

5 Basin Management

5.1 Groundwater 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 relies on current hydrologic conditions to direct 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 by its retailers through legal binding contracts (Section 5.1.3).
- Importing surface water to meet demands (Section 5.1.4).
- Implementing a conjunctive use program that recharges imported water into existing streams and lakes (Section 5.1.5).
- Promoting and monitoring wastewater and recycled water use (Section 5.1.6).
- Reviewing development plans for future supply and demand impacts (Section 5.1.7).
- Promoting water conservation (Section 5.1.8).

5.1.2 Natural Sustainable Yield (Safe Yield)

The Main Basin's natural, sustainable, groundwater yield is defined as the amount of water that can annually be pumped from the groundwater basin and replenished by average annual 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 in Sections 4.1, 4.2, and 5.1.4):

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

The long-term, natural, sustainable yield in the Main Basin has been documented to be about 13,400 AF annually. Additional water can be and is pumped from the Main Basin each year as long as Zone 7 artificially recharges the basin with additional water from other sources.

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 during the year. For the 2009 Water Year, the natural recharge was about 9,117 AF, approximately 74% of normal (Table 4.2-4).

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 Components (Water Year)

DEMAND COMPONENT	NORMAL/QUOTA (AF/Yr)	2009 WY (AF)
Municipal pumping by Zone 7 retailers	7,214 (CY) (Section 5.1.3.1)	7,428
Other local groundwater users (SFWD, Alameda County Fairgrounds, golf courses, and domestic supply)	1,186	1,153
Agricultural pumping	400	177
Incidental mining area evaporation	3,200	4,194
Groundwater losses by gravel mining activities	1,400	2,193
TOTAL WATER YEAR	13,400	15,145

CY = Calendar Year

For 2009 Water Year the estimated total for these demand components was approximately 15,145 AF; approximately 1,745 AF above the long-term sustainable yield of 13,400 AF. The mining activity demands (losses) vary over time depending on the stage of mining in any given pit. When the permitted gravel extraction is complete (estimated for 2030), the decrease in groundwater losses associated with the mining activities (i.e. pit dewatering, gravel washing, and moisture export) should reduce or eliminate this potential overdraft condition. For the near-term, Zone 7 staff is currently working with the gravel mining

company staff to investigate ways for the water generated by their pit dewatering operations to be re-percolated into the basin rather than being lost to basin outflow as it is today.

5.1.3 Municipal Pumping

5.1.3.1 Pumping by Zone 7 Retailers

As a condition to the water supply contracts and conditions of use that Zone 7 has with its retailers, each retailer is limited to an annual ‘Groundwater Pumping Quota’ (GPQ), which is generally based on average historical uses and is part of the basin sustainable yield. The retailers are permitted to pump a combined 7,245 AF annually with no charge from Zone 7. However, they must pay a ‘recharge fee’ to Zone 7 for all pumped groundwater that exceeds their quota, and Zone 7 must provide additional artificial recharge to balance the excess pumping. This practice helps prevent over-drafting of the basin by the large municipal pumpers.

During the 2009 Calendar Year, the retailers pumped their collective GPQ. The table below shows the individual GPQs and the amounts pumped in 2009 for each retailer. The carry-over amount will be added to the retailers’ GPQ for the following year.

Table: Retailer GPQs Volumes (Calendar Year)

Retailer	GPQ	Carry-over from 2008	Pumped in 2009	Carry-over to 2010
City of Pleasanton*	3,500	680	3,505	675
Cal Water Service*	3,069	0	3,064	5
DSRSD*	645	0	645 (by Zone 7)	0
City of Livermore (currently not used)	31	Not used	Not used	Not used
Normal Total/ Quota (sum of *)	7,214	680	7,214	680

5.1.3.2 Zone 7 Pumping

Zone 7’s annual groundwater pumping historically has varied with the availability of surface water and its 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 and customer requests based on aesthetic water quality issues. Although reduced groundwater pumping can have a positive impact on groundwater storage and delivered water quality, increased groundwater pumping has a positive impact on the salt mass loading because much of the salt in the groundwater pumped from the wells eventually leaves the basin as wastewater export.

Prior to the completion of the South Bay Aqueduct (SBA) in 1962, groundwater was the only source of water for the basin. Since then, the ratio of groundwater basin pumping relative to Valley-wide water production has generally been decreasing. Figure 5.1-1 shows that in the late 1970s, groundwater supplied about 50-70% of the Valley water production, while over the last 10 years that percentage has decreased to about 20-40%.

For 2009:

- Drought conditions in 2009 and the completion of the demineralization plant (Section 5.2.3) resulted in increased Zone 7 groundwater pumping. In 2009 Calendar Year, Zone 7 produced 10,911 AF (26% of the treated water demand): 9,760 AF from the Amador Subbasin and 1,151 AF from the Bernal Subbasin.
- In 2009, Hopyard Well No. 6 was pumped half as much as in 2008 because of increased Mocho Wellfield pumping for the startup and testing of Zone 7's new groundwater demineralization plant.
- In the 2009 Calendar Year, 645 AF of Zone 7's total groundwater pumping was for DSRSD's GPQ by agreement. The remaining 10,266 AF was for Zone 7's own demand, which was much more than Zone 7's artificial recharge for the year (4,632 AF for the Calendar Year).

5.1.4 Supplemental Water Sources

Zone 7 ensures that the groundwater supplies are not depleted by importing most of the Valley's water supply (approximately 75%) and by recharging the Main Basin with imported or Lake Del Valle water. In addition to the Livermore Valley Groundwater Basin, Zone 7's main sources of water supply are:

- **Arroyo Valle Prior Rights (Lake Del Valle)** - The operation of Lake Del Valle has the potential to impact Main Basin groundwater storage if unmanaged or unmitigated. 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. These releases are a requirement of Zone 7's water rights for the Arroyo Valle water and give Zone 7 the ability to use another portion of Arroyo Valle water for supply to its treatment plants. Zone 7 also recharges additional supplemental SWP water in the Arroyo Valle.
- **State Water Project (via South Bay Aqueduct)** - As a SWP contractor, Zone 7 imports supplies from the SWP using the SWP conveyance system. As of 2008, Zone 7 has 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 can be and have been less due to hydrologic conditions. In 2009, DWR revised its long-term reliable yield estimate to 60% of the Table A amount (48,370 AF/yr) due to future climate change and imposed restrictions on Delta pumping.

- **Byron-Bethany Irrigation District (via South Bay Aqueduct) (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-1913 Delta water.
- **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. Both are located in the Kern Groundwater Basin in Kern County located in south-central California, near Bakersfield.

Figure 5.1-2 shows the volumes for each of the main water supply and use components for the 2009 Calendar Year. Highlights of activities for 2009 included the following:

- Zone 7 decided to carry-over approximately 8,200 AF of local water rights water in Lake Del Valle for use in 2009, and maintained a live-flowing stream on the Arroyo Valle to meet water rights permit conditions.
- Zone 7 imported 31,200 AF of SWP water into the Valley (including 5,000 from BBID).
- Zone 7 total outside storage remained at about 83,000 AF (Semitropic at 78,000 AF and Cawelo at 5,000 AF).
- In 2007, federal judge Wanger imposed restrictions in Delta pumping due to Delta Smelt, an endangered fish species, thus reducing the Zone 7 SWP yield. As a result of the Wanger decision and potential climate change, DWR revised its long-term reliable yield from about 76% to about 66% of the Table A Contract Amount. In 2009, DWR issued a draft reliability report further reducing the long-term yield to 60%.
- For the 2009 Calendar Year, total DWR allocations to Zone 7 were 40% of Zone 7's Table A Contract Amount.

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 and out-of-basin groundwater banking participation with the management of the local groundwater basin. 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 location and timing of artificial recharge can be used as a water quality management tool as outlined in the Salt Management Plan as well as a temporal water storage activity. The timing and quantity of artificial recharge are typically dependent upon available supply, natural flows, source water quality, and regulatory requirements.

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 was pumped and by importing most of the water needed by the Valley's growing population.

Zone 7 can manage the water quality of the groundwater basin by selecting the location and quality of recharge waters and the location and depth of groundwater pumping. Each acre-foot of surface water recharged when TDS is low in the spring adds low TDS water to the groundwater basin. Each acre-foot that is subsequently pumped removes water with higher TDS. This process, often called 'increased conjunctive use', removes salts from 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 2009 Zone 7's Conjunctive Use Program included the following activities and highlights:

- In spite of the continued drought, Zone 7 increased artificial recharge on the Arroyo Mocho. Zone 7 limited the use of Shadow Cliffs lake for off-stream recharge to conserve water for other uses and to stress the severity of the drought on our limited water supplies. Zone 7's groundwater pumping withdrew 11,035 AF (Calendar Year) of water from its basin storage.
- Storage for 2009 Water Year dropped about 13,000 AF to 76,000 AF (74,000 AF for Calendar Year) of 'Operational Storage' (Section 4.2).

Looking into the future, the local groundwater basin will continue to be used conjunctively to meet annual and dry year demands. Groundwater pumping in normal years will increase to about 10,000 AF per year with the completion of the Mocho groundwater demineralization facility. This will require a commensurate increase in artificial recharge (e.g., future Arroyo Mocho diversion into the Chain of Lakes).

5.1.6 Municipal Wastewater and Recycled Water Use

Wastewater disposal from domestic and commercial sites, if disposed in natural waterways or if disposed on the land, can have a significant impact on water resources and the groundwater basin. Zone 7 also sees recycled water use as an integral part of the valley-wide water resources management program. From a water supply/quantity perspective, wastewater disposal and recycled water can be a significant source of water. From a water quality perspective they can be a potential source of contamination primarily from elevated concentrations of total dissolved solids, nitrates and chlorides, along with the potential for other wastewater contaminants (nutrients, organics, NDMA [N-Nitrosodimethylamine], and biological constituents).

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. Proper management of local resources require 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 the impacts of recycled water on the local groundwater

resources. The wastewater quality concerns have been greatly reduced through prevention of high-density un-sewered development, wastewater export, and elimination of nitrification of recycled water. The water quality concerns related to the salt loading from recycled water use will be mitigated by Zone 7 through the Salt Management Plan (Section 5.2.1), which will be updated by May 2014 to address the State Water Board's new Recycled Water Policy (State Water Board, Resolution No. 2009-0011, adopted February 2009).

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 new significant future impacts to the groundwater supply were identified during Zone 7's project review efforts in 2009; 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 keeping groundwater levels low to minimize mining exports. Evaporation has been incorporated into long-range plans. See Section 5.4.1 for additional information on these plans.

5.1.8 Water Conservation Program

Zone 7 recognizes that water is a limited and precious resource, as reflected in the agency's approach to water management. Zone 7's conservation and outreach programs are comprehensive and reflect the need to continually conserve water given California's recurring drought cycle. Highlights of selected conservation and outreach programs are listed below.

Low Flow Toilet Rebate Program - In 1994, Zone 7 implemented the Ultra-Low-Flow-Toilet (ULFT) Rebate Program to encourage households to install new water-conserving ULFTs by providing up to a \$75 rebate for each toilet. Rebates for the ULFTs were phased out as of July 1, 2008 and replaced by rebates for new, high-efficiency toilets (HET) that save about 20 percent more water than ULFTs. Each eligible HET is rebated for up to \$150. Approximately 13,900 ULFTs and 2,050 HETs have been installed as part of the program, resulting in an annual water savings of approximately 1,097 AF. Future HET programs to be implemented in 2010 include rebates for commercial, industrial, and institutional customers and a direct install program for low income customers.

Residential Clothes Washer Rebate Program – this program subsidizes the purchase of high-efficiency clothes washing machines. This program is a regional partnership with other Bay Area water agencies including Alameda County Water District, Contra Costa Water District, East Bay Municipal Utility District, and Santa Clara Valley Water District. These high-efficiency machines use up to half the energy and about 40 percent less water, leading to a potential annual savings of

from 5,100 to 7,200 gallons per machine. Since 1999, more than 15,950 rebates have been processed, increasing annual water savings to approximately 270 AF in the Zone 7 service area.

Large Landscape Survey Audit Support Service - In August 2009 Zone 7 developed and implemented this service to the highest 20% water users (parcels greater than three acres). The service provides a detailed water-audit analysis to the customer. The customer is also invited to participate in Zone 7's rebate program, which includes up to \$5,000 for smart controllers, weather based irrigation controllers, and hardware replacements.

California Irrigation Management Information System (CIMIS) Station - In 2004, Zone 7 and DWR installed a CIMIS station at the Alameda County Fairgrounds in Pleasanton to assist landscape professionals in determining an appropriate irrigation schedule for the properties they manage. Today, the data obtained from the station can also be used by any irrigation customer to develop a water budget. During 2009, Zone 7 continued to maintain the CIMIS station, the data from which is available at <http://www.cimis.water.ca.gov/cimis/data.jsp>.

WaterWise Gardening Website - In 2009, Zone 7 and a software firm converted the WaterWise Gardening CD they jointly developed in 2003 to a web-based version on Zone 7's website (<http://www.zone7.watersavingplants.com/zone7>). The website provides

- information based on climate and other factors specific to the region,
- step-by-step installation instructions for water-efficient landscaping and gardening practices,
- watering schedules based on turf type, and
- a visual drought-tolerant plant selection which the customer can print or save for future reference.

The website continues to be a popular tool to increase water conservation awareness with nearly 3,000 unique visitors during the 2009 calendar year.

Water Saving Hero - Zone 7 continued participation with several other Bay Area water agencies in the regional 'Water Saving Hero' Water Conservation Campaign. The campaign highlights simple and effective steps Bay Area residents can take to conserve water now and for the future. The website (<http://watersavinghero.com/>) and materials help water users learn more about water conservation programs and cash rebates provided by their local utilities.

Annual PG&E Water Conservation Showcase - Zone 7 helped sponsor the San Francisco showcase for 2009. The event provides information on water-conserving technologies for building designers, managers and operators. Workshops present opportunities for commercial conservation practices and bay-friendly gardening.

Alameda County Home & Garden Show - Zone 7 partnered with East Bay Municipal Utility District for an information booth on water conservation, drought tolerant gardening and pollution prevention though integrated pest management.

Water Conservation Postcards - Starting annually in 2007, Zone 7 has mailed out a postcard advising residents throughout the service area to adjust their irrigation system timers and irrigation schedules. These postcards are sent to approximately 60,000 addresses.

Waterways Newsletters – Zone 7 delivers these newsletters to about 80,000 customers throughout Zone 7's service area. The newsletters cover a variety of topics including water conservation and local water saving heroes.

Business-targeted outreach - In 2009, Zone 7 spearheaded an effort with the retailers to include water conservation fliers geared to local businesses in three different Chamber of Commerce newsletters.

5.2 Salt Management

5.2.1 Strategy and Overview

Zone 7's Water Supply Operations Plans can use an adaptive management approach to selecting the combination of salt management strategies to be implemented in a given year. Multiple variables are balanced when making decisions, and variables 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, completed in July 2009 (Section 5.2.3), which is designed to decrease or halt the build-up of salts in the groundwater basin without having to deliver them to Zone 7's customers.

5.2.2 Salt Management Plan

Zone 7's SMP was designed to protect the long-term water quality of the Main Basin and was added at Zone 7's request as a requirement 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 the 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.

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

- Management of artificial recharge to take advantage of low TDS imported water when available;
- Pump and deliver more high TDS groundwater to customers so more salts are exported as wastewater; and
- Construct and operate a groundwater demineralization facility to remove salts that are exported as waste by-products (reverse osmosis concentrate/brine), and blend the low-salt effluent with groundwater or Zone 7 system water.

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.

The SMP identified 14 cross-sectional transects to evaluate potential subsurface inflows of salt into the Main Basin. Staff has completed a preliminary evaluation of three transects across the northwestern boundary of the Main Basin: Chabot, Hacienda, and East Dublin. Staff will continue to evaluate the other SMP transects, the results of which will be presented when the SMP is updated.

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 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 Regional Water Board, Zone 7 plans to update the basin's Salt Management Plan (*Zone 7, 2004*) by the May 2014 deadline to conform to the State Water Board's new recycled water policy. This Salt Nutrient Management Plan update will be incorporated into the forthcoming Groundwater Management Plan update for the basin.

5.2.3 Demineralization

In July 2007, Zone 7 started construction of the Mocho Groundwater Demineralization facility 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 through the regional wastewater export pipeline operated by LAVWMA. Based on Zone 7's projections, 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.

During the 2009 Water Year, 968 AF of groundwater from the Mocho Wellfield were routed through the demineralization plant's reverse osmosis (RO) membranes. As a result, 759 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 concentrate (brine) that was exported from the basin via the LAVWMA treated wastewater pipeline which discharges to the San Francisco Bay. Approximately 192 AF of brine containing about 800 tons of salt, was exported from the basin as a direct result of the groundwater demineralization operations during the 2009 Water Year. The discharge volumes and salt concentrations of the exported brine is monitored by DSRSD and reported to Zone 7 staff periodically throughout the year.

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

Volume exported from Valley (AF)	Average TDS Concentration (mg/L)	Salt Mass Exported (Tons)	Tons Salt Removed per 1000 AF of Export
192	3059	798	4,160

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. There is currently no fee for the Zone 7 permits.

A copy of the current Zone 7 drilling permit application is available for download from the Zone 7 website. 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.

Zone 7 issued 100 drilling permits in the 2009 Calendar Year (182 in 2008). Zone 7 tracks the purpose of each project requiring a drilling permit. Following is the itemization of the types of permits issued:

- 24 for drilling associated with geotechnical investigations;
- 37 for drilling associated with contamination investigations, monitoring and clean-ups;
- 7 for general groundwater monitoring;

- 21 for the destruction of existing wells;
- 10 for new water supply wells; and
- 1 for cathodic protection wells.

Zone 7 is in the process of creating a new District “Well Ordinance” to regulate the construction, repair, reconstruction, destruction or abandonment of wells within the Zone 7 service area. The Alameda County General Ordinance Code that is currently being used by Zone 7 is a recent replacement of the original County Ordinance (No. 73-68), which was adopted by Zone 7 and the cities of Livermore, Pleasanton and Dublin; however, the General Ordinance is silent about Zone 7’s jurisdiction within the County. 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 adoptions of County Ordinance 73-68 and for the adoption of the new Zone 7 ordinance. These actions are anticipated to take place in 2010.

5.3.2 Septic Tank Management Program

Although Alameda County Environmental Health (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’ 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.”

During 2009, there were no commercial septic tank applications received by Zone 7; therefore, no commercial septic systems were approved by the Zone 7 Board. However, one special approval was issued by Zone 7 staff for a new onsite sewage treatment system planned to serve two residences on a five-acre lot created by a split of a historic ten-acre lot-of-record. The approval was made on the basis that the proposed treatment process would reduce the available nitrate-producing nitrogen in the effluent by more than 50%, thereby resulting in an onsite wastewater loading of one residential-unit-equivalence or less on a nitrogen-mass-loading basis. The approval was given with the added conditions that ACEH

approves the design and provides the appropriate oversight during construction, operation, and maintenance of the treatment system.

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 maximum contaminant level (MCL) and a water supply well is within 2,000 ft down-gradient of the site, or it is shown that drinking 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** - include 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** – include 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 µg/L.

In 2009, Zone 7 tracked the progress of 81 active sites (five were closed since 2008) where groundwater contamination has been detected or contamination is threatening groundwater. 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 (Figure 5.3-2), and Dublin (Figure 5.3-3).

As summarized in the latest program report, presented to the Zone 7 Board in February 2010, eleven of the sites are designated as high priority: six in Livermore, four 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.

Seven of the eleven high priority sites are fuel leak cases and the other four are the result of industrial solvent contamination. All of the seven fuel leak cases are being overseen by ACEH. Three cases have

remediation underway, and the remaining four fuel leak cases have completed a remediation workplan. 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. Further site characterization is underway to determine the lateral and vertical extent of contamination to help determine an effective remediation strategy.

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 Pleasanton contamination has impacted a public supply well, which has required the well owner to utilize GAC to remove the contamination prior to public consumption. The Livermore contamination has been identified, but the extent of contamination and its source have not been determined. Zone 7 is in the process of investigating potential sources for both of these two sites in order for the RWQCB to consider taking them on as cases in the RWQCB's oversight program.

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, and enhancement of special-status species habitat. 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.

Planning for the full implementation project(s) is included in Zone 7's current Capital Improvement Program (CIP) Ten-Year Water System Plan as a project itself (i.e., Chain of Lakes Master Plan). The project concepts have been developed over time, but the project details and the associated environmental impact analyses aren't scheduled to kick-off until fiscal year 2012-13, and are anticipated to take two to four years to complete.

The interim projects, which are anticipated to be in service by 2014, include:

- a stream diversion facility on the Arroyo Mocho to capture SWP water released to the arroyo from the SBA and divert it into Lakes H and I for enhanced artificial aquifer recharge; and
- improvements for two existing stream crossings to mitigate the impact of the additional SWP releases involved with the interim project.

Zone 7 is also considering another COL recharge project that may be implementable in 2010. This potential project would make use of groundwater that is normally produced by Vulcan Materials during their dewatering of active quarry pits and lost as “basin outflow” when discharged to the Arroyo Mocho; and instead, discharge it directly into Lakes H and/or Lake I where it will percolate and recharge the Amador subbasin. The decision whether to further pursue this project is anticipated by Summer 2010.

5.4.2 Well Master Plan

The Well Master Plan (WMP) project involves the construction of seven to nine new municipal water supply wells over the next 15 years to meet Zone 7’s potable water drought reliability goal. The reliability goal was established in 2002 by Zone 7 Resolution 02-2382. It requires Zone 7 to maintain sufficient well capacity for Zone 7 to meet 100% of its Municipal and Industrial (M&I) customers’ projected future needs, even during worse-case drought conditions. As additional benefits, these wells will provide Zone 7 with a better ability to manage groundwater levels, groundwater flow, dissolved salt build-up/removal, delivered water quality blending, and peak-day demands.

The WMP was completed by CH2M Hill in 2003, and an Environmental Impact Report (EIR) was certified by the Zone 7 Board in August 2006. The first two new wells (COL#1 and COL #2), including the associated pipelines, pump stations and treatment facility; have since been constructed in the Chain of Lakes/Gravel Pits Wellfield. These wells are currently undergoing testing and should be in-service by Summer 2010. Their combined maximum production capacity has been estimated at eight million gallons per day (MGD).

In 2009, a report of Groundwater Influence on Delivered Water Quality was completed by Zone 7 staff (a WMP EIR requirement) and was accepted by the Zone 7 Board as verification that the COL wells presented no new significant or substantial increase in previously identified, environmental effects. The planning for the next and future wells has been delayed due to budgetary constraints and slower-paced future demand increases. Currently, the completion of the next wells are projected for fiscal-year 2015/16.

5.4.3 Demineralization Plant

In July 2007, Zone 7 started constructing the Mocho Groundwater Demineralization Facilities to halt salt build-up in the groundwater basin and to improve delivered water quality. The facility was substantially completed in July of 2009 and Final Completion was obtained on December 31, 2009. See Section 5.2.3 for a more detailed description of this project.

5.4.4 Monitoring Wells

One nested monitoring well set (two wells total) was installed in the basin during the 2009 Water Year as part of the New Key Monitoring Wells Project (Section 3.2.2). The nested wells are an upgrade to the existing key monitoring well network for the Mocho II Subbasin. These two new wells (3S/2E 8H 3 and 3S/2E 8H 4) will initially be measured on a monthly basis. One of these will provide an index for the quality and quantity of groundwater in the lower portions of the Mocho II Subbasin. Well construction details for each new well are presented in the table below.

Table: New Monitoring Wells for 2009 Water Year

Project	Well Name	Well Number	Depth (ft)	Upper Screen (ft bgs)	Lower Screen (ft bgs)
New Monitoring Wells	Intermediate Well	3S/2E 8H3	190	165	185
	Deep Well	3S/2E 8H4	385	360	380

5.4.5 Surface Water Stations

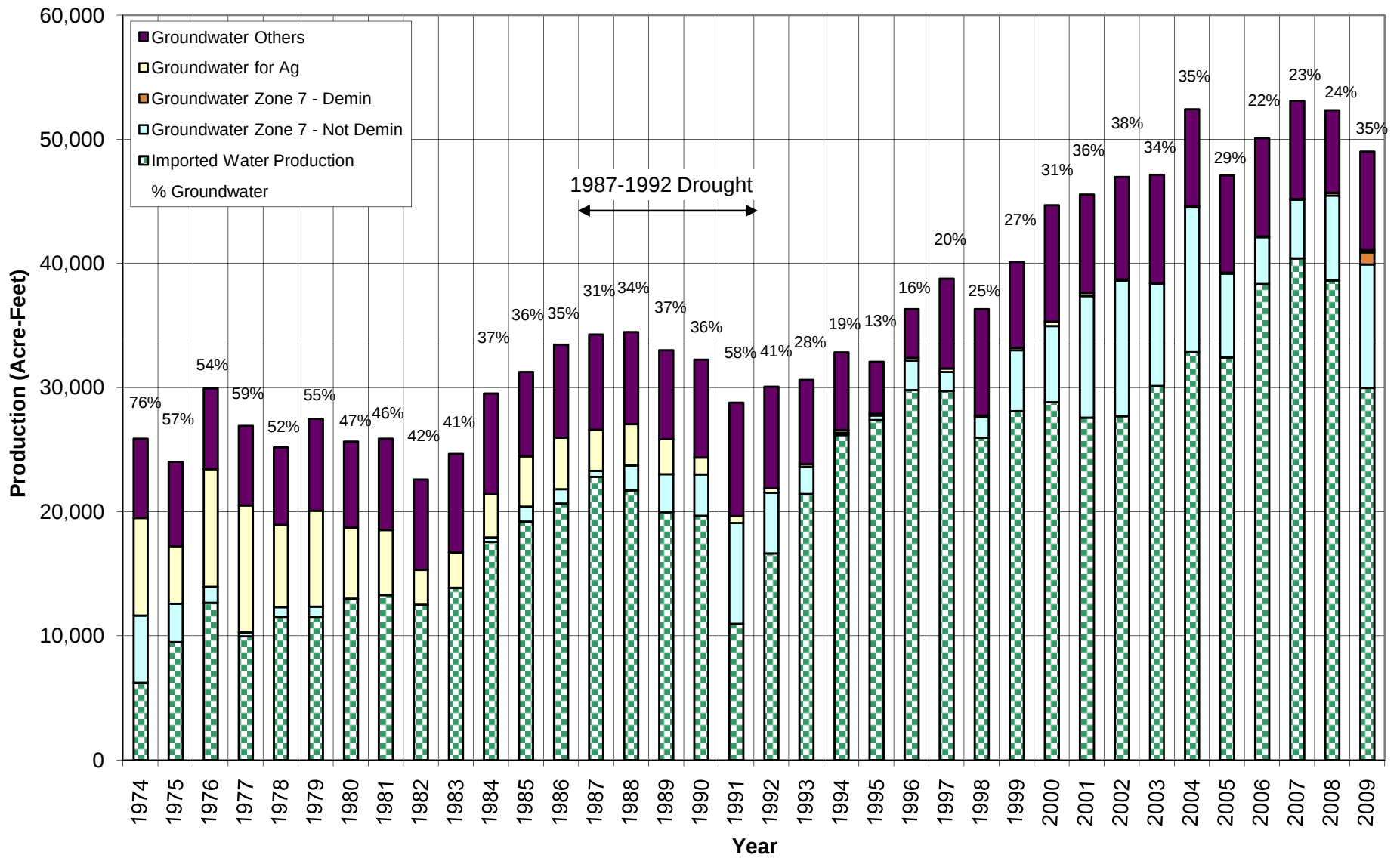
The surface water gaging control at the ‘Arroyo Las Positas Livermore’ (ALPL) stream gage site was slightly modified to improve the accuracy of the station for medium range flows. In 1989 a piece of angle iron was installed in the original concrete weir to provide higher-accuracy stage measurements during low flow conditions. Since 1989 however, flows have increased from upstream development and other discharges; therefore, in January 2010 the angle iron was removed to allow more flow to pass through the weir. Recent storm events have provided an opportunity to produce a new rating curve for the new weir that will provide proper data for the current conditions.

5.4.6 Other Projects

During the 2009 Water Year, DWR accepted Zone 7’s Local Groundwater Assistance Program grant submittal entitled “Hydrostatic Investigation of the Aquifer Recharge Potential for Lakes C and D of the Chain of Lakes, Livermore, California’. The project, anticipated to begin in May 2010, will investigate the potential connectivity between future Lakes C and D, of the future Chain-of-Lakes, and the productive aquifers in the West Amador Subbasin. The results of the study will serve as a preliminary assessment of these lakes’ capability to recharge the deep aquifers, giving Zone 7 other options if Lakes H and I turn out to be less effective at recharging the deep aquifers than originally planned. The grant provides Zone 7 up to \$250,000 towards the study.

FIGURE 5.1-1

Valley Water Production from Imported Water and Groundwater Sources 1974 to 2009 Water Years



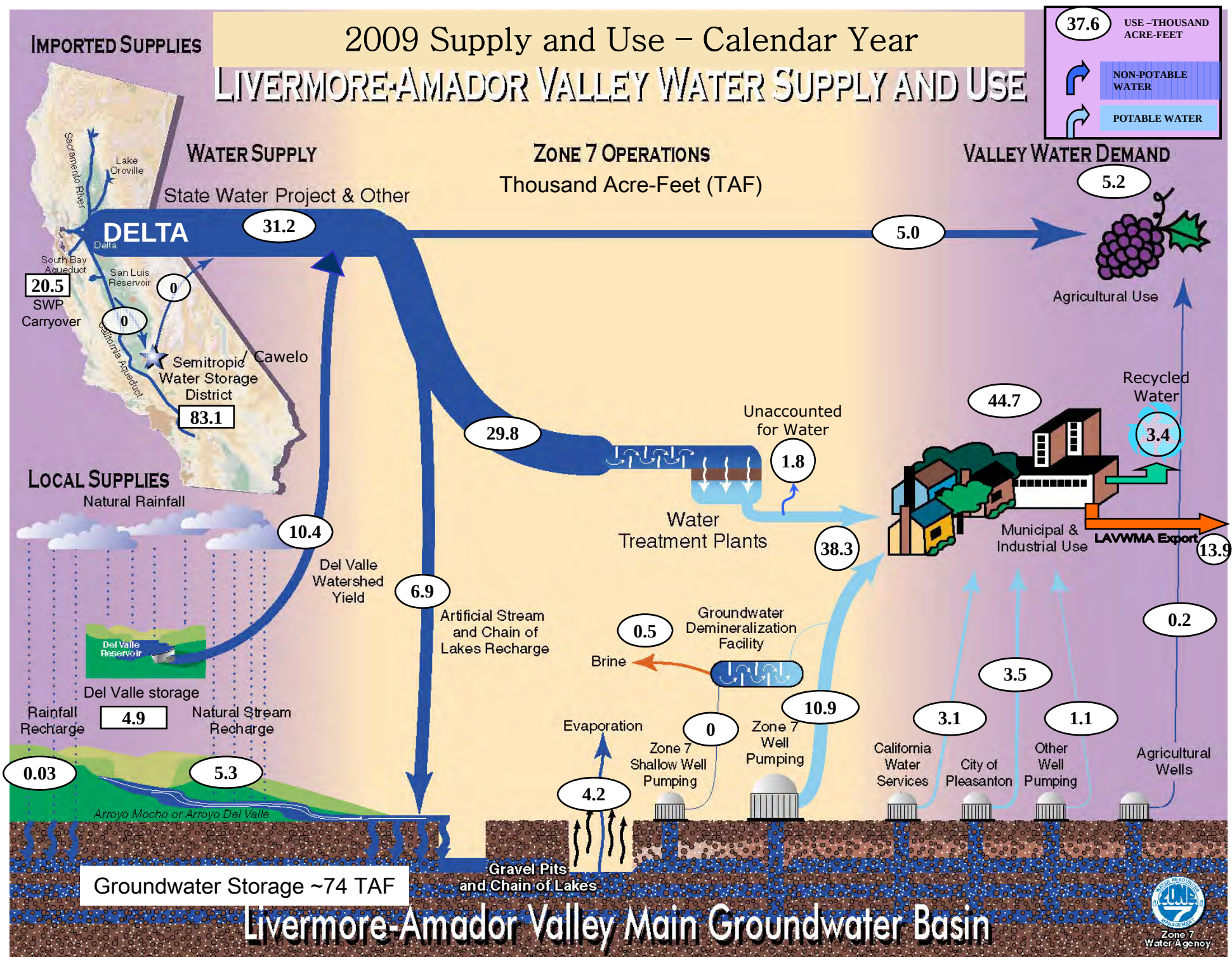
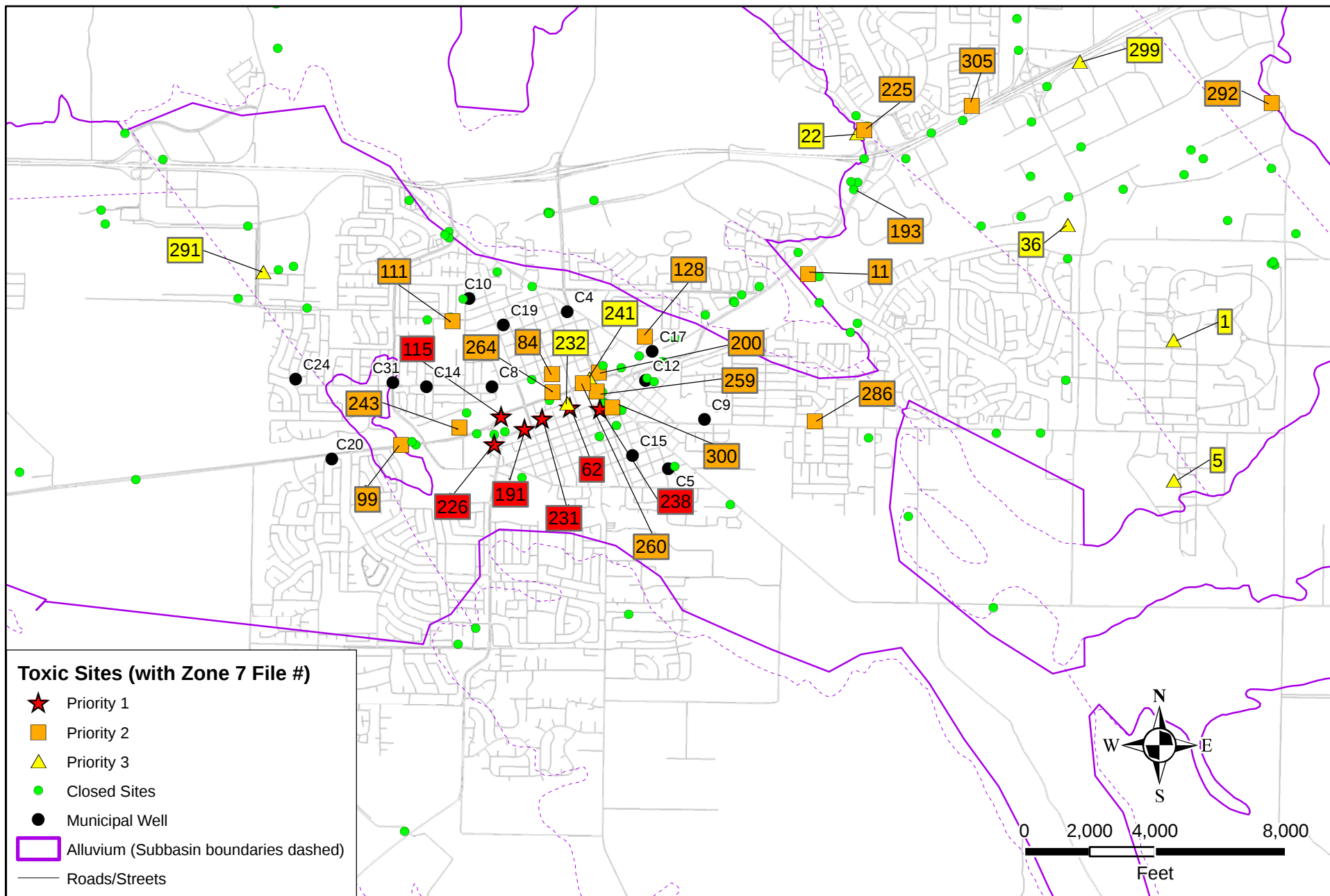


Figure 5.1-2



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

DRAWN: CD/TR

REVIEWED: CD/MK

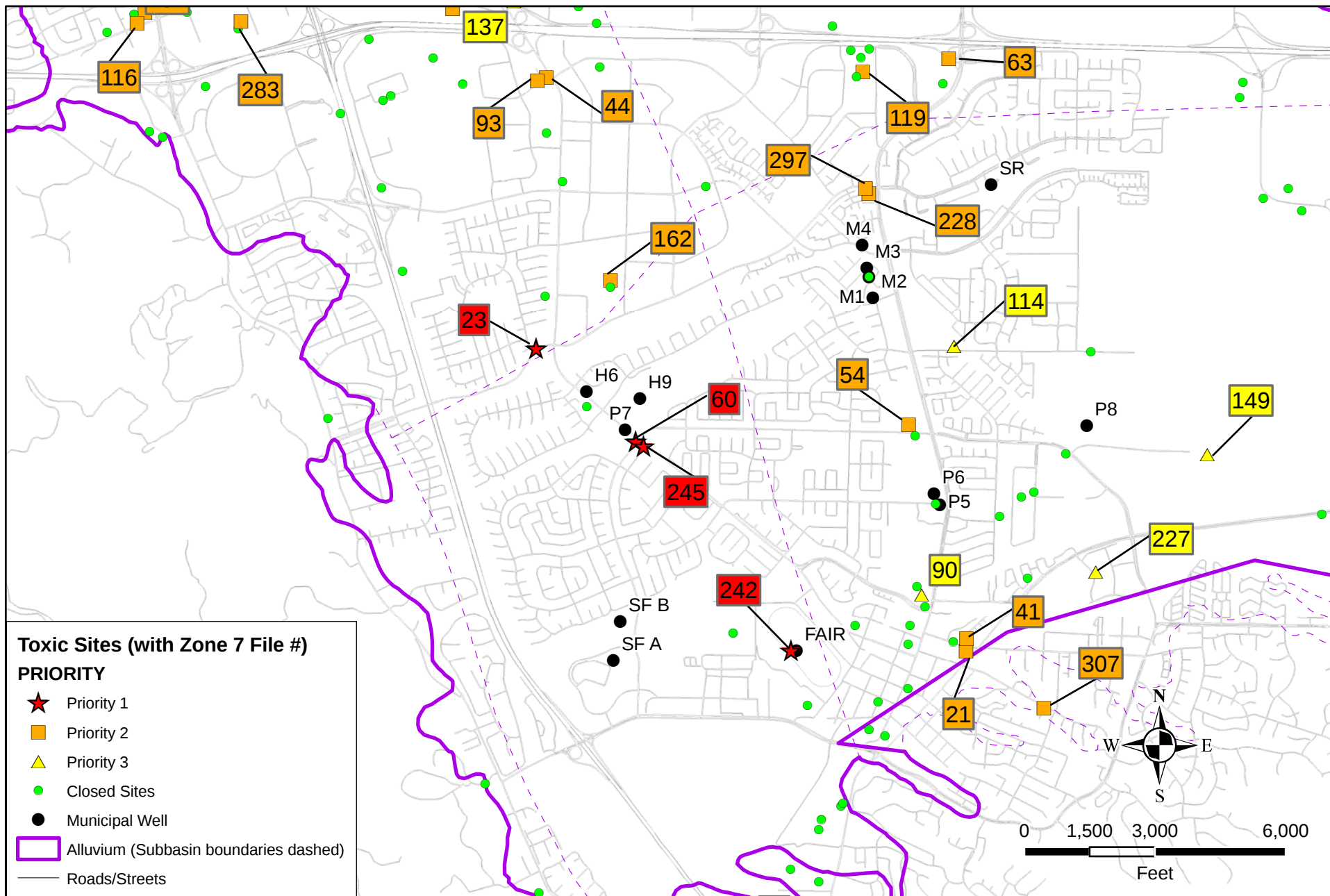
File: P:\WRE\GWMP\2009AnnRpt\Figures
Fig5.3-1Toxics-Livermore.mxd

Toxic Site Surveillance Livermore Area Sites

Scale: 1" = 4000'

Date: Feb 2010

FIGURE 5.3-1



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

DRAWN: CD/TR

REVIEWED: CD/MK

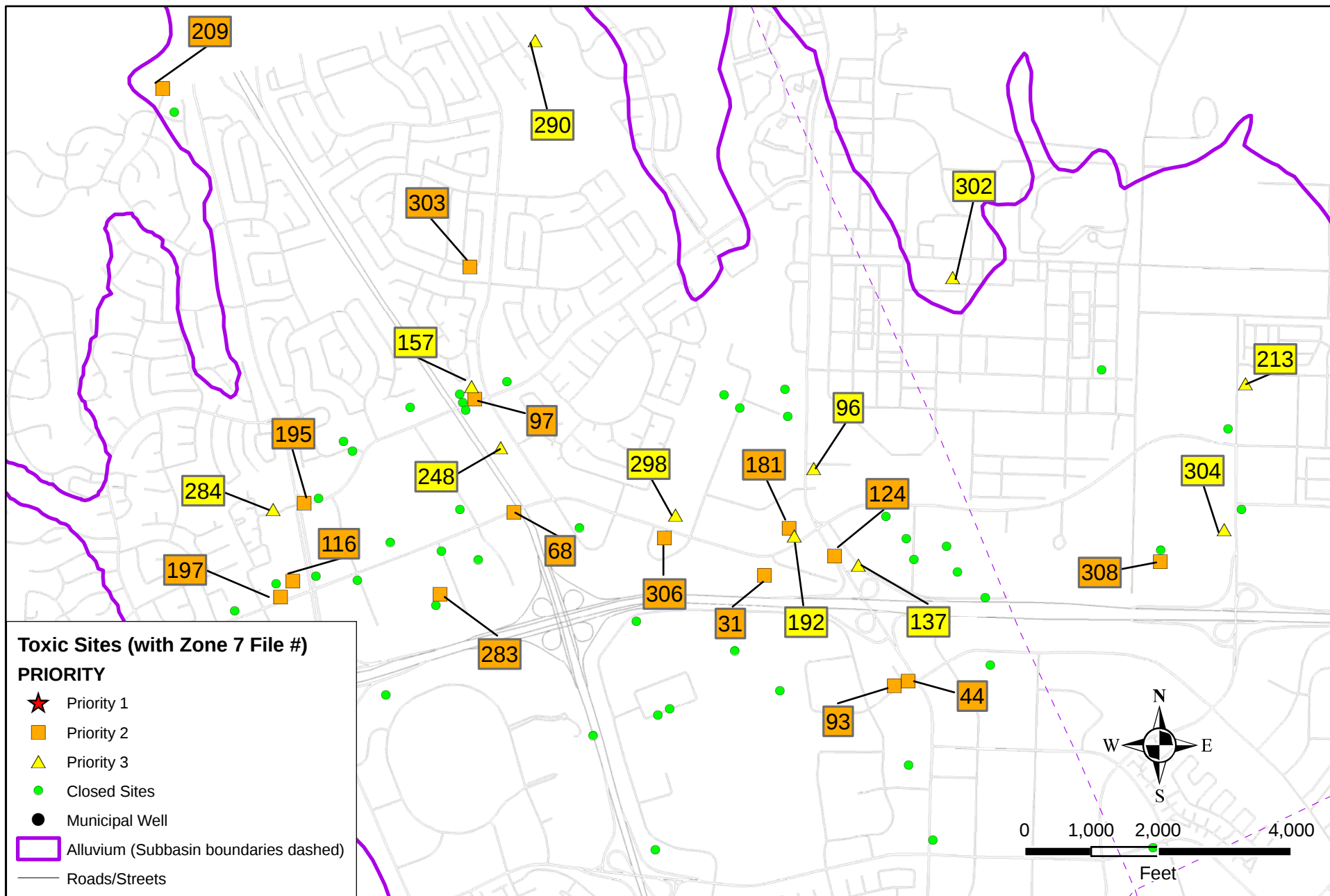
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Fig5.3-2Toxics - Pleasanton.mxd

Toxic Site Surveillance Pleasanton Area Sites

Scale: 1" = 3000'

Date: Feb 2010

FIGURE 5.3-2



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

DRAWN: CD/TR

REVIEWED: CD/MK

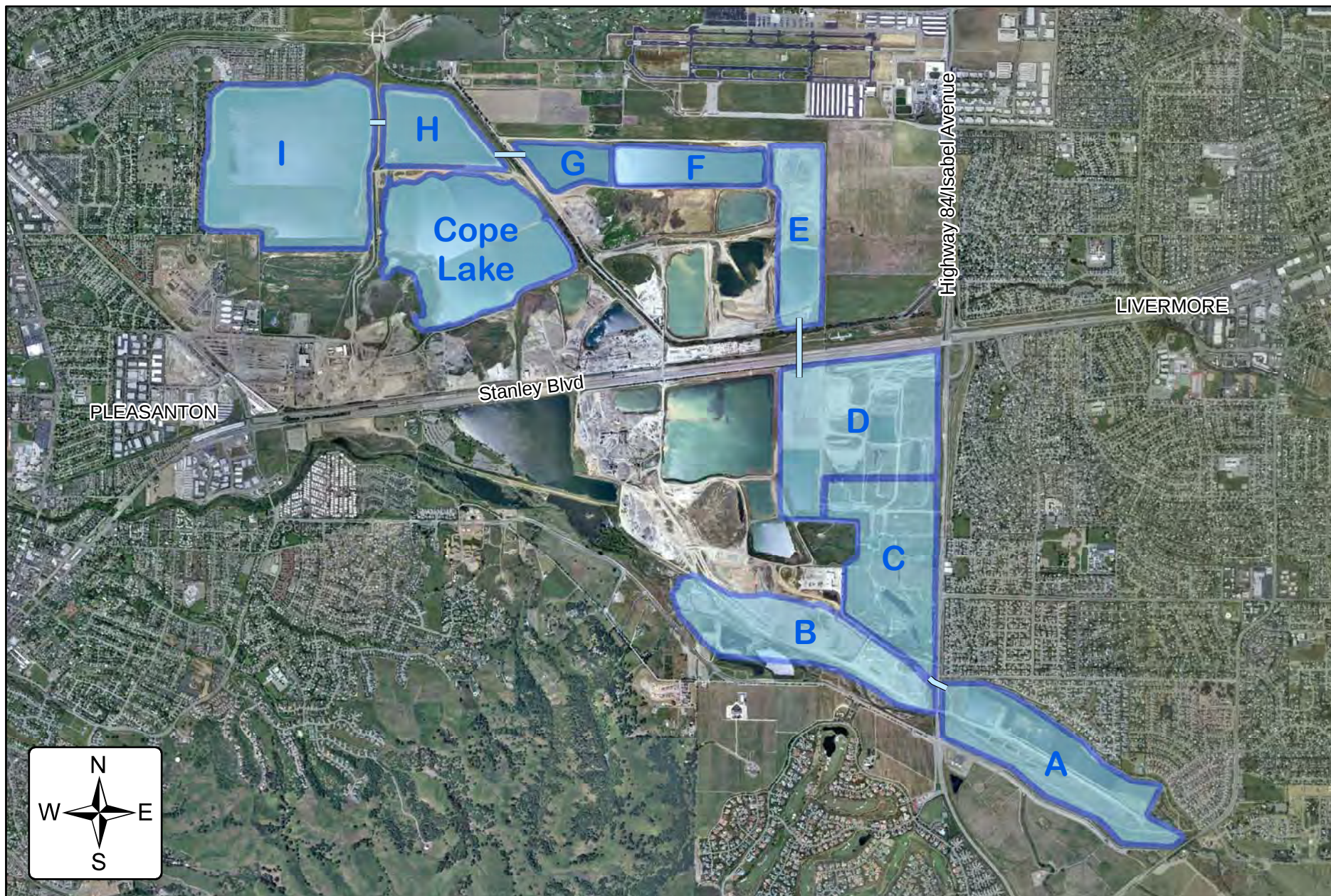
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Fig5.3-3Toxics - Dublin.mxd

**Toxic Site Surveillance
Dublin Area Sites
(North of Main Basin)**

Scale: 1" = 2000'

Date: Feb 2010

FIGURE 5.3-3



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

DRAWN: CW/TR

REVIEWED: MK

File: P:\WRE\GWMP\2009AnnRpt\
Figures\Fig5.4-1-COL.mxd

**Location of Future
Chain Of Lakes**

Scale: 1" = 3,000 ft

Date: Apr 12, 2010

FIGURE 5.4-1