5 Basin Management

5.1 Groundwater Management and Sustainability

5.1.1 Overview

Zone 7's basin management program attempts to find the best cost-effective way of providing a long-term viable water supply to meet 100% of valley-wide demands during any hydrologic condition while ensuring long-term stable groundwater quality and protection from groundwater basin overdraft. The program is adaptive because it adjusts to reflect current hydrologic conditions and available data while directing the program towards the best solution for the current water supply, water demand, and water quality conditions. The program includes:

- Calculating the long-term sustainable groundwater yield (Section 5.1.2)
- Limiting groundwater pumping to the sustainable replenishment quantities (Section 5.1.3).
- Importing and banking surface water to meet future demands (Section 5.1.4).
- Implementing a conjunctive use program that utilizes the full storage capacity of the groundwater basin (Section 5.1.5).
- Promoting increased and sound recycled water use (Section 5.1.6).
- Identifying and planning for development plans for future supply and demand impacts (Section 5.1.7).

The details of these program components are described briefly below and in more detail in the GWMP (Zone 7, 2005a).

5.1.2 Natural Sustainable Yield (Safe Yield)

5.1.2.1 Natural Recharge

The Main Basin's "natural", sustainable, groundwater yield is defined as the amount of water that can be pumped from the groundwater basin and replenished by long-term average, natural recharge. The long-term, natural, sustainable yield, which is calculated based on natural recharge over a century of

hydrologic records and projections of future recharge conditions, consists of the following components (described further in Sections 4.1 and 4.2):

- Natural Stream Recharge including Arroyo Valle Prior Rights
- Rainfall Recharge
- Applied Water Recharge
- Subsurface Inflow
- Basin Overflow

The long-term, natural, sustainable yield in the Main Basin has been estimated to be about 13,400 AF annually (Zone 7, 1992). The groundwater basin can be and is being used to sustain additional demands as long as there is a corresponding sustainable means for additional replenishment such as artificially recharging the basin with imported water, which is what Zone 7 does.

While the natural sustainable yield represents long-term-average natural recharge, the actual amount of natural recharge varies from year to year depending on the amount of local precipitation and irrigation during the year. For the 2012 Water Year, the natural recharge was about 7,117 AF, approximately 53% of normal (Table 4.2-4).

5.1.2.2 Demand Components

The natural sustainable yield supplies the following demand components, which Zone 7 monitors to make sure they are within the acceptable range:

Table: Sustainable Yield Demand Components (Water Year)

DEMAND COMPONENT	SUSTAINABLE DEMANDS (AF/Yr)	2012 WY (AF)
Municipal pumping by Zone 7 retailers	7,214*	7,889
Other groundwater pumping (SFWD for Castlewood, County Fairgrounds, golf courses, and domestic supply)	1,186	1,125
Agricultural pumping	400	95
Mining area evaporation	3,200	2,946
Gravel mining operations	1,400	4,546
TOTAL WATER YEAR	**13,400**	**16,601**

*Retailer Pumping Quota for a Calendar Year (see Section 5.1.3.1)

Annual variability with the demand components can be accommodated as long as the long-term average demands don't exceed the sustainable average recharge. For the 2012 Water Year the estimated total for these demand components was 16,601 AF; approximately 3,201 AF above the long-term sustainable yield

of 13,400 AF. The largest contributor to this single-year exceedance was the stream export component of gravel mining dewatering operations, which has been ramping up over the last four years.

The mining activity demands (losses) vary over time depending on the stage of mining in any given pit and the demand for aggregate resources. When the permitted gravel extraction is complete (estimated for 2030), the associated decrease in groundwater losses (i.e. pit dewatering, gravel washing, and moisture export) should eliminate this potential overdraft condition. For the near-term, Zone 7 staff is working with the active gravel mining company to capture the water generated by their pit dewatering operations and re-percolate it into the basin using one of Zone 7's Chain-of-Lakes. See Section 5.4.1 for more information on this project.

5.1.3 Municipal Pumping

5.1.3.1 Pumping by Zone 7 Retailers

As a condition to the water supply contracts that Zone 7 has with its retailers, each retailer is limited to an annual independent GPQ, which is generally based on average historical uses and is allocated to the basin's natural sustainable yield (Section 5.1.2). Together, the retailers are permitted to pump a total of 7,245 AF annually with no charge from Zone 7. However, they must pay a "recharge fee" for all groundwater pumped exceeding their GPQ, for which Zone 7 will provide additional artificial recharge to balance the excess pumping. This practice helps avoid a repetition of historical over-drafting of the basin by the large municipal users.

During the 2012 Calendar Year, CWS pumped above their GPQ (by 184 AF), but had "carry-over" water (unused GPQ from the year before) that more than covered the additional pumping. The City of Pleasanton pumped below their GPQ and added their remaining GPQ to their carry-over amount from the 2011 Calendar Year. The table below shows the individual GPQs, the carry-over amounts, and the amounts pumped in the 2012 Calendar Year for each retailer. The new carry-over amount from 2012 will be added to the retailers' GPQ for the following calendar year.

Table: Retailer GPQs Volumes (Calendar Year)

Retailer	GPQ	Carry-over from 2011	Pumped in 2012	Carry-over to 2013
City of Pleasanton*	3,500	665	3,459	700
Cal Water Service*	3,069	253	3,253	69
DSRSD*	645	0	645 (by Zone 7)	0
City of Livermore (currently not used)	31	6.2*	0	6.2*
Normal Total/ Quota (sum of *)	**7,214**	**918**	**7,357**	**775**

* Maximum of 20% of GPQ can be carried over.

5.1.3.2 Zone 7 Production

Figure 5.1-1 shows historical Valley water production from groundwater and imported water treated at the water treatment plants. Zone 7's annual groundwater pumping historically has varied with the availability of surface water and the capacity to treat that surface water. In general, Zone 7 operates its wells for demand peaks and whenever a shortage or interruption occurs in its surface water supply or treatment. However, Zone 7 has also pumped groundwater as an interim salt management strategy. The decision of which well(s) to pump first is based on pumping costs, pressure zone needs, delivered aesthetic water quality issues, and demineralization facility capacity. Although reduced groundwater pumping may have a positive impact on groundwater storage and delivered water quality, increased groundwater pumping has a beneficial impact on the basin's salt loading because much of the salt in the pumped groundwater eventually leaves the basin as wastewater export.

The following summarizes Zone 7's groundwater production for the 2012 Calendar Year:

- Zone 7 pumped 11,995 AF of groundwater; of which 876 AF was exported as Mocho Groundwater Demineralization Plant (MGDP) brine, 645 AF was pumped for DSRSD's GPQ, and 37 AF was pumped-to-waste during start-ups; leaving 10,437 AF for Zone 7 potable water production. This groundwater production represents 26% of Zone 7's total treated water demand for 2012. Treated surface water made up the other 74% of Zone 7's potable water deliveries in 2012.

- Zone 7 pumped 9,866 AF of groundwater from the Amador Subbasin and 2,129 AF from the Bernal Subbasin.

- Most of the Amador Subbasin groundwater pumped came from the Mocho wellfield (9,866 AF); whereas 995 AF was pumped from the Chain of Lakes (COL) wellfield and 1,280 AF was pumped from the Stoneridge wellfield. All of Zone 7's Bernal pumped groundwater (2,129 AF) came from the Hopyard Wellfield.

- It is anticipated that groundwater pumped from the Mocho Wellfield will continue to be first in priority because of its connection to the MGDP.

5.1.4 Supplemental Water Sources

Zone 7 imports most of the Valley's water supply (approximately 75%) and ensures that the groundwater supplies are not depleted by recharging the Main Basin with imported SWP and Lake Del Valle water. In addition to the water stores in the Livermore Valley Groundwater Basin, Zone 7 also draws water from the following sources:

- **Arroyo Valle Water Rights (Lake Del Valle)** – Zone 7 has water rights to a portion of the natural flows into Lake Del Valle. Accordingly, Zone 7 coordinates releases from the reservoir into the Arroyo Valle to maintain flows and recharge through the streambed at the levels that would have occurred had the reservoir not been constructed plus additional flows when water is available. These releases are a condition of Zone 7's water rights permit for the Arroyo Valle

water and give Zone 7 the ability to use other portions of Arroyo Valle water for supply to its treatment plants.

- **State Water Project (via the South Bay Aqueduct or SBA)** - As a SWP contractor, Zone 7 imports supplies from the SWP through the SBA. As of 1998, Zone 7 has had an annual maximum SWP contract amount of 80,619 AF per year (AF/yr) referred to as the "Table A Contract Amount". However, actual SWP deliveries are usually allocated at a lower level based on numerous factors, including hydrologic conditions. Currently, the long-term reliable yield of the SWP is 60% of the Table A amount (48,370 AF/yr). This may increase if a "Delta Fix" is implemented sometime in the future.

- **Byron-Bethany Irrigation District (BBID)** - Zone 7 has a contract with Byron-Bethany Irrigation District for up to an additional 5,000 AF/yr of supplemental water made available as a transfer of pre-1914 water rights water. It is delivered to Zone 7 through the SBA.

- **Kern Groundwater Basin (storage rights only)** - Zone 7 has purchased water storage rights (78,000 AF) in the Semitropic Water Storage District and 120,000 AF of storage in Cawelo Water Storage District groundwater basins in Kern County. These rights give Zone 7 the ability to store surplus SWP water when available, and then import that quantity of SWP supply through an in-lieu exchange.

Figure 5.1-2 diagrams the main water supply and use components for the 2012 Calendar Year. Highlights of activities for the 2012 Calendar Year included the following:

- Zone 7 carried-over approximately 3,800 AF of local water in Lake Del Valle for use in 2013.

- Zone 7 imported 34,900 AF of SWP water into the Valley (including 2,000 from BBID). For the 2012 Calendar Year, total DWR allocations to Zone 7 were 65% of Zone 7's Table A Contract Amount.

- Zone 7 released about 8,200 AF to the local arroyos for its artificial recharge program and to maintain a live-flowing stream on the Arroyo Valle to meet water rights permit conditions.

- Zone 7 increased its total water storage in out-of-basin groundwater banks to about 111,200 AF (Semitropic at 86,000 AF and Cawelo at 25,200 AF).

5.1.5 Conjunctive Use Program

Zone 7 actively embraces a conjunctive use approach to Basin Management by integrating management of local and imported surface water supplies with the management of local assets including the groundwater basin and surface features including local arroyos (which are used as flood protection facilities during wet seasons) and two former quarry pits (Lake I and Cope Lake). A key component of Zone 7's integrated conjunctive use approach has been artificial recharge which utilizes releases of surface water to dry arroyos that subsequently recharge the groundwater basin. The timing and quantity of artificial recharge are typically dependent upon available supply, natural flows, source water quality, and

regulatory requirements. The historical, long-term-average, artificial recharge for the Main Basin is about 5,300 AF per year.

Zone 7 has caused the Main Basin's water levels to rise and be maintained above the historical lows by artificially recharging more water than it has pumped, and by importing most of the water needed by the Valley's growing population.

The location and timing of artificial recharge can also be used as a water quality management tool as outlined in the SMP as well as a temporal water storage activity. When practical, Zone 7 prioritizes its SWP releases for recharge in the spring when TDS is low. Each acre-foot that is subsequently pumped removes water with higher TDS. This exchange process can eventually improve the salinity of the groundwater basin. The salt removal effectiveness is related to the difference in the TDS of recharge and pumped water and the annual volume of water conjunctively used.

For 2012 Zone 7's Conjunctive Use Program included the following activities and highlights:

- Zone 7 released 8,200 AF of water for artificial recharge in 2012 (Calendar Year) while pumping 11,995 AF of water from the Main Basin.

- Zone 7 allowed EBRPD to divert a total of 553 AF (2012 Calendar Year) into Shadow Cliffs for maintaining the lake level and recharging the basin, integrating not only the imported surface supply with groundwater storage but also facilitating recreational opportunities.

- From the end of the 2011 Water Year to the end of the 2012 Water Year, total Main Basin operational storage dropped about 9,196 AF to 89,831 AF (Section 4.2).

Looking into the future, Zone 7 is planning to increase its conjunctive use to keep up with growing demands. Acquisition of additional former quarries (Lakes A through H) will become the area's future "Chain of Lakes" allowing enhanced artificial recharge and regional flood protection projects to be fully implemented (see Section 5.4.1). Groundwater pumping in normal years will increase to about 10,000 AF per year after the completion of the Arroyo Mocho diversion into Lake H to supplement Zone 7's artificial recharge capacity.

5.1.6 Municipal Wastewater and Recycled Water Use

Wastewater disposal concerns have been greatly reduced in the valley through the implementation of municipal wastewater treatment and export projects and the restriction of high-density unsewered development over the Main Basin in the 1970's and early 1980's. In the late 1980's and early 1990's, Zone 7 partnered with the cities, wastewater agencies, and the permitting agency (RWQCB) to develop a master water recycling permit. The permit goals were essentially to maximize the beneficial use of recycled water while protecting the groundwater basin from possible water quality degradation. One of the permit conditions was to develop a Salt Management Plan to assure beneficial uses of the local groundwater basin were not impaired. The resulting program to manage local resources requires that wastewater disposal and recycled water use be monitored to determine the quantity, the quality, and the

impact on the local resources. The City of Livermore and DSRSD are responsible for treating and monitoring the majority of wastewater and all recycled water used within the Valley. Zone 7 reviews their monitoring program data (Section 3.8.2) and evaluates potential impacts of recycled water on the local groundwater resources.

Onsite disposal of wastewater from domestic, commercial and industrial sites, if disposed in natural waterways or if disposed on the land, can have an impact on groundwater quality. However the risk for negative groundwater impacts is greatly reduced when the wastewater has gone through a water reclamation or recycling process prior to its application. Zone 7 views recycled water as a valuable water resource that should be managed appropriately. From a groundwater supply perspective, recycled water contributes to the stored volume when incidental percolation occurs during irrigation of landscapes and crops. However, in the 2012 Water Year it accounted for approximately 229 AF or less than 1.3% of the Main Basin's new groundwater supply component (i.e., recharging waters). The bigger advantage of recycled water's use in the 2012 Water Year was that it conserved up to 4,482 AF of groundwater storage, assuming that the irrigation demand would have been met with groundwater supplies had it not been supplied by the recycled water. This conservation could also be considered in-lieu recharge.

From a groundwater quality perspective, recycled water use can add salts and nutrients to the stored groundwater just as onsite wastewater disposal can. About 847 tons of salt or about 6% of the total salt inflow to the Main Basin was attributed to the 1,273 AF of recycled water and wastewater applied over the Main Basin in the 2012 Water Year. However, if potable water supplies would have been used for this irrigation demand, the salt loading would have been only 335 tons less. By comparison Zone 7's MGDP removed over 4,000 tons of salt in the 2012 Water Year, more than compensating for salt impacts and groundwater pumping lost to brine discharges.

Both Livermore and DSRSD plan to expand the use of recycled water for turf and landscape irrigation projects over the next few years. Similarly, Pleasanton is studying the feasibility of importing recycled water from DSRSD and/or Livermore for irrigation of city parks and landscapes located over the Main Basin. Although recycled water is currently only a minor contributor to the salt accumulation in the Main Basin, the average TDS concentration of the applied recycled water tends to be over twice the average TDS concentration of the fresh water served by Zone 7. Therefore, the expansion of recycled water should be carefully planned along with expansion of demineralization facilities to minimize impacts to salt loading.

Mitigation of the water quality concerns related to salt loading from recycled water use is addressed in Zone 7's Salt Management Plan (*Zone 7, 2004*) (Section 5.2.1). This plan is currently being updated to conform to the State Water Board's new Recycled Water Policy (*State Water Board, Resolution No. 2009-0011, adopted February 2009*) which calls for the addition of nutrient management planning and CEC monitoring to the overall plan. In the process, Zone 7 is collaborating with Livermore, DSRSD, and Pleasanton to incorporate future planned recycled water use expansions, and to identify strategies for limiting the impact to groundwater and delivered water quality. The updated SMP is scheduled for completion by May 2014.

5.1.7 Review of Development Plans and Land Use Changes

Zone 7 reviews new development plans and their associated CEQA documentation to evaluate their potential impact to groundwater supply and quality. The potential supply impacts can be from new or increased pumping/losses or from a reduction in the Main Basin's recharge capacity. No potentially significant impacts to the groundwater supply or quality were identified during Zone 7's project review efforts in the 2012 Water Year. However, additional evaporative losses and groundwater exportation are anticipated as gravel mining progresses in the future Lakes C and D areas, south of Stanley Boulevard. Zone 7 is managing groundwater levels in the vicinity of the gravel quarries to minimize groundwater exports by the mining companies. Quarry pond evaporation has been incorporated into long-range plans. See Section 5.4.1 for additional information on these plans.

5.2 Salt Management

5.2.1 Strategy and Overview

Zone 7's Water Supply Operations Plans use an adaptive management approach to select the combination of salt management strategies to be implemented in a given year. Multiple variables are balanced when making decisions, and priorities change from year to year; hence the need for a so-called adaptive or iterative management approach.

In 2004, Zone 7 prepared a Salt Management Plan (SMP, Section 5.2.2) to address the increasing level of total salts in the Main Basin. This plan led to the construction of Zone 7's groundwater demineralization facility (MGDP), which was completed in July 2009 (Section 5.2.3). The MGDP is designed to decrease or halt the build-up of salts in the groundwater basin while improving delivered drinking water quality. Zone 7 plans to update the Salt Management Plan by May 2014 to conform to the State Water Board's new recycled water policy (*State Water Board, Resolution No. 2009-0011*), and to verify that the original plan's strategy is still appropriate (and sustainable) for managing the future salt loading projected from the updated water supply plans.

5.2.2 Salt Management Plan

Zone 7's SMP was designed to protect the long-term water quality of the Main Basin and is a permit condition of the Master Water Recycling Permit, RWQCB Order No. 93-159, issued jointly to Zone 7, the City of Livermore, and Dublin San Ramon Services District. In May 2004, Zone 7, in cooperation with the other agencies, published its SMP to address the increasing level of salt in the Main Basin. The SMP was approved by the RWQCB in October 2004. The SMP was incorporated into Zone 7's GWMP in 2005. Copies of these annual GWMP reports are submitted to the RWQCB to satisfy associated permit reporting requirements.

The SMP identified potential salt management strategies to offset the calculated long-term average salt loading to the Main Basin. The selected alternatives generally fall into three categories:

- Management of artificial recharge to take advantage of low TDS imported water when available;
- Pump and deliver more groundwater to customers so more salts are exported as wastewater; and
- Construct and operate groundwater demineralization facilities that remove salts from pumped groundwater and export salts as part of the waste by-products (concentrate/brine).

Factors used to track salt loading include data and information collected from the various monitoring programs (Section 3). The existing monitoring programs are sufficient for tracking salt loading from existing sources and for existing land use conditions. Future land use changes and any increased use of recycled water may require additional monitoring to track the resultant additional salt loading. The monitoring component of the SMP facilitates tracking any progress in salt removal.

In February 2009, the State Water Board adopted a Recycled Water Policy (State Water Board, Resolution No. 2009-0011) which requires that Salt Nutrient Management Plans (SNMPs) be completed for all groundwater basins in California by May 2014. While this requirement does not apply to a basin where a plan has already been approved by the RWQCB, Zone 7 plans to update the SMP (*Zone 7, 2004*) by the May 2014 deadline to conform to the State Water Board's new recycled water policy. The updated SMP will evaluate the success of the demineralization plant on salt loading, fulfill nutrient and CEC requirements, evaluate salt loading impacts of increased recycled water use over the Main Basin, and assess the potential impacts of the water supply "portfolios" outlined in the Water Supply Evaluation (Zone 7, 2011c).

In addition, the original SMP planned for new monitoring wells along 14 basin boundary transects to evaluate subsurface inflow of salt into the Main Basin from the adjacent fringe basins. Many of the monitoring wells have now been installed, and their groundwater levels and quality have been monitored for several years. Staff will also update the SMP's estimate of salt inflow from the fringe basins in the SMP update.

5.2.3 Groundwater Demineralization

In July 2007, Zone 7 started construction of the MGDP to reduce salt build-up in the groundwater basin while improving delivered water quality to meet targets established in Zone 7's Water Quality Policy. The facility went online in July 2009. It is a reverse osmosis (RO) membrane-based treatment system producing product water with extremely low TDS. The demineralized water is then blended with other groundwater (non-demineralized) or system water to achieve the desired overall delivered water TDS and hardness. The brine concentrate from the RO process is exported out of the watershed to San Francisco Bay by way of DSRSD to the regional wastewater export pipeline operated by LAVWMA. Additional salt removal facilities may be required to keep pace with the additional salt loading projected for the basin as the overlying communities approach build-out and the use of recycled water increases.

Table: Salts Removed by Zone 7's Groundwater Demineralization Plant Operations (2012 Water Year)

Brine volume exported from Valley (AF)	Average Brine TDS Concentration (mg/L)	Salt Mass Exported (Tons)	Salt Removed per 1000 AF of Export (Tons)
935	3,198	4,064	4,340

During the 2012 Water Year, 4,672 AF of groundwater from the Mocho Wellfield were routed through the demineralization plant's reverse osmosis (RO) membranes. As a result, 3,655 AF of very low-to-no-salt permeate was blended with system or other groundwater and fed into Zone 7's distribution system for delivery to Zone 7's customers. The RO process also generated approximately 935 AF of wastewater consisting of the water and the salts rejected by the membranes during the 2012 Water Year. This concentrate, or brine, contained about 4,064 tons of salt and was exported from the basin by way of DSRSD to the LAVWMA treated wastewater pipeline, which discharges to the San Francisco Bay. The discharge volumes and salt concentrations of the exported brine are monitored by DSRSD and reported to Zone 7 staff periodically throughout the year.

5.3 Groundwater Resource Protection Programs

5.3.1 Well Ordinance Program

The construction, repair, reconstruction, destruction or abandonment of wells within Zone 7 is currently regulated by Alameda County General Ordinance Code, Chapter 6.88. Zone 7 administers the associated well permit program within its service area including within the three incorporated cities: Dublin, Livermore, and Pleasanton. As a result, any planned new well construction, soil-boring construction, or well destruction must be permitted by Zone 7 before the work is started. Additionally, all unused or abandoned wells must be properly destroyed; or, if there are plans to use the well in the future, a signed statement of future intent must be filed at Zone 7.

Zone 7 is in the process of drafting its own "Well Ordinance" to regulate the construction, repair, reconstruction, destruction or abandonment of wells within the Zone 7 service area. Once completed, and reviewed by the affected public agencies, the new Zone 7 ordinance will be presented to the Zone 7 Board of Directors and to the local City councils along with requests for rescission of their previous well ordinance adoptions, and for the adoption of the new ordinance. These actions are anticipated to take place in 2013.

Zone 7 issued 150 drilling permits in the 2012 Calendar Year (140 in the 2011 Calendar Year). Zone 7 tracks the purpose of each project requiring a drilling permit. Following is the itemization of the types of permits issued:

- 62 for drilling associated with geotechnical investigations;
- 49 for drilling associated with contamination investigations, monitoring and clean-ups;

- 4 for general groundwater monitoring;
- 25 for the destruction of existing wells;
- 8 for new water supply wells; and
- 2 for cathodic protection wells.

In 2012 Calendar Year, about 51% of the permitted well work was physically inspected by Zone 7 permit compliance staff.

A copy of the current Zone 7 drilling permit application is available for download from the Zone 7 web-site. Zone 7 must receive permits at least five days prior to beginning any drilling. Well construction and destruction permit requirements are determined on a case-by-case basis, but generally follow DWR's California Well Standards (Bulletins 74-81 and 74-90). This program allows Zone 7 to protect the groundwater basin from any negative impacts that would be threatened by poorly-constructed wells. There is currently no fee for a Zone 7 permit.

5.3.2 Septic Tank Management Program

Although ACEH issues permits for the operation, installation, alteration, and repair of onsite wastewater treatment systems in Alameda County; Zone 7 requires special approval for any the following septic systems located within the Valley:

- Any new septic system constructed, partially or fully, for a commercial or industrial use;
- Any conversion of a residential septic system to a commercial or industrial use; or
- Any new residential septic system that discharges greater than one rural residential equivalence of wastewater (i.e., greater than an annual average of 320 gallons/day).

In 1982, the Zone 7 Board of Directors adopted the "Wastewater Management Plan for the Unsewered, Unincorporated Area of Alameda Creek Watershed Above Niles (WWMP)" and its recommended policies (Resolution No. 1037). In addition, a separate policy was established in 1983 that prohibits the use of septic tanks for new developments zoned for commercial or industrial uses (Resolution No. 1165). This prohibition can be waived by the Zone 7 Board if "it can be satisfactorily demonstrated to the Board that the wastewater loading will be no more than the loading from an equivalent rural residential unit (on a five-acre lot) and said septic tank(s) will be in compliance with all other conditions and provisions."

One new commercial septic tank application was received by Zone 7, and a plan for expansion of an existing permitted commercial use was considered during the 2012 Calendar Year. The new commercial application was for a proposed commercial horse boarding facility and caretaker's unit on a 7-acre parcel in South Livermore, which already had a single family residential unit onsite being served by a septic tank. The proposal included the installation of a treatment unit that has demonstrated, in other applications, the ability to reduce effluent nitrogen concentrations by at least 70%. Consequently, staff recommended approval of the project, but since the authorization request came in late December 2012, the Zone 7 Board's decision will be reported for the 2013 Calendar Year.

The other commercial case considered in the 2012 Calendar Year was for The Wine Group's Concannon Winery, and involved an expansion of their office and bottling facilities and full disclosure of their entire existing wastewater disposal practices. Although located on a large parcel in South Livermore, and having received Zone 7 Board authorization for a previous expansion of onsite commercial facilities that generate wastewater, Zone 7 staff was concerned for the potential exacerbation and mobilization of a nitrate plume that already exists in the same vicinity. Zone 7 collaborated with ACEH and RWQCB to require a Report of Waste Discharge (ROWD), a cumulative impact analysis of the onsite wastewater flows, installation of nitrogen treatment equipment on all domestic sewage systems and a performance monitoring program to ensure that groundwater was not being further degraded by the winery operations (present and future). Zone 7 also facilitated discussions between RWQCB, City of Livermore and The Wine Group with the intent that the Concannon Winery be eventually connected to the City's municipal sewer system. These discussions are ongoing. In the interim, The Wine Group and Concannon Winery completed its ROWD and cumulative impact study, and is now moving forward with construction of the new wastewater treatment and monitoring facilities.

5.3.3 Toxic Site Surveillance Program

Zone 7 documents and tracks sites across the groundwater basin that pose a potential threat to drinking water. Information on these sites is gathered from state, county, and local agencies, as well as from Zone 7's well permitting program. Each site has been assigned a Zone 7 number, which corresponds to a file number containing reports or other information about the site. In addition, all sites are reviewed and given a priority designation (high, moderate, or low) based on criteria used by the RWQCB and ACEH that have been modified to meet Zone 7 standards. For example, a site is designated as high priority if contamination at the site is in groundwater at concentrations greater than the MCL and a water supply well is within 2,000 ft down-gradient of the site, or it is shown that drinking water or surface water will likely be impacted by the contamination at the site.

In general, the Toxic Site Surveillance Program has found two types of contamination threatening groundwater in the Livermore Valley Groundwater Basin:

- **Petroleum-based fuel products -** including total petroleum hydrocarbon as gasoline (TPHg), TPH as diesel (TPHd), benzene, toluene, ethylbenzene, xylene (collectively known as BTEX), and fuel oxygenates, such as methyl tertiary-butyl ether (MTBE) and tertiary-butyl alcohol (TBA). California has assigned clean-up standards (Title 22, California Code of Regulations) for the BTEX compounds and fuel oxygenates. However, a clean-up standard for total petroleum (TPHg or TPHd) has not officially been established.

- **Industrial chemical contaminants –** including the chlorinated solvents tetrachlorethylene (PCE), trichloroethylene (TCE), and their degradation by-products, such as vinyl chloride (VC) and dichloroethene (DCE). PCE is common in the dry cleaning business, and TCE is commonly used as a degreaser for electronics. Both PCE and TCE have an established maximum contaminant level (MCL, EPA National Primary Drinking Water Regulations) of 5 micrograms per liter (µg/L).

In 2012, Zone 7 tracked the progress of 65 active sites where groundwater contamination has been detected or contamination is threatening groundwater. Seven contamination cases were closed during

2012, after they were determined to no longer pose a threat to drinking water. Maps have been generated that show the site locations, their priority, and their proximity to municipal supply wells for each main area of the groundwater basin: Livermore (Figure 5.3-1), Pleasanton-Sunol (Figure 5.3-2), and Dublin (Figure 5.3-3).

As summarized in the latest program report (*Zone 7, 2013*), presented to the Zone 7 Board in February 2013, 16 of the sites are designated as high priority: ten in Livermore, five in Pleasanton, and one in Sunol. Although several sites in Dublin have elevated levels of MTBE (i.e., >10,000 parts per billion [ppb]) and one has elevated levels of TCE, none are classified as high priority because they are not near drinking water supply wells and are outside the Main Basin.

Twelve of the 16 high priority sites are fuel leak cases and the other four are the result of industrial solvent contamination. All of the twelve fuel leak cases are being overseen by ACEH. Six cases have on-going active remediation, three fuel leak cases have completed a remediation workplan, two cases have closure requests pending and the remaining case is working on completing site characterization. A domestic well in Sunol was impacted by one of these fuel leak sites and currently has a wellhead treatment system in operation.

Of the four high priority industrial solvent cases, two are being overseen by the RWQCB while the other two are not included in any of the Local Oversight Programs (LOP). Both of the RWQCB cases involve contamination from dry cleaner facilities; one in Pleasanton and one in Livermore. The Pleasanton site is now undergoing active remediation. The Livermore site has attempted remediation but with limited success; low-level PCE contamination has now reached two municipal supply wells located down-gradient of the Livermore dry cleaner site. The water purveyor is currently using granulated-activated carbon (GAC) filters to ensure against any customer health impacts. The lateral and vertical extent of contamination has been determined and an effective remedial action plan is being developed.

The other two industrial solvent cases which are of concern to Zone 7, but are not currently included in any of the LOP cases, also involve PCE contamination: one in Pleasanton and one in Livermore. The contamination in Pleasanton has impacted a public supply well, which has required the well owner to utilize GAC to remove the contamination prior to public consumption. Zone 7 is in the process of investigating a potential source for this site in order for the RWQCB to consider taking it on as a formal case in the RWQCB's oversight program. For the site in Livermore, a potential Responsible Party has been identified, but the extent of contamination has not been determined. Zone 7 is working with the RWQCB to expedite opening this site as a formal case in the RWQCB's oversight program and begin directing its further investigation.

5.4 Capital Projects

5.4.1 Chain of Lakes Recharge Projects

As mitigation for removal of aquifer material and interruption of groundwater movement resulting from the mining of aggregate resources between Livermore and Pleasanton, ten of the resulting quarry lakes, collectively called the Chain of Lakes (COL), will be deeded to the Zone 7 Water Agency for water resources management purposes (see Figure 5.4-1). Zone 7's planned uses for these lakes include water

supply storage, capture and percolation of surface water, detention of flood waters, enhancement of special-status species habitat, and public recreation/education, as outlined in Zone 7's Stream Management Master Plan (SMMP). Full implementation of these uses is not expected before 2030 when the mining operations are projected to be complete. However, Zone 7 is working on several interim projects that are designed to convey, capture and recharge imported SWP water and mining discharge and/or detain peak stormwater flows.

Near-term and long-term COL planning is provided for in Zone 7's current Capital Improvement Program (CIP) Ten-Year Water System Plan as a project in itself (i.e., Chain of Lakes Master Plan) and Five-Year Flood Protection CIP. The project concepts have been developed over time, and are continuing to be refined; however, the main thrust to develop a detailed integrated use plan and the associated environmental impact analyses has been deferred until FY15-16 through FY17-18 due to CIP funding issues and priorities. In the near-term, a Chain of Lakes Evaluation Plan is being developed with an emphasis on Lakes H, I and Cope which are all currently or soon-to-be owned by Zone 7. These lakes and the surrounding area are also included in the City of Pleasanton's East Pleasanton Specific Plan which is currently under development.

Zone 7 staff is continuing to collaborate with Vulcan Materials on a project to capture groundwater that would normally be discharged to the Arroyo Mocho, and be lost as "basin outflow." Vulcan produces varying quantities of groundwater, mostly from their quarry pit de-watering operations, and discharges a large portion of it into the Arroyo Mocho under an NPDES permit issued by the RWQCB. This project would extend their discharge line to one of the Zone 7-owned lakes, and then convey the water into Lake I where it will percolate through the sidewall and recharge the Amador Subbasin aquifers. It is estimated that this project has the potential to eliminate 1,500 to 4,000 AF of groundwater losses per year once constructed and fully operational. A pipeline alignment has been selected and a design is being developed by Vulcan with input from Zone 7 staff. The construction agreement is still being negotiated by staff; however, Zone 7 has assisted Vulcan with their Report of Discharge to the RWQCB for this project, and has completed California Environmental Quality Act (CEQA) documentation in anticipation of the project moving forward in Calendar Year 2013.

Another near-term recharge enhancement project is the Arroyo Mocho Diversion, which is anticipated to be in service by 2015. This project consists of a fish-friendly stream diversion facility on the Arroyo Mocho that will divert imported SWP water released to the arroyo from the SBA into Lake H or Cope Lake and then, in turn, convey the water into Lake I to further enhance Zone 7's artificial aquifer recharge capacity. Hanson Aggregates (Hanson) is responsible for the design, permitting, and construction of the diversion facility per the existing agreement between Zone 7 and Hanson (formerly Kaiser Sand and Gravel), 1987, and the Livermore Amador Valley Quarry Reclamation Specific Plan, 1980. Zone 7 is assisting Hanson, as appropriate.

5.4.2 Well Master Plan

Zone 7's 2003 Well Master Plan identified the need for seven to nine new municipal water supply wells over the next 30 years to maintain Zone 7's potable water reliability goal based on a 2002 reliability goal of maintaining 100% reliability "even during worse-case drought conditions." As additional benefits, these new wells would provide Zone 7 with a better ability to pump back its stored water resources,

optimize groundwater production while maintaining groundwater levels above the historic lows, and remove dissolved salts from more of the groundwater basin. A new reliability policy was adopted by the Zone 7 Board in November 2012 which may relax the quantity and urgency of new supply wells needed by Zone 7 as new development continues in the Valley.

The first two wells were completed in 2008, and the next new wells are currently planned for completion in 2018; however, with the adoption of new reliability goals, implementation of additional water conservation measures, and the Retailer's expansion of recycled water use, the need for new supply wells and the timing of their construction will be confirmed during water supply planning efforts.

5.4.3 Groundwater Demineralization Plant

Zone 7 completed the MGDP to reduce salt build-up in the groundwater basin and to improve delivered water quality in December 2009. The MGDP was operated for a third year in Calendar Year 2012, although not continuously or always at full capacity during that time. Nonetheless, it was directly responsible for removing 4,064 tons of salt from the groundwater basin during the 2012 Water Year (see Section 5.2.3 for a more detailed description of this project).

Tentatively, Zone 7 plans to construct a second groundwater demineralization plant in about 2030. One issue of concern that could impede progress of these plans is that in order to extract more groundwater from the basin, there would need to be a way to replenish the groundwater at about the same rate in order to keep the groundwater supply sustainable. Although there are plans to increase the artificial recharge capacity of Zone 7's system, the actual water supply for the program and the actual percolation rate (and rate of plugging) for the Chain of Lakes has not been firmly established. Both of these unknowns should be resolved in the coming years, well in advance of planning future demineralization facilities. Zone 7 staff is working on these sustainability issues during its Salt Management Plan Update and Chain of Lakes Recharge Project efforts.

5.4.4 Monitoring Wells

No new monitoring wells were installed during the 2012 Water Year. Two former supply wells and a Zone 7 test well located in the Mocho Wellfield, that are no longer being used, were identified for destruction in order to eliminate the wells as potential vertical conduits for lower water quality to move into the lower aquifers. The destruction specifications were completed in the 2011 Water Year. Two of the well destructions (3S/1E 8H 4 and 3S/1E 8H14) were completed in the 2012 Water Year. There were some delays in identifying the best destruction method for the third well (3S/1E 8H 3), but it is now scheduled and budgeted to be destroyed in 2013.

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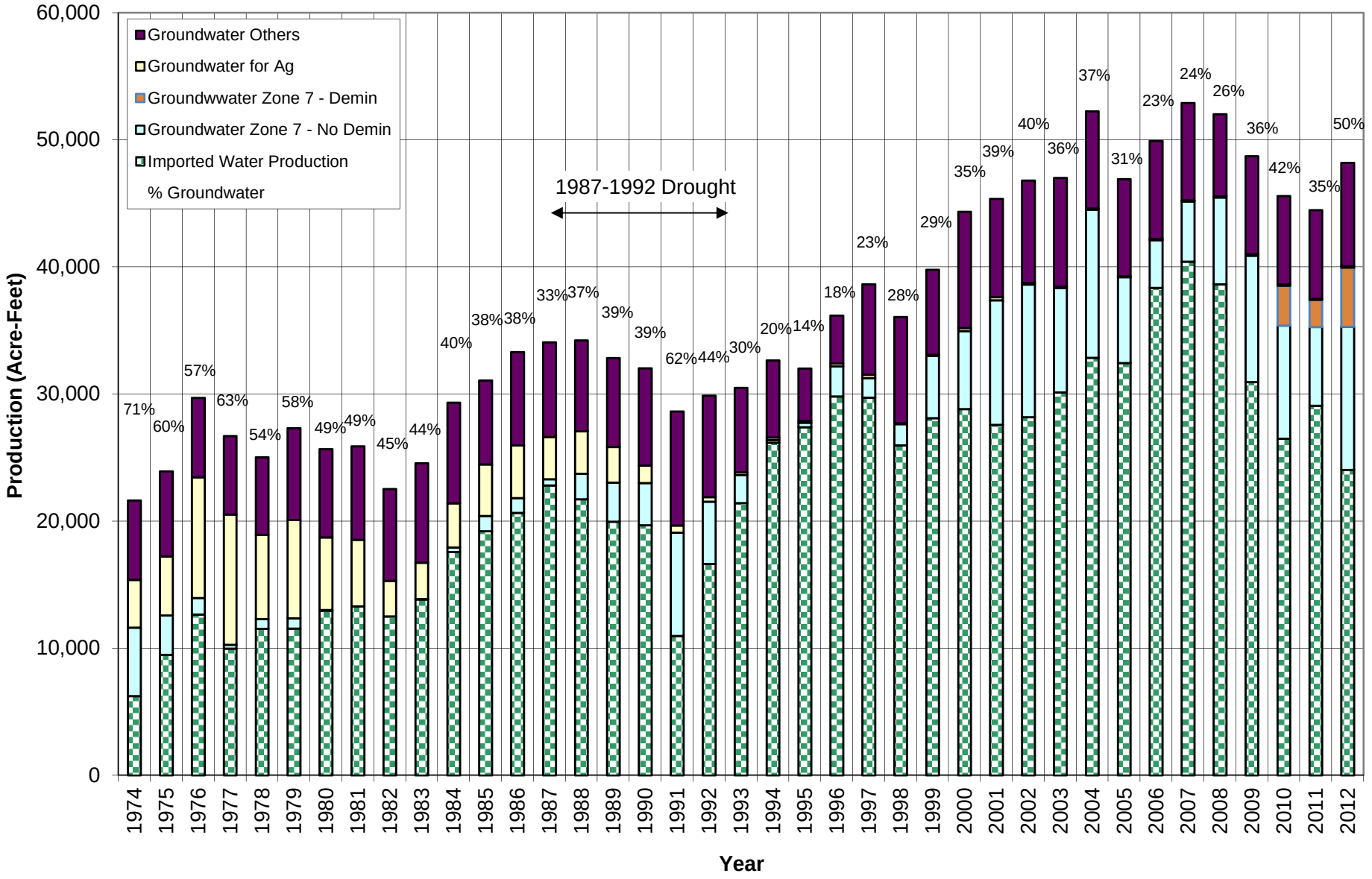
FIGURE 5.1-1
VALLEY WATER PRODUCTION FROM IMPORTED WATER AND GROUNDWATER SOURCES
1974 TO 2012 WATER YEARS



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3/5/2013

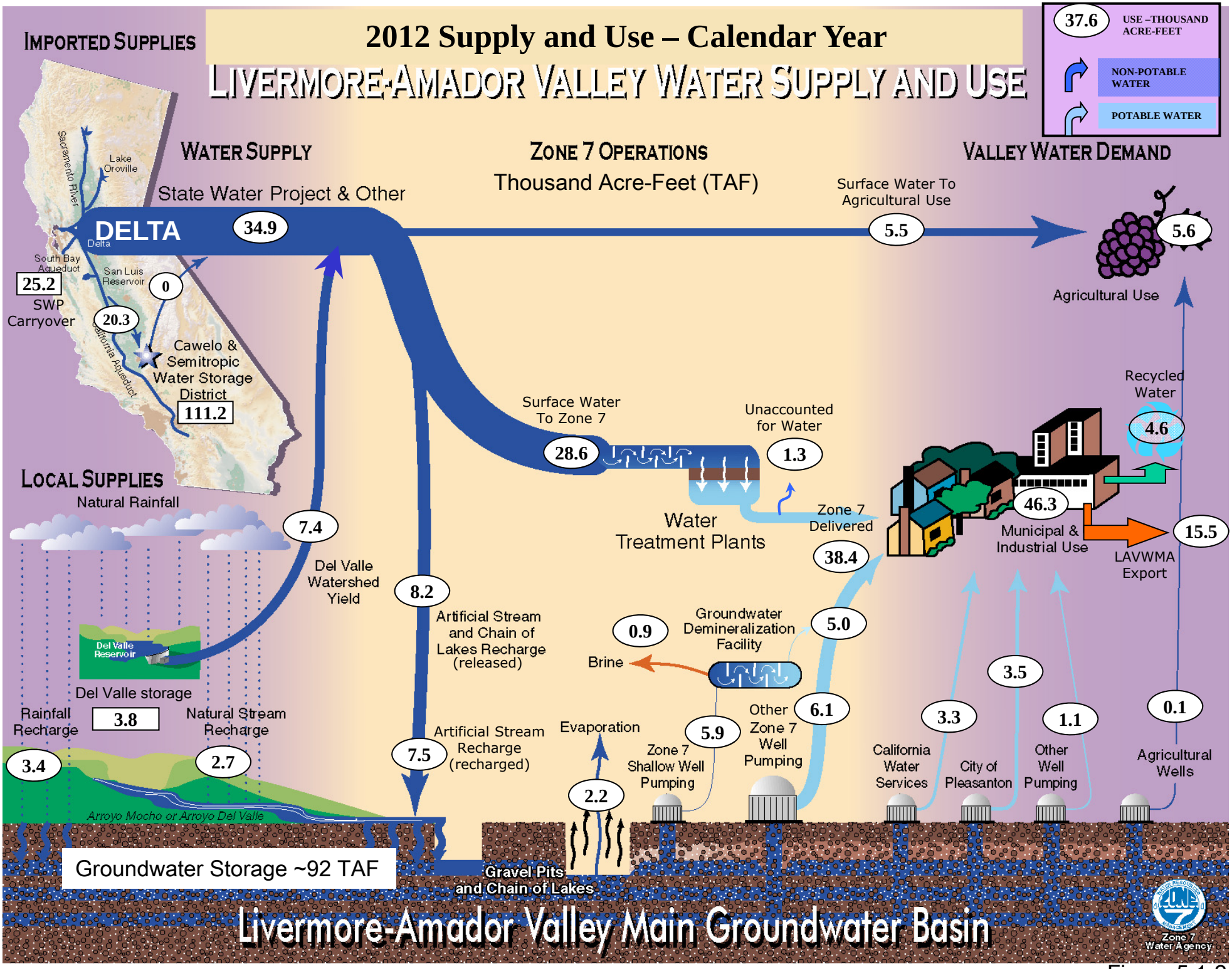
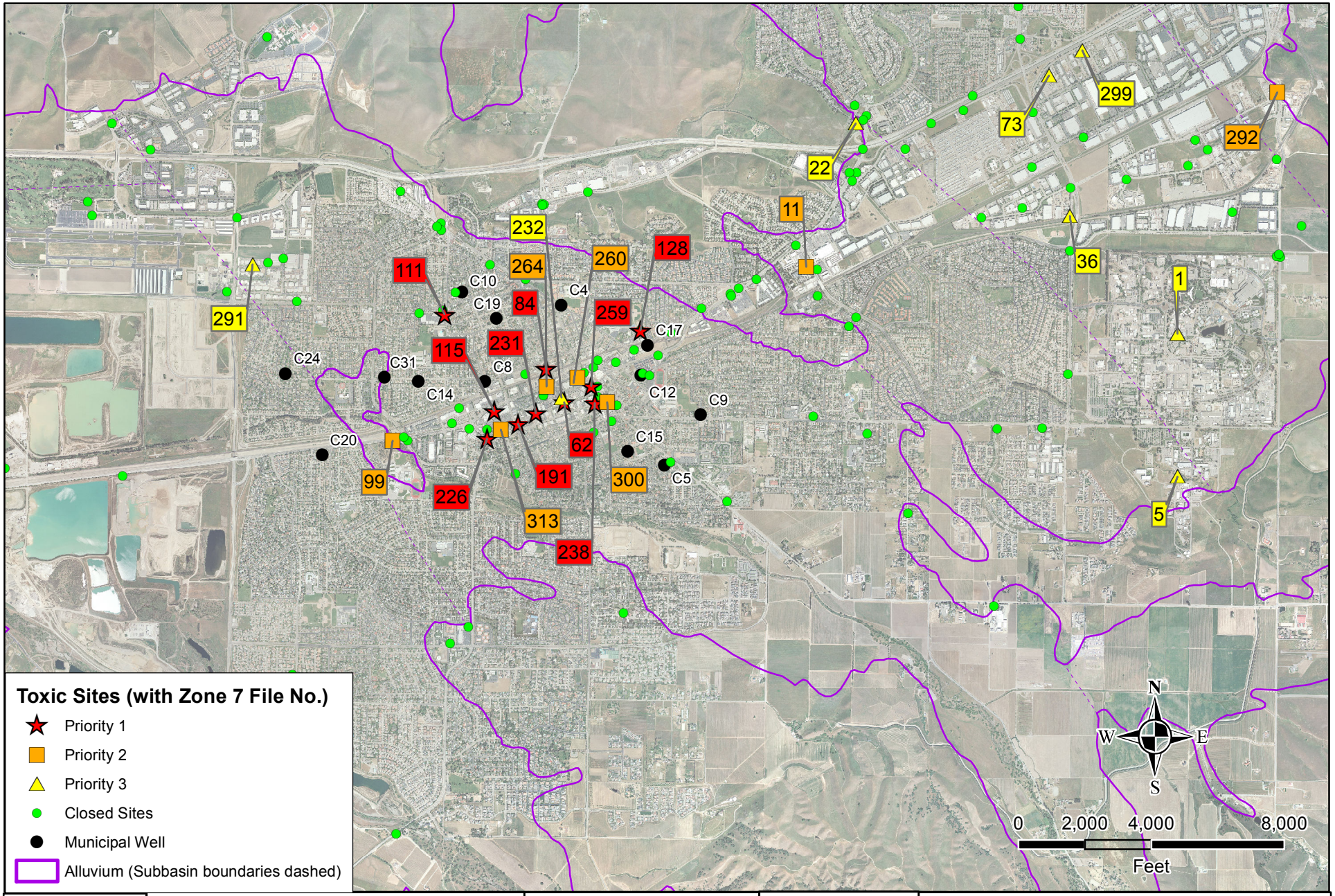

2012 Supply and Use – Calendar Year
LIVERMORE-AMADOR VALLEY WATER SUPPLY AND USE
37.6
USE –THOUSAND ACRE-FEET
NON-POTABLE WATER
POTABLE WATER
IMPORTED SUPPLIES
WATER SUPPLY
ZONE 7 OPERATIONS
Thousand Acre-Feet (TAF)
VALLEY WATER DEMAND
State Water Project & Other
Lake Oroville
Sacramento River
DELTA
Delta
34.9
South Bay Aqueduct
San Luis Reservoir
25.2
SWP Carryover
0
20.3
California Aqueduct
Cawelo & Semitropic Water Storage District
111.2
Surface Water To Agricultural Use
5.5
5.6
Agricultural Use
Surface Water To Zone 7
28.6
Unaccounted for Water
1.3
Water Treatment Plants
Zone 7 Delivered
38.4
Recycled Water
4.6
46.3
Municipal & Industrial Use
15.5
LAVWMA Export
LOCAL SUPPLIES
Natural Rainfall
7.4
Del Valle Watershed Yield
Del Valle Reservoir
Del Valle storage
Rainfall Recharge
3.8
Natural Stream Recharge
3.4
2.7
8.2
Artificial Stream and Chain of Lakes Recharge (released)
0.9
Brine
Groundwater Demineralization Facility
5.0
3.5
Other Zone 7 Well Pumping
6.1
5.9
Zone 7 Shallow Well Pumping
Evaporation
7.5
Artificial Stream Recharge (recharged)
2.2
3.3
California Water Services
1.1
City of Pleasanton
Other Well Pumping
0.1
Agricultural Wells
Arroyo Mocho or Arroyo Del Valle
Groundwater Storage ~92 TAF
Gravel Pits and Chain of Lakes
Livermore-Amador Valley Main Groundwater Basin
Zone 7 Water Agency

Figure 5.1-2



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

DRAWN: CD/CW	Scale:1 " = 4,000 '
REVIEWED: MK	Date: 3/29/2013
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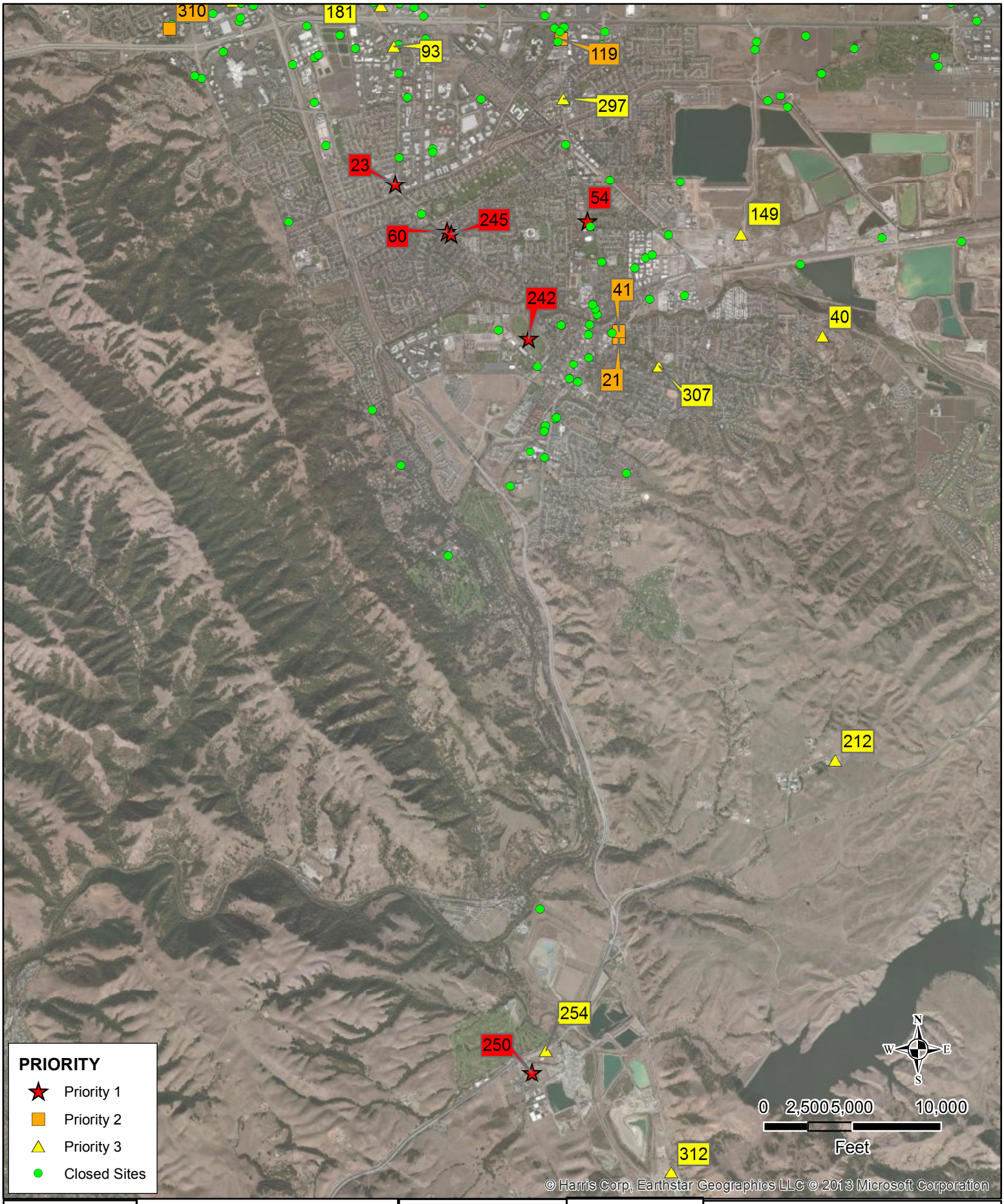
Figure 5.3-1
Toxic Site Surveillance
Livermore Area Sites
with Zone 7 Case ID



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

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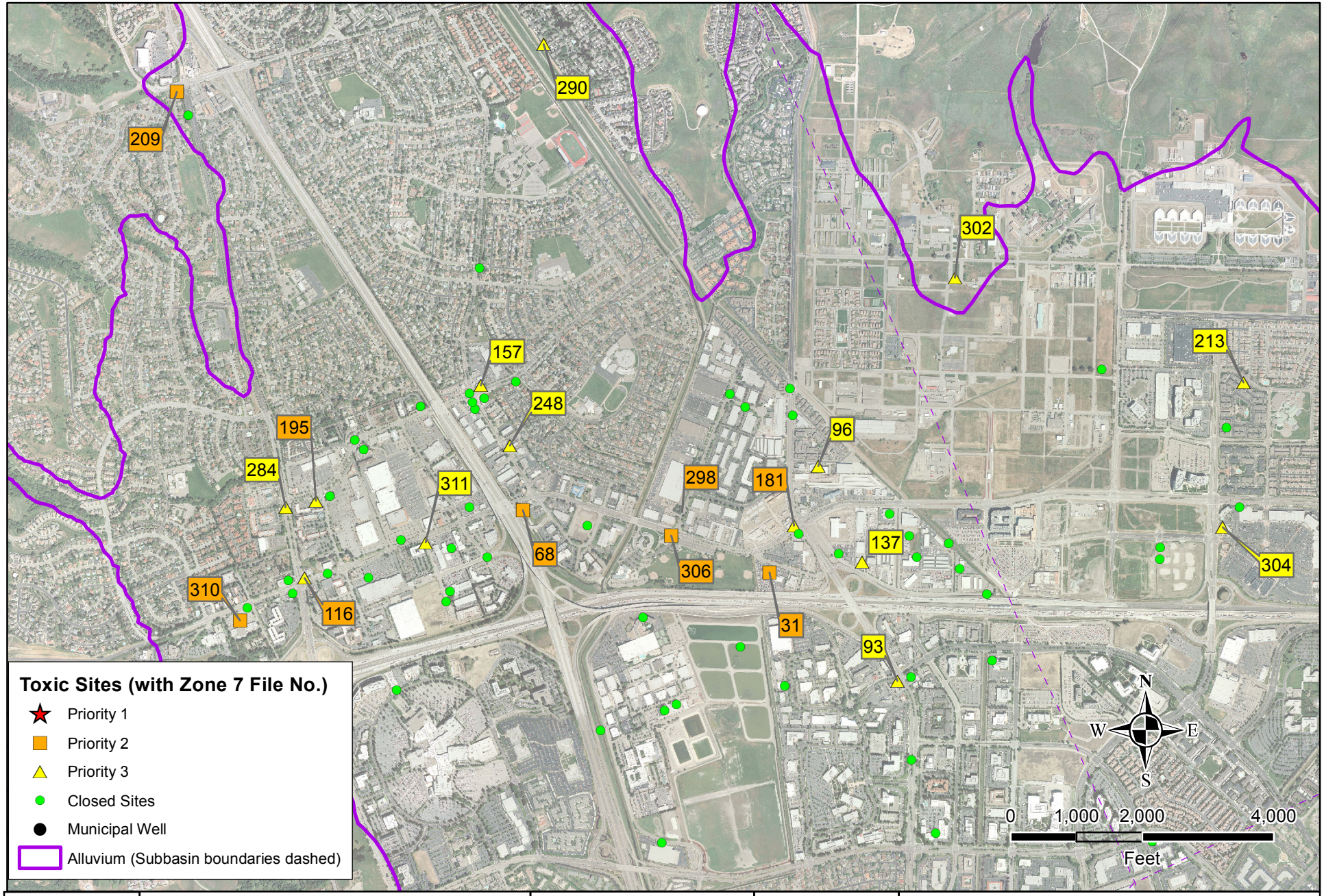
REVIEWED: MK	Date: Mar 29,2013
File: E:\Toxic\Toxics-Pleasanton-Sunol.mxd	

Figure 5.3-2
Toxic Site Surveillance
Pleasanton and Sunol Area Sites
with Zone 7 Case ID



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

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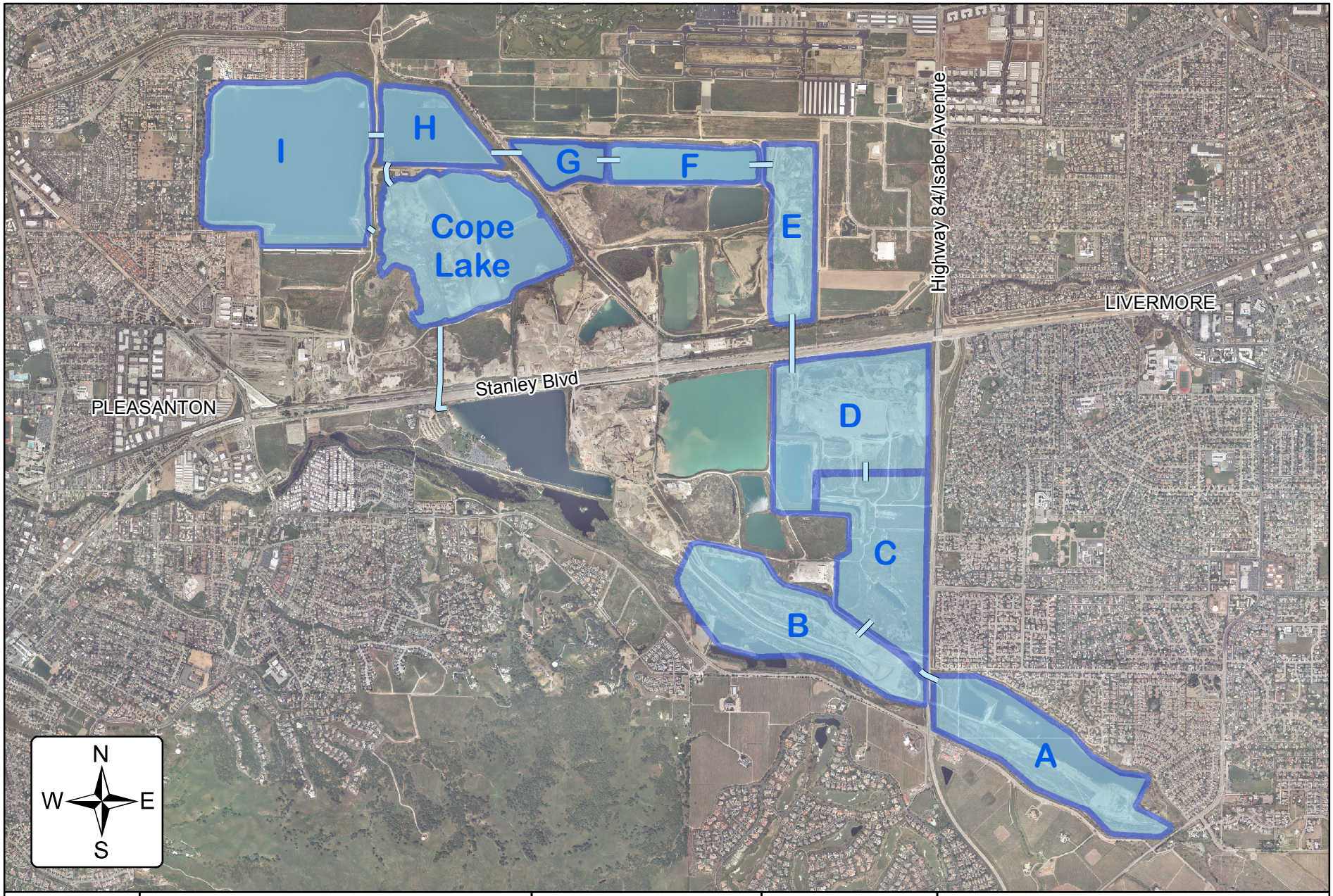
Figure 5.3-3
Toxic Site Surveillance
Dublin Area Sites with Zone 7 Case ID
(North of Main Basin)



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

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Figure 5.4-1
Location of Future Chain Of Lakes

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