treatment Plant (DVWTP), and Patterson Pass Water Treatment Plant (PPWTP) (as required by National Pollutant Discharge Elimination System (NPDES) No. CAG382001, Order No. R2-2009-0033). Samples are taken above and below existing treatment plant discharge points during the first significant rainfall event of the season.

The program utilizes a network of telemetered recorder stream gage stations and meters (*Figure 2.2-1* and *Figure 2.2-2*) to compute the quantity of water flowing past each station. Stream discharge measurements are periodically conducted at each station to recalibrate the gage, if necessary, to maintain its accuracy. Once per year, water samples are collected from all ten main recorder sites and four other NPDES sites in the program and submitted to Zone 7's laboratory for analysis of metals and minerals; the same parameters that are routinely analyzed in the Groundwater Monitoring Program (Section 2.4).

2.2.2 2013 Water Year Results

The 2013 Water Year (October 2012 through September 2013) Surface Water Monitoring Program included 12 surface water recorder stations (*Figure 2.2-3*). Monthly total flows for the 2013 Water Year for 10 of the 12 recording stations are presented in *Figure 2.2-4*. All of these stations were maintained throughout the year and records have been reviewed and archived as part of the long-term historical record. Two of the 12 stations are less than two years old and are for high flow monitoring only. A discharge record has not yet been computed at those two stations due to lack of high flow discharge measurements during the relatively dry period since installation. For the 2013 Water Year, water quality at the ten main recorder stations was routinely sampled and analyzed. These results are presented in *Figure 2.2-5*.

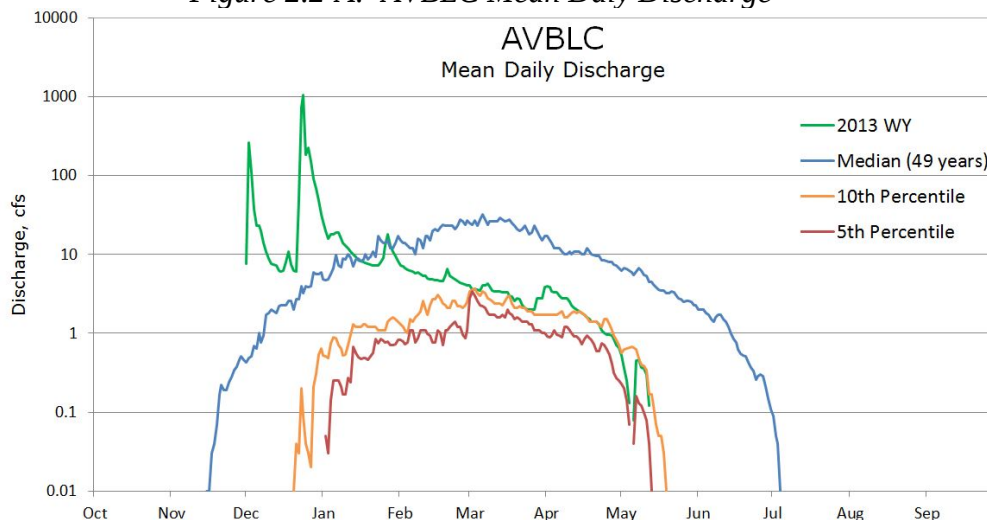
The following sections outline the Surface Water Program activities for the 2013 Water Year (listed by stream), and highlight the findings and conclusions from these activities. The aquifer recharge and discharge estimated from the surface water program results are discussed in Section 3.1, Groundwater Storage.

2.2.2.1 Arroyo Valle

The following are items of special note for the Arroyo Valle in the 2013 Water Year (October 2012 through September 2013):

- During the 2013 Water Year, the watershed runoff total into Lake Del Valle as recorded by the Arroyo Valle below Lang Canyon (AVBLC) stream gage was 7,801 AF, 31% of average (where the average is 25,200 AF for Water Year 1964 [October 1963 through September 1964] through Water Year 2012 [October 2011 through September 2012]).
- The AVBLC stream gage dried up on May 12, 2013, the third earliest date in a water year since records began October 1963 (after 1977 Water Year [October 1976 through September 1977] and 1990 Water Year [October 1989 through September 1990]). There are no upstream dams, diversions or artificial flow control facilities above this station making its data a good indicator of watershed conditions. The following graph shows how stream flows during the first quarter of the water year began above the median due to two storms in December but ended with one of the driest conditions on record.

Figure 2.2-A: AVBLC Mean Daily Discharge



Note: Water Years are tracked October of the previous year through September of the water year.

- In the 2013 Water Year (October 2012 through September 2013), Lake Del Valle flood releases (LDV_FLD_TTL) totaled 0 AF; however releases to the Arroyo Valle from the SBA (SBA_AV_TTL) totaled 5,922 AF.
- At the beginning of the 2013 Water Year (October 2012 through September 2013), the Lake Del Valle water surface elevation was 699.53 feet which represents a storage

volume of 37,507 AF. At the end of the 2013 Water Year, the Lake Del Valle water surface elevation was 692.10 ft which represents a storage volume of 32,668 AF.

- In the 2013 Water Year (October 2012 through September 2013), the Arroyo Valle near Livermore (AVNL) stream gage recorded a total of 4,960 AF of water that flowed past the gage, which is 32% of the average annual amount (compared to the average of 15,590 AF for Water Years 1970-2012). The annual mean stream flow at AVNL was 6.8 cubic feet per second (cfs), the median was 4.9 cfs, and the minimum instantaneous flow was 0.3 cfs.
- The peak flow rate recorded at the AVNL stream gage in the 2013 Water Year (October 2012 through September 2013) was 48 cfs on March 25, 2013. There were no high flow releases or dam spills during the 2013 Water Year.
- CEMEX did not make any discharges into the Arroyo Valle in the 2013 Water Year (October 2012 through September 2013) (see Section 2.3.2).
- East Bay Regional Parks District (EBRPD) diverted a total of 540 AF from the Arroyo Valle into Shadow Cliffs Lake in the 2013 Water Year (October 2012 through September 2013).
- The peak flow recorded at the Arroyo Valle at Pleasanton (ADVP) stream gage in the 2013 Water Year (October 2012 through September 2013) was 236 cfs on December 02, 2012. The annual mean discharge was 4.7 cfs, the median 2.0 cfs, and the minimum instantaneous flow was 0.3 cfs.
- In order to meet the 2013 Water Rights objective, recorder flow data was collected at both AVNL and ADVP. In addition, three water quality grab samples were collected at both sites. Zone 7 is required to maintain a “live stream” condition on the Arroyo Valle whenever water stored under the permit is available in Lake Del Valle. Zone 7’s stream gage discharge record at ADVP verified that this permit condition was met during the 2013 Water Year (October 2012 through September 2013). The discharge computations from the flow recorders and the water quality sampling are submitted to the State Water Resources Control Board (SWRCB) each year to comply with permit requirements.
- Zone 7’s NPDES permit requires samples be collected from the South Tributary of the Arroyo Valle above and below the DVWTP following periods of high precipitation. During the 2013 Water Year (October 2012 through September 2013), water quality samples were collected both above and below DVWTP on November 30, 2012. The samples were collected after 1.43 inches of rain was recorded by the National Weather Service rain gage at the Livermore Airport that day.

- For a Zone 7 aquatic habitat study being conducted as part of the Zone 7 Water Rights extension application, nine locations record water temperature along the Arroyo Valle from above the confluence with Arroyo De La Laguna, to Del Valle Dam Turnout 2 (*Figure 2.2-1*). On December 1, 2012, Zone 7 added a HOBO water temperature recorder to the AVBLC stream gage.

2.2.2.2 Arroyo Mocho

The following are items of special note for the Arroyo Mocho in the 2013 Water Year (October 2012 through September 2013):

- There was no flow at the Arroyo Mocho near Livermore (AMNL) stream gage for about 48% of the 2013 Water Year from October 1 – December 2, 2012 and June 12 – September 30, 2013. The annual mean discharge was 1.16 cfs while the median was 0.02 cfs. The peak flow recorded was 926 cfs on December 23, 2012.
- For the 2013 Water Year (October 2012 through September 2013) computations, the rating curve, below about 15 cfs, was updated to take into account more precise gage heights surveyed this year. The outside staff gage, which had been bent since the 2006 Water Year (October 2005 through September 2006) was straightened.
- Water temperature monitoring was added to the AMNL stream gage on December 12, 2012.
- As part of Zone 7's artificial recharge and conjunctive use programs, 6,301 AF of imported SWP water, previously conveyed through the Delta, was released from the SBA to the Arroyo Mocho (SBA_AM) for artificial recharge of the groundwater basin during the 2013 Water Year (October 2012 through September 2013). SBA_AM was completely shut off for only 26 days during the water year. The annual mean discharge was 8.7 cfs while the median was 9.2 cfs.
- On April 09, 2013, one HOBO combination water temperature and water level probe was installed on the upper portion of the Arroyo Mocho - Stanley Reach and two HOBO water temperature only probes were installed on the lower portion of the same reach prior to a Zone 7 restoration project that took place during the summer of 2013. The HOBOS will be used to monitor water temperatures to evaluate the restoration project's effect on water temperature and discharge along the reach.
- On April 19, 2013, a discharge measurement of 9.0 cfs was made at the upper end of the Arroyo Mocho Stanley Reach and a discharge measurement of 3.5 cfs was made at the lower end of the reach. Those two discharge measurements suggest that 5.5 cfs of recharge was occurring prior to the restoration work along the Stanley reach during those

flow conditions, at that time of the year. On October 07, 2013, a discharge measurement of 3.7 cfs was made at the upper end of the Stanley Reach Bypass and a discharge measurement of 3.1 cfs was made at the lower end of the Stanley Reach Bypass. From those two discharge measurements, a recharge capacity of 0.6 cfs is now assumed for the Stanley Reach Bypass.

- There was no flow at the Arroyo Mocho at Livermore (AMHAG) stream gage for about 27% of the 2013 Water Year, mostly during periods of reduced or no flow (i.e., no imported water releases) from the SBA to the Arroyo Mocho (SBA_AM). The annual mean discharge was 3.4 cfs while the median was 1.3 cfs.
- Vulcan Materials (MA_CM_AM) discharged a total of 7,054 AF into the Arroyo Mocho; an annual mean discharge of 9.7 cfs.
- The Arroyo Mocho at Kaiser Bridge (AM_KB) stream gage recorded an annual mean discharge of 8.8 cfs while the median was 6.2 cfs. The difference of 3.5 cfs between the annual median at MA_CM_AM (above) and AM_KB is close to the assumed recharge rate of 5 cfs in the reach between the two stations.
- For the 2013 Water Year (October 2012 through September 2013) discharge computations, the AM_KB stage-discharge rating was updated for flows below 9.5 cfs due to gravel fill in the fish ladder gage pool from the December 2012 high flow.
- On January 30, 2013, at AM_KB, a new recorder and pressure probe was installed on the west bank of the fish ladder and connected to a supervisory control and data acquisition (SCADA) remote terminal unit. Stream gage data recording is now integrated into the Zone 7 SCADA system.
- The unconfirmed peak flow recorded at the Arroyo Mocho at Livermore (AMHAG) stream gage was 1,750 cfs on December 24, 2012 whereas the unconfirmed peak flow at the Arroyo Mocho at Kaiser Bridge (AM_KB) stream gage was 1,160 cfs also on December 24, 2012. During the same storm, the Arroyo Mocho near Pleasanton (AMP) stream gage peaked at 931 cfs (not the peak flow of the water year). The AMP flow is thought to be the most accurate based on having more recent higher flow measurements at the site than the other two sites. There will continue to be inconsistencies between AMHAG and AM_KB peak flows and doubts about the accuracy of those peak flows until new high flow discharge measurements can be made.
- The peak flow of the 2013 Water Year (October 2012 through September 2013) at the AMP stream gage was 1,240 cfs on December 02, 2012. The annual mean discharge was 15.5 cfs while the median was 9.2 cfs.

- At the AMP stream gage, a stilling well float was installed on November 16, 2012 as the primary gage height sensor. The pressure probe already installed instream was thereafter used as the backup gage height sensor. The float has already shown to be slightly more precise than the pressure probe in recording peak gage heights when compared against crest stage gage readings.
- For the third year of a multi-year sediment transport study, turbidity-triggered auto-samplers were still in place at AMHAG and AMP. Bedload and suspended sediment samples were collected on December 02, 2012 by Zone 7 and Zone 7's consultant, San Francisco Estuary Institute (SFEI). This event took place during the highest peak runoff event of the water year as recorded by the AMP stream gage.

2.2.2.3 Arroyo Las Positas

The following are items of special note for the Arroyo Las Positas (ALP) in the 2013 Water Year (October 2012 through September 2013):

- A total of 139 AF of water from the State Water Project was released for artificial stream recharge into the Arroyo Las Positas (SBA_ALT) October 1 through October 12, 2012 and May 07 through September 30, 2013.
- The peak flow recorded at Arroyo Las Positas near Livermore (ALPL) during the 2013 Water Year (October 2012 through September 2013) was 661 cfs on December 12, 2012 at 10:15 and the peak flow recorded at the downstream Arroyo Las Positas at El Charro (ALP_ELCH) stream gage was 678 cfs an hour and thirty minutes later.
- At ALPL, the 2013 Water Year (October 2012 through September 2013) mean discharge was 4.83 cfs while the median was 2.70 cfs. At downstream ALP_ELCH, the mean discharge was 5.26 cfs while the median was 2.10 cfs. The difference in median values (0.6 cfs) reflects the low recharge rate in the reach between the two stations.
- At ALP_ELCH, a new pressure probe was installed on March 29, 2013 to replace the old unreliable pressure probe.
- One water quality sample was collected along the Arroyo Las Positas both above and below the PPWTP on November 30, 2012 to meet the NPDES permit requirements for the 2013 Water Year (October 2012 through September 2013) (see results in *Figure 2.2-5*). The sample was taken following 1.30 inches of rain that day as recorded by the National Weather Service rain gage at the Livermore Airport.
- For the third year of a multi-year sediment transport study, a turbidity-triggered auto-sampler was in place at ALPL. In conjunction with the auto-sampler, bedload and

suspended sediment samples were collected on the December 02, 2012 during the highest peak flow runoff event of the water year by Zone 7 and SFEI.

- On January 26, 2013, the Lawrence Livermore National Laboratory flushed their pipelines with approximately 100,000 gallons of water over the course of the day (daily average of 0.15 cfs). The majority of this water flowed to the Arroyo Las Positas. On August 03, 2013, 200,000 gallons of water was again flushed over the course of the day (daily average of 0.31 cfs). The ALPL stream gage did not record noticeable changes in the Arroyo Las Positas flow due to these pipeline flushes.

2.2.2.4 Arroyo De La Laguna

The following are items of special note for the Arroyo De La Laguna in the 2013 Water Year (October 2012 through September 2013):

- Water flowed continuously down Arroyo De La Laguna throughout the 2013 Water Year (October 2012 through September 2013). The peak flow recorded at the Arroyo De La Laguna at Verona (ADLLV) stream gage during the 2013 Water Year was 5,070 cfs on December 02, 2012 at 10:45. Upstream of ADLLV, ADVP peaked at 236 cfs at 09:30 and AMP peaked at 770 cfs. This indicates that the majority of the peak flow recorded at ADLLV came from unmonitored Alamo Canal.
- A total of 31,776 AF of water flowed out of the valley past ADLLV during the 2013 Water Year (October 2012 through September 2013), 60% of average (where the average is 53,150 AF for Water Years 1970 through 2012). The water year annual mean flow was 43.9 cfs, the median was 21.0 cfs, and the minimum instantaneous flow was 3.1 cfs.

2.3 Chain of Lakes Monitoring

2.3.1 Program Description

The Chain of Lakes/Mining Area Monitoring Program includes water level measurements and water quality sampling in many of the mining area ponds or quarry lakes. The program also maps and documents current mining activities, locations of discharge lines, circulation and conveyance of water between pits, and the locations of flow barriers created by clay-lined or backfilled pits.

Figure 2.3-A below identifies the previous owners, current owners, and current mining operators associated with each lake/pond prefix and pond number as shown on *Figure 2.3-1*.



FIGURE 2.2-2
TABLE OF SURFACE WATER MONITORING STATIONS
AND MONITORING FREQUENCIES
2013 WATER YEAR (Oct 2012 to Sep 2013)

Station ID	Description	Gage Type	Program and Frequency				
			Groundwater Management		Other Programs		
			Flow	Wtr Temp	Sample	Wtr Rights	NPDES
ARROYO VALLE - LINE E							
AVBLC	Arroyo Valle Below Lang Canyon	Recorder	R	R	A		
LDV_FLD_GATE	Lake Del Valle Flood Gate	Meter	D				
LDV_FLD_TTL	Lake Del Valle Total Flood Release	None	D				
AVRUNOFF	Arroyo Valle Runoff	None	D				
SBA_TO2_AV	SBA Turnout 2 to Arroyo Valle	Meter	D				
AVTO2	Arroyo Valle below Turnout 2	Recorder		R			
AVCAT	Arroyo Valle along Camp Arroyo Trail	Recorder		R			
AVNL	Arroyo Valle Near Livermore	Recorder	R	R	Q	Q	
SBA_TO1_AV	SBA Turnout 1 to Arroyo Valle	Meter	D				
SBA_AV_TTL	SBA Turnouts to Arroyo Valle - Total	None	D				
AVDCC	Arroyo Valle at Dry Creek Confluence	Recorder		R			
SBA_AV_BlowOff	SBA Blow-Off to Arroyo Valle	None	D				
AVSGP	Arroyo Valle at Sycamore Grove Park	Recorder		R			
STRIB_ADVWTP	South Tributary Above DVWTP	None					A
DVWTP_DISCH	DVWTP Discharge to South Tributary	Meter	D				
STRIB_KB	South Tributary at Kalthoff Bridge	None					A
AV_ISABEL	Arroyo Valle at Isabel Avenue	Recorder		R			
MA_LS_SC	Lonestar Discharge to Shadow Cliffs	Meter	D				
MA_LS_AV	Lonestar Discharge to Arroyo Valle	Meter	D				
AV_DIV_SC	Arroyo Valle Diversion to Shadow Cliffs	Meter	D				
AVSCP18	Arroyo Valle at Shadow Cliffs Pond K18	Recorder		R			
ADVP	Arroyo Valle at Pleasanton	Recorder	R	R	Q	Q	
AVADLL	Arroyo Valle above Arroyo De La Laguna	Recorder		R			
ARROYO MOCHO - LINE G							
AMNL	Arroyo Mocho Near Livermore	Recorder	R	R	A		
SBA_AM	SBA Turnout to Arroyo Mocho	Meter	D				
WEN_DIV_AM	Wente Diversion from Arroyo Mocho	Meter	D				
AM_StnRch_10	Arroyo Mocho Stanley Reach at 10 feet	Recorder	R	R			
AM_StnRch_4050	Arroyo Mocho Stanley Reach at 4050 feet	Recorder		R			
AMHAG	Arroyo Mocho At Livermore	Recorder	R	R	A		
MA_CM_AM	Calmat Dishcharge to Arroyo Mocho	None	D				
AM_KB	Arroyo Mocho at Kaiser Bridge	Recorder	R	R	A		
AMP	Arroyo Mocho Near Pleasanton	Recorder	R	R	A		
ARROYO LAS POSITAS - LINE H							
SBA_ALTC	SBA Turnout to Altamont Creek	Meter	D				
LIV_DIV_BPT	Livermore Diversion from Brushy Peak Trib	Meter	D				
ALP_APPWTP	Arroyo Las Positas above PPWTP	None					A
PPWTP_DISCH	PPWTP Discharge to Arroyo Las Positas	Meter	D				
ALP_BPPWTP	Arroyo Las Positas below PPWTP	None					A
LLNL_ALP	LLNL Treated Groundwater Discharge to ALP	Meter	D		D		
LLNL_SECO	LLNL Treated Groundwater Discharge to ALP	Meter	D		D		
ALPL	Arroyo Las Positas at Livermore	Recorder	R	R	A		
ALP_ELCH	Arroyo Las Positas at El Charro	Recorder	R	R	A		
ARROYO DE LA LAGUNA - LINE B							
ADLLV	Arroyo De La Laguna at Verona	Recorder	R	R	A		
ALAMO CREEK - LINE K							
AC_WCD	Alamo Creek at Willow Creek Drive	Recorder	R	R			
TASSAJARA CREEK - LINE F							
TC_580	Tassajara Creek above Interstate 580	Recorder	R	R			

R = Recorder
D = Daily
Q = Quarterly
A = Annual

Figure 2.2-2



**FIGURE 2.2-3
STREAM GAGE DETAILS
RECORDER TYPE STATIONS
2013 WATER YEAR (Oct 2012 to Sep 2013)**

	Station Name	Site ID	Parameters Recorded	Data Collected By	Drainage Description	Drainage Area (mi ²)	Gage Datum (feet)	Location* Lat. Long	
Arroyo Valle (AV)	Arroyo Valle below Lang Canyon	AVBLC	Gage Height, Water Temperature	USGS, Zone 7	Upland Valle Drainage Basin	130	750.00	2029018	6218632
	Arroyo Valle near Livermore	AVNL	Gage Height, Water Temperature	USGS	Valle below dam and SBA Releases; (regulated flow due to dam)	147	510.44	2051872	6197234
	Arroyo Valle at Pleasanton	ADVP	Gage Height, Water Temperature	Zone 7	Valle Drainage Basin	171	312.66	2068336	6161483
Arroyo Mocho (AM)	Arroyo Mocho near Livermore	AMNL	Gage Height, Water Temperature	Zone 7	Upland Mocho Drainage Basin	38	746.47	2052947	6212841
	Arroyo Mocho Stanley Reach near Livermore	AM_StanRch_10	Gage Height, Water Temperature	Zone 7	Boundary of Mocho II and Amador Basins	49	439.00	2072292	6188367
	Arroyo Mocho at Livermore	AMHAG	Gage Height, Water Temperature, Turbidity	Zone 7	AM before mining discharges	51	374.78	2071596	6181235
	Arroyo Mocho at Kaiser Bridge	AM_KB	Gage Height, Water Temperature	Zone 7	AM before confluence with ALP	60	325.47	2077841	6171655
	Arroyo Mocho near Pleasanton	AMP	Gage Height, Water Temperature, Turbidity	Zone 7	Mocho Drainage Basin	141	323.77	2076846	6164322
Arroyo Las Positas (ALP)	Arroyo Las Positas at Livermore	ALPL	Gage Height, Water Temperature, Turbidity	Zone 7	Upland Positas Drainage Basin	53	460.99	2079760	6193222
	Arroyo Las Positas at El Charro	ALP_ELCH	Gage Height, Water Temperature	Zone 7	Positas Drainage Basin	75	338.82	2078400	6172552
Arroyo De La Laguna (ADLL)	Arroyo de la Laguna near Verona	ADLLV	Gage Height, Water Temperature, Specific Conductance, pH	USGS	Laguna Drainage Basin	403	280.00	2053613	6161313
Alamo Creek (AC)	Alamo Creek at Willow Creek Drive	AC_WCD	Gage Height, Water Temperature	Zone 7	Dublin Basin	17	368.80	2089660	6153583
Tassajara Creek (TC)	Tassajara Creek above Interstate 580	TC_580	Gage Height, Water Temperature	Zone 7	Camp Basin	27	341.00	2080989	6162777

* State Plane Coordinates Ca. Zone III, NAD83



**FIGURE 2.2-4
MONTHLY STREAM FLOWS (ACRE-FEET)
RECORDER STATIONS
2013 WATER YEAR (Oct 2012 to Sep 2013)**

MONTH	ARROYO VALLE Below LANG CANYON* AVBLC	ARROYO VALLE Near LIVERMORE* AVNL	ARROYO VALLE At PLEASANTON ADVP	ARROYO MOCHO Near LIVERMORE AMNL	ARROYO MOCHO At LIVERMORE AMHAG	ARROYO MOCHO At KAISER BRIDGE AM_KB	ARROYO MOCHO Near PLEASANTON AMP	ARROYO LAS POSITAS At LIVERMORE ALPL	ARROYO LAS POSITAS At EL CHARRO ALP_ELCH	ARROYO DE LA LAGUNA At VERONA* ADLLV
OCT	0	393	108	0	181	141	277	174	112	920
NOV	0	265	257	0	211	720	1,833	573	677	6,004
DEC	6,430	118	865	682	1,274	1,855	3,735	1,107	1,506	12,609
JAN	756	134	98	81	54	466	897	343	404	2,007
FEB	298	267	122	26	31	534	781	227	242	1,664
MAR	193	724	457	26	43	671	837	195	201	1,916
APR	118	424	138	18	129	197	429	200	198	1,324
MAY	7	419	96	3	106	489	621	150	114	1,050
JUN	0	819	355	0	74	348	451	135	91	1,054
JUL	0	1,019	496	0	109	392	477	122	65	1,234
AUG	0	257	328	0	172	190	299	124	75	880
SEP	0	120	94	0	104	387	566	149	121	1,115
TOTAL	7,801	4,960	3,413	837	2,486	6,389	11,202	3,500	3,806	31,776

* USGS Stations

Note: AM_StanRch_10, AC_WCD, and TC_580 are new recorder stations without established flow rating tables; therefore, monthly stream flows were not calculated during WY 2013.



**FIGURE 2.2-5
TABLE OF SURFACE WATER QUALITY RESULTS
2013 WATER YEAR (Oct 2012 to Sep 2013)**

			FLOW	TEMP.	SC		Mineral Constituents (mg/L)									Select Metals (mg/L)				TDS	Hard
SITE ID	DATE	TIME	(cfs)	°C	mS/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3	SiO2	B	As	Fe	Mn	mg/L	mg/L
ADLLV	10/1/2012	16:21	9.2	23.5	1044	8.4	62	37	114	2.7	295	110	141	0.62	12.4	0.72	0.003	<0.05	<0.01	632	305
ADLLV	7/23/2013	14:08	17	25.1	823	8.2	47	26	75	2.3	231	74	98	<0.44	9.2	0.52	0.0022	<0.05	<0.01	449	227
ADVP	1/9/2013	13:08	2.2	7.3	488	7.9	37	17	40	3.7	144	29	66	1.15	10.9	0.20	<0.001	0.055	0.012	277	165
ADVP	4/8/2013	11:57	4.9	16.0	494	7.6	35	17	35	2.6	149	40	57	<0.44	9.2	0.21	0.0015	<0.05	0.019	270	156
ADVP	7/23/2013	15:03	9.5	24.4	492	8.1	32	15	42	2.1	151	37	61	<0.44	6.0	0.29	0.0013	<0.05	<0.01	271	142
ALP_APPWTP	11/30/2012	10:40	<0.1	14.8	120	7.9	10	4	7	2.9	65	2.1	1.9	1.15	8.8	<0.10	0.0028	0.41	<0.01	70	40
ALP_BPPWTP	11/30/2012	10:30	<0.1	14.9	209	7.3	14	3	22	3.2	41	29	20	9.26	4.9	0.44	0.0016	0.16	<0.01	126	49
ALP_ELCH	7/23/2013	12:12	0.82	23.0	1299	8.3	48	40	150	2.4	318	82	187	2.39	9.4	2.59	0.0032	<0.05	<0.01	684	283
ALPL	7/23/2013	11:45	1.9	21.8	1224	8.1	67	46	113	2.0	386	72	151	12.71	25.7	1.76	0.0024	<0.05	<0.01	684	356
AM_KB	10/11/2012	14:58	0.39	16.2	581	8.0	22	18	61	3.1	117	22	106	3.90	13.1	0.15	0.0017	<0.05	<0.01	308	132
AM_KB	7/24/2013	15:35	15	25.7	707	8.4	38	46	30	1.9	235	44	77	1.20	14.6	0.28	<0.001	<0.05	<0.01	374	284
AMHAG	10/1/2012	16:58	3.1	24.1	651	8.2	22	18	80	3.5	157	27	131	<0.44	10.5	0.15	0.002	<0.05	<0.01	372	130
AMHAG	7/23/2013	15:50	1.7	24.3	450	8.5	22	18	37	2.0	124	23	65	<0.44	11.8	0.16	0.0016	<0.05	<0.01	244	130
AMNL	5/2/2013	16:30	0.12	18.5	1132	7.7	23	120	59	3.0	603	80	59	<0.44	13.9	1.0	0.0011	<0.05	<0.01	657	550
AMP	10/1/2012	15:25	1.7	26.3	1351	8.5	64	42	148	4.3	303	77	226	12.84	19.0	1.38	0.0029	<0.05	<0.01	751	332
AMP	7/23/2013	13:23	0.77	25.4	1090	8.8	59	36	110	2.9	274	56	176	1.82	18.4	1.07	0.0027	<0.05	<0.01	611	295
AVBLC	1/8/2013	11:00	16	6.4	460	8.3	47	25	16	2.0	220	48	8.9	1.64	11.8	0.27	<0.001	<0.05	<0.01	273	221
AVBLC	5/3/2013	16:05	0.11	0.0	616	8.3	66	28	34	1.9	281	71	23	<0.44	12.0	1.0	<0.001	<0.05	<0.01	379	283
AVNL	1/9/2013	13:50	1.2	8.4	635	8.0	50	24	56	3.6	199	82	61	1.24	15.2	0.55	0.0015	<0.05	0.077	393	223
AVNL	4/8/2013	12:58	8.7	16.6	636	7.9	34	18	64	2.7	131	78	88	2.83	9.2	0.34	0.002	<0.05	0.027	362	161
AVNL	7/23/2013	16:22	18	24.6	383	8.0	18	10	37	2.3	82	19	62	<0.44	13.9	0.12	0.0022	<0.05	<0.01	203	84
STRIB_ADVWTP	11/30/2012	12:11	-	15.3	325	7.4	14	5	45	3.2	56	15	64	0.89	5.6	0.15	<0.001	0.14	<0.01	180	55
STRIB_KB	11/30/2012	11:30	-	15.3	102	7.0	8	2	8	2.9	23	5.7	9.6	8.72	5.8	<0.10	<0.001	0.67	0.011	62	28

* Daily Average