# 3 Surface Water

## 3.1 Program Description

This section describes the Surface Water Monitoring 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. The amounts of streamflow recharging the groundwater basin (stream recharge) in the 2014 WY (October 1, 2013 through September 30, 2014) are described in Section 10.3.2.

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 stream recharge 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; and

- **Del Valle Water Rights** - Satisfy the requirements of Zone 7's and Alameda County Water District's (ACWD) existing water rights application on the Arroyo Valle. This involves quarterly sampling and continuous flow monitoring at two surface water stations.

The program utilizes a network of recorder stream gage stations and flow meters (*Figure 3-1* and *Figure 3-2*) 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. At least once per year, water samples are collected from the ten main recorder sites and submitted to Zone 7's laboratory for analysis of metals and minerals; the same parameters that are routinely analyzed in the Groundwater Quality Monitoring Program (*Section 6*).

## 3.2 2014 Results

The Surface Water Monitoring Program for the 2014 WY included 13 surface water recorder stations (*Figure 3-3*). Monthly total flows for the 2014 WY for 10 of the 13 recording stations are presented in *Figure 3-4*. One of the 13 recording stations is a low flow only monitoring site

and two stations are high flow only monitoring sites, therefore, monthly streamflows are not calculated at those locations. For the 2014 WY, water quality at the ten main recorder stations was routinely sampled and analyzed. These results are presented in *Figure 3-5*.

The following sections outline the Surface Water Monitoring Program activities for the 2014 WY (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 10.3.2.1, Stream Recharge and 10.3.3.3 Mining Area Lakes.

### 3.2.1 Arroyo Valle

The following are items of special note for the Arroyo Valle in the 2014 WY:

- During the 2014 WY, the watershed runoff total into Lake Del Valle as recorded by the Arroyo Valle below Lang Canyon (AVBLC) stream gage was 272 acre-feet (AF), 1% of average (where the average is 24,850 AF for water years 1964 through 2013). There has only been one time since records began in 1964 when there has been less runoff recorded for a water year; in the 1977 WY recorded runoff was 177 AF.

- The AVBLC stream gage dried up on May 02, 2014, the third earliest date in a water year since records began in October 1963 (after April 19 in the 1977 WY and April 30 in the 1990 WY). There are no upstream dams, diversions or artificial flow control facilities above this station making its data a good indicator of watershed conditions.

- In the 2014 WY, Lake Del Valle flood releases (LDV_FLD_TTL) totaled 0 AF; however releases to the Arroyo Valle from the South Bay Aqueduct (SBA) (SBA_AV_TTL) totaled 1,942 AF.

- In the 2014 WY, the Arroyo Valle near Livermore (AVNL) stream gage recorded a total of 1,890 AF of water that flowed past the gage, which is 12% of the average amount (where the average is 15,350 AF for water years 1970 through 2013) and nearly equivalent to the amount release from the SBA. The water year mean streamflow at AVNL was 2.6 cubic feet per second (cfs), the median was 0.37 cfs, and the minimum instantaneous flow was 0.02 cfs.

- From April thru September of the 2014 WY, no releases were being made to the Arroyo Valle from Del Valle Dam Turnout 2 (SBA_TO2_AV) due to the State Water Project (SWP) water allocation of 5% which wasn't available until after September 1, 2014. During this period, the mean flow at AVNL was 0.12 cfs and the max was 0.75 cfs.

- The peak flow rate recorded at the AVNL stream gage in the 2014 WY was 48 cfs on December 15, 2013. This peak flow was during a short period of water delivery to

ACWD using the arroyo for conveyance. There were no high flow releases or dam spills during the 2014 WY.

- CEMEX did not make any discharges into the Arroyo Valle in the 2014 WY (see Section 4.2).

- East Bay Regional Parks District (EBRPD) diverted a total of 111 AF from the Arroyo Valle into Shadow Cliffs Lake (AV_DIV_SC) in the 2014 WY.

- The peak flow recorded at the Arroyo Del Valle at Pleasanton (ADVP) stream gage in the 2014 WY was 98 cfs on November 20, 2013 from a rainfall event of about 1.1 inches. The annual mean discharge was 1.6 cfs, the median 0.31 cfs, and the minimum instantaneous flow was 0 cfs.

- ADVP was dry from April 28 through September 30 of the 2014 WY due to the drought and cut backs in SWP allocations to Zone 7 from California Department of Water Resources (DWR).

- In order to meet the 2014 Water Rights water quality objective, two water quality samples were collected at both AVNL and ADVP on November 14 and March 5. On June 10 and August 27, water quality samples were collected at AVNL but not at ADVP as ADVP had been dry since April 28. To comply with the permit requirements, the water quality sample results were submitted to the State Water Resources Control Board (SWRCB).

- To meet the 2014 Water Rights streamflow objective, recorder flow data was collected at both AVNL and ADVP. 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. Due to the drought causing very little inflow into Lake Del Valle and the low SWP water allocation, Zone 7 was unable (and not required) to keep "live stream" conditions at ADVP. To comply with the permit requirements, the discharge computations from the flow recorders were submitted to SWRCB.

- For a Zone 7 aquatic habitat study being conducted as part of the Zone 7 Water Rights extension application, nine locations continue to record water temperature along the Arroyo Valle from above the confluence with Arroyo De La Laguna (ADVADLL), to SBA_TO2_AV (*Figure 3-1*). In addition, there is one HOBO® water temperature recorder at the AVBLC stream gage above Lake Del Valle.

### 3.2.2 Arroyo Mocho

The following are items of special note for the Arroyo Mocho in the 2014 WY:

- At Arroyo Mocho near Livermore (AMNL), the total runoff for the 2014 WY was 51 AF. This is 1% of the long-term historical annual average of 3,850 AF (derived from 55 years of data collected when the United States Geological Survey (USGS) operated the station during the 1913-1930 and 1965-2001 WYs). The 2014 WY total runoff of 51 AF is the second lowest amount of runoff recorded. The 1977 WY had the third lowest total runoff with 71 AF. There are no upstream dams, diversions or artificial flow control facilities above this station making its data a good indicator of watershed conditions.

- There was no flow at the AMNL stream gage for 66% of the 2014 WY; i.e., from October 1 – February 1 and June 10 – September 30. The annual mean discharge was 0.07 cfs while the median was 0 cfs. The peak flow recorded was 3.8 cfs on Mar 2, 2014.

- A new vented pressure probe was installed at AMNL on November 8, 2013. It produced accurate gage heights but data spiking issues proved to be problematic. On May 21, the problematic pressure probe quit communicating with the recorder. A temporary non-vented pressure sensor was installed and operated May 30 – June 24. On June 24, a new replacement vented pressure probe was installed and has since worked very accurately and without problems.

- As part of Zone 7's artificial recharge and conjunctive use programs, 2,973 AF of imported SWP water was released from the SBA to the Arroyo Mocho (SBA_AM) for artificial recharge of the groundwater basin during the 2014 WY. The 2,973 AF released into the Arroyo Mocho was 59% of the average of the preceding four water years (where the average was 5,064 AF per water year). SBA_AM was completely shut off from March 28 – Sept 30 (except for July 16 – July 21) due to DWR cut backs in water allocations to Zone 7. The water year mean discharge was 4.1 cfs while the median was 0 cfs.

- There was no flow at the Arroyo Mocho Hageman (AMHAG) stream gage for 77% of the 2014 WY. The 2014 WY mean discharge was 0.70 cfs while the median was 0 cfs. The peak flow was 414 cfs on November 20.

- Vulcan Materials discharged a total of 1,165 AF into the Arroyo Mocho (MA_CM_AM) during the 2014 WY from October 1 to December 7. On December 8, Vulcan Materials began diverting their discharge water into Cope Lake through the new pipeline extension where it was stored locally for future groundwater recharge. From December 8 through the end of the 2014 WY, 5,420 AF of water was diverted into Cope Lake by Vulcan Materials (MA_VUL_COPE). Vulcan Materials will continue to divert water into Cope Lake in order to eliminate discharges and reduce its impact on groundwater losses.

- The Arroyo Mocho at Kaiser Bridge (AM_KB) stream gage recorded a total of 1,072 AF flowing past the gage in the 2014 WY. The site was dry from December 30 to the end of

the water year (except for few small rainfall-runoff events) in conjunction with Vulcan Materials eliminating its discharge to the Arroyo Mocho in favor of diverting the water into Cope Lake. The peak flow recorded was 219 cfs on November 20.

- During the 2014 WY, the Arroyo Mocho near Pleasanton (AMP) stream gage recorded 3,875 AF of streamflow past the gage. During the 2011, 2012, and 2013 WYs, AMP recorded 16,735 AF, 9,271 AF and 11,202 AF, respectively, of flow past the gage. The 2014 WY's substantially less total streamflow of 3,875 AF is a result of both the drought and Vulcan Materials eliminating its discharge to the Arroyo Mocho.

- The peak flow of the 2014 WY at the AMP stream gage was 463 cfs recorded on February 28, 2014. The annual mean discharge was 5.27 cfs while the median was 2.4 cfs.

- At AMP there were two periods of recorder failure from January 28 through February 6 and March 2 through March 28. Streamflow has been estimated for these two periods. After the old recorder was replaced with a new recorder and cellular modem on May 1, there was no further data loss.

- For the fourth year of a multi-year sediment transport study, turbidity-triggered auto-samplers operated at AMHAG and AMP. Manual bedload and suspended sediment samples were not collected during the 2014 WY by Zone 7 or Zone 7's consultant, San Francisco Estuary Institute (SFEI), because the low rainfall totals and runoff magnitudes experienced in the 2014 WY did not reach the thresholds for further sampling requirements.

### 3.2.3 Arroyo Las Positas

The following are items of special note for the Arroyo Las Positas (ALP) in the 2014 WY:

- A total of 103 AF of water from the SWP was released into the Arroyo Las Positas (SBA_ALT) at various small intervals from April 29 through September 23 for Springtown Golf Course diversions.

- The peak flow recorded at Arroyo Las Positas near Livermore (ALPL) during the 2014 WY was 429 cfs on February 28, 2014 at 06:30 and the peak flow recorded 5.1 miles downstream at Arroyo Las Positas at El Charro (ALP_ELCH) was 318 cfs two hours later.

- At ALPL, the 2014 WY mean discharge was 3.0 cfs while the median was 2.2 cfs. At downstream ALP_ELCH, the mean discharge was 3.0 cfs while the median was 1.9 cfs.

The difference in median values (0.3 cfs) reflects the low recharge rate in the reach between the two stations.

- Zone 7's National Pollutant Discharge Elimination System (NPDES) permit requires samples to be collected along the Arroyo Las Positas both above and below the Patterson Pass Water Treatment Plant (PPWTP). For the 2014 WY and into the future, this responsibility was shifted to the PPWTP and Del Valle Water Treatment Plant (DVWTP) staff and the results will be reported separately.

- For the fourth year of a multi-year sediment transport study, a turbidity-triggered auto-sampler operated at ALPL. Manual bedload and suspended sediment samples were not collected during the 2014 WY by Zone 7 or Zone 7's consultant, SFEI, because low rainfall totals and runoff magnitudes did not meet further sampling requirements.

- Typically, once or twice per year, Lawrence Livermore National Laboratory (LLNL) flushes their pipelines with 100,000 - 200,000 gallons of water over the course of one day. During the 2014 WY, there were no notifications from LLNL to Zone 7 about such discharges.

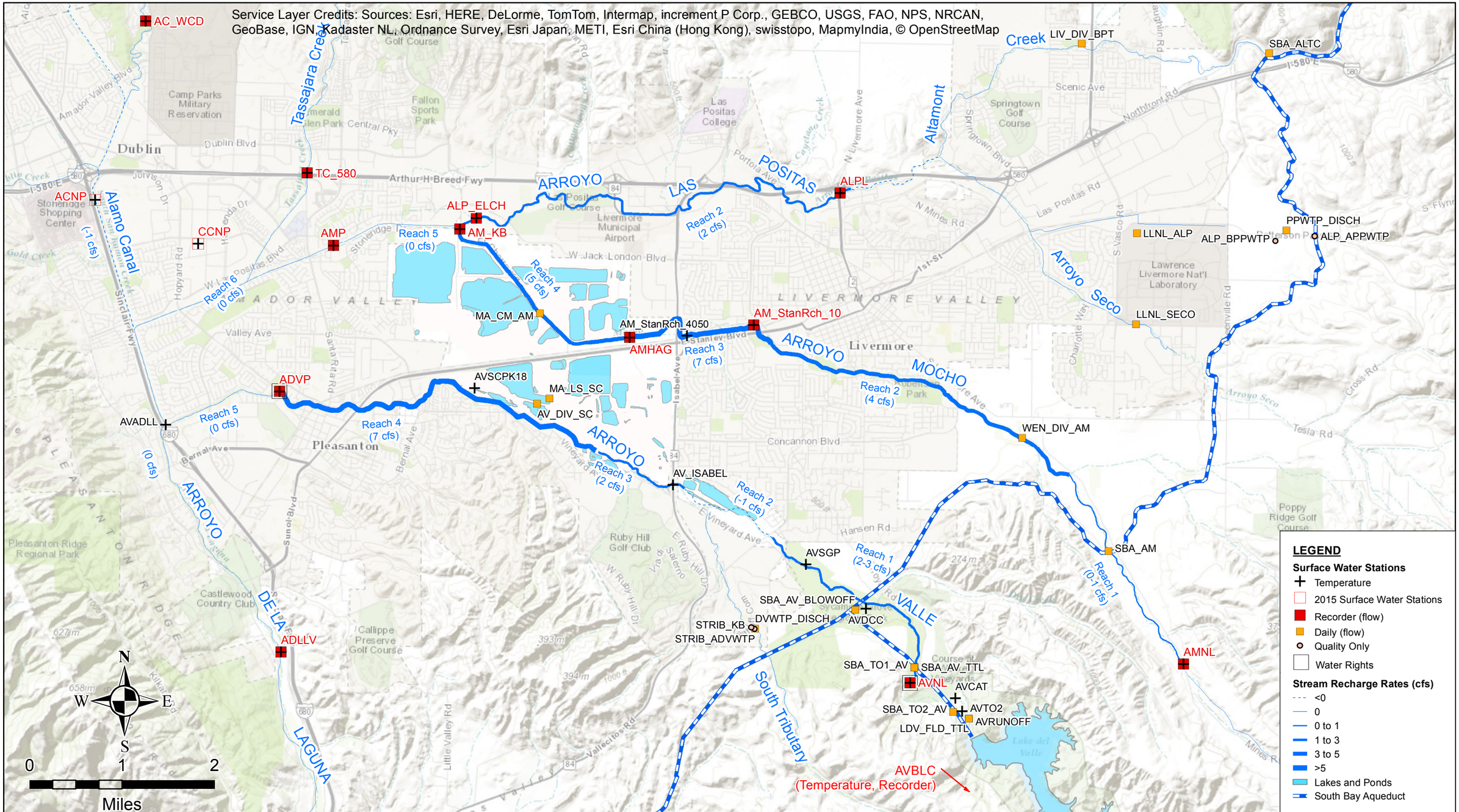
### 3.2.4 Arroyo De La Laguna

The following are items of special note for the Arroyo De La Laguna in the 2014 WY:

- A total of 14,128 AF of water flowed out of the valley past Arroyo De La Laguna at Verona (ADLLV) during the 2014 WY, 27% of average (where the average is 52,620 AF for water years 1970 through 2013). The 2014 WY mean flow was 19.5 cfs, the median was 8.3 cfs, and the minimum instantaneous flow was 1.2 cfs on April 13.

- Water flowed continuously down Arroyo De La Laguna throughout the 2014 WY. The peak flow recorded at the ADLLV stream gage during the 2014 WY was 1,670 cfs recorded on February 28, 2014 at 06:30. This is the lowest water year peak streamflow since the 1994 WY.

- The minimum mean daily discharge at ADLLV during the 2014 WY was 1.7 cfs recorded on July 28, 2014. There has not been a daily value that low since the 1992 WY. During the previous 10 water years (from 2004 through 2013), the lowest mean daily discharge was 6.4 cfs (in the 2013 WY).




| | | | |
|---|---|---|---|
| ZONE 7 WATER AGENCY<br>100 North Canyons Parkway<br>Livermore, CA | DRAWN: TR | SCALE: 1 in = 1 Mile | **FIGURE 3-1**<br>**Map of Surface Water Sites**<br>**2014 Water Year**<br>**Livermore Valley Groundwater Basin** |
| | REVIEWED: RG/CW | DATE: Mar 20, 2015 | |
| | FILE: E:\MONITOR\SW\2014WY\AnnualReport\Fig03-01-MapSWStations14.mxd | | |

# FIGURE 3-2
# TABLE OF SURFACE WATER MONITORING STATIONS AND MONITORING FREQUENCIES
# 2014 WATER YEAR

| 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 | | | | |
| AVSCPK18 | 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_StanRch_10 | Arroyo Mocho Stanley Reach at 10 feet | Recorder | R | R | | | |
| AM_StanRch_4050 | Arroyo Mocho Stanley Reach at 4050 feet | Recorder | | R | | | |
| AMHAG | Arroyo Mocho At Livermore | Recorder | R | R | A | | |
| MA_CM_AM | Calmat Dishcarge to Arroyo Mocho | None | D | | | | |
| MA_VUL_COPE | Vulcan Discharge to Cope Lake | Meter | D | | | | |
| MA_COPE_I | Pipeline Diversion from Cope Lake to Lake I | Meter | R | R | | | |
| 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 3-3
# STREAM GAGE DETAILS
# RECORDER TYPE STATIONS
# 2014 WATER YEAR

| | 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 3-4
# MONTHLY STREAMFLOWS (ACRE-FEET)
# RECORDER STATIONS
# 2014 WATER YEAR

| 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 | 466 | 124 | 0 | 96 | 333 | 432 | 129 | 108 | 864 |
| **NOV** | 0 | 373 | 213 | 0 | 235 | 588 | 1,029 | 317 | 370 | 2,251 |
| **DEC** | 0 | 608 | 466 | 0 | 63 | 95 | 337 | 179 | 189 | 1,592 |
| **JAN** | 0 | 169 | 58 | 0 | 2 | 0 | 162 | 144 | 139 | 516 |
| **FEB** | 30 | 90 | 145 | 2 | 79 | 42 | 748 | 409 | 519 | 4,103 |
| **MAR** | 155 | 141 | 75 | 30 | 18 | 5 | 458 | 262 | 325 | 1,964 |
| **APR** | 87 | 13 | 44 | 16 | 15 | 9 | 362 | 230 | 276 | 1,656 |
| **MAY** | 1 | 4 | 0 | 3 | 0 | 0 | 92 | 120 | 80 | 345 |
| **JUN** | 0 | 4 | 0 | 0 | 0 | 0 | 70 | 107 | 60 | 244 |
| **JUL** | 0 | 7 | 0 | 0 | 0 | 0 | 66 | 100 | 47 | 198 |
| **AUG** | 0 | 8 | 0 | 0 | 0 | 0 | 52 | 95 | 40 | 147 |
| **SEP** | 0 | 8 | 0 | 0 | 0 | 0 | 68 | 96 | 53 | 249 |
| **TOTAL** | **272** | **1,890** | **1,124** | **51** | **507** | **1,072** | **3,875** | **2,191** | **2,207** | **14,128** |

* USGS Stations

Note: AM_StanRch_10 is a low flow only monitoring site. AC_WCD and TC_580 are high flow only monitoring sites. Therefore, monthly streamflows are not calculated at these locations.

# FIGURE 3-5
# TABLE OF SURFACE WATER QUALITY RESULTS
# 2014 WATER YEAR

| | | | | | | | Mineral Constituents (mg/L) | | | | | | | | | Select Metals (mg/L) | | | | TDS | Hard |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SITE ID | DATE | TIME | FLOW (cfs) | TEMP. °C | SC mS/cm | pH | Ca | Mg | Na | K | HCO3 | SO4 | Cl | NO3 | SiO2 | B | As | Fe | Mn | mg/L | mg/L |
| ADLLV | 8/5/2014 | 14:13 | 3.3 | 26.2 | 1457 | 8.2 | 66 | 49 | 166 | 2.9 | 370 | 149 | 188 | <0.44 | 12.8 | 1.18 | 0.0044 | <0.05 | 0.062 | 821 | 366 |
| ADVP | 11/14/2013 | 14:20 | 2.0 | 12.9 | 633 | 7.9 | 39 | 20 | 58 | 3.7 | 161 | 25 | 99 | <0.44 | 11.6 | 0.23 | 0.0018 | <0.05 | 0.016 | 337 | 179 |
| ADVP | 3/5/2014 | 10:50 | 1.7 | 14.2 | 592 | 7.5 | 39 | 20 | 53 | 2.8 | 161 | 43 | 95 | <0.44 | 7.3 | 0.22 | 0.0013 | <0.05 | 0.025 | 340 | 179 |
| ALP_APPWTP | 2/28/2014 | 11:30 | - | 12.5 | 810 | 7.3 | 30 | 8 | 101 | 3.7 | 160 | 45 | 128 | 16.74 | 18.2 | 1.9 | 0.015 | 0.081 | 0.17 | 430 | 108 |
| ALP_BPPWTP | 2/28/2014 | 11:00 | - | 12.3 | 1420 | 7.6 | 63 | 19 | 203 | 5.9 | 284 | 98 | 250 | 1.28 | 30.0 | 3.6 | 0.0093 | 0.093 | 0.22 | 811 | 236 |
| ALP_ELCH | 8/5/2014 | 11:26 | 0.8 | 20.9 | 1222 | 8.1 | 49 | 54 | 131 | 2.4 | 372 | 87 | 164 | 1.95 | 11.1 | 1.72 | 0.0023 | <0.05 | <0.01 | 688 | 344 |
| ALPL | 8/5/2014 | 10:40 | 1.6 | 20.4 | 1219 | 8.0 | 83 | 41 | 118 | 1.8 | 398 | 79 | 150 | 13.46 | 25.7 | 1.58 | 0.0022 | <0.05 | 0.014 | 711 | 374 |
| AMNL | 2/3/2014 | 13:35 | <0.1 | 12.1 | 2533 | 7.6 | 100 | 194 | 183 | 6.7 | 681 | 304 | 394 | <0.44 | 13.9 | 1.8 | <0.005 | <0.25 | 0.46 | 1533 | 1047 |
| AMNL | 3/4/2014 | 17:10 | 1.0 | 14.9 | 1104 | 7.9 | 55 | 99 | 56 | 2.8 | 576 | 114 | 54 | 0.97 | 8.6 | 1.0 | 0.0012 | <0.05 | <0.01 | 678 | 544 |
| AMP | 8/5/2014 | 13:15 | 0.7 | 23.7 | 1217 | 8.4 | 46 | 47 | 142 | 2.7 | 334 | 77 | 197 | <0.44 | 12.8 | 1.54 | 0.0029 | <0.05 | <0.01 | 697 | 307 |
| AVBLC | 3/5/2014 | 11:55 | 3.9 | 16.0 | 613 | 8.1 | 63 | 30 | 32 | 1.9 | 246 | 111 | 24 | 0.97 | 11.3 | 0.93 | <0.001 | <0.05 | <0.01 | 398 | 282 |
| AVNL | 11/14/2013 | 15:45 | 6.6 | 15.1 | 545 | 7.9 | 24 | 14 | 62 | 4.4 | 109 | 36 | 96 | 1.06 | 10.9 | 0.21 | 0.0024 | <0.05 | 0.025 | 303 | 118 |
| AVNL | 3/5/2014 | 11:20 | 1.7 | 13.8 | 863 | 7.5 | 42 | 26 | 96 | 4.3 | 169 | 83 | 149 | 2.44 | 15.4 | 0.42 | 0.0019 | <0.05 | 0.06 | 502 | 212 |
| AVNL | 6/10/2014 | 12:42 | 0.1 | 23.6 | 1206 | 7.9 | 82 | 41 | 124 | 4.5 | 321 | 186 | 136 | <0.44 | 27.8 | 1.51 | 0.0028 | <0.05 | 0.17 | 762 | 374 |
| AVNL | 8/27/2014 | 12:45 | 0.3 | 20.2 | 1198 | 7.7 | 75 | 40 | 111 | 3.6 | 274 | 196 | 126 | <0.44 | 22.3 | 0.91 | 0.0016 | <0.05 | 0.08 | 710 | 353 |
| STRIB_ADVWTP | 2/28/2014 | 13:15 | - | 13.6 | 401 | 7.0 | 22 | 6 | 52 | 1.5 | 85 | 29 | 65 | 1.99 | 18.8 | 0.26 | <0.001 | 0.65 | 0.015 | 238 | 81 |
| STRIB_ADVWTP | 2/28/2014 | 13:15 | - | 13.6 | 401 | 7.0 | 22 | 6 | 52 | 1.5 | 85 | 29 | 65 | 1.99 | 18.8 | 0.26 | <0.001 | 0.65 | 0.015 | 238 | 81 |
| STRIB_KB | 2/28/2014 | 13:25 | - | 12.9 | 180 | 7.1 | 12 | 4 | 16 | 3.1 | 51 | 8.4 | 19 | 7.62 | 9.2 | <0.10 | <0.001 | 0.44 | 0.016 | 105 | 47 |

Note: Only two quarterly water quality samples were collected at ADVP because the site was dry from April 29 to September 30, 2014.