

**Redwood Shores Lagoon
October 2018
Monthly Water Quality Monitoring Report**



Prepared for

**Redwood City
Public Works Services Department
1400 Broadway
Redwood City, CA 94063-2594**

Prepared by

**Clean Lakes, Inc.
P. O. Box 3186
Martinez, CA 94553**

November 2018

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RESULTS - Water quality results for each site is provided below in Table format for 2018 to allow comparison of results from month to month.

SITE R-1

				Fecal		Dissolved						
	Ortho		Fecal	Coliform	Water	Oxygen	DO		PH	PH		
	Phosphate	Nitrate as N	Coliform	MPN/100 ml	Temp	(DO)	mg/l		Lower	Upper	Salinity	Turbidity
Months	mg/l	mg/l	MPN/100 ml	Limit	C°	mg/l	Limit	PH	Limit	Limit	ppt	NTU
1.18	0.17	ND	17	1,000	13	6.23	5	8.4	6.5	8.5	22.34	9.56
2.18	0.12	ND	4.5	1,000	16.7	7.11	5	8	6.5	8.5	18.67	9.24
3.18	0.15	ND	22	1,000	19	6.75	5	7.7	6.5	8.5	19.35	2.35
4.18	0.12	ND	ND	1,000	20.7	8.7	5	7.9	6.5	8.5	9.11	2.83
5.18	0.14	ND	13	1,000	18.9	6.15	5	7.7	6.5	8.5	30.11	2.32
6.18	0.19	ND	ND	1,000	20.7	6.14	5	7.7	6.5	8.5	30.85	3.31
7.18	0.53	ND	ND	1,000	26.6	2.94	5	7.7	6.5	8.5	25.46	3.41
8.18	0.26	ND	ND	1,000	28	5.32	5	7.8	6.5	8.5	24.51	4.38
9.18	0.16	ND	49	1,000	23.6	9.35	5	7.9	6.5	8.5	28.68	4.57
10.18	0.18	ND	6	1,000	22.3	7.69	5	7.9	6.5	8.5	28.04	7.07
11.18				1,000			5		6.5	8.5		
12.18				1,000			5		6.5	8.5		

SITE R-2

				Fecal		Dissolved						
	Ortho		Fecal	Coliform	Water	Oxygen	DO		PH	PH		
	Phosphate	Nitrate as N	Coliform	MPN/100 ml	Temp	(DO)	mg/l		Lower	Upper	Salinity	Turbidity
Months	mg/l	mg/l	MPN/100 ml	Limit	C°	mg/l	Limit	PH	Limit	Limit	ppt	NTU
1.18	0.16	ND	33	1,000	12.7	6.59	5	7.6	6.5	8.5	26.67	15.1
2.18	0.12	ND	2	1,000	17.6	5.38	5	7.5	6.5	8.5	22.54	5.66
3.18	0.15	ND	14	1,000	19.7	4.11	5	8	6.5	8.5	22.71	5.14
4.18	0.28	ND	350	1,000	22.7	5.2	5	8	6.5	8.5	8.46	23.2
5.18	0.14	ND	8.3	1,000	21.1	3.81	5	8	6.5	8.5	32.71	21.4
6.18	0.19	ND	4.5	1,000	21	3.97	5	8	6.5	8.5	32.33	4.27
7.18	0.55	ND	11	1,000	27.3	3.76	5	7.4	6.5	8.5	23.23	5.93
8.18	0.62	ND	ND	1,000	25.9	5.07	5	7.3	6.5	8.5	26.18	4.55
9.18	0.5	ND	ND	1,000	22.6	5.39	5	7.3	6.5	8.5	28.86	15.2
10.18	0.39	ND	21	1,000	23.6	5.08	5	7.5	6.5	8.5	28.04	20.8
11.18				1,000			5		6.5	8.5		
12.18				1,000			5		6.5	8.5		

SITE R-3

				Dissolved						
	Ortho		Water	Oxygen	DO		PH	PH		
	Phosphate	Nitrate as N	Temp	(DO)	mg/l		Lower	Upper	Salinity	Turbidity
Months	mg/l	mg/l	C°	mg/l	Limit	PH	Limit	Limit	ppt	NTU
1.18	0.16	ND	16.4	7.81	5	8	6.5	8.5	32.54	48.3
2.18	0.12	ND	17.2	5.87	5	7.8	6.5	8.5	26.84	6.54
3.18	0.16	ND	18.7	5.75	5	7.9	6.5	8.5	21.43	22
4.18	0.32	ND	23.3	7.42	5	7.6	6.5	8.5	8.73	18
5.18	0.14	ND	19.2	5.19	5	7.8	6.5	8.5	32.01	33.3
6.18	0.19	ND	18.9	4.22	5	7.7	6.5	8.5	31.15	6.24
7.18	0.25	ND	27.1	6.73	5	7.6	6.5	8.5	26.47	29.7
8.18	0.21	ND	25.7	4.9	5	7.7	6.5	8.5	27.59	25.7
9.18	0.3	ND	19.4	6.82	5	7.6	6.5	8.5	30.58	21.3
10.18	0.28	ND	18.2	6.71	5	7.6	6.5	8.5	31.42	29
11.18					5		6.5	8.5		
12.18					5		6.5	8.5		

SITE R-4

				Dissolved						
	Ortho		Water	Oxygen	DO		PH	PH		
	Phosphate	Nitrate as N	Temp	(DO)	mg/l		Lower	Upper	Salinity	Turbidity
Months	mg/l	mg/l	C°	mg/l	Limit	PH	Limit	Limit	ppt	NTU
1.18	0.16	ND	17.8	9.65	5	7.7	6.5	8.5	29.25	13.8
2.18	0.12	ND	18.4	7.96	5	8.2	6.5	8.5	31.27	9.88
3.18	0.16	ND	18.9	4.81	5	7.9	6.5	8.5	19.11	6.72
4.18	0.29	ND	22.6	6.23	5	7.9	6.5	8.5	8.67	15.7
5.18	0.14	ND	18.4	5.71	5	7.7	6.5	8.5	33.1	17.4
6.18	0.19	ND	19.5	3.41	5	7.9	6.5	8.5	30.28	9.22
7.18	0.63	ND	26.5	3.78	5	7.4	6.5	8.5	26.72	15.71
8.18	0.73	ND	25.9	4.22	5	7.3	6.5	8.5	26.13	16.2
9.18	0.54	ND	23.7	4.54	5	7.3	6.5	8.5	27.81	18
10.18	0.38	ND	18.8	5.58	5	7.6	6.5	8.5	31.56	20.3
11.18					5		6.5	8.5		
12.18					5		6.5	8.5		

				Dissolved						
	Ortho		Water	Oxygen	DO		PH	PH		
	Phosphate	Nitrate as N	Temp	(DO)	mg/l		Lower	Upper	Salinity	Turbidity
Months	mg/l	mg/l	C°	mg/l	Limit	PH	Limit	Limit	ppt	NTU
1.18	0.16	ND	15.9	8.54	5	7.2	6.5	8.5	30.56	5.84
2.18	0.12	ND	17.1	6.54	5	7.8	6.5	8.5	31.66	22.7
3.18	0.16	ND	19.9	4.22	5	7.9	6.5	8.5	20.55	5.45
4.18	0.24	ND	20.6	5.93	5	8.1	6.5	8.5	9.09	23
5.18	0.14	ND	19.8	5.06	5	7.7	6.5	8.5	30.2	10.4
6.18	0.19	ND	19.1	5.01	5	8	6.5	8.5	31.62	6.47
7.18	0.34	ND	23.7	3.27	5	7.2	6.5	8.5	28.19	13.73
8.18	0.24	ND	27.2	6.2	5	7.5	6.5	8.5	25.32	13.7
9.18	0.27	ND	22.1	6.69	5	7.6	6.5	8.5	28.56	20.2
10.18	0.25	ND	19	6.15	5	7.8	6.5	8.5	32.3	31
11.18					5		6.5	8.5		
12.18					5		6.5	8.5		

NUTRIENTS – Orthophosphate as P (ORP) was detected at every site in a range between 0.18 and 0.39 mg/l. The lowest site for ORP was at R-1 measuring 0.18 mg/l, while the highest site R-2 measured 0.39 mg/l. ORP concentrations decreased in four sites, in comparison to September. Nitrate as N was below the detection limit at all sites in October.

Phosphorus and nitrogen are essential nutrients for the plants and animals that make up the aquatic food web. Since phosphorus is the nutrient in short supply in most fresh waters, even a modest increase in phosphorus can, under the right conditions, set off a whole chain of undesirable events in a stream including accelerated plant growth, algae blooms, low dissolved oxygen, and the death of certain fish, invertebrates, and other aquatic animals.

There are many sources of phosphorus, both natural and human. These include soil and rocks, wastewater treatment plants, runoff from fertilized lawns and cropland, failing septic systems, runoff from animal manure storage areas, disturbed land areas, drained wetlands, water treatment, and commercial cleaning preparations.

Inorganic nitrate as N should be less than 0.3 mg/L to avoid algal blooms. Excessive concentrations of nitrate in lakes and streams greater than about 5 milligrams per liter (measured as nitrogen), depending on the water body, can cause excessive growth of algae and other plants, leading to accelerated eutrophication or "aging" of lakes, and occasional loss of dissolved oxygen. Animals and humans cannot use inorganic forms of nitrogen.

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Since phosphorus is often scarce in freshwater ecosystems, it is typically a limiting nutrient, meaning that it limits the amount of life the system can sustain. When humans add phosphate-rich sewage or agricultural runoff, algae growth may no longer be limited by the scarcity of phosphorus in its environment and may grow out of control. In order to control algae growth, the EPA recommends that phosphate levels not exceed 0.05 milligrams per liter for streams discharging into lakes or reservoirs, 0.1 milligrams per liter for lakes and reservoirs, and 0.1 milligrams per liter for other streams and rivers.

FECAL COLIFORM - The fecal coliform levels were measured at 6 MPN/100mL for site R-1 and 21 MPN/100mL for site R-2. Coliform levels decreased in R-1 and increased in R-2, in comparison to September. Fecal coliform levels did not exceed the established limits. Single sample results over 1,000 MPN/100mL are considered to exceed limits.

GENERAL WATER QUALITY ANALYSIS – The Dissolved Oxygen (DO) levels in October exceeded the 5.0 mg/l threshold in all 5 sites. DO was highest at Site R-1 (7.69 mg/l) and lowest at Site R-2 (5.08 mg/l). The water temperature decreased at all sites except R-2 in October, with temperatures ranging from 18.2 to 23.6 C. PH measurements were within the limit at every site, ranging from 7.5 to 7.9. Salinity measurements varied from approximately 28.04 ppt. to a maximum of 32.30 ppt. Turbidity was within limits and varied between 7.07 and 31 NTU. It was noted in the field data sheet that algae and aquatic plant life were present during the time of sampling in R-1 and R-2. It was also noted that the pumps were running at the time of sampling in sites R-4 and R-5.

Field Results

Redwood Shores Lagoon
Monthly Water Quality Monitoring Field Data

Date: 10/18/18 Name(s) of Field Personnel: CORY CATTANEO

Weather Conditions _____ Air Temperature: 55°

Wind Conditions: Light / Moderate / High Percent Cloud: 30%

Field Measurements

Sampling Station	Time	Maximum Depth (ft)	Sample Depth (ft)	Water Temp °C	Dis. Oxy. Mg/l	pH units	Salinity ppt	Turbidity NTU
R-1	11:42	6'	3'	22.3	7.69	7.9	28.04	7.07
R-2	11:25	6'	3'	23.6	5.08	7.5	28.04	20.8
R-3	10:29	3'	2'	18.2	6.71	7.6	31.42	29.0
R-4	10:06	6'	3'	18.8	5.58	7.6	31.56	20.3
R-5	9:40	6'	3'	19.0	6.15	7.8	32.30	31.0

Samples for the following test will be collected for laboratory analyses

- Nitrate-N
- Ortho-P04-P (preservative required, do not rinse bottle)
- Fecal Coliform Bacteria (R-1 and R-2 only)

Notes & Observations about floatables, oil & grease, films, scum water discoloration, algae, aquatic plant growth and presence of dead wildlife:

R-1- ALGAE, AQUATIC PLANT LIFE PRESENT AT SAMPLE SITE

R-2- ALGAE, AQUATIC PLANT LIFE PRESENT AT SAMPLE SITE

R-3- _____

R-4- PUMPS RUNNING AT TIME OF SAMPLE

R-5- PUMPS RUNNING AT TIME OF SAMPLE

Laboratory Results



Alpha Analytical Laboratories Inc.

e-mail: clientservices@alpha-labs.com

Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
 Bay Area: 262 Rickenbacker Circle, Livermore, CA 94551 • Phone: (925) 828-6226 • Fax: (925) 828-6309
 Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192
 North Bay: 110 Liberty Street, Petaluma, CA 94952 • Phone: (707) 769-3128 • Fax: (707) 769-8093

Redwood City, City of - Redwood Shores 1400 Broadway Street Redwood City, CA 94063	Project Manager: Cory Cattaneo Project: Redwood Shores Lagoon Project Number: Monthly Monitoring	Reported: 11/13/18 14:59
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Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
R-1 (18J2025-01)							
Sample Type: Water				Sampled: 10/18/18 11:42			
Conventional Chemistry Parameters: by APHA/EPA Method:							
Orthophosphate as P	0.18 mg/L	0.10	1	AK82979	11/09/18 09:45	11/09/18 13:33	SM4500-PE T-02
Anions: by EPA Method 300.0							
Nitrate as N	ND mg/L	5.0	25	AJ84002	10/20/18 02:34	10/20/18 02:34	EPA 300.0 R-01
Microbiological Parameters: by APHA Standard Method:							
Fecal Coliform:	6.0 MPN/100mL	1.8	1	AJ84079	10/18/18 16:00	10/21/18 16:45	SM9221
R-2 (18J2025-02)							
Sample Type: Water				Sampled: 10/18/18 11:25			
Conventional Chemistry Parameters: by APHA/EPA Method:							
Orthophosphate as P	0.39 mg/L	0.10	1	AK82979	11/09/18 09:45	11/09/18 13:33	SM4500-PE T-02
Anions: by EPA Method 300.0							
Nitrate as N	ND mg/L	5.0	25	AJ84002	10/20/18 03:07	10/20/18 03:07	EPA 300.0 R-01
Microbiological Parameters: by APHA Standard Method:							
Fecal Coliform:	21 MPN/100mL	1.8	1	AJ84079	10/18/18 16:00	10/21/18 16:45	SM9221
R-3 (18J2025-03)							
Sample Type: Water				Sampled: 10/18/18 10:29			
Conventional Chemistry Parameters: by APHA/EPA Method:							
Orthophosphate as P	0.28 mg/L	0.10	1	AK82979	11/09/18 09:45	11/09/18 13:33	SM4500-PE T-02

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Alpha Analytical Laboratories Inc.

e-mail: clientservices@alpha-labs.com

Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
 Bay Area: 262 Rickenbacker Circle, Livermore, CA 94551 • Phone: (925) 828-6226 • Fax: (925) 828-6309
 Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192
 North Bay: 110 Liberty Street, Petaluma, CA 94952 • Phone: (707) 769-3128 • Fax: (707) 769-8093

Redwood City, City of - Redwood Shores 1400 Broadway Street Redwood City, CA 94063	Project Manager: Cory Cattaneo Project: Redwood Shores Lagoon Project Number: Monthly Monitoring	Reported: 11/13/18 14:59
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	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
R-3 (18J2025-03)		Sample Type: Water			Sampled: 10/18/18 10:29			
Anions: by EPA Method 300.0								
Nitrate as N	ND mg/L	5.0	25	AJ84002	10/20/18 03:40	10/20/18 03:40	EPA 300.0	R-01
R-4 (18J2025-04)		Sample Type: Water			Sampled: 10/18/18 10:06			
Conventional Chemistry Parameters: by APHA/EPA Methods:								
Orthophosphate as P	0.38 mg/L	0.10	1	AK82979	11/09/18 09:45	11/09/18 13:33	SM4500-PE	T-02
Anions: by EPA Method 300.0								
Nitrate as N	ND mg/L	5.0	25	AJ84002	10/20/18 04:13	10/20/18 04:13	EPA 300.0	R-01
R-5 (18J2025-05)		Sample Type: Water			Sampled: 10/18/18 09:40			
Conventional Chemistry Parameters: by APHA/EPA Methods:								
Orthophosphate as P	0.25 mg/L	0.10	1	AK82979	11/09/18 09:45	11/09/18 13:33	SM4500-PE	T-02
Anions: by EPA Method 300.0								
Nitrate as N	ND mg/L	5.0	25	AJ84002	10/20/18 04:46	10/20/18 04:46	EPA 300.0	R-01

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END OF REPORT