ES Executive Summary

In Summer 2012, Zone 7 celebrated 50 years of groundwater recharge. Operating the basin as a kind of bank account, Zone 7 continues to use a portion of its State Water Project water, along with local surface water stored in Del Valle Reservoir, to recharge the basin. It draws on this storage to augment imported supplies, especially during summer when seasonal demands are highest, and in times of drought. Recharge also helps dilute the natural hardness of groundwater. This Annual Report for the Groundwater Management Program summarizes Zone 7's groundwater management and monitoring efforts in the Livermore Valley Groundwater Basin (Figure ES-1) for the 2012 Water Year (October 2011 through September 2012). This report includes 2012 Water Year data sets, results, and interpretations for the monitoring, evaluation, and management programs outlined in the 2005 Groundwater Management Plan (GWMP). This report also includes revised quantities for various groundwater storage and salt loading components (e.g., rainfall recharge, applied recharge). The current and historical numbers in this report replace any generated for past reports.

ES 1 Overview

From October 2011 through September 2012 (2012 Water Year), water levels dropped and groundwater supplies stored locally in the Main Basin decreased by approximately 10,000 acre-feet (AF). Below-normal rainfall (Figure ES-2) on the watershed led to very low rainfall recharge and natural stream recharge for this year's Main Basin supply. The low rainfall along with some extended outages of the State Water Project's delivery system and difficult to treat raw water quality factored into higher–than-normal groundwater pumping totals for the year as well. Another significant demand on groundwater this year involved the gravel mining operations which needed to pump more groundwater to keep their quarries dewatered as they excavate them deeper. One partially offsetting addition to the groundwater supply was Zone 7's aggressive artificial recharge operations which managed to percolate over 8,700 AF into the basin using the three main arroyos that flow through the Valley.

The 2012 Water Year ended with an estimated 89,000 AF of groundwater in storage above the "historic low" constraint and available for recovery. This represents about 71% of the Main Basin's estimated operational storage capacity. Accordingly, groundwater elevations in the Main Basin's Key Wells were generally lower (-7 to -18 feet) than they were at the end of the 2011 Water Year (Figure ES-3 and Figure ES-4). There were no indications that inelastic subsidence occurred anywhere in the valley during the water year due to groundwater pumping.

The greatest salt inflows to the Main Basin during the 2012 Water Year came from "applied water recharge" and "natural and artificial stream recharge," whereas the greatest salt removal (sinks) resulted from the salt exports associated with "municipal pumping" and "mining discharges." Zone 7's Mocho Groundwater Demineralization Plant (MGDP) was directly responsible for removing approximately 4,064 tons of salt while operating at about 60% of its capacity during the 2012 Water Year. After accounting for salt inflows and outflows from all sources and sinks, the net salt loading on the Main Basin was

approximately -6,800 tons for the 2012 Water Year, marking the fourth year in a row that the net annual salt loading has been a negative value. However, despite the net salt reduction in 2012, the calculated basin-wide average Total Dissolved Solids (TDS) concentration increased by about 16 mg/L. This is because rainfall recharge, which typically accounts for a great deal of "salt-free" water being added to the inventory, was very low in 2012, therefore driving the average TDS concentration of the Basin's recharge supply to be greater than the average TDS concentration of its discharge (production and outflow).

For groundwater protection purposes, staff issued 150 well activity permits in 2012; ten more than in 2011. One new commercial septic tank use approval application was received during the year, and a plan for expansion of an existing permitted commercial use was considered during 2012. Staff carefully tracked the progress being made for the cleanup of 16 "high priority" toxic sites that have either impacted or are a threat to potable water supply wells within the valley. None of the local development project proposals received and reviewed by staff during the year, contained unmitigated "potentially significant impacts" for groundwater supply or quality.

In 2013 Zone 7 staff continued the effort to update the Salt Management Plan (SMP). The update is required by the State Water Resources Control Board's adoption of the Recycled Water Policy, which is intended to provide direction to the Regional Water Quality Control Boards, proponents of recycled water projects, and the public regarding the appropriate criteria to be used by the State Water Board and the Regional Water Boards in issuing permits for recycled water projects. The Policy outlines requirements for development of Salt/Nutrient Management Plans in areas where recycled water is used over active groundwater basins. Zone 7's existing SMP already satisfies many of the newly-adopted requirements of the State Board's Recycled Water Policy but the SMP is being updated to include an analysis of nutrients (and any appropriate related management plans to address them), as well as monitoring for "constituents of emerging concern" (CECs). As part of the same SMP update effort, staff are evaluating the portfolios presented in the Water Supply Evaluation for potential impacts on groundwater quality. The SMP update should be completed in early 2014.

Also beginning in 2012 and continuing into 2013, staff have been working towards execution of an agreement and implementation of a project with Vulcan Materials to recapture groundwater pumped as part of Vulcan's mining operations. Under the new project, Vulcan would decant surplus water they had pumped then transfer the water to Cope Lake or one of the other lakes owned by Zone 7 for subsequent recharge back into the groundwater basin, rather than discharging the water to a non-losing stream reach where is will be lost as surface outflow to the Bay (as it is now).

ES 2 Monitoring Programs

Climatological – The 2012 Water Year rainfall in the valley was below average at 68% of normal (Figure ES-2 shows rainfall at Station 15E, which was 61% of normal). The evaporation for the Valley, represented by the Lake Del Valle Station, ended the year with 110% of normal evaporation.

Groundwater – In general, the Main Basin groundwater levels dropped significantly during the 2012 Water Year in response to low rainfall recharge and lack of supply for artificial recharge (Figure ES-3 to Figure ES-6). Water levels in the Key Wells in subbasins pumped by Zone 7 (Bernal and Amador) indicated that water levels in the lower aquifer were 34 to 116 ft above historical lows at the end of the 2012 Water Year (Figure ES-7).

Groundwater quality in the Upper Main Basin (Figure ES-8) and Lower Main Basin (Figure ES-9) aquifers remained relatively unchanged from the 2011 Water Year. The individual municipal supply wells in the Mocho Wellfield that experienced higher than average increases in hardness and salinity starting in about 2000, began to stabilize or decrease slightly in most wells during 2011 and 2012. The poorer quality water seems to be coming from the upper aquifers as a result of a strong downward gradient induced by the pumping wells. Staff will continue to investigate whether these localized increases are consequences of natural "leaky" aquitards between the upper aquifers (with poorer water quality) and the lower aquifers (which are being pumped) or are due to poorly constructed wells in the neighboring area serving as conduits. Three abandoned and improperly sealed wells located in the immediate vicinity of the Mocho Wellfield have been or will be properly destroyed in 2012 and 2013. Staff will continue to closely monitor the water quality and aquifer conditions in the Mocho Wellfield to see if these well destructions make a difference in the Mocho supply wells' TDS concentrations.

Surface Water – Due to the low rainfall in the Valley during the 2012 Water Year, the watershed runoff total into Lake Del Valle was 1,557 AF, only 6% of average. There were no flood releases from Lake Del Valle into the Arroyo Valle. Releases from the South Bay Aqueduct (SBA) to the Arroyo Valle totaled 6,575 AF, releases from the SBA to the Arroyo Mocho totaled 5,192 AF, and releases from the SBA to the Arroyo Las Positas (via Altamont Creek) totaled 562 AF.

Two sets of synoptic discharge measurements were made on the Arroyo Las Positas in 2012 which calculated that the recharge rate from the Arroyo Las Positas was 1 cfs and 1.5 cfs for flows of 2.8 and 6 cfs, respectively. These recharge rates are much lower than anticipated.

Subsidence – There was no evidence of inelastic (permanent) subsidence due to groundwater pumping during the 2012 Water Year. Zone 7's survey benchmarks changed in elevation from Fall 2011 to Fall 2012 from +0.030 to -0.071 ft (Figure ES-10). These changes in land surface elevation are within the range of elastic subsidence observed over the life of the monitoring program. Elevation changes from Spring to Fall 2012, which varied from +.044 to -0.049 ft, were also within the range of elastic movement.

Mining Area - Mining activities continued for Vulcan Materials (formerly Calmat) and Cemex (formerly RMC and Lonestar). Vulcan Materials continued their mining in R28 located south of Stanley Boulevard (future Lake D area) and continued limited operation in R24 (future Lake E). Cemex continued mining in P42, located just north of Arroyo Valle (in the future Lake B area). As a result of these mining operations, about 4,677 AF of groundwater were discharged to the Arroyo Mocho and subsequently flowed out of the Valley and approximately 700 AF of groundwater were lost during gravel processing. Evaporation from the mining ponds accounted for another 2,946 AF of groundwater loss. TDS concentrations (a surrogate for hardness readings) in the mining area pits ranged from about 300 mg/L to over 1,000 mg/L, with the better water quality found in the ponds that are intercepting groundwater and artificially recharged surface water. The higher TDS concentrations are found, for the most part, in the sealed ponds, where evaporation is likely concentrating the minerals in the water.

Land Use - For the 2012 Water Year, Main Basin land use remained relatively unchanged from the 2012 Water Year. Development continues to be slow due to the effect of the poor economy.

Groundwater Production - During the 2012 Water Year, about 20,558 AF of groundwater was pumped from the Main Basin. Zone 7 produced approximately 11,246 AF of the pumped groundwater. For the 2012 Water Year, Pleasanton pumped 3,459 AF and California Water Service Company pumped 3,253 AF. All other groundwater production (1,126 AF) was about normal for the basin.

Wastewater and Recycled Water – In 2012, approximately 20,630 AF of wastewater flowed to the two publicly-owned treatment works (POTWs; Livermore Water Reclamation Plant (LWRP), and Dublin San Ramon Services District's (DSRSD) wastewater plant as compared to 21,092 AF in 2011. About 22% of the wastewater received by these two POTWs was recycled and applied as irrigation: 1,178 AF by the City of Livermore and 2,763 AF by DSRSD. About 67% (1,143 AF) of the recycled water produced by LWRP was applied over the Main Basin; whereas all of DSRSD's recycled water was applied on areas outside of the Main Basin, primarily on fringe basin areas. Zone 7 staff continues to investigate the hydrogeologic relationship between the fringe and Main basins as part of updating its Salt Management Plan (SMP) to quantify the inflow of groundwater and salts from the fringe basins to the Main Basin.

The recycled water from both plants met the State Department of Public Health "Title 22" water quality standards for irrigation uses during the 2012 Water Year. TDS concentrations in the portion applied directly on the Main Basin ranged from 450 mg/L to 704 mg/L, while its Total Kjeldahl Nitrogen (TKN) content ranged from 14 mg/L to 45 mg/L. About 6% (847 tons) of the Main Basin's gross salt loading (13,087 tons) was attributed to recycled water use over the Main Basin during the 2012 Water Year.

ES 3 Basin Evaluation Programs

Recharge Calculations – For the 2012 Water Year, total natural recharge was about 7,116 AF. This includes rainfall recharge of about 1,462 AF, natural stream recharge of about 1,618 AF, Arroyo Valle Prior Rights recharge of 601 AF, applied water recharge at about 2,435 AF and subsurface Basin inflow of about 1,000 AF. Artificial stream recharge (8,778 AF) for the 2012 Water Year was about 166% of the historical average.

Groundwater Storage - At the end of the 2012 Water Year, the total groundwater in storage was estimated to be 217,000 AF, and the total recoverable groundwater in storage was estimated to be about 89,000 AF, which is about 71% of the basin's operational capacity of 126,000 AF calculated as the difference in groundwater storage between the "low" established in the early 1960's and the "high" in 1983 (Figure ES-11).

Salt Loading Calculations – Net salt loading to the Main Basin dropped approximately 6,800 tons during the 2012 Water Year (Figure ES-12). This year's main salt contributors were "applied water recharge" (6,069 tons which includes 847 tons from recycled water), "natural stream recharge" (1,167 tons), "basin inflow" (2,092 tons), and "artificial stream recharge" (2,851 tons). The main de-salting components were "municipal pumping" (16,749 tons including 4,064 tons removed by the Mocho Groundwater Demineralizaton Plant) and "mining export" (2,665 tons).

Before Zone 7's demineralization plant was constructed in 2009, approximately 84,264 tons of salt had been added to the Main Basin since 1973. This was equivalent to a total theoretical TDS increase of about 261 mg/L since 1973. Since 2009, there has been a net reduction in Main Basin salts by approximately 9,872 tons of salt. However, during this same period, the average basin-wide TDS increased slightly, by

about 16 mg/L, due to several years (especially in 2009 and 2012) of reduced natural rainfall and stream recharge, which would have reduced the basin-wide TDS if they had been closer to average. The net reduction of water in storage during the 2012 Water Year was also a contributing factor to why the average TDS increased while the total mass decreased.

ES 4 Basin Management Programs

Most 2012 Basin Management Programs remained unchanged from 2011 except for:

Groundwater Demineralization – During the 2012 Water Year, approximately 4,672 AF of groundwater produced from Mocho Wellfield wells was run through the MGDP, which uses reverse osmosis technology to remove dissolved minerals/salts. As a result, 935 AF of brine containing 4,000 tons of salt was generated and exported from the basin via DSRSD.

Well Ordinance Program - Zone 7 issued 150 drilling permits in the 2012 Calendar Year, 10 more than were issued in 2011. Zone 7 permit compliance staff inspected approximately 51% of all permitted well work in 2012.

Septic Tank Management – Authorization was requested for one new commercial-use septic tank at the end of 2012. Staff recommended approval based on the reduced nutrient loading that the proposed treatment system would achieve. Staff also evaluated plans for an expansion of an existing large-scale winery's onsite wastewater disposal operations in South Livermore in 2012 and collaborated with ACEH and Regional Water Quality Control Board (RWQCB) to require 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 both presently and in the future.

Toxic Site Surveillance Program - In 2012, Zone 7 tracked the progress of 65 active sites where contamination has been detected or is threatening groundwater. Sixteen of the sites are designated as "High Priority" because they have impacted or are an immediate threat to potable water supply wells or surface water. Twelve of the high priority sites are fuel leak cases; the other four cases involve solvent contamination (tetrachloroethylene [PCE]). Seven contamination cases were closed during 2012, after they were determined to no longer pose a threat to drinking water. Alameda County Environmental Health (ACEH) is the lead agency overseeing the cleanup of all of the fuel leak sites. Generally, the RWQCB oversees solvent contamination cases; however, two of the solvent cases identified by Zone 7 have not been incorporated into the RWQCB's case load because the responsible parties have not yet been identified. For these two cases, Zone 7 staff continues to work with the RWQCB to identify potentially responsible parties so that they can begin pursuing investigation and cleanup.

Projects – Zone 7 is continuing to make progress on a collaborative effort with Vulcan Materials Co. to capture the groundwater they pump from their quarry pits to de-water them for ease of gravel mining. For this project, Vulcan would pump the extracted groundwater into a Zone 7-owned lake within the future Chain of Lakes, where it could be used to replenish Main Basin aquifers instead of being discharged to the arroyos and lost as basin outflow. A pipeline alignment has been identified and a design is being developed by Vulcan with input from Zone 7 staff.

Zone 7 is scheduled to complete an update to its 2004 SMP for the Livermore Valley Groundwater Basin in 2014. One purpose of the update is to add nutrient management considerations and CEC monitoring requirements to Zone 7's SMP to make it compliant with the State's 2009 Recycled Water Policy requirements for Salt/Nutrient Management Plans (SNMPs) (State Water Board, Resolution No. 2009-0011). The updated SMP will also assess the potential impacts of the water supply "portfolios" outlined in the Zone 7's Water Systems Evaluation (Zone 7, 2011c) including salt loading impacts associated with increased recycled water use over the Main Basin, and evaluate the success of Zone 7's demineralization plant to mitigate the basin's net salt loading.

Attached Figures

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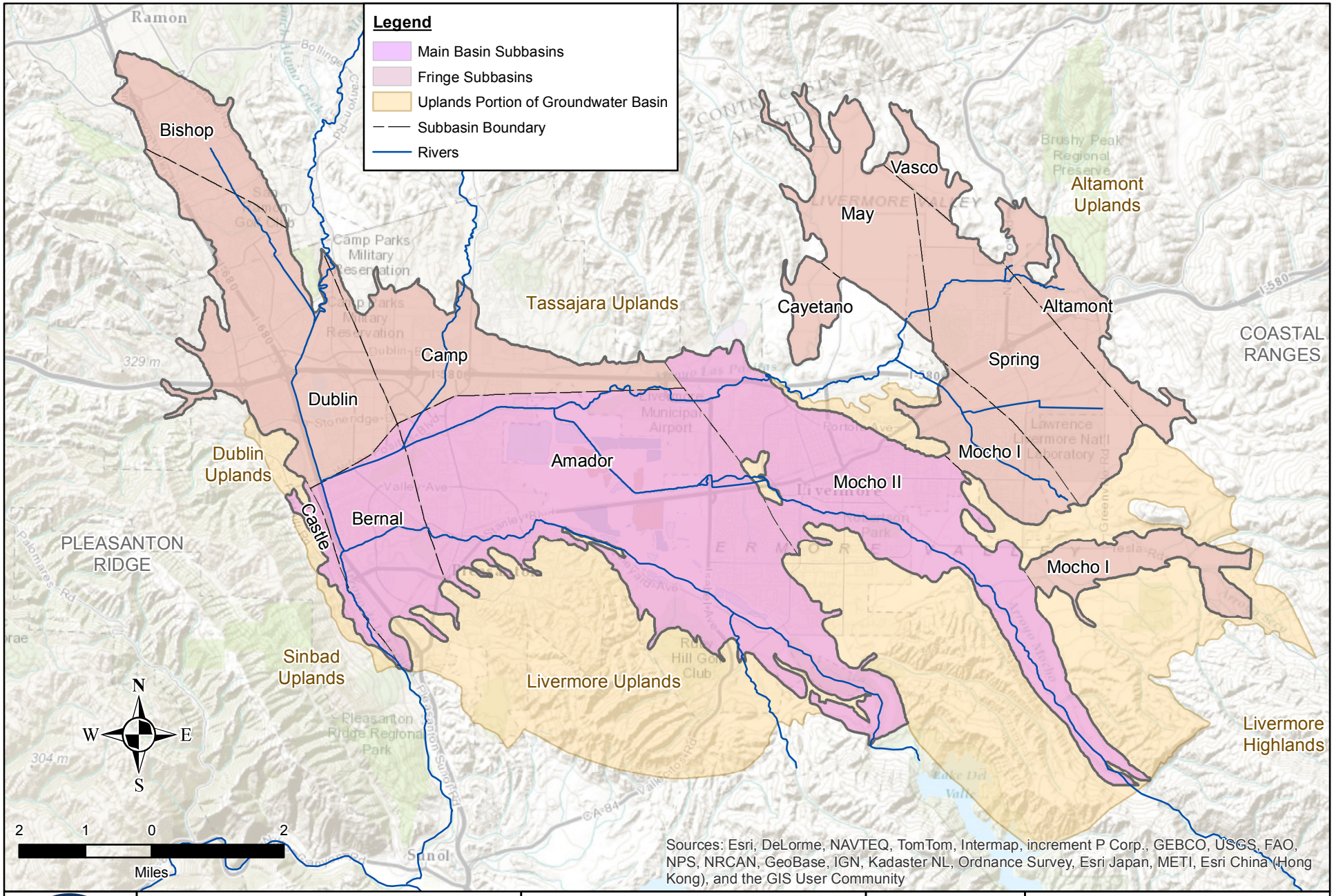

ZONE 7 WATER AGENCY
100 North Canyons Parkway, Livermore, CA

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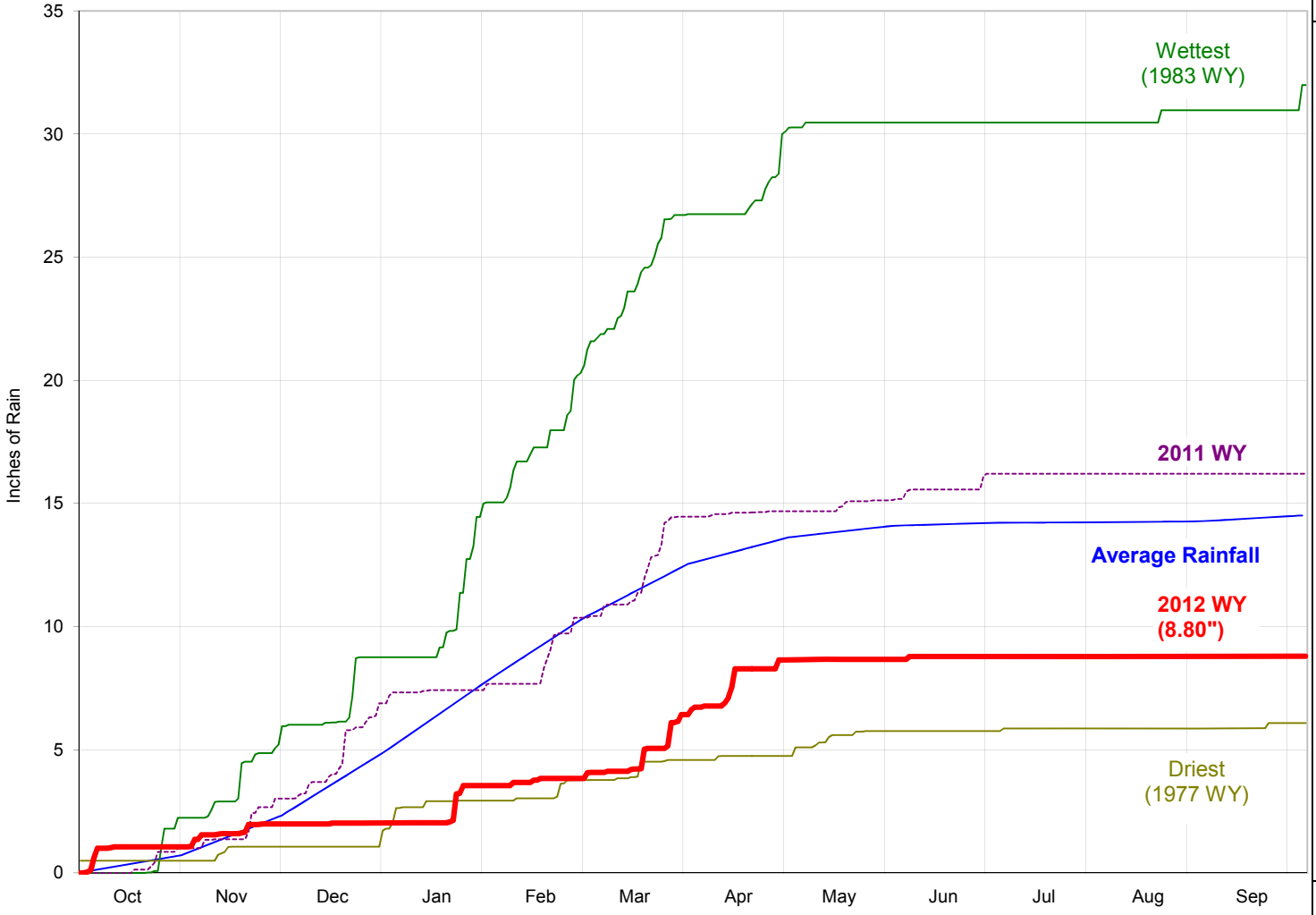
Figure ES-1
Groundwater Basin Map

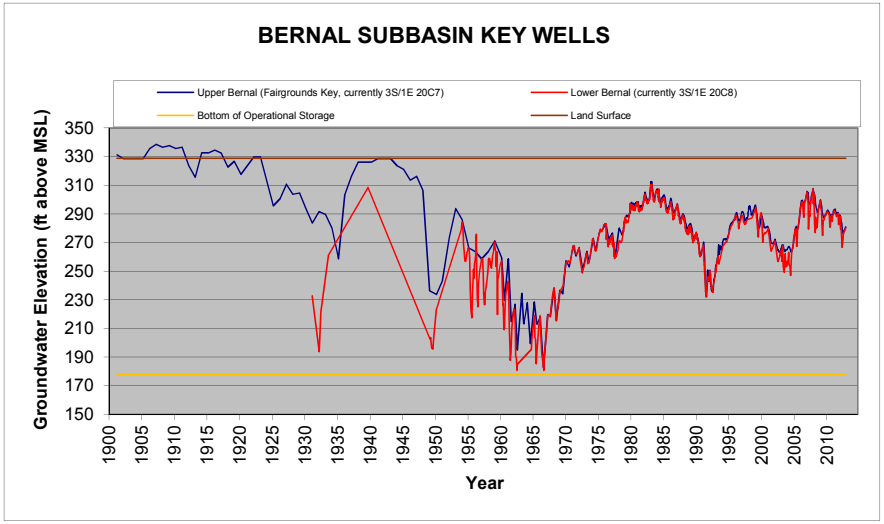
FIGURE ES-2
ZONE 7 WATER AGENCY
GRAPH OF LIVERMORE RAINFALL (Station 15E NOAA)
2012 WATER YEAR

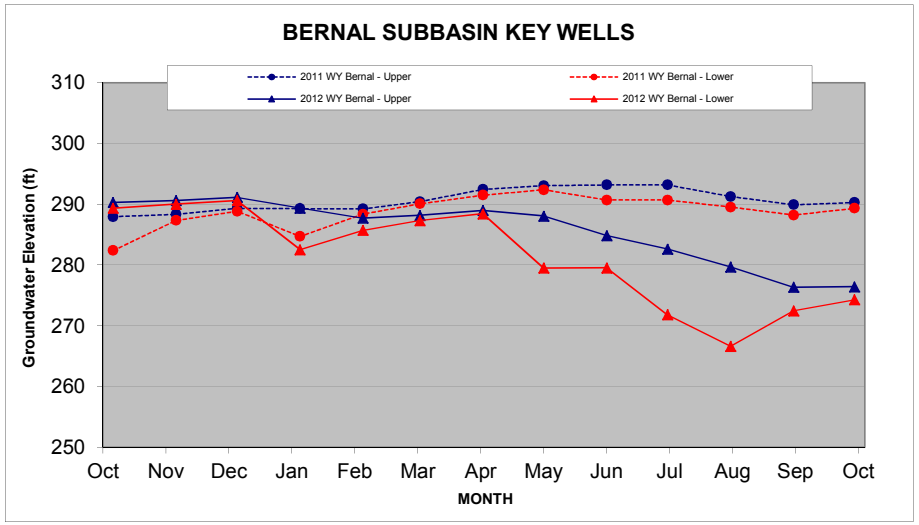


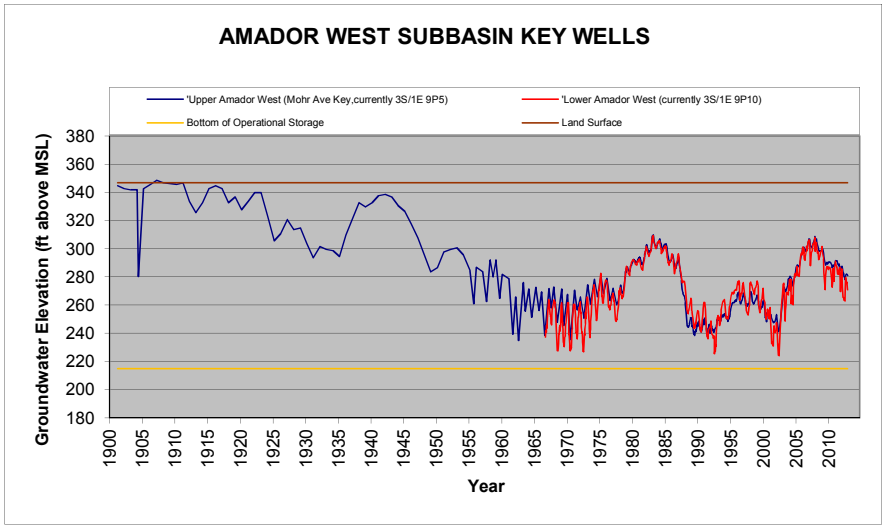
	Total Annual Rainfall	% Avg	Probability of Exceedence
Wettest (1983 WY)	31.98"	220%	1%
2011 WY	16.21"	112%	32%
Average Rainfall	14.51"	100%	41%
2012 WY (8.80")	8.80"	61%	94%
Driest (1977 WY)	6.02"	42%	98%

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Monthly (inches)	1.06	0.93	0.04	1.52	0.29	2.80	2.01	0.02	0.12	0.00	0.00	0.01
% Monthly Average	149%	57%	2%	52%	12%	128%	186%	4%	100%	0%	0%	4%
YTD (inches)	1.06	1.99	2.03	3.55	3.84	6.64	8.65	8.67	8.79	8.79	8.79	8.80
% Average YTD	149%	85%	41%	45%	37%	51%	63%	62%	62%	62%	62%	61%
% Annual Average	7%	14%	14%	24%	26%	46%	59%	59%	60%	60%	60%	60%

FIGURE ES-3
KEY WELL HYDROGRAPHS
WESTERN PORTION OF MAIN BASIN
2012 WATER YEAR







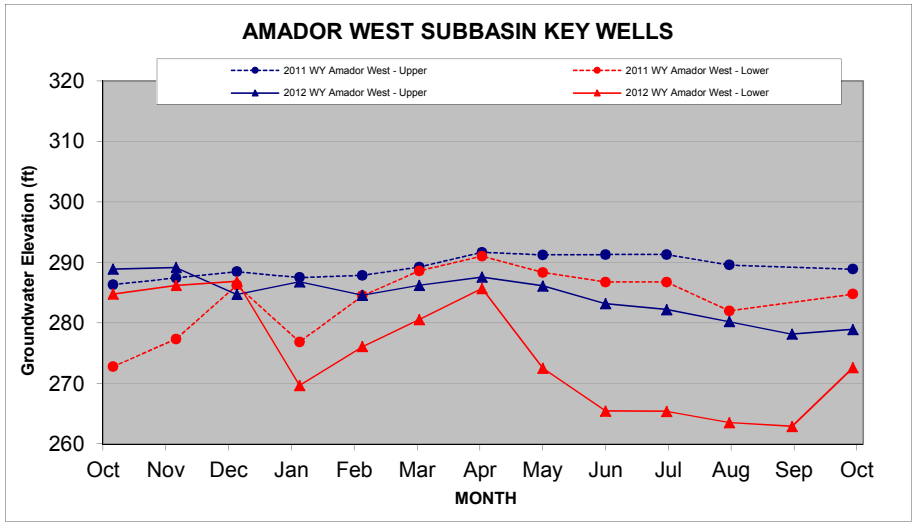


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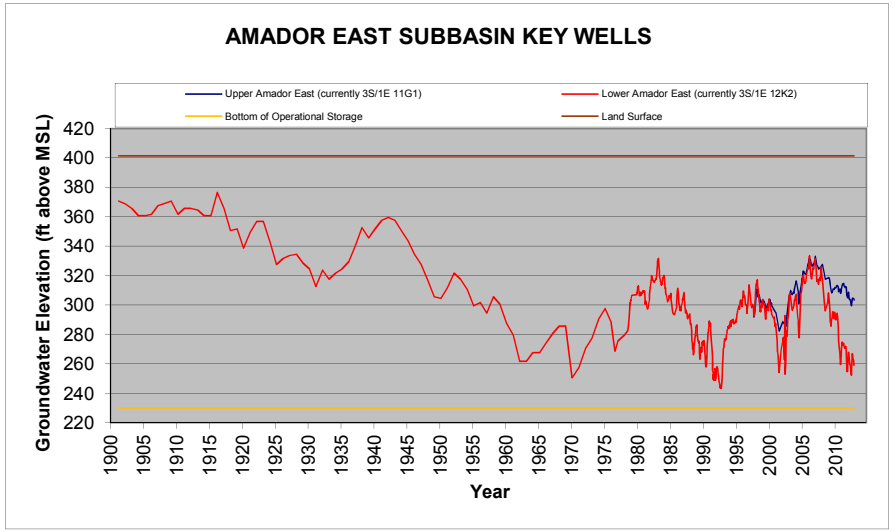
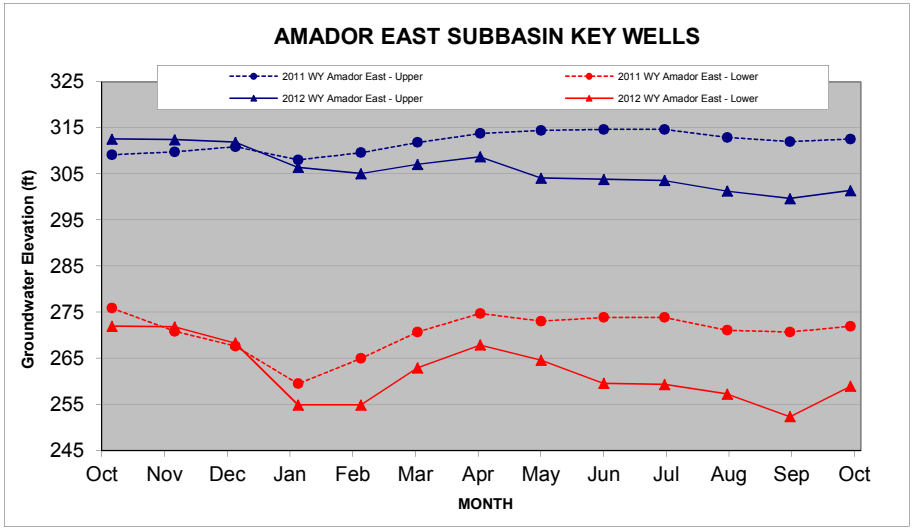
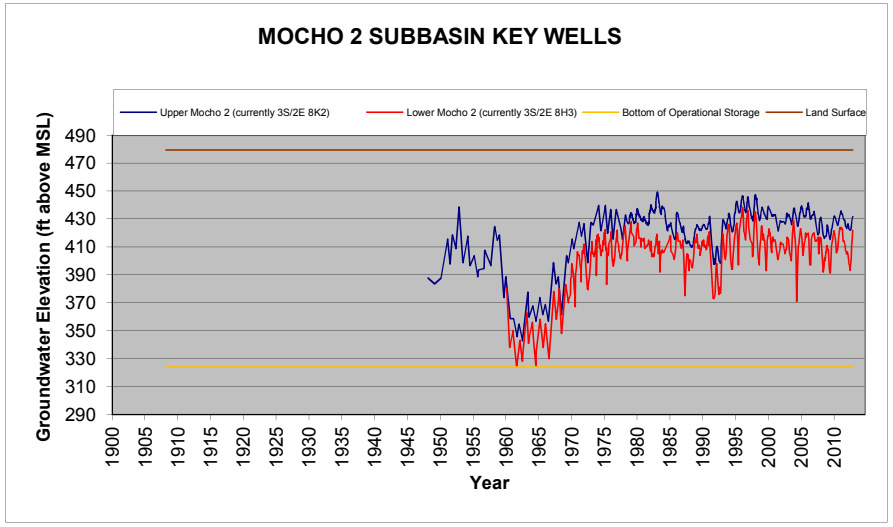
FIGURE ES-4
KEY WELL HYDROGRAPHS
EASTERN PORTION OF MAIN BASIN
2012 WATER YEAR







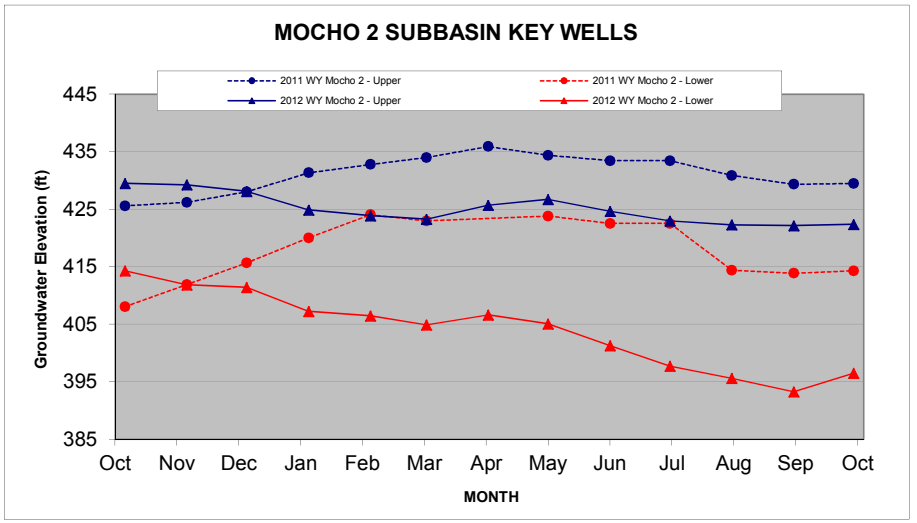


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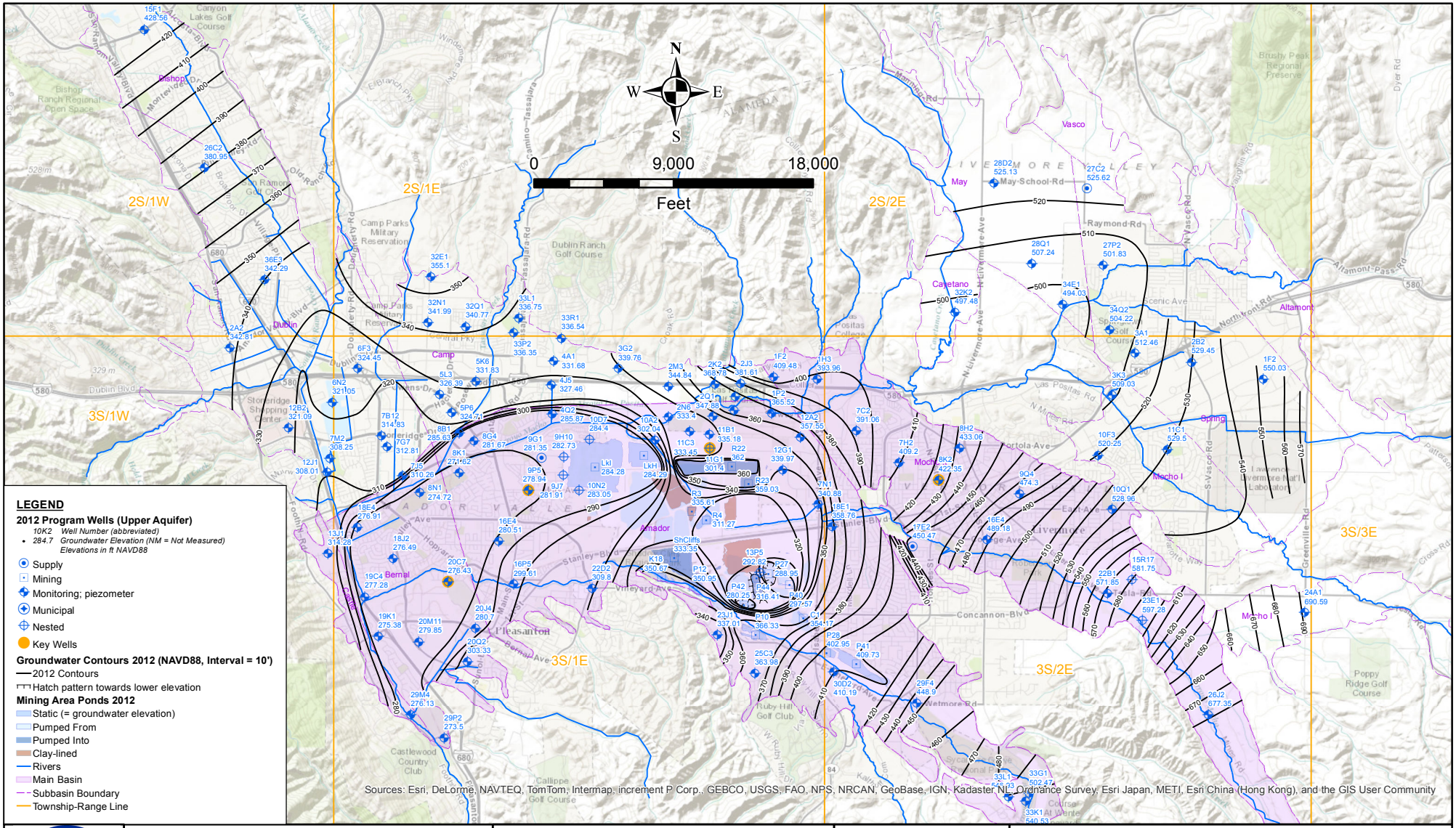
Figure ES-4



ZONE 7 WATER AGENCY
100 North Canyons Parkway
Livermore, CA

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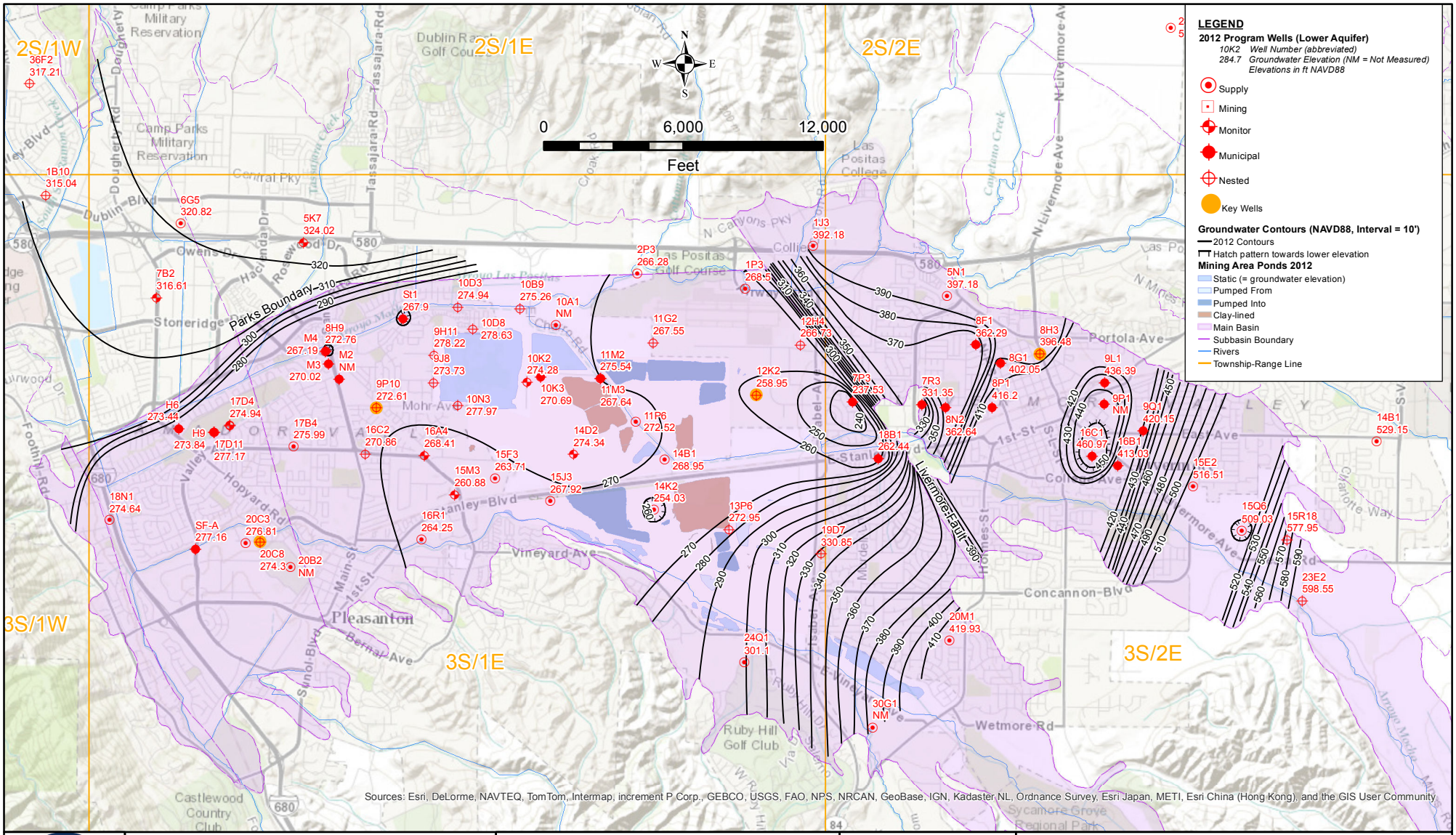
Figure ES-5
Groundwater Gradient Map
Upper Aquifer; Fall 2012 (September)
Livermore Valley Groundwater Basin



ZONE 7 WATER AGENCY 100 North Canyons Parkway Livermore, CA	DRAWN: TR	SCALE: 1 in = 6,000 ft	**Figure ES-6** **Groundwater Gradient Map** **Lower Aquifer; Fall 2012 (October)** **Livermore Valley Groundwater Basin**
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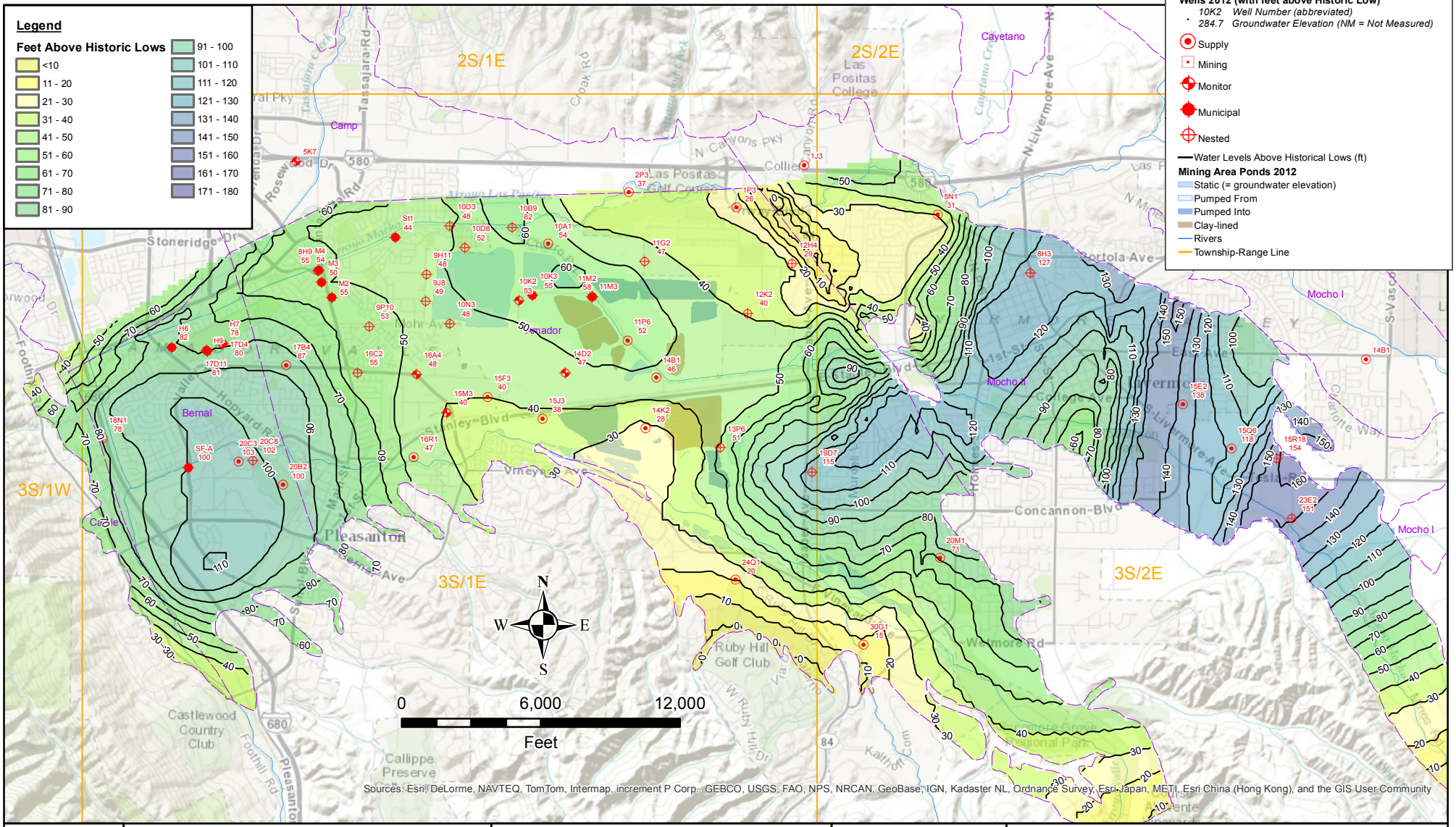

ZONE 7 WATER AGENCY
100 North Canyons Parkway
Livermore, CA

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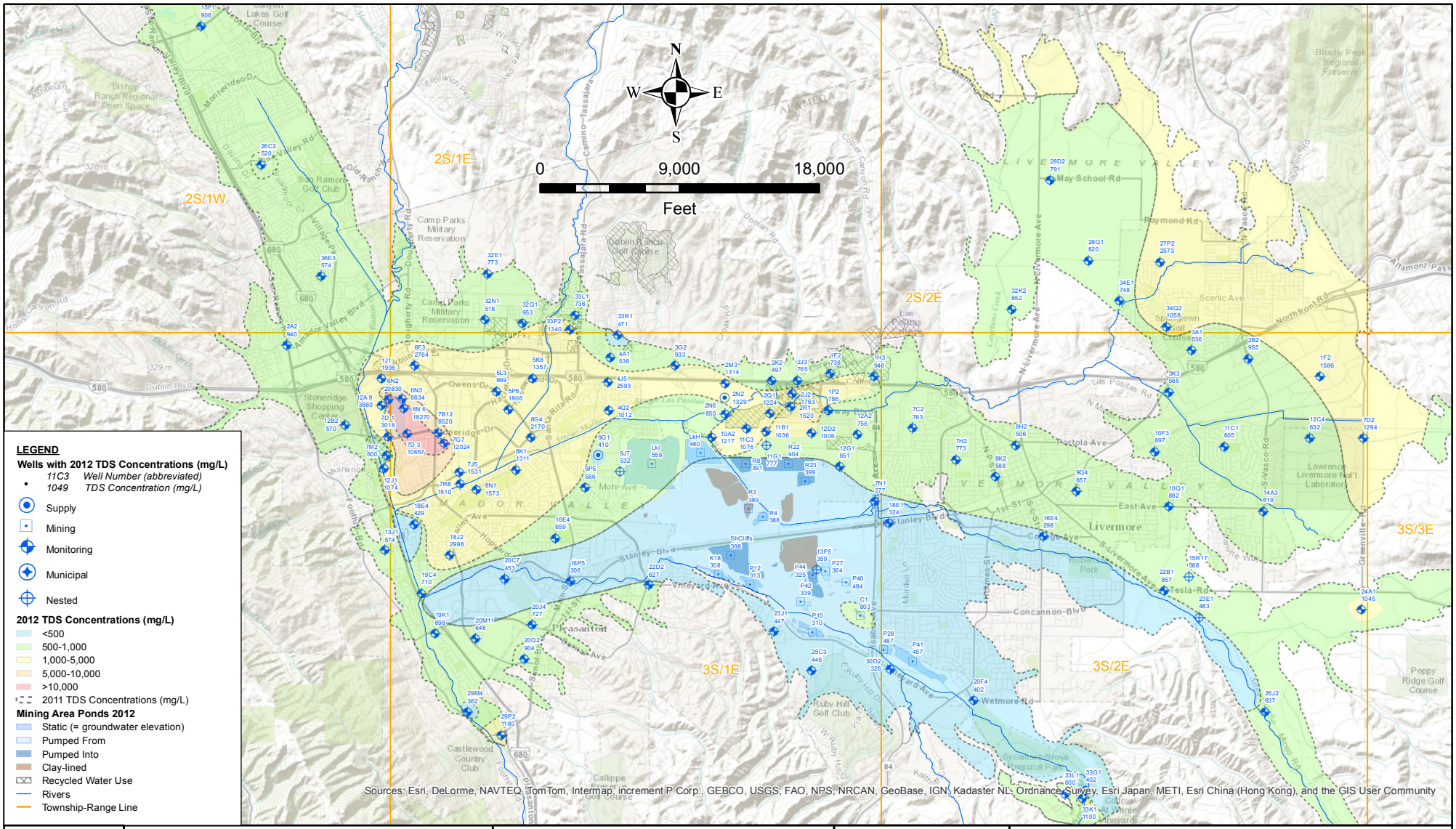
Figure ES-7
Groundwater Levels Above Historical Lows
Lower Aquifer; Fall 2012 (September)
Western Livermore Valley Groundwater Basin



ZONE 7 WATER AGENCY
100 North Canyons Parkway
Livermore, CA

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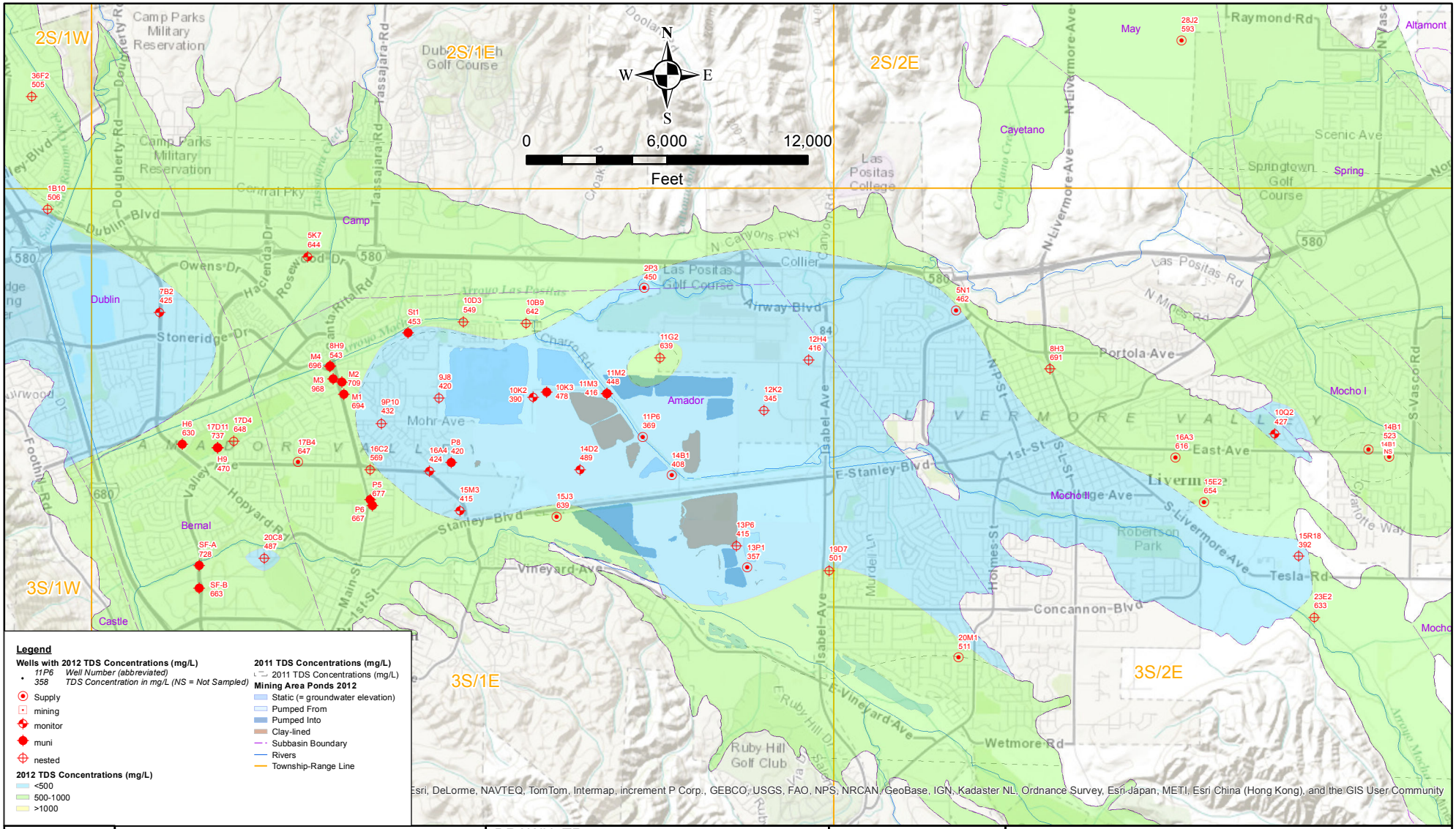
Figure ES-8
TDS Concentrations (mg/L)
Upper Aquifer; 2012 Water Year
Livermore Valley Groundwater Basin



Legend

Wells with 2012 TDS Concentrations (mg/L)

- *11P6* Well Number (abbreviated)
- *358* TDS Concentration in mg/L (NS = Not Sampled)
- Supply
- mining
- monitor
- muni
- nested

2012 TDS Concentrations (mg/L)

- <500
- 500-1000
- >1000

2011 TDS Concentrations (mg/L)

- 2011 TDS Concentrations (mg/L)

Mining Area Ponds 2012

- Static (= groundwater elevation)
- Pumped From
- Pumped Into
- Clay-lined
- Subbasin Boundary
- Rivers
- Township-Range Line

ZONE 7 WATER AGENCY
100 North Canyons Parkway
Livermore, CA

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SCALE: 1 in = 6,000 ft

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DATE: May 2, 2013

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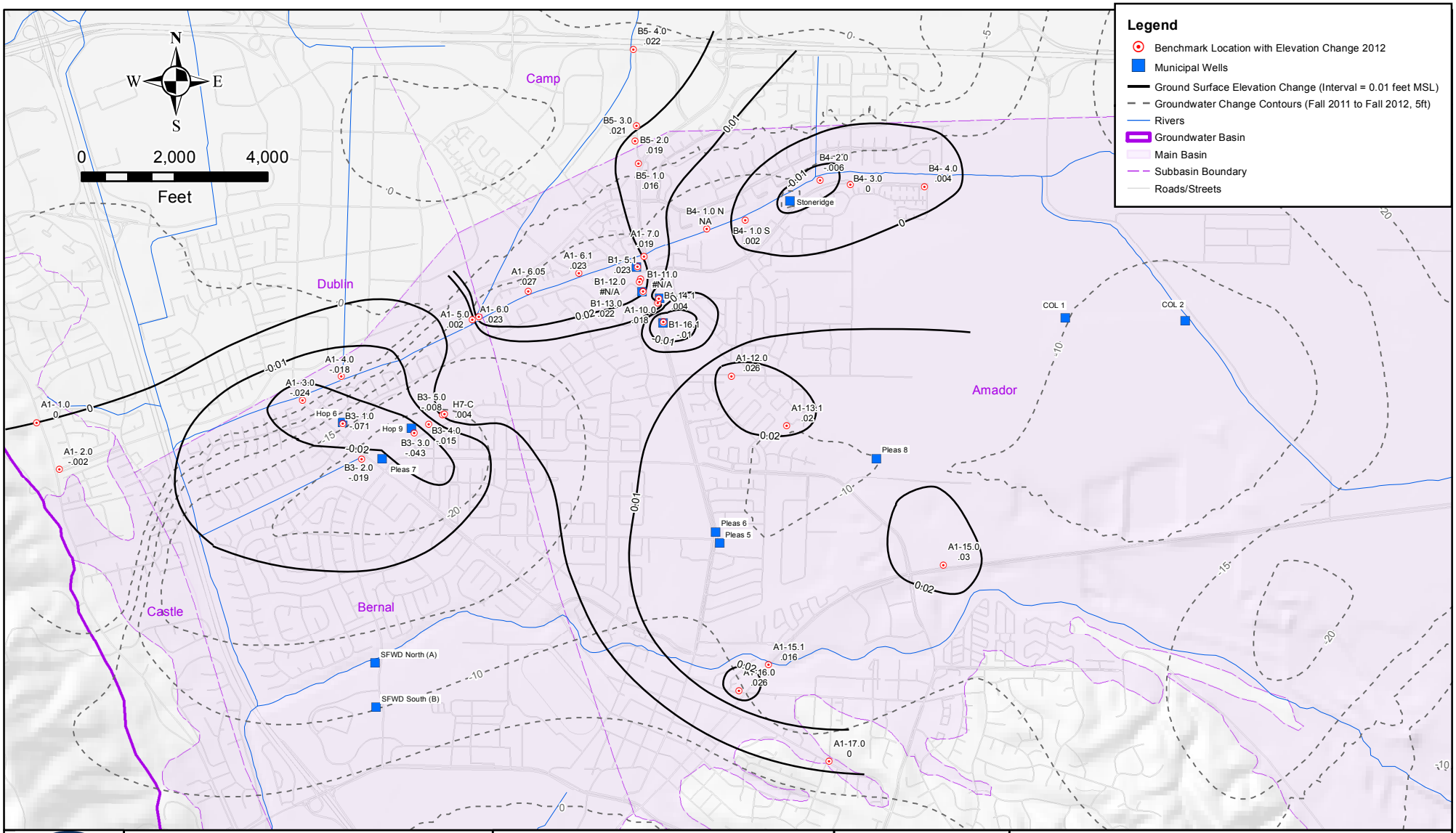
Figure ES-9
TDS Concentrations (mg/L)
Lower Aquifer; 2012 Water Year
Livermore Valley Groundwater Basin



ZONE 7 WATER AGENCY 100 North Canyons Parkway Livermore, CA	DRAWN: CW	SCALE: 1 in = 3,000 ft	**Figure ES-10** **Ground Surface Elevation Change (ft)** **Fall 2011 to Fall 2012** **Livermore Valley Groundwater Basin**
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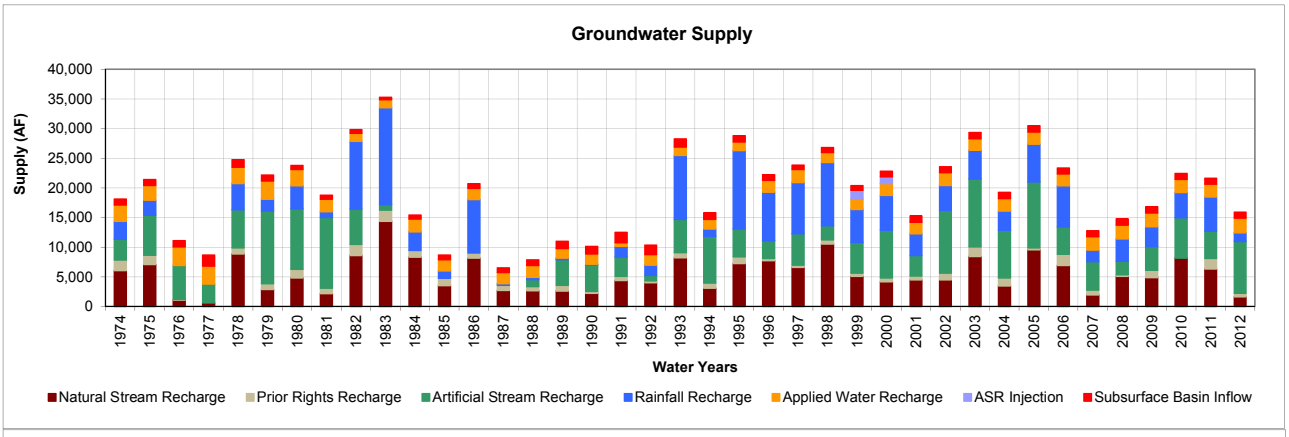
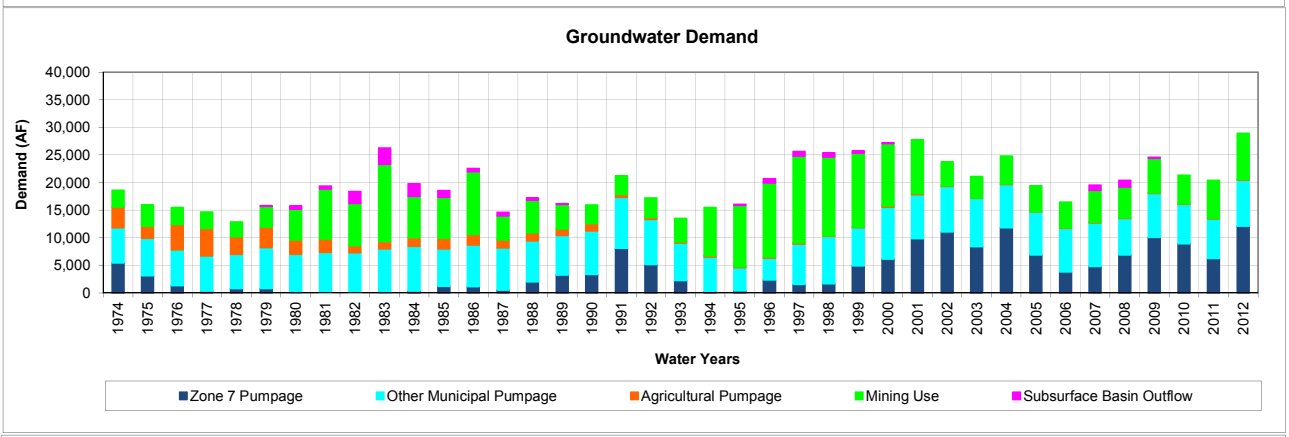
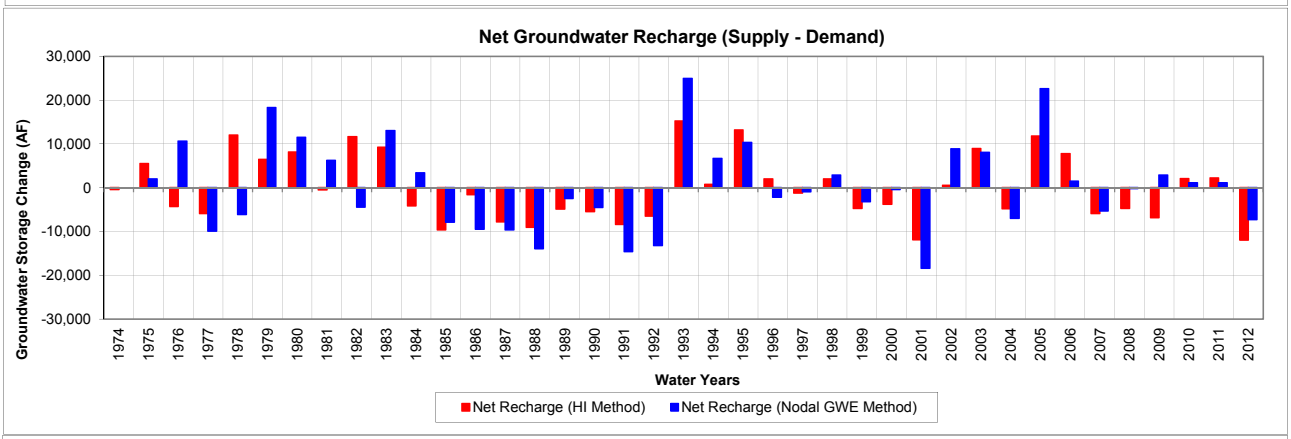
FIGURE ES-11
GRAPHS OF HISTORICAL MAIN BASIN HYDROLOGIC INVENTORY
1974 TO 2012 WATER YEARS







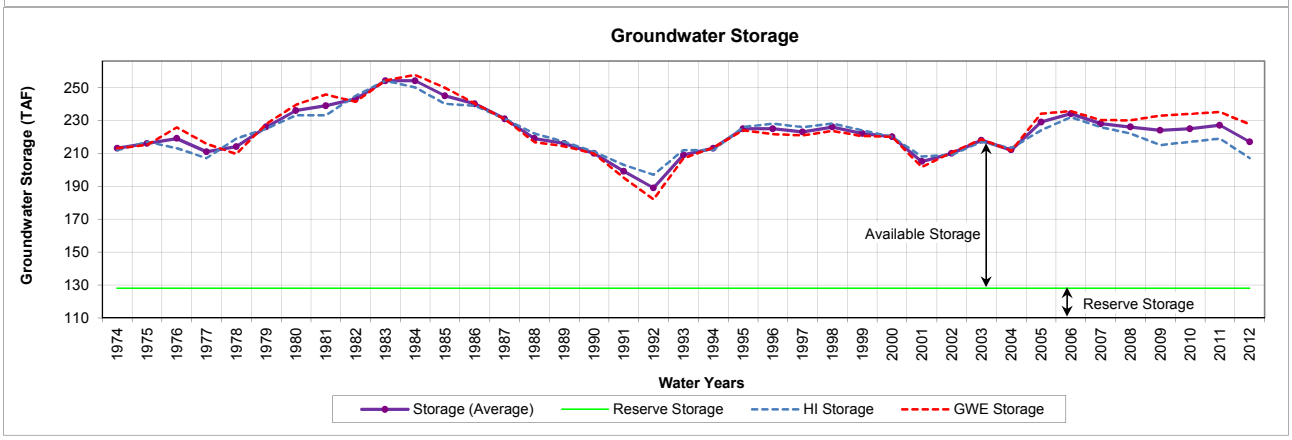
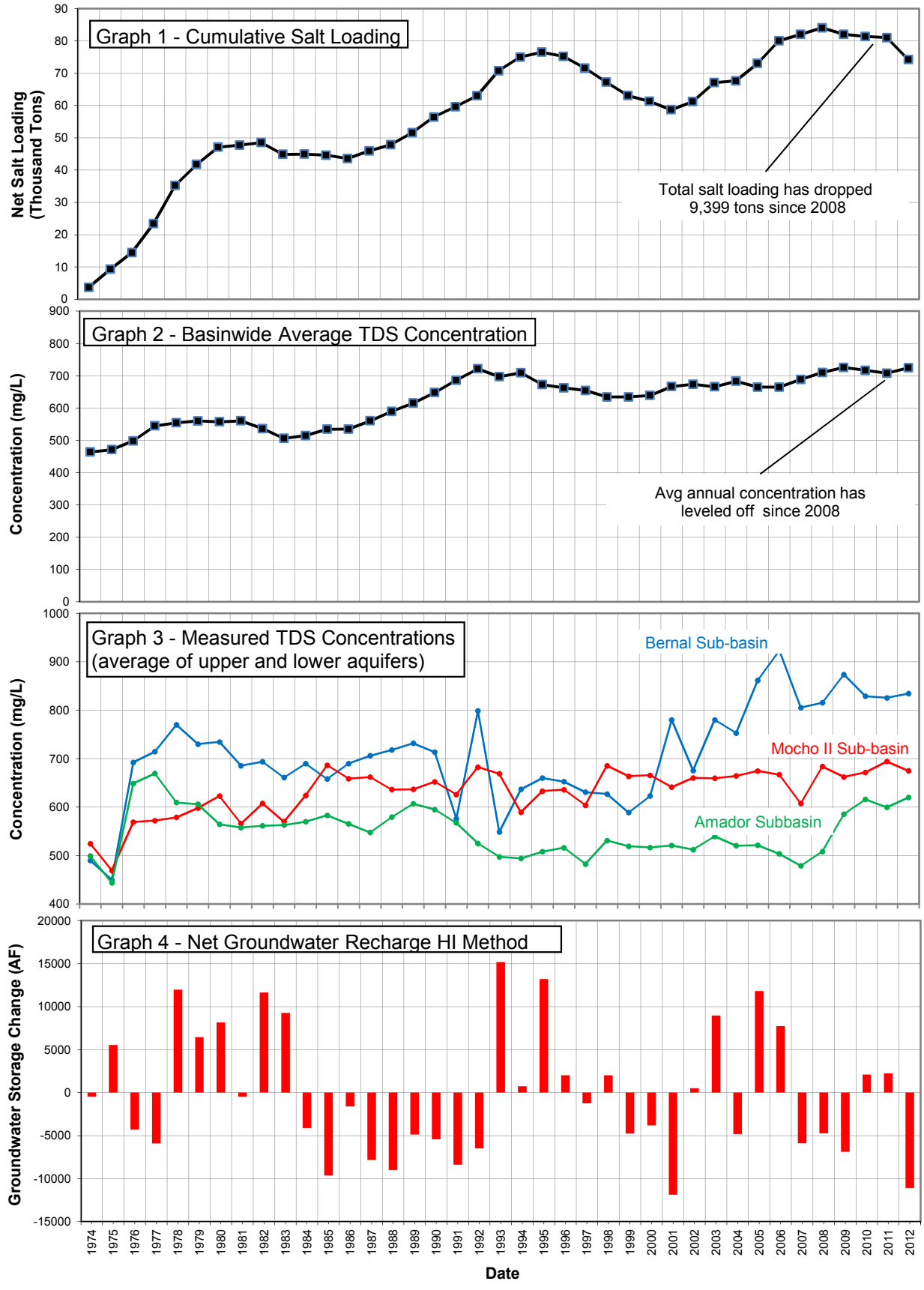


FIGURE ES-12
GRAPHS OF SALT LOADING AND CONCENTRATIONS
1974 TO 2012 WATER YEARS



E:\MONITOR\SaltBalance\2012WY\SaltBalaceCalcs2012.xls\Fig1-Graphs
4/19/2013