2.5.2 2013 Water Year Results

Figure 2.5-3 shows the most recent (October 2013) survey results and includes the elevation changes since the October 2012 and April 2013 measurements. *Figure 2.5-4* shows the change in surface elevations since the previous year (October 2012) spatially. Most of Zone 7's survey benchmarks have dropped in elevation during the 2013 Water Year (October 2012 through September 2013). From October 2012 to October 2013, the average decrease in land elevation was 0.047' with the largest drops having occurred somewhat concentrically around the Mocho wellfield (maximum -0.095'), Hopyard Well #6 (maximum -0.062'), and Pleasanton Well #8 (maximum -0.062').

A-circuit survey points are graphed, along with Key Well water elevations, on *Figure 2.5-5* (Bernal Subbasin) and *Figure 2.5-6* (Amador Subbasin). *Figure 2.5-7* (Bernal Subbasin - Hopyard 6 Well), *Figure 2.5-8* (Amador Subbasin - Mocho Wellfield), and *Figure 2.5-9* (Amador Subbasin - Stoneridge) show graphs of land surface elevation changes and groundwater elevation at Zone 7's municipal wells. These graphs show a one-time jump in ground surface elevation in September 2006. This is because Site A1-9.0 was originally believed to be on stationary bedrock and therefore its elevation was held constant. However, in 2007 Water Year (October 2006 through September 2007) it was determined that the site had actually been moving elastically. Therefore, starting with the September 2006 dataset, the data calculations were readjusted so that A1-9.0 elevations could vary, artificially creating the elevation shift seen in the graphs in 2006. It was removed from the program in 2007.

2.6 Wastewater and Recycled Water

This section presents a summary of wastewater and recycled water use in Livermore Valley. As part of this program, Zone 7 compiles and reviews data on the volume and quality of wastewater collected and recycled water used within the watershed from the Livermore Wastewater Recycling Plant (LWRP), and Dublin San Ramon Services District (DSRSD) Water Reclamation plant. Onsite disposal of wastewater from the Veterans Hospital sewage treatment plant and individual septic systems within the groundwater basin are also accounted for in this section.

2.6.1 Introduction

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 (Chapter 3, Section 3.3.1.1) 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 and evaluates potential impacts of recycled water on the local groundwater resources.

Zone 7 views recycled water as a valuable water resource that should be managed appropriately. 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. In addition, recycled water use contributes to the stored groundwater volume when incidental percolation occurs during irrigation of landscapes and crops. On the other hand, onsite disposal of wastewater from domestic, commercial and industrial sites, if disposed to the land, can have an impact on groundwater quality. Therefore, care should be taken to limit the density of onsite disposal systems.

2.6.2 Wastewater (WW) and Recycled Water (RW)

2.6.2.1 Wastewater and Recycled Water Volumes

The results of the Zone 7 Wastewater Monitoring Program for the 2013 Water Year (October 2012 through September 2013) are presented in *Figure 2.6-A* below. The two largest wastewater collection and treatment agencies (Livermore Water Reclamation Plant or LWRP and DSRSD), which treat over 99% of the wastewater in the Valley, are listed first, followed by the much smaller Veterans Administration (VA) Hospital and the Main Basin Septic Tanks. The third row ("Volume Recycled") shows the volume recycled within the watershed, whereas the fourth row shows the volume of RW that was applied only over the Main Basin.

Figure 2.6-A: Wastewater & Recycled Water Volumes (AF) for 2013 Water Year (October 2012 through September 2013)

	Livermore (LWRP)	DSRSD	VA Hospital*	Septic Tanks in MB*	Total
Influent WW to Plants	7,690	12,214	50	80	20,034
Exported WW	3,902	8,653	0	0	12,555
Volume Recycled	1,994	2,999	0	0	4,993
APPLIED TO MAIN BASIN					
RW	1,317	0	50	80	1,447
WW & RW Pipe Leakage	-	-	-	-	400

* Estimated

This table helps illustrate the relative magnitude of different sources of recycled water use and wastewater disposal on the basin and watershed. Moreover, only a small portion of the water applied as irrigation eventually makes its way to the groundwater supply; most of the applied water is evaporated, taken up by plant roots or bound to the unsaturated soil. In total, less than two percent of groundwater supply is from wastewater or recycled water origin.

In the 2013 Water Year (October 2012 through September 2013), 20,034 AF of wastewater was produced as compared to 20,630 AF in the 2012 Water Year (October 2011 through September 2012). About 25% of the wastewater was recycled for irrigation projects; 1,994 AF by City of Livermore and 2,999 AF by DSRSD. About 66% (1,317 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 its Salt Management Plan (SMP) update to quantify the inflow of groundwater and salts from the Fringe Basins to the Main Basin. The remainder, not used for irrigation, was exported from the valley through the Livermore-Amador Valley Water Management Agency (LAVWMA) export pipeline.

There is a small amount of non-recycled wastewater that is applied over Main Basin in the form of leachate from onsite domestic wastewater systems (septic systems) and from the VA Hospital wastewater treatment system located in southern Livermore. The contribution to the groundwater supply (130 AF) is estimated using "typical" wastewater flows since actual discharges are not monitored. There have been no significant changes in land uses or septic system densities over the Main Basin that would change the estimated water contribution from these sources in recent years.

Some wastewater likely leaks from pipes on its way to the Valley's wastewater treatment systems (see Chapter 3, Section 3.1.2.2 for a discussion of pipe leakage). The portion of leakage from wastewater pipes is estimated to be roughly 400 AF/year.

Recycled water accounted for only 1.4% of the Main Basin's groundwater inflow component (i.e., recharging waters) in the 2013 Water Year. The bigger advantage of recycled water's use in the 2013 Water Year was that it conserved up to 4,993 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.

2.6.2.2 Wastewater and Recycled Water Quality

The recycled water from both wastewater plants met the State Department of Public Health "Title 22" water quality standards for irrigation uses during the 2013 Water Year (October 2012 through September 2013). While salt and nutrients are the primary constituents-of-concern for wastewater and recycled water applications over the Main Basin, other potential constituents-of-emerging-concern (CECs) and their surrogates would need to be monitored if recycled water was

used in aquifer recharge projects. *Figure 2.6-B* below presents the concentration ranges of salts (measured as Total Dissolved Solids) and nitrogen compounds in the applied wastewater and recycled water for the 2013 Water Year.

Figure 2.6-B: Wastewater Quality (mg/L, except where noted) for 2013 Water Year (October 2012 through September 2013)

Compound	Livermore (LWRP)	DSRSD	VA Hospital	Septic Tanks in Main Basin*
		SALTS		
Total Dissolved Solids (TDS)	540 - 610	412 - 748	430 - 630	500-700
		NITROGEN COMPOUNDS		
Nitrogen (as NO_3)	ND	ND - 4.61	0.5 - 7.3	ND - Trace
Nitrogen (as NO_2)	0.26 - 0.88	0.91 - 4.10	ND - 0.62	ND - Trace
Total Kjeldahl Nitrogen (TKN)	40 - 44	24 - 36	4.1 - 27	50-90
Nitrogen Loading (lbs/AF)	**109 - 120**	**66 - 99**	**11 - 78**	**136 - 245**

* Estimated

TDS concentrations in the portion applied directly on the Main Basin ranged from 540 to 700 mg/L. Zone 7 assumes that all of the salt mass in the applied water is carried downward by the percolate and eventually reaches groundwater. This leads to a conservative (potentially high) estimate of the salt loading attributed to their applications. About 885 tons (about 7%) of the Main Basin's gross salt loading (12,716 tons) was attributed to recycled water use over the Main Basin during the 2013 Water Year (October 2012 through September 2013). However, if potable water supplies would have been used for this irrigation demand, the salt loading would have been 343 tons less. By comparison Zone 7's MGDP removed over 2,400 tons of salt in the 2013 Water Year, more than compensating for salt impacts from recycled water use.

The three nitrogen compounds in the table represent the nitrogen content potentially available for conversion to nitrate as the water percolates through the soil. The bottom row of the table shows the total nitrogen loading (in pounds of nitrogen per AF) from all three of these compounds. However, from a practical standpoint, some of the nitrogen will be removed from the percolate through soil denitrification and plant uptake processes.

2.6.2.3 Future Wastewater and Recycled Water Use

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*) (Chapter 3, Section 3.3.1.1). This plan is currently being augmented 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 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 plan for future groundwater demineralization facilities to mitigate for the potential impact to groundwater and delivered water quality. The nutrient management addendum is scheduled for completion in 2014.

2.6.3 Septic Tank Management

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."

The Zone 7 Board approved two new commercial septic tank applications in 2013 after it was demonstrated that their resulting wastewater loadings would be no greater than the equivalence of one residence on 5 acres. One of the approvals was for a commercial horse boarding facility with caretaker's unit on a 7-acre parcel, and the other was for a small boutique winery, tasting room, and residence on a 2-acre parcel that is associated with another 6.4–acre of vineyards on a permanent agricultural easement. Both parcels are located on the far eastern limit of the Central Basin in South Livermore.

Zone 7 continued to collaborate with ACEH and RWQCB in 2013 on the commercial use of septic tanks and leachfields for The Wine Group's (TWG's) Concannon Winery facility expansion project, which began in 2011 and continued through 2013. The Report of Waste Discharge (ROWD) required by the RWQCB in 2011, and was to include a cumulative impact analysis of the onsite wastewater flows, plans for the installation of nitrogen treatment equipment on all domestic sewage systems, and a performance monitoring program was completed in December 2012 by TWG. The RWQCB then circulated it to Zone 7 and ACEH for comments. In 2013, Zone 7 provided comments regarding The Wine Group's pursuit of connecting the Concannon Winery to Livermore's municipal sewer. In the comment letter, Zone requested that the RWQCB include among their Waste Discharge Requirements (WDR) a timeline for TWG to determine the feasibility of the sewer connection and a reporting requirement for them to provide progress updates to the three involved agencies. By the end of the 2013 calendar year, the RWQCB had not yet issued the anticipated WDR, but communicated to Zone 7 that they were working on it, and would have it ready for public review in 2014. In the meantime, TWG installed the nitrogen-reducing pretreatment equipment on their sanitary waste systems and constructed two monitoring wells along the down-gradient edge of their property.

2.7 Land Use Monitoring Program

This section describes the Zone 7's Land Use Monitoring Program for the 2013 Water Year (October 2012 through September 2013). Zone 7 monitors land use changes in the Valley as part of the long-range groundwater basin management program. The purpose of the program is to map and quantify Main Basin land use for areal recharge calculations (e.g., rainfall recharge, applied water recharge, and unmetered groundwater pumping for agriculture).

2.7.1 Program Description

The Land Use Monitoring Program identifies changes in land use with an emphasis on changes in impervious areas and the volume and quality of irrigation water that could impact the volume or quality of water recharging the Main Basin. Land use data are derived from aerial photography (when available), permit applications, field observations, and City and County planning documents.

In the 2012 Water Year (October 2011 through September 2012) Zone 7 modified its land use monitoring program as part of the revisions to the areal recharge spreadsheet model (described in Chapter 3, Section 3.1.2.2). The resulting land use categories are:

- Residential (rural)
- Residential (low density)
- Residential (medium density)
- Residential (high density)
- Commercial and Business

- Industrial
- Public
- Public (Irrigated Park)
- Agriculture (vineyard)
- Agriculture (non-vineyard)
- Mining Area – Pit
- Water Body
- Golf Course
- Open Space

Each of the land use polygons is also catalogued with the source of the water that supplies that area as follows:

- Delivered (municipal) water
- Groundwater
- Recycled water

Also, starting in the 2011 Water Year (October 2010 through September 2011) and continuing through the 2013 Water Year (October 2012 through September 2013), land use categories are not quantified by DWR nodes in the Main Basin but rather they are assigned spatially to the groundwater model cells (500 feet by 500 feet), which are also the spatial units used for the areal recharge calculations.

2.7.2 2013 Water Year Results

The 2013 Water Year (October 2012 through September 2013) land use areas were mapped and are shown in *Figure 2.7-1*. For the 2013 Water Year, land uses remained relatively unchanged from the 2012 Water Year (October 2011 through September 2012), and in fact still remains very similar to the land use of the mid-2000s. The only major change in land use during the 2012 Water Year was the addition of the commercial and residential development in the Staples Ranch area at El Charro Road just south of Interstate 580.

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 2013 Water Year (October 2012 through September 2013).

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Feet

N

W E

S

LEGEND

- Residential (rural)
- Residential (low density)
- Residential (medium density)
- Residential (high density)
- Commercial and Business
- Industrial
- Public
- Public (Irrigated Park)
- Golf Course
- Agriculture (non-vineyard)
- Agriculture (vineyard)
- Mining Area (pit)
- Water
- Open Space
- Roads

ZONE 7 WATER AGENCY
100 North Canyons Parkway
Livermore, CA

DRAWN: TR	SCALE: 1 in = 6,000 ft
REVIEWED: MK	DATE: Jul 22, 2014
FILE: E:\MONITOR\Land Use\2013WY\Fig10-1-LUMap2013.mxd	

Figure 2.7-1
Livermore Valley Land Use
2013 Water Year (Oct 2012 to Sep 2013)
Livermore Valley Groundwater Basin