TO: **Los Osos Basin Management Committee Interested Parties**

FROM: **Daniel Heimel, Executive Director**

DATE: **August 11, 2020**

SUBJECT: **Draft 2020 Spring Lower Aquifer Groundwater Basin Monitoring Results**

Discussion

As described in Section 5.14 of the Stipulated Judgment and Chapter 7 of the Basin Plan, the Basin Management Committee (BMC) established a groundwater monitoring program to provide the BMC, parties to the adjudication, private Basin water users and public agencies with continuously updated information on groundwater resources in the Basin. The BMC retained Cleath Harris Geologists (CHG) to perform the groundwater monitoring program for 2020. The following attachments include the draft results from the Spring 2020 lower aquifer groundwater monitoring and updated Water Level and Chloride Metrics and are being provided interested parties for information purposes. Final results, including water levels and results from the first water and upper aquifer monitoring, will be included in the 2020 Annual Report.

The draft Spring 2020 lower aquifer groundwater monitoring results will also be included as an item on the agenda for the August 19th, 2020 BMC Meeting. The BMC Meeting will include BMC and staff discussion of the lower aquifer monitoring program results.

Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	umhos/cm	units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/10E-11A2	Sand Spit #1 East	LA2	D	3/14/2005	180	4600	16000	7.3	8900	5400	ND	430	770	640	20	1300
				10/21/2015	150	6640	17700	7.4	13100	6300	ND	740	1030	990	31	1560
30S/10E-12J1	MBO5 DWR Obs.	LA11	E	2/14/2005	350	370	1300	8.1	840	77	ND	190	51	58	6.1	110
				11/20/2009	300	360	1150	7.5	732	83	ND	190	51	58	4.4	95
				7/24/2014	360	489	1290	7.7	780	105	ND	212	69	77	5	88
				4/22/2015	360	475	1290	7.8	810	112	ND	189	65	76	5	88
				10/1/2015	250	486	1280	7.3	840	117	ND	188	68	77	4	85
				4/20/2016	330	524	1370	n/a	840	151	ND	193	73	40	5	83
				10/10/2016	350	497	1370	7.1	930	173	ND	189	69	79	4	81
				4/11/2017	350	541	1380	7.5	880	167	ND	186	75	86	4	81
				10/4/2017	300	543	1370	7	850	162	ND	191	76	86	5	90
				4/10/2018	350	595	1390	7.6	820	173	ND	192	85	93	5	97
				10/2/2018	350	497	1340	7.4	870	160	ND	160	69	79	3	87
				4/9/2019	350	539	1430	7.4	860	196	ND	189	76	85	4	85
				10/2/2019	250	290	1520	7.6	1000	187	ND	189	80	90	5	91
				4/14/2020	350	667	1580	7	950	**222**	ND	187	81	113	5	83
30S/10E-13Bb	Lupine Zone D	LA41	D	11/7/2019	210	312	1310	7.7	760	136	3.1	188	69	34	4	140
				4/8/2020	310	204	943	7.8	560	**68**	0.3	109	44	23	2	101
30S/10E-13Ba	Lupine Zone E	LA40	E	11/6/2019	210	2090	5330	7	4750	1460	1.3	224	388	272	6	182
				4/7/2020	240	3300	7360	7.6	6340	**2190**	0.3	202	569	458	7	203
30S/10E-13J1* Highlighted chloride values from GSWC water quality monitoring (dates vary from those listed)	GSWC Rosina	LA10	D,E	12/20/2004	72	230	720	7.1	410	150	1.6	14	38	33	1.4	29
				1/14/2010	35	260	778	6	435	200	1.6	13	41	38	1.5	33
				7/24/2014	80	418	1200	7.3	910	303	1.7	16	67	61	2	39
				4/22/2015	80	431	1230	7.1	750	331	1.9	20	69	63	2	39
				10/5/2015	70	460	1280	7	950	329	1.7	19	74	67	2	41
				4/26/2016	80	412	1170	7.1	840	299	1.8	18	66	60	2	37
				10/12/2016	60	509	1430	6.8	1100	389	1.8	27	82	74	2	44
				4/10/2017	80	327	957	6.9	720	300	2.6	15	52	48	2	35
				10/12/2017	80	245	702	6.9	510	220	3.4	13	39	36	2	33
				4/24/2018	70	188	620	7.4	400	190	4.3	12	29	28	1	29
				10/9/2018	70	265	730	7.1	450	210	3.2	13	42	39	2	34
				4/15/2019	80	251	744	7	600	174	1.9	10	38	38	2	31
				10/14/2019	80	332	961	7.1	830	229	2	13	54	48	1	33
				4/21/2020	80	353	1310	6.4	970	**250**	2.1	14	59	50	2	32
30S/10E-13M2	Howard East	LA31	C,D	11/22/2004	51	810	2900	7.3	1500	810	0.5	140	60	120	4.7	210
				12/9/2009	55	1100	3740	7.1	2170	1100	0.5	220	160	160	4.8	370
				8/4/2014	60	757	3340	7.1	2450	990	0.6	178	117	113	5	382
				4/21/2015	60	739	3430	7.3	1930	950	0.6	178	117	113	5	382
				10/6/2015	30	756	3370	7.1	2140	960	0.5	185	115	114	5	342
				4/20/2016	50	726	3520	7.2	2190	941	0.7	179	113	108	5	400
				10/19/2016	70	722	3420	7.4	2190	943	0.6	182	113	107	4	398
				4/17/2017	60	733	3380	6.8	2060	907	0.6	178	114	109	4	413
				10/5/2017	60	738	3350	7.5	2190	960	0.7	160	116	109	5	411
				4/24/2018	70	664	3370	7.2	2020	946	0.6	2.8	103	99	4	367
				10/17/2018	60	740	3400	7.3	2180	834	0.6	153	115	110	5	414
				4/3/2019	70	640	3290	7.8	2010	940	0.6	179	103	93	4	341
				10/3/2019	70	574	3120	7.4	2120	827	0.7	169	90	85	4	340
				4/9/2020	70	519	2970	7.8	1740	**738**	0.6	152	86	74	4	258

Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	umhos/cm	units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/10E-13N	S&T #5	LA8	D	11/23/2004	42	80	390	6.9	200	67	5.9	9.2	13	12	1.7	38
				11/19/2009	41	89	386	6.8	267	73	6.1	11	15	13	1.4	38
				7/24/2014	50	100	438	7.4	270	76	7	10	17	14	2	38
				4/21/2015	50	98	445	6.9	280	77	7.7	11	16	14	2	38
				10/6/2015	40	98	422	7.2	310	75	6.8	10	16	14	1	38
				4/20/2016	20	97.5	446	7	320	76	7.2	12	16	14	1	38
				10/13/2016	50	104	470	8	320	79	7.2	12	17	15	1	40
				4/11/2017	50	100	434	7.4	270	77	7.3	12	17	14	1	38
				10/2/2017	30	95	438	7.2	290	78	7.6	13	15	14	1	36
				4/11/2018	60	104	440	7	260	79	7.9	14	17	15	1	39
				10/3/2018	60	107	430	6.5	340	66	6.7	13	18	15	2	40
				4/3/2019	50	100	434	6.3	250	75	7.3	13	17	14	1	36
				10/7/2019	60	95	446	7.6	250	77	7.7	14	15	14	1	37
				4/13/2020	60	104	443	8	300	**75**	7.4	15	17	15	2	37
30S/10E-14B2	Sand Spit #3 Deep	LA3	D	3/15/2005	100	3600	30000	8	17000	8500	ND	960	1200	130	34	4300
				10/21/2015	ND	7140	29500	11	24700	10000	ND	530	2830	20	80	4040
30S/10E-24C1	GSWC Cabrillo	LA9	D	12/20/2004	64	130	610	7	310	110	4.5	19	22	19	1.6	50
				11/20/2009	60	150	611	7.1	347	130	4.1	22	23	22	1.6	52
				7/24/2014	40	69	339	7.6	240	46	8.4	6	11	10	1	32
				4/22/2015	70	117	530	7.3	320	95	5.5	16	19	17	2	45
				10/5/2015	50	75	349	7.6	270	50	7.6	7	12	11	1	34
				4/26/2016	70	115	499	7	300	90	5.6	16	18	17	2	44
				10/12/2016	70	111	506	7.1	320	93	5.5	15	18	16	1	44
				4/10/2017	70	111	490	7	310	89	5.7	16	18	16	1	43
				10/12/2017	70	117	484	7	270	89	6	16	19	17	2	46
				4/24/2018	70	115	486	7.8	300	90	6.2	17	18	17	1	43
				10/9/2018	60	135	477	6.9	280	76	5.8	17	21	20	2	50
				4/15/2019	70	112	488	7.1	310	92	5.7	16	17	17	2	45
				10/14/2019	no sample (off-line)											
				4/21/2020	50	75.2	492	6.7	290	**80**	9.1	8.4	12	11	1	34
30S/11E-7Q3	LOCSD 8th St.	LA12	D	11/18/2004	250	270	790	7.5	410	73	ND	39	44	40	2.3	48
				11/19/2009	220	290	782	7.4	465	92	ND	46	46	42	1.9	53
				7/23/2014	290	303	876	7.6	460	91	ND	43	49	44	2	54
				4/21/2015	290	305	897	7.7	500	101	ND	55	48	45	2	59
				10/6/2015	280	298	828	7.4	490	91	ND	46	47	44	2	55
				4/20/2016	190	307	907	7.7	520	91	ND	49	49	45	2	54
				10/11/2016	280	278	827	4.9	490	93	ND	46	44	41	2	52
				4/10/2017	300	294	839	7.3	480	91	ND	50	47	43	2	54
				10/4/2017	220	305	826	6.5	470	92	ND	45	48	45	2	56
				4/10/2018	300	319	814	7.7	440	93	ND	46	52	46	2	56
				10/2/2018	290	283	822	7.3	470	78	ND	50	46	41	1	53
				4/9/2019	300	301	844	7.5	480	94	ND	50	48	44	2	53
				10/2/2019	290	312	877	8	530	91	ND	51	49	46	2	56
				4/16/2020	310	301	883	7.8	500	**94**	ND	55	48	44	2	52

Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	umhos/cm	units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/11E-17E8	So. Bay Obs. Middle	LA22	D	1/14/2005	150	150	440	7.5	290	34	2.2	11	24	22	1.4	28
				11/20/2009	120	160	455	7.3	255	42	4.3	12	25	23	1.3	29
				7/23/2014	150	166	500	7.6	270	43	6.3	10	27	24	2	28
				4/21/2015	150	157	481	7.6	270	49	7.1	13	25	23	1	28
				10/1/2015	120	164	475	7.4	290	44	6.6	10	26	24	1	28
				4/19/2016	150	164	476	6.9	290	45	6.9	12	26	24	1	29
				10/13/2016	140	161	521	7.3	290	46	6.9	12	25	24	1	29
				4/13/2017	150	164	466	7.3	300	46	6.7	13	26	24	1	29
				10/11/2017	150	168	476	7.7	260	47	7.2	14	26	25	1	29
				4/16/2018	150	165	473	6.4	310	47	6.7	14	25	25	1	29
				10/10/2018	150	160	471	7.5	250	43	6.1	15	26	23	1	28
				4/10/2019	180	153	466	7.2	290	46	5.8	14	25	22	1	28
				10/9/2019	150	155	485	7.3	270	49	7	15	24	23	1	28
				4/14/2020	160	164	482	8	280	**48**	6.3	15	26	24	1	27
30S/11E-17N10	GSWC So. Bay #1	LA20	C,D,E	Jan 2003	250	--	510	7.1	290	37	ND	21	41	25	1.3	35
				11/20/2009	230	220	638	7.3	357	41	0.5	30	35	33	1.7	37
				7/24/2014	280	232	646	7.7	370	37	0.5	24	37	34	2	41
				4/22/2015	290	234	653	7.4	360	43	0.6	27	36	35	2	42
				10/5/2015	280	227	614	7.2	370	38	0.5	23	35	34	2	41
				4/26/2016	230	227	629	7.1	360	39	0.6	27	35	34	2	40
				10/12/2016	290	221	631	7	370	40	0.6	25	34	33	2	40
				4/10/2017	280	227	624	7.2	380	39	0.6	27	35	34	2	40
				10/12/2017	260	240	583	6.6	320	41	0.7	28	37	36	2	43
				4/24/2018	200	166	515	7.4	330	43	3.2	23	27	24	2	31
				10/9/2018	290	273	632	7.2	340	38	0.6	29	42	41	3	47
				4/15/2019	200	181	559	7.4	310	42	3.1	22	28	27	2	34
				10/14/2019	290	221	626	7.2	380	41	0.7	29	34	33	2	40
				4/21/2020	300	230	705	7	400	**50**	0.7	27	36	34	2	42
30S/11E-18K8	10th St. Obs. East (Deep)	LA18	E	1/19/2005	260	290	650	7.5	370	33	ND	38	62	33	2.5	28
				11/20/2009	230	220	620	7.5	378	32	ND	40	51	24	1.8	23
				7/24/2014	290	271	647	7.5	380	28	ND	34	56	32	2	27
				4/21/2015	290	265	634	7.7	400	33	ND	39	55	31	2	27
				10/19/2015	230	256	621	7.3	370	29	ND	33	53	30	2	26
				4/20/2016	190	265	700	7.5	390	31	ND	38	55	31	2	26
				10/18/2016	290	256	615	6.8	370	31	ND	36	53	30	2	26
				4/12/2017	290	274	616	7.5	450	31	ND	38	57	32	2	27
				10/10/2017	220	271	619	7.8	350	30	ND	36	56	32	2	27
				4/17/2018	290	260	625	7.3	390	33	ND	40	53	31	2	27
				10/10/2018	290	254	608	7.5	360	31	ND	40	54	29	2	26
				4/10/2019	290	245	620	7.6	380	32	ND	37	52	28	2	25
				10/9/2019	290	253	647	7.9	390	33	ND	41	52	30	2	26
				4/14/2020	290	269	629	7.5	400	**33**	ND	40	55	32	2	26

Water Quality Results - Lower Aquifer Monitoring

Station ID	Well Name	Basin Plan Well ID	Aquifer Zone	Date	HCO3	Total Hardness	Cond	pH	TDS	Cl	NO3-N	SO4	Ca	Mg	K	Na
					mg/l	mg/l	umhos/cm	units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30S/11E-18K9	LOCSD 10th St.	LA32	C,D	May 2002	250	--	550	6.9	320	37	0.2	26	31	32	--	39
				11/20/2009	180	160	539	7.2	307	36	1	27	27	24	1.3	32
				7/23/2014	220	190	546	7.7	300	32	1	20	30	28	1	35
				4/21/2015	190	108	504	7.6	270	38	1.6	20	17	16	1	27
				10/6/2015	50	62	248	7.2	190	31	5.9	3	10	9	ND	21
				4/20/2016	130	121	382	7.5	220	32	3.3	12	19	18	1	27
				10/11/2016	200	168	511	6.6	270	36	1.2	22	26	25	1	34
				4/10/2017	190	155	461	7.3	270	35	1.9	19	24	23	1	31
				10/9/2017	200	168	493	7.6	270	36	1.4	23	26	25	1	33
				4/10/2018	50	75.2	256	7.7	150	35	6.5	29	12	11	ND	23
				10/2/2018	210	168	492	7.3	270	36	1.3	22	26	25	ND	33
				4/9/2019	200	172	474	7.6	270	34	1.6	22	26	26	1	33
				10/2/2019	200	185	531	7.4	310	36	1.4	25	28	28	1	35
				4/16/2020	60	72.7	272	8.1	190	**35**	6	5.4	11	11	ND	20
30S/11E-18K	GSWC Los Olivos #5	LA39	D	4/15/2019	290	230	619	8.1	350	38	ND	27	33	36	2	41
				10/14/2019	300	225	628	7.2	370	37	ND	29	34	34	1	41
				4/21/2020	300	236	674	6.9	370	**37**	0.2	28	37	35	2	42
30S/11E-18L2**	LOCSD Palisades	LA15	D,E	11/18/2004	220	330	880	7.3	420	120	ND	31	54	48	2.2	40
				11/19/2009	200	590	1460	7.2	890	360	0.4	39	94	86	2	44
			D	7/23/2014	250	293	783	7.8	390	90	0.4	26	48	42	2	40
				4/29/2015	80	78	348	7.4	230	43	5	10	13	11	ND	30
				10/28/2015	230	288	782	7.4	420	104	0.6	29	46	42	ND	36
				4/27/2016	230	264	796	7.3	450	93	0.9	28	43	38	2	43
				10/11/2016	200	221	694	7	380	91	1.7	26	36	32	1	35
				10/5/2017	180	306	768	7.6	400	102	0.7	27	50	44	2	40
				4/10/2018	250	311	767	7.3	420	100	0.8	32	52	44	2	40
				10/23/2018	250	288	772	7.7	440	83	0.6	31	48	41	1	38
				4/9/2019	250	301	774	7.4	460	102	0.8	29	48	44	1	38
				11/14/2019	210	303	806	7.8	430	107	0.7	33	49	44	2	39
				4/16/2020	260	299	832	7.7	460	**109**	0.8	33	49	43	2	37

ND = Not Detected

Chloride Metric Wells in Green (13J1 weighted x2); **current chloride concentrations in red**

*Chloride concentrations at 13J1 can vary seasonally by 100+ mg/l and are affected by well production and borehole leakage, so fluctuations are expected.

**Water from 18L2 affected by wellbore leakage/upper aquifer influence when inactive

Legend and Detection Limits

Constituent	Description	Practical Quantitation Limit*
HCO3	Bicarbonate Alkalinity in mg/L CaCO3	10.0
Total Hardness	Total Hardness in mg/L CaCO3	--
Cond	Electrical Conductance in μmhos/cm	1.0
pH	pH in pH units	--
TDS	Total Dissolved Solids in mg/L	20.0
Cl	Chloride concentration in mg/L	1.0
NO3-N	Nitrate as Nitrogen concentration in mg/L	0.1
SO4	Sulfate concentration in mg/L	2.0
Ca	Calcium concentration in mg/L	1.0
Mg	Magnesium concentration in mg/L	1.0
K	Potassium concentration in mg/L	1.0
Na	Sodium concentration in mg/L	1.0

*where dilution not required

Spring 2020 DRAFT