4 Chain of Lakes

4.1 Program Description

The Chain of Lakes/Mining Area Monitoring Program includes water level measurements and water quality analysis for many of the mining area ponds or quarry lakes within the Livermore Valley. The program also tracks and documents current mining activities, locations of discharge lines, circulation and conveyance of water between pits, and the locations of flow barriers created by clay-lined or backfilled pits.

Figure 4-A, below, identifies the previous owners, current owner, and current mining operators associated with each lake/pond prefix and pond number as shown on *Figure 4-1*.

Figure 4-A: Mining Pond Operators and Owners

Pond Prefix*	Previous Owner(s)	Pond Number	Current Owner	Current Operator (if other than Owner)	Other Name
K	Kaiser Sand & Gravel; Hanson Aggregates	K1-8,19,32,33	Various	backfilled/developed	
		K9-14,24	Lionstone/Legacy	backfilled	
		K15	EBRPD		Shadow Cliffs Lake
		K18	EBRPD		Lake Boris
		K28	PGC	Hanson Aggregates	Lake H
		K30	Zone 7		Cope Lake
		K37	Zone 7		Lake I
R	Rhodes & Jamieson	R3-4, 12	Vulcan		
		R5	PGC	Vulcan	Lake G
		R8,10,11,13,14,21,23,24,27	PGC	Vulcan	
		R22	PGC	Vulcan	Lake F
		R25	PGC	Vulcan	Lake E
C	Cal Rock	C1,2,6	PGC	Vulcan	Lake C
		C3,4	PGC	Vulcan	
		C5	Cemex		
		C7-10, R28	PGC	Vulcan	Lake D
P	Pacific Coast Aggregates; RMC/Lonestar	P1-11,13,21,27,34,40,43-45	Cemex		
		P12	EBRP		Island Pond
		P28, 41	Cemex		Lake A
		P39,42	Cemex		Lake B

* Prefix for pond names (e.g., K37)
PGC Pleasanton Gravel Company
EBRPD East Bay Regional Parks District

Water surface elevations are measured semi-annually in the ponds. The semi-annual pond level measurements are collected at the same time as the semi-annual monitoring well level measurements.

Water quality is determined annually through sampling and analysis. Zone 7's laboratory performs a general mineral and metals analysis that is consistent with the analyses performed for the groundwater monitoring program.

All water generated during mining that is discharged to a non-quarry property (i.e. to an arroyo, Shadow Cliffs, and Cope Lake) is metered. The volume of water that leaves the Valley through discharges to the arroyos is computed by prorating the flows after accounting for any re-percolation back into the groundwater basin.

This program also includes the tracking of pond evaporative areas, total monthly evaporative losses for the ponds, and an estimate of groundwater lost due to the export of moist gravels. Mining area evaporation accounts for a large portion of the "Demand" component for the annual hydrologic inventory (HI) calculation, second only to "Municipal Pumping."

4.2 2014 Results

Mining activities continued for Vulcan Materials (formerly Calmat) and Cemex (formerly RMC Lonestar). Vulcan Materials continued their mining in R24 (future Lake E). Cemex continued mining in P42 (Lake B). A summary of mining pit conditions including their areal extent and water elevations are shown on *Figure 4-1*.

For the 2014 WY, Vulcan Materials discharged 1,260 AF into the Arroyo Mocho, of which an estimated 410 AF re-percolated back into the groundwater basin and 850 AF was lost as basin outflow. In December 2013, Vulcan Materials, in collaboration with Zone 7, completed an extension to their Arroyo Mocho discharge pipeline which allows their de-silted mining water to be captured in Cope Lake rather than discharged to the Arroyo Mocho. Vulcan diverted 5,420 AF of water into Cope Lake in the 2014 WY. An estimated 881 AF was transferred from Cope Lake to Lake I via a new conduit which Zone 7 installed in May 2014.

Cemex did not discharge into the Arroyo Valle during the 2014 WY. The groundwater pumped from their active excavation was transferred to onsite ponds and used as a gravel wash water source. Consequently, some of this water evaporated or left the Valley as gravel moisture, and some percolated through the ponds' bottoms and sides and back into the aquifer.

In total, an estimated 3,648 AF of water evaporated from all the mining area ponds and 700 AF left as gravel moisture during the 2014 WY, from Cemex and Vulcan operations.

Zone 7 continued its cooperative off-site recharge program with EBRPD using the Shadow Cliffs lake. Due to the drought, Zone 7 had to reduce significantly the amount of water that was diverted by EBRPD into Shadow Cliffs between October 2013 and September 2014. EBRPD diverted only 113 AF compared to an average of 900 AF. Water levels dropped below 326 feet elevation in the latter half of the year.

Water elevations were measured in most of the pits in the mining area that contained water (i.e., the lakes or ponds) during the 2014 WY, and the results are shown on *Figure 4-2*. The water elevations from the pits that are in direct communication with the upper aquifer are included in the Groundwater Monitoring Program's dataset used for the upper aquifer groundwater elevation contour maps (*Section 5*; *Figure 5-8* and *Figure 5-9*).

Water quality was also monitored in certain mining ponds (*Figure 4-3*). Salt concentrations, measured as TDS, in the mining area ponds ranged from about 316 mg/L in the ponds along the Arroyo Valle to over 1,400 mg/L in Cope Lake [K30] in October 2013. The high TDS in Cope Lake was due to evaporation which concentrates the salts in this clay-lined pond. However, starting in December 2013, Vulcan's discharges to Cope Lake resulted in its TDS dropping to 470 mg/L by September 2014. The TDS, nitrate and boron concentrations measured in the mining area ponds that are in direct communication with the upper aquifer are included in the Groundwater Monitoring Program's dataset used to create the upper aquifer concentration maps *(Section 6; Figure 6-4 to Figure 6-6).*

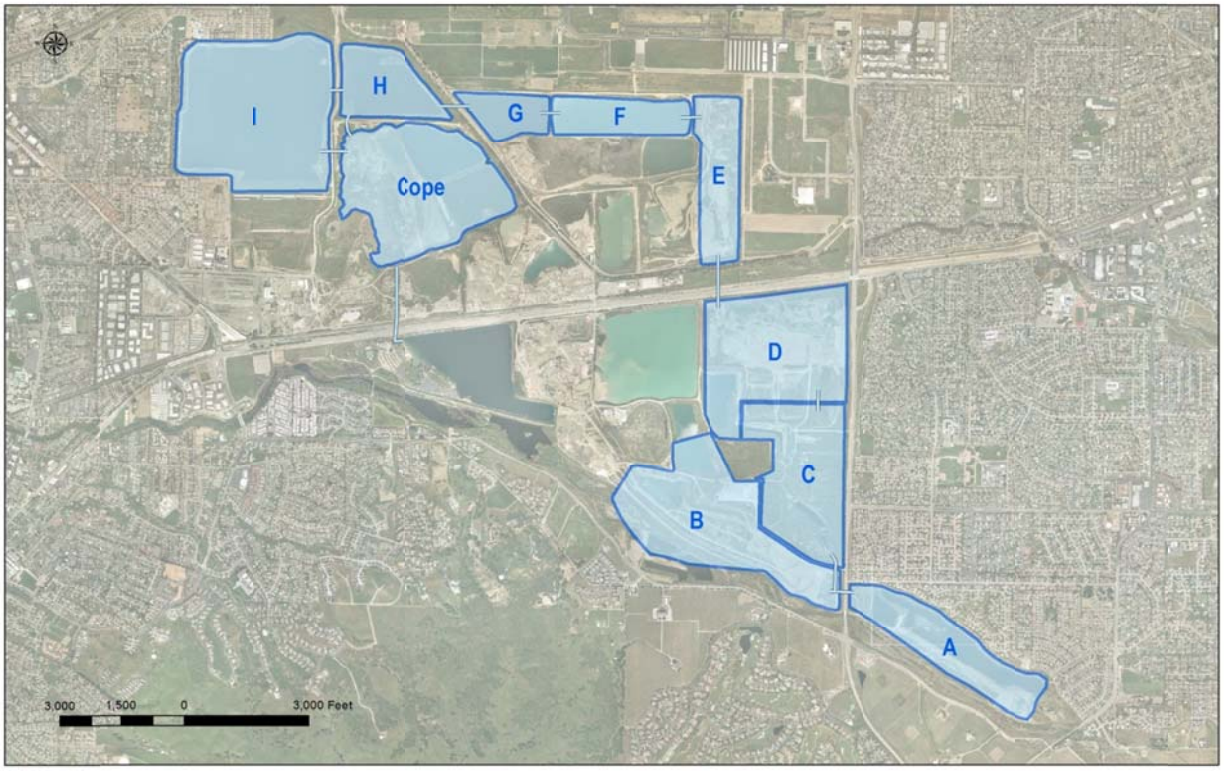
4.3 Chain of Lakes Recharge Projects

This section summarized recent activities on Zone 7 Chain of Lakes Projects that will enhance Zone 7's ability to monitor and recharge the groundwater basin.

Many of the quarry pits have been dug deep into the Upper Aquifer, creating "windows" into the groundwater basin, and exposing groundwater to large evaporative losses. Groundwater is also pumped from some of the pits and transferred to others or discharged to the arroyos to facilitate the gravel extraction in the active pits.

As mitigation for removal of aquifer material and interruption of groundwater movement resulting from the mining of aggregate resources and occasional placement of less permeable material in former pits between Livermore and Pleasanton, ten of the resulting quarry lakes (Lakes A through I and Cope Lake) have been or will be deeded to the Zone 7 Water Agency for water resources management purposes (*Figure 4-B*). Currently, only Lake I and Cope Lake are owned and maintained by Zone 7.

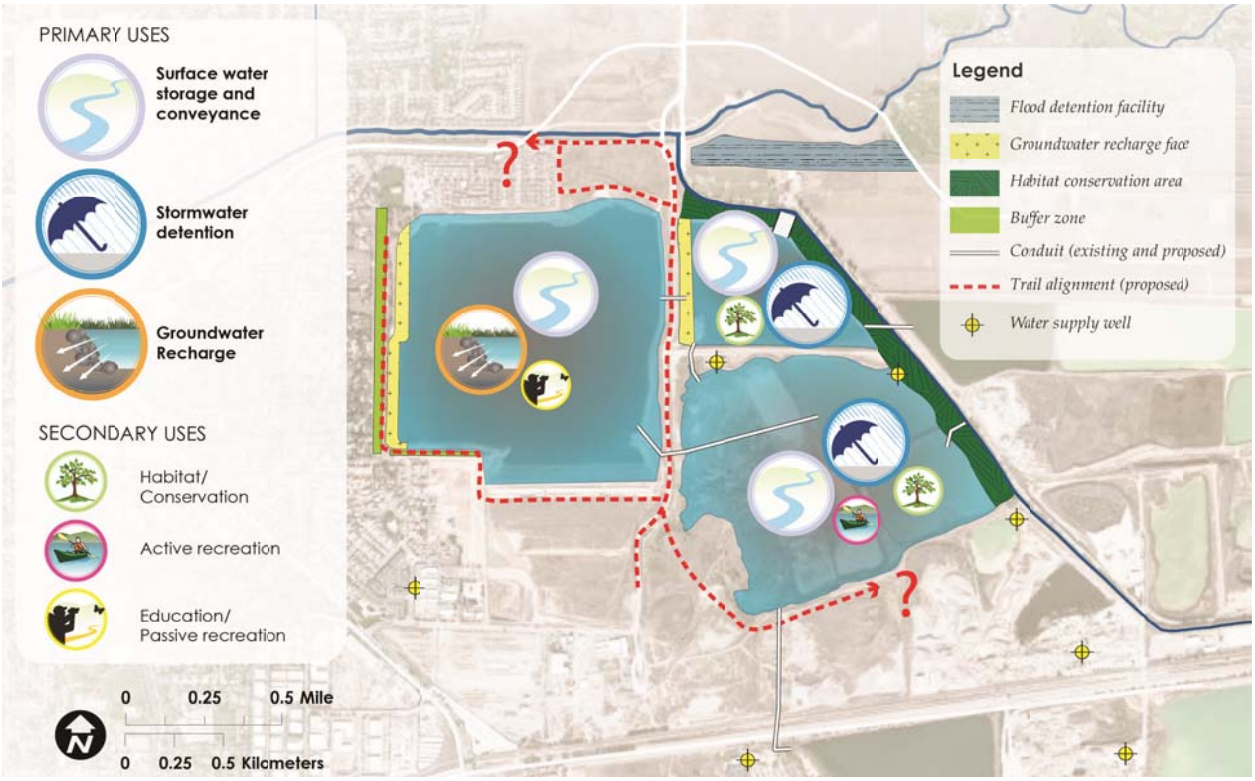
Figure 4-B: Map of Future Chain of Lakes



In 2014, Zone 7 completed a Preliminary Lake Use Evaluation for the Chain of Lakes (*Zone 7, 2014*). This effort evaluated the suitability of each of the lakes in the future Chain of Lakes for seven potential uses. Three of the uses were designated as primary uses because they directly support Zone 7's mission of water supply and flood protection: surface water storage and conveyance, stormwater detention, and groundwater recharge. Four secondary uses were also identified: active recreation, passive recreation/education, habitat/conservation, and recycled water storage. All of the future lakes were included in the evaluation but an emphasis was put on Lakes H, I and Cope which are already under the control of Zone 7 or soon to be (*Figure 4-C*). These three lakes and their surrounding areas are also part of the future City of Pleasanton's East Pleasanton Specific Planning area.

Full implementation of the Chain of Lakes use by Zone 7 is not expected before 2058 when the mining operations are projected to be completed. However, Zone 7 is working on several interim projects that are designed to convey, capture and recharge imported SWP water and captured mining releases, and/or detain peak stormwater flows.

Figure 4-C: Near-term recommendations for Lakes H, I, and Cope from Preliminary Lake Use Evaluation

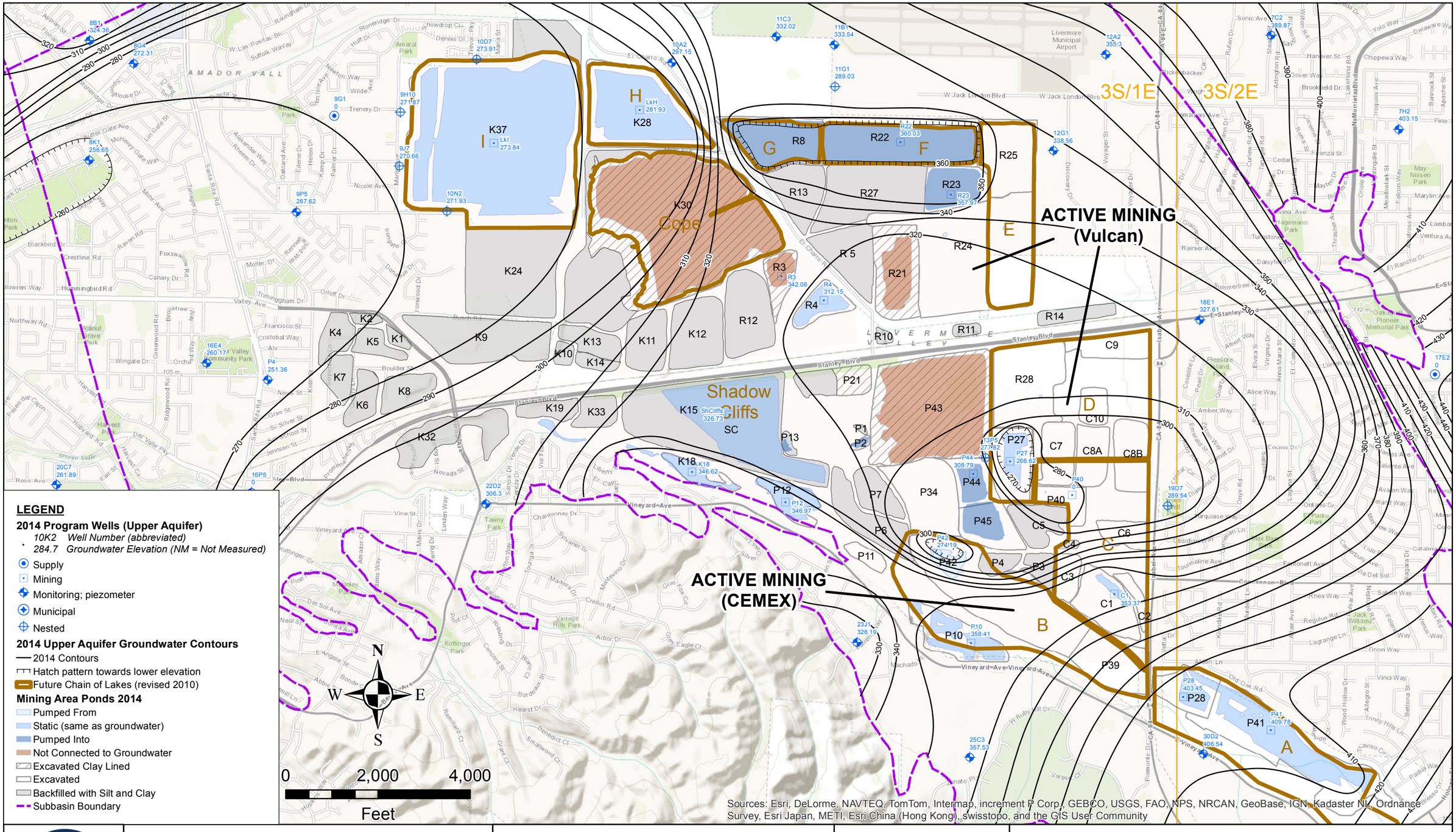


In the 2013 WY, Zone 7 staff collaborated with Vulcan Materials on a project to capture groundwater pumped as part of mining operations to minimize future groundwater discharges to the Arroyo Mocho that would normally be lost as "basin outflow." This groundwater capture project extended Vulcan's pipeline past the Arroyo Mocho to Cope Lake. In the 2014 WY, another project was completed by Zone 7 which constructed a pipeline between Cope Lake and Lake I. This pipeline allows the water that is diverted into Cope Lake to then be conveyed into Lake I where it can percolate through the sidewall and recharge the Amador Subbasin aquifers. It is estimated that, together, these projects have the potential to eliminate 2,000 AF to 5,000 AF of groundwater losses per year.

Another near-term recharge project is the Arroyo Mocho Diversion, which is anticipated to be in service within the next few years. 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 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 Area Reclamation (LAVQAR) Specific Plan, 1981. In the 2014 WY, Hanson has made significant progress on a design for the diversion structure. Hanson should be ready to submit a permit

application to the Army Corps of Engineers in the 2015 WY. Zone 7 is supporting Hanson, as appropriate, since Zone 7 will eventually own and operate the structure.

In 2012, Cemex started the amendment process for their surface mining permit (SMP-23) due to anticipated changes in their planned mining. These changes include realigning the Arroyo Mocho, which was previously captured in Lake A then exited Lake B under the original SMP-23. The amendment also proposes changes to the shape and size of Lakes A and B. In the 2014 WY, Cemex produced two technical memos in support of their proposed amendment: one on hydraulic modeling of the Arroyo Valle and one on Arroyo Valle Diversion and Conveyance Feasibility. Staff has been working closely with the Alameda County Community Development Agency (CDA) which oversees SMP-23. The amendment process will also involve an updated Environmental Impact Report (EIR) which is anticipated to be completed in the 2015 WY. Staff will continue to work with Cemex and the CDA.



LEGEND

2014 Program Wells (Upper Aquifer)

10K2 Well Number (abbreviated)

284.7 Groundwater Elevation (NM = Not Measured)

- Supply
- Mining
- Monitoring; piezometer
- Municipal
- Nested

2014 Upper Aquifer Groundwater Contours

- 2014 Contours
- Hatch pattern towards lower elevation
- Future Chain of Lakes (revised 2010)

Mining Area Ponds 2014

- Pumped From
- Static (same as groundwater)
- Pumped Into
- Not Connected to Groundwater
- Excavated Clay Lined
- Excavated
- Backfilled with Silt and Clay
- Subbasin Boundary

ZONE 7 WATER AGENCY
100 North Canyons Parkway
Livermore, CA

DRAWN: TR/CW	SCALE: 1 in = 2,000 ft
REVIEWED:	DATE: April 9, 2015
File: E:\MONITOR\MA\2014WY\Fig04-1-MiningArea14.mxd	

Figure 4-1
Map of Gravel Mining Pits with Groundwater Elevation Contours (October 2014) Livermore Valley Groundwater Basin

FIGURE 4-2
SEMIANNUAL WATER LEVELS IN MINING AREA PONDS
2014 WATER YEAR

Pit Number	Chain of Lakes Name	Frequency		Contact with Aquifer	Original Ground Elev	Deepest Mined Depth		Mining Use	Pond Elevation (ft MSL, NAVD88)		
		Levels	Quality			Elev	Depth	2014	Spring 14	Fall 14	Difference
CALROCK/RHODES & JAMIESON/VULCAN/PLEASANTON GRAVEL COMPANY/CALMAT											
C 1	C	SA	A	C	410	360	50	Unused	356.16	353.37	-2.79
C 2	C			N	410	360	50	Clay Storage			
C 3	C			N	410	360	50	Clay Storage			
C 4	C			N	400	390	10	Clay Storage			
C 5				N	400	290	110	Backfilled with clay			
C 6	C			N	400	385	15	Clay Storage			
C 7	D			N	400	330	70	Clay Storage			
C 8A	D			C	410	330	80	Unused			
C 8B	D			C	410	340	70	Unused			
C 9	D			N	410	310	100	Active Mining			
C10	D			N	410	310	100	Active Mining			
R 3		SA	A	CP	370	240	130	Water & Clay	341.56	342.06	0.5
R 4		SA	A	CP	380	240	140	Water Storage	310.95	312.15	1.2
R 5				N	380	240	140	Clay Storage			
R 8	G	SA	A	CP	365	260	105	Same as R22			
R10				N	380	370	10	Backfilled with clay			
R11				N	390	370	20	Backfilled with clay			
R12				N	370	240	130	Clay Storage			
R13				N	370	270	100	Clay & Debris			
R14				N	390	370	20	Backfilled with clay			
R21				N	380	280	100	Water & Clay			
R22	F	SA	A	CP	380	290	90	Water Storage	363.78	360.03	-3.75
R23		SA	A	CP	380	270	110	Water & Clay	361.84	357.97	-3.87
R24	E	SA	A	C	390	200	190	Active Mining			
R25	E			-	395	300	95	Inactive Mining	156.28	155.87	-0.41
R27				N	380	300	80	Water & Clay			
R28	D	SA	A	CP	400	320	80	Active Mining			
KAISER GRAVELS/HANSON AGGREGATES											
K 1				N	350	325	25	Backfilled with clay			
K 2				N	350	325	25	Backfilled with clay			
K 4				N	350	315	35	Backfilled with clay			
K 5				N	350	315	35	Backfilled with clay			
K 6				N	350	325	25	Backfilled with clay			
K 7				N	350	320	30	Backfilled with clay			
K 8				N	350	320	30	Backfilled with clay			
K 9				N	360	305	55	Backfilled with clay			
K10				N	370	355	15	Backfilled with clay			
K11				N	370	315	55	Backfilled with clay			
K12				N	370	275	95	Backfilled with clay			
K13				N	370	275	95	Backfilled with clay			
K14				N	370	275	95	Backfilled with clay			
K15	Sh.Cliff	SA	A	C	360	265	95	Recreation	330.81	326.73	-4.08
K18	Lake Boris	SA	A	C	360	330	30	Connected to ADV	350.31	346.62	-3.69
K19					350	335	15	Backfilled with clay			
K24				N	360	220	140	Backfilled with clay			
K24A	Busch Pit			N	360	220	140	Backfilled with clay			
K28	H	SA	A	C	360	220	140	Water Storage	282.77	281.93	-0.84
K30	Cope	SA	A	N	370	240	130	Water Storage	330.73	331.42	0.69
K32				N	360	335	25	Backfilled with clay			
K33				-	360	335	25	Backfilled with clay			
K37	I	SA	A	C	360	220	140	Water Storage	276.73	273.84	-2.89
PACIFIC AGGREGATE/RMC/LONESTAR/CEMEX											
P 1					380	360	20	Clay Storage			
P 2				CP	380	360	20	Water Storage			
P 3					400	360	40	Clay Storage			
P 4					400	360	40	Clay Storage			
P 6					380	280	100	Clay & Debris			
P 7					380	280	100	Clay & Debris			
P10		SA	A	C	400	340	60	Unused	365.47	358.41	-7.06
P11		SA	A	C	380	340	40	Unused			
P12	Island Pond	SA	A	C	360	330	30	Unused	350.4	346.97	-3.43
P13				C	380	300	80	Water Storage			
P21					380	240	140	Clay Storage			
P27		SA	A	C	390	250	160	Water Storage	278.1	266.62	-11.48
P28	A	SA	A	CP	420	360	60	Water Storage	405.72	403.45	-2.27
P34					380	270	110	Clay & Debris			
P39	B				410	380	30	Inactive Mining			
P40		SA	A	C	390	260	130	Water Storage			
P41	A	SA	A	CP	410	370	40	Water Storage	412.39	409.78	-2.61
P42	B	SA	A	CP	380	310	70	Active Mining	279.61	274.19	-5.42
P43				N	390	240	150	Water & Clay	344.19	343.91	-0.28
P44		SA	A	CP	390	250	140	Water Storage	320.73	308.79	-11.94
P45				CP	380	310	70	Water Storage			

A = Annual; SA = Semiannual

C = in contact with groundwater; CP = groundwater contact but subject to pumping; N = no contact with groundwater.

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4/9/2015

FIGURE 4-3
WATER QUALITY RESULTS FOR MINING AREA WATER SAMPLES
2014 WATER YEAR

		DTW	TEMP.	EC		Mineral Constituents (mg/L)									Select Metals (mg/L)				TDS	Hard
SITE ID	DATE	(Ft)	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3	SiO2	B	As	Fe	Mn	mg/L	mg/L
MA-C01	10/3/13	355.22	21.6	1563	8.3	131	34	179	3.5	412	88	259	<0.44	<1.1	1.00	0.0067	<0.1	<0.01	905	468
MA-C01	9/16/14	353.37	26.7	1648	8.7	22	107	188	3.5	395	91	310	<0.44	<1.1	0.78	0.0071	<0.05	<0.01	934	497
MA-K15	10/3/13	332.58	21.4	729	8.8	30	33	76	3.9	207	46	107	<0.44	10.1	0.50	0.0048	<0.1	<0.01	420	212
MA-K15	9/16/14	326.73	26.7	759	8.8	28	36	83	4.0	201	54	108	<0.44	9.4	0.40	0.0045	<0.05	<0.01	433	218
MA-K18	10/3/13	351.2	20.6	574	8.2	33	18	58	2.9	154	24	91	<0.44	11.1	0.24	0.0019	<0.1	<0.01	316	155
MA-K18	9/16/14	346.62	26.2	646	8.7	31	23	73	2.6	127	50	110	<0.44	7.9	0.21	0.002	<0.05	<0.01	366	173
MA-K28	10/3/13	282.92	21.9	870	8.6	35	53	80	2.3	277	53	105	<0.44	18.8	0.72	0.0053	<0.1	0.012	494	306
MA-K28	1/28/14	-	11.4	885	8.4	38	49	81	2.4	303	59	92	<0.44	14.8	0.61	0.0029	<0.05	<0.01	492	297
MA-K28	2/4/14	-	11.7	897	8.4	38	49	83	2.5	276	60	103	<0.44	14.8	0.65	0.003	<0.05	<0.01	493	295
MA-K28	2/10/14	-	13.9	854	8.1	40	49	82	2.5	299	58	101	<0.44	14.3	0.65	0.003	<0.05	<0.01	497	302
MA-K28	2/18/14	-	14.2	917	8.2	41	50	83	2.5	304	59	102	<0.44	14.3	0.65	0.0031	<0.05	<0.01	506	309
MA-K28	9/16/14	281.93	25.4	856	8.6	28	56	77	2.1	253	62	119	<0.44	16.7	0.52	0.0058	<0.05	<0.01	495	301
MA-K30	5/29/14	-	0.0	935	8.1	45	54	70	3.4	297	54	122	<0.44	8.1	0.71	0.0078	<0.05	0.024	506	333
MA-K30	9/16/14	331.42	25.1	879	8.7	23	60	71	2.7	234	53	131	<0.44	2.8	0.49	0.007	<0.05	<0.01	470	303
MA-K30_NE	10/3/13	314.5	22.1	2543	9.2	17	140	375	3.8	354	198	517	<0.44	2.4	3.57	0.025	0.35	0.012	1480	619
MA-K30_NE	1/28/14	-	12.5	1590	8.3	36	84	198	3.7	333	135	269	<0.44	9.6	1.6	0.0086	0.13	0.01	905	435
MA-K30_NE	2/4/14	-	11.4	1562	9.1	35	78	188	3.5	280	129	282	<0.44	9.8	1.4	0.0079	<0.05	<0.01	896	411
MA-K30_NE	2/10/14	-	14.0	1409	8.8	36	75	171	3.4	304	113	247	<0.44	11.6	1.3	0.0072	<0.05	<0.01	825	401
MA-K30_NE	2/18/14	-	15.0	1362	8.9	43	70	154	3.6	294	103	219	<0.44	9.6	1.2	0.0063	<0.05	<0.01	769	394
MA-K30_SE	10/3/13	318.41	20.9	1310	9.8	28	69	167	1.3	168	97	243	<0.44	3.0	1.35	0.0088	<0.1	<0.01	790	357
MA-K30_SE	1/28/14	-	11.2	802	9.0	41	48	59	2.6	243	50	85	1.73	12.2	0.42	0.0018	<0.05	<0.01	442	302
MA-K30_SE	2/4/14	-	10.9	799	8.6	42	46	57	2.7	248	49	92	1.90	11.8	0.42	0.0019	<0.05	<0.01	434	292
MA-K30_SE	2/10/14	-	12.9	769	8.3	43	44	54	2.6	266	46	96	1.95	10.5	0.40	0.0018	<0.05	<0.01	434	288
MA-K30_SE	2/18/14	-	14.2	768	8.5	49	43	51	2.7	265	44	91	2.21	10.3	0.38	0.0019	<0.05	<0.01	431	300
MA-K37	10/3/13	279.67	23.6	1025	8.9	23	66	110	2.7	291	73	168	<0.44	6.0	1.12	0.0046	<0.1	<0.01	614	331
MA-K37	1/28/14	-	12.6	1068	8.3	28	63	118	3.0	321	79	136	<0.44	5.8	1.0	0.004	<0.05	<0.01	597	328
MA-K37	2/4/14	-	12.9	1109	8.5	27	64	119	3.1	303	82	147	<0.44	6.2	1.0	0.0038	<0.05	<0.01	606	332
MA-K37	2/10/14	-	13.1	1072	8.2	27	63	118	3.1	324	77	145	<0.44	6.2	1.0	0.0039	<0.05	<0.01	604	326
MA-K37	2/18/14	-	15.7	1111	8.4	38	59	120	3.1	319	79	150	<0.44	5.8	1.0	0.004	<0.05	<0.01	619	339

FIGURE 4-3
WATER QUALITY RESULTS FOR MINING AREA WATER SAMPLES
2014 WATER YEAR

		DTW	TEMP.	EC		Mineral Constituents (mg/L)									Select Metals (mg/L)				TDS	Hard
SITE ID	DATE	(Ft)	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3	SiO2	B	As	Fe	Mn	mg/L	mg/L
MA-K37	9/16/14	273.84	25.8	1083	8.5	22	69	108	2.5	296	86	161	<0.44	7.3	0.86	0.0049	<0.05	<0.01	610	336
MA-P10	10/3/13	366.55	21.7	649	8.4	29	31	62	3.5	243	17	81	<0.44	<1.1	0.38	0.0026	<0.1	<0.01	349	201
MA-P10	9/16/14	358.41	29.4	670	9.1	27	31	75	3.8	190	19	102	<0.44	<1.1	0.33	0.0059	<0.05	<0.01	374	195
MA-P12	10/3/13	351.28	19.4	624	8.8	38	18	63	2.8	147	23	109	<0.44	14.6	0.23	0.0016	<0.1	<0.01	349	169
MA-P12	9/16/14	346.97	26.3	719	8.7	32	25	82	3.2	144	49	123	<0.44	12.4	0.24	0.0039	<0.05	<0.01	404	182
MA-P27	10/3/13	281.39	21.8	656	8.6	34	32	65	1.8	160	56	110	<0.44	8.6	0.51	0.0036	0.11	<0.01	392	214
MA-P27	9/16/14	266.62	28.5	688	8.7	22	35	68	1.7	130	63	110	<0.44	8.6	0.41	0.0047	<0.05	<0.01	378	202
MA-P28	10/3/13	404.79	21.8	943	8.6	55	32	100	3.1	234	49	174	<0.44	5.8	0.47	0.0045	<0.1	<0.01	543	268
MA-P28	9/16/14	403.45	27.2	986	8.6	27	49	104	2.7	222	45	182	<0.44	3.9	0.37	0.0041	<0.05	<0.01	531	270
MA-P40	10/3/13	293.19	0.0	9255	8.3	131	447	1860	11	1255	885	2220	<0.44	4.5	12.6	0.068	2.1	0.89	6199	2165
MA-P41	10/3/13	410.93	22.7	901	8.9	29	48	94	3.0	220	43	171	<0.44	6.6	0.42	0.0038	<0.1	<0.01	519	270
MA-P41	9/16/14	409.78	27.8	938	9.1	22	51	100	2.8	193	44	180	<0.44	2.1	0.34	0.003	<0.05	<0.01	520	264
MA-P42	10/3/13	284.78	21.4	668	8.3	30	37	55	1.9	212	45	83	<0.44	16.3	0.37	0.0017	<0.1	<0.01	377	226
MA-P42	9/16/14	274.19	26.9	716	8.3	46	29	59	1.7	182	51	94	0.62	15.4	0.32	0.0015	<0.05	<0.01	390	236
MA-P43	10/3/13	343.29	21.7	618	8.4	38	19	61	2.5	118	56	105	<0.44	7.5	0.43	<0.001	0.14	<0.01	350	174
MA-P43	9/16/14	343.91	28.2	681	8.7	37	23	62	2.5	91	65	116	<0.44	10.1	0.34	0.0013	<0.05	<0.01	365	186
MA-P44	10/3/13	317.87	22.1	616	8.5	34	23	60	2.3	123	52	99	<0.44	7.9	0.42	<0.001	<0.1	<0.01	342	178
MA-P44	9/16/14	308.79	27.5	699	8.4	41	22	63	2.5	114	65	112	<0.44	11.6	0.35	0.0012	<0.05	<0.01	376	195
MA-R03	10/3/13	339.92	17.9	682	8.3	40	41	39	3.1	231	44	79	<0.44	16.7	0.31	0.0014	<0.1	<0.01	381	271
MA-R03	9/16/14	342.06	21.3	681	8.4	36	43	39	3.1	223	47	85	<0.44	20.5	0.25	0.0019	0.061	0.012	389	268
MA-R04	10/3/13	313.5	20.8	682	8.5	40	44	38	2.4	232	43	77	<0.44	17.3	0.30	0.0016	<0.1	<0.01	383	283
MA-R04	9/16/14	312.15	24.4	669	8.6	36	45	37	2.2	221	46	82	<0.44	20.8	0.25	0.0017	<0.05	<0.01	386	276
MA-R22	10/3/13	362.74	20.4	666	8.6	45	41	37	2.2	221	45	76	1.68	17.1	0.31	0.0017	<0.1	<0.01	382	282
MA-R22	9/16/14	360.03	24.5	647	8.8	34	48	36	2.0	210	46	80	<0.44	23.5	0.26	0.0015	<0.05	<0.01	385	281
MA-R23	10/3/13	359.83	20.5	674	8.6	42	43	38	2.3	230	45	76	0.62	18.2	0.31	0.0015	<0.1	<0.01	387	285
MA-R23	9/16/14	357.97	23.9	663	8.6	35	46	36	2.1	223	47	82	<0.44	21.4	0.24	0.0012	<0.05	<0.01	388	277
MA-R25	10/3/13	167.79	18.0	702	8.1	53	41	33	1.8	262	42	68	10.41	23.5	0.30	<0.001	<0.1	<0.01	405	301
MA-R25	9/16/14	155.87	19.6	718	8.0	46	47	33	1.6	272	44	70	13.55	25.7	0.23	<0.001	0.053	0.011	417	310