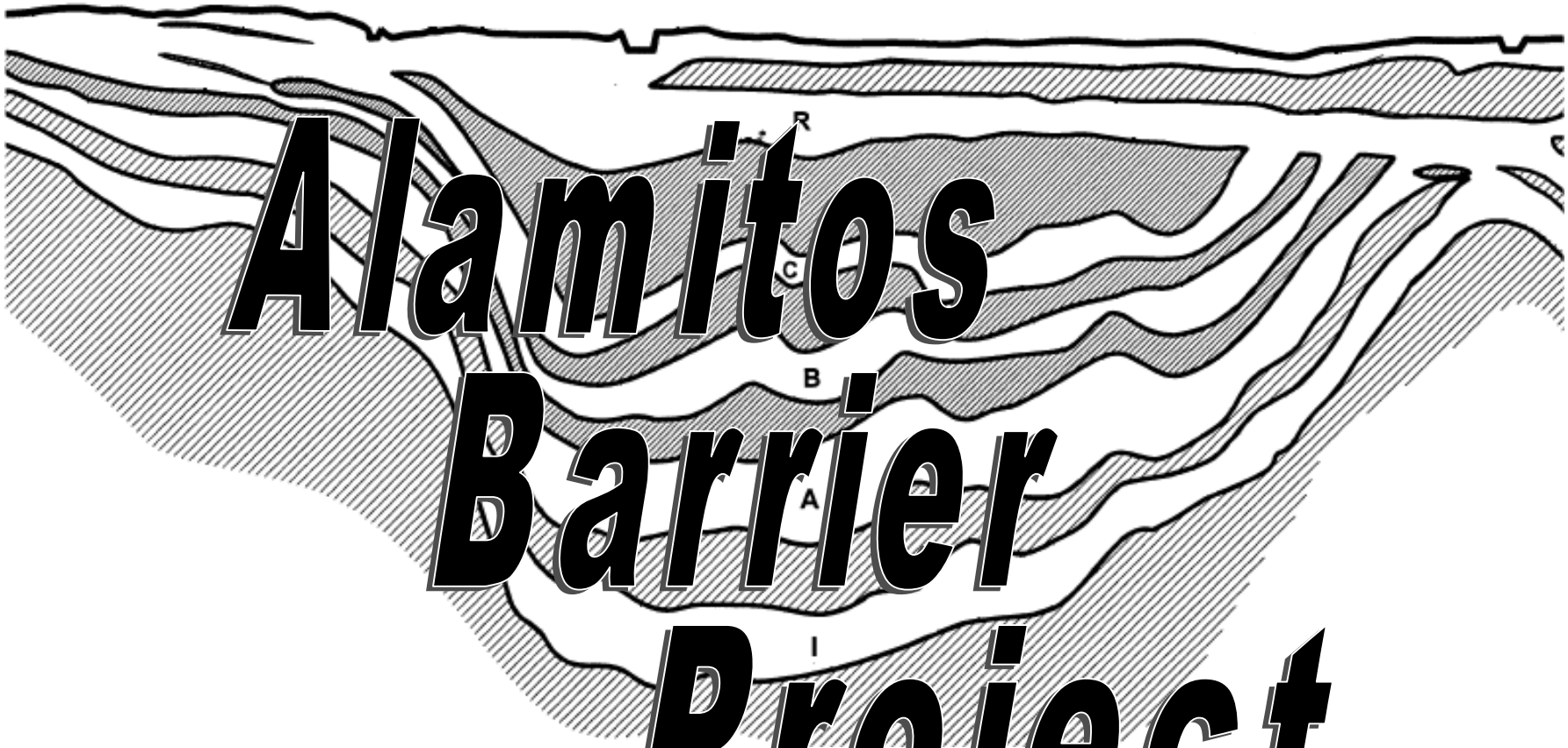

Alamitos Barrier Project

Alamitos Barrier Project

Annual report on the control of seawater intrusion

2020 - 2021

Member Agencies:

Orange County Water District

Water Replenishment District of Southern California

Long Beach Water Department

Golden State Water Company

Los Angeles County Flood Control District

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INTRODUCTION

The Alamitos Barrier Project (ABP) was designed and constructed to protect the groundwater supplies of the Central/Orange County Basin of the Coastal Plain from the intrusion of seawater through the Alamitos Gap area. The project facilities are located near the Los Angeles-Orange County border about two miles inland from the terminus of the San Gabriel River. The original facilities included injection wells to form a freshwater pressure ridge and extraction wells to form a saltwater trough. The freshwater pressure ridge has proven to be historically effective, whereas the saltwater trough has not. As a result, the extraction wells are currently not in operation. A map showing the supply pipeline, injection wells, extraction wells, and observation wells is shown on page A-12.1.

Los Angeles County Public Works (Public Works) operates and maintains the ABP and its associated facilities under the direction and approval of the Joint Management Committee (JMC), acting on behalf of the Los Angeles County Flood Control District (LACFCD) and the Orange County Water District (OCWD).

This report summarizes design and construction issues, operation and maintenance activities, hydrogeologic effects, chloride concentrations, and project costs for Fiscal Year (FY) 2020-21 (i.e., July 1, 2020, through June 30, 2021).

SUMMARY

During FY 2020-21, a total of 6,500.9 acre-feet (AF) of water was injected into the ABP (an average rate of 9.0 cubic feet per second (cfs)). Of that total, OCWD purchased 2,591.8 AF (39.9 percent) and the Water Replenishment District of Southern California (WRD) purchased 3,909.1 AF (60.1 percent). This total injected amount was 964.0 AF more than FY 2019-20 and was 940.0 AF higher than the average injection of 5,561.0 AF for the previous five fiscal years. The ABP also experienced two full shutdowns, which occurred from February 1 – 3, 2021 and April 1 – 12, 2021. These shutdowns are detailed in the Injection Operation section of this report and Appendix A-18, which also includes details of individual well shutdowns that occurred in FY 2020-21.

The total costs associated with the ABP in FY 2020-21 are summarized below:

- Total Cost in FY 2020-21: $11,412,825
  - Injection Water costs: $7,926,158 (OCWD: $3,156,935; WRD: $4,769,223)
  - Total Operations and Maintenance Costs (not including liability insurance): $3,419,917
    - Injection-related costs: $3,418,785 (OCWD: $1,075,909; LACFCD: $2,342,876)
      - Equivalent cost per AF of water injected: $407.49
    - Extraction-related costs: $1,132 (LACFCD only)
  - Liability Insurance cost: $66,750 (OCWD: $33,375; LACFCD $33,375)

During this reporting period, the ABP generally had groundwater elevations near or above protective elevations throughout all aquifer zones, except some portions of the A and I Zones. Compared to the last reporting period, groundwater elevations west and east of the San Gabriel River generally increased slightly.

West of the San Gabriel River, chloride concentrations had a slight increase across all Zones, except for the R Zone. East of the San Gabriel River, chloride concentrations increased slightly, with the exception of the R and B Zones, which had a minimal

decrease. Detailed analyses of the reporting period's groundwater elevations and chloride concentrations are provided in the "Hydrogeologic Effects" and "Chlorides" sections of the report.

It is imperative that the ABP operate consistently and continuously to best prevent seawater intrusion. The JMC will continue to ensure that the ABP is operated and maintained efficiently, economically, and continuously protects the region's groundwater supplies.

PROJECTS AND STUDIES

Capital improvement projects and studies over this reporting period are briefly summarized below. The general location of each project is identified on the map in Appendix A-12.2 and further project details are included in Appendix A-17.

ABP Unit 15 Injection and Observation Wells

LACFCD was awarded grant funding up to $4,191,693 from the State Water Resources Control Board, Proposition 1 Groundwater Grant to construct five new injection wells and two new observation wells to replace and supplement existing ABP facilities. The total estimated cost of the project is $8,383,386. Project construction is estimated to begin in May 2022 with a project completion of December 2022. LACPW and LADWP will be entering into a 5-year License Agreement for the new wells that are purposed to be constructed on the Haynes Generating Station owned by LADWP. LACPW and LADWP will continue working towards a 30-year license agreement to encompass all ABP facilities located within the Haynes Generating Station.

The ABP Unit 15 Project will accomplish the following:

- Destroy injection well 33W and construct two replacement injection wells, 33W2(C,B) and 33W2(A,I) to provide additional operational flexibility.
- Destroy injection well 34F(A) and construct replacement injection well 34F2(A).
- Destroy injection wells 34H(A) and 34H(I) and construct two replacement wells 34H2(A) and 34H2(I).
- Construct new internodal observation wells 34FG and 34G2H2

Seawater Barriers Condition Assessment

This project involves the assessment of all three of LACFCD's Seawater Barriers (Alamitos Barrier Project, Dominguez Gap Project, and West Coast Basin Barrier Project). The project is managed by LACFCD and it is funded by LACFCD and OCWD. This project involves the evaluation of 5,764 feet of the ABP supply pipeline, appurtenances, and 11 injection wells. The scope of work was developed during FY 2019-20. The Consultant was selected from a list of LACPW As-Needed Engineering Consultants in

February 2021 and a Notice to Proceed was issued in March 2021 to CH2M Hill (now Jacobs Engineering Group). Field work was started in May 2021 and is expected to be completed in December 2021. The final report is anticipated to be finalized and distributed during the first half of FY 2022-23.

INJECTION OPERATIONS

The total amount of water injected into the ABP during FY 2020-21 was 6,500.9 AF. Of this total, approximately 42.0 percent (3,773.2 AF) was recycled water and 58.0 percent (2,727.7 AF) was imported water. The maximum monthly injection during this reporting period was 624.5 AF (44.0 percent imported, and 56.0 percent recycled) which occurred in December 2020. The minimum monthly injection of 274.5 AF (44.2 percent imported, and 55.8 percent recycled) occurred in April 2021, and is directly related to a shut down that occurred in this month. The ABP had two full shutdowns during the months of February and April. The shutdown in February was necessary so that the Metropolitan Water District (MWD) could inspect and exercise their LB-07A valve connection. The shutdown in April was related to MWD's need to inspect a portion of their concrete South Coast Feeder supply line, which delivers imported water to the ABP.

The percentage of recycled water injection FY2020-21 significantly increased from the previous year because of increased recycled water production at the Leo J. Vander Lans Advanced Water Treatment Facility (LVL AWTF). Since completion of the plant expansion in 2014, the LVL AWTF has operated intermittently between 3 and 5 million gallons per day (MGD). Further details regarding LVL AWTF operations can be found in the *Recycled Water Operations* section of this report.

The injection volumes and costs for FY 2019-20 and FY 2020-21 are shown in Table 1. The representative unit costs included in Table 1 for imported and reclaimed water were calculated by WRD. Table 1 shows that the volume of water injected into the ABP during FY 2020-21 increased by 17.4 percent from the previous year. The increase in flow is most likely a result of lower groundwater and increased pumping due to the region receiving well below average rainfall.

All ABP injection well shutdowns that occurred during FY 2020-21 are summarized in Appendix A-18. There were two full shutdowns during this reporting period (as mentioned above), and there was a partial shutdown that occurred during the month of March. This partial shutdown was related to the redevelopment of injection well 34S, which is a nested three casing well for the C/B, A, and I Zones. The wellheads sit about 6 to 7 feet below grade and due to the artesian conditions, 19 adjacent injection wells had to be taken off-line to lower groundwater levels so these well casings could be redeveloped.

TABLE 1. INJECTION OPERATIONS

	Imported Water Injections			Recycled Water Injections			Total Injections		
	FY19-20	FY20-21	Percent Change From Previous Year	FY19-20	FY20-21	Percent Change From Previous Year	FY19-20	FY20-21	Percent Change From Previous Year
	VOLUME OF WATER INJECTED IN ACRE-FEET								
OCWD[1]	1,763.8	1,093.3	-38.0	335.7	1,498.5	346.4	2,099.5	2,591.8	23.4
WRD[2]	2,916.6	1,634.4	-44.0	520.8	2,274.7	336.8	3,437.4	3,909.1	13.7
TOTAL	4,680.4	2,727.7	-41.7	856.5	3,773.2	340.5	5,536.9	6,500.9	17.4
	UNIT COST OF WATER PER ACRE-FOOT[3]								
JULY - DEC	$1,184.01	$1,203.79	1.7	$1,184.01	$1,203.79	1.7			
JAN - JUN	$1,213.15	$1,237.25	2.0	$1,213.15	$1,237.25	2.0			
	COST OF WATER PURCHASED								
OCWD[1]	$2,108,307	$1,331,609	-36.8	$407,255	$1,825,326	348.2	$2,515,561	$3,156,935	25.5
WRD[2]	$3,484,831	$1,993,548	-42.8	$631,809	$2,775,675	339.3	$4,116,639	$4,769,223	15.9
TOTAL	$5,593,138	$3,325,157	-40.5	$1,039,063	$4,601,001	342.8	$6,632,200	$7,926,158	19.5
	AVERAGE INJECTION RATE IN CFS								
OCWD[1]	2.44	1.51	-38.0	0.46	2.07	346.4	2.90	3.58	23.4
WRD[2]	4.03	2.26	-44.0	0.72	3.14	336.8	4.75	5.40	13.7
TOTAL	6.47	3.77	-41.7	1.18	5.21	340.5	7.65	8.98	17.4

[1] Orange County Water District (OCWD)

[2] Water Replenishment District of Southern California (WRD)

[3] The Unit Cost of ***Imported Water*** Per Acre-Foot is the sum of the Metropolitan Water District's wholesale rate at LB-07A (managed by Long Beach Water Department) , the $5 Administrative Surcharge, Readiness-To-Serve (RTS) costs, and Capacity costs (using total volume plus penalties). This amount is greater than what is shown on monthly invoices because Capacity costs are not typically known or accounted for at the time of those invoices. Based on the agreement between the OCWD and the WRD, the representative Unit Cost of ***Recycled Water*** Per Acre-Foot is equal to that of the imported water and is shown in the calculations by the WRD.

FIGURE 1 - MONTHLY AMOUNT OF WATER INJECTED

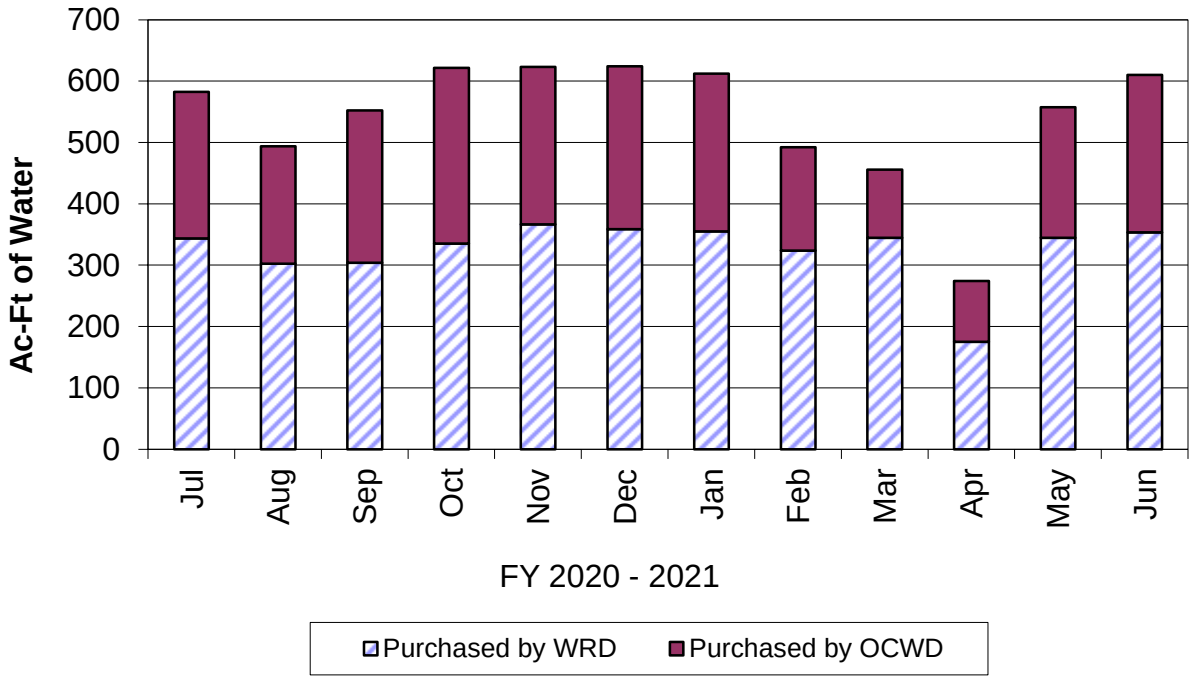
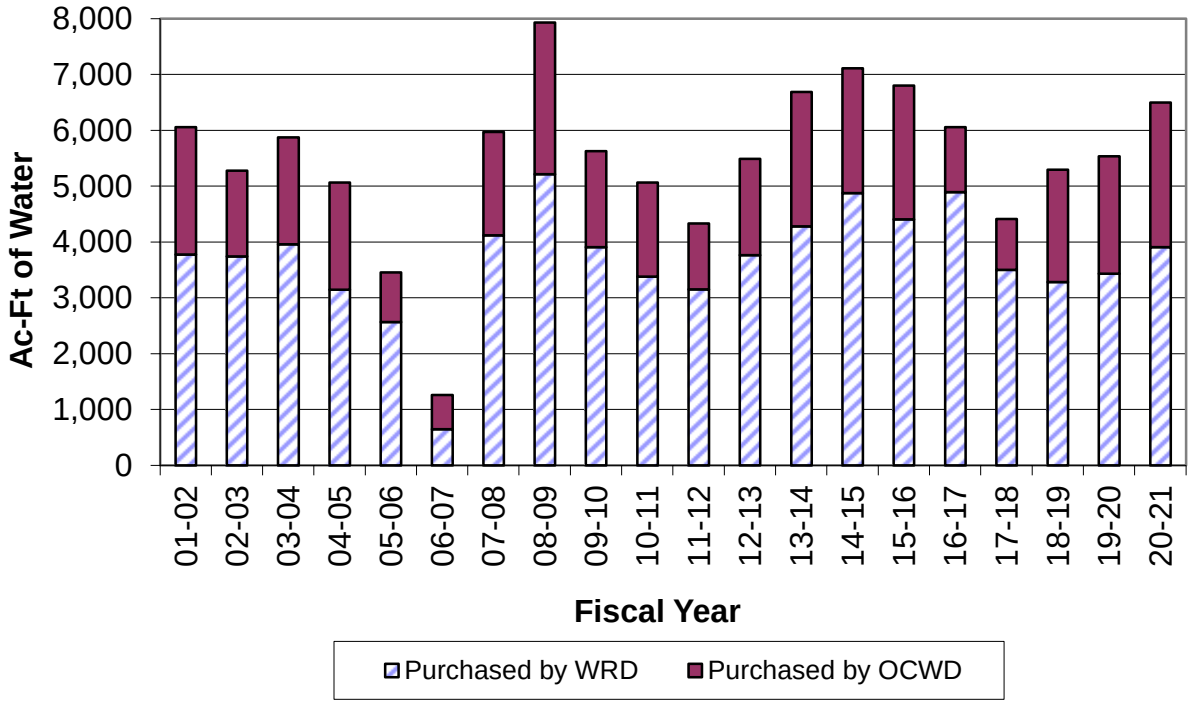


FIGURE 2 - ANNUAL AMOUNT OF WATER INJECTED



RECYCLED WATER OPERATIONS

The Leo J. Vander Lans Advanced Water Treatment Facility (LVL AWTF) was constructed in 2005 to provide up to 3 million gallons per day (MGD) of advanced treated recycled water to inject at the ABP. The LVL AWTF treatment train consists of Micro-Filtration (MF), Reverse Osmosis (RO), and Ultra-Violet light (UV) disinfection. An expansion project completed in 2015 increased the plant capacity to 8 MGD by adding a recovery MF system and a third stage RO system. The Long Beach Water Reclamation Plant (LBWRP) owned by the Los Angeles County Sanitation Districts (LACSAN) provides recycled water to Long Beach Water Department (LBWD), who in turn provides recycled water to the LVL for advanced treatment.

The LVL AWTF was authorized to deliver up to 3 MGD for injection at the ABP under Regional Water Quality Control Board (RWQCB) Order No. R4-2005-0061 with the condition that the 10-year running average of recycled water contribution does not exceed 50 percent. In conjunction with completion of the plant expansion project, the LVL AWTF was authorized under RWQCB Order No. R4-2014-0111 to inject up to 8 MGD of advanced treated recycled water with no limitation on the percent recycled water contribution running average.

For FY 2020-21, the LVL AWTF conducted a series of tests to confirm the facility's ability to supply an increased amount of recycled water for delivery to the ABP. Flows were incrementally increased over a four-month testing period that occurred between October 2020 to January 2021. The tests were initially conducted as "day-tests" to coincide with normal daytime "working hours" as requested by LACPW. The successful completion of the "day-tests" allowed the testing to continue overnight to get a better understanding of long-term production at the LVL AWTF. The testing also considered the potential for hydraulic oscillation issues at the pressure reducing valve controlling imported water flow that had been previously observed when flow through the valve decreased to near zero and as such the testing was limited to a maximum flow rate of 6.0 MGD. The testing confirmed higher flow rates could be achieved at the LVL AWTF.

During the reporting period, the LVL AWTF provided a total of 3,773.2 AF of advanced treated recycled water to the ABP at rates between 3.0 MGD to 6.0 MGD. During the months of September 2020, October 2020, and May 2021, the LVL AWTF produced an amount of advanced treated recycled water equivalent to 100 percent of the total water injected into Los Angeles County's portion of the barrier. For the remaining months in the reporting period, on average the LVL AWTF produced an amount of advanced treated recycled water equivalent to 90 percent of the total water injected into Los Angeles County's portion of the barrier. In addition, the volume of advanced treated recycled water delivered during FY2020-21 was 340% higher than FY2019-20. The increase in advanced treated recycled water was a result of limited source water due to LACSAN's planned maintenance at the LBWRP in FY2019-20 and WRD's overall increased operational reliability at LVL AWTF.

WRD has made significant improvements over the past few years at the LVL AWTF. However, thirty-seven (37) plant shutdowns occurred during the reporting period where most of the shutdowns were of short duration. Status update meetings are being held weekly to discuss facility operations and provide an opportunity for increased coordination/communication between WRD, LACPW, and key operational staff at LVL AWTF.

MAINTENANCE

Typical well maintenance at the ABP includes injection well redevelopments and observation well cleanouts. The purpose of injection well redevelopments is to remove accumulated sediments from the bottom of the well casing, remove sediment from the perforations and remove any microbiological build-up within the well casings to restore each well's ability to operate at its maximum injection capacity. Each of the 60 injection well casings are routinely redeveloped once every two years. During FY 2020-21, LACPW completed redevelopment activities at the following 18 well casings: 33N (A,I), 33Q (A,I), 33Q1 (C,B), 33W (C,B,A,I), 33X (C,B,A,I), 33Y (C,B,A,I), 33Z (C,B,A,I), 33Z2 (A), 33Z2 (I), 34D (C,B,A,I), 34G2 (C,B), 34G2 (A,I), 34J (A), 34J (I), 34S (C/B), 34S (A), 34S (I), and 35H2 (A,I).

Observation well cleanouts are performed on an as-needed basis to clean out accumulated sediments and microbiological build-up within the well casings. LACPW staff performing observation well cleanouts typically rotate between the Alamitos Barrier Project, Dominguez Gap Barrier Project, and West Coast Basin Barrier Project. During FY 2020-21, LACPW completed cleanout activities at the following 15 well casings: 33L 23 (A), 33S 20 (I), 33S 43 (A), 33T 12.5 (I), 33WX (A), 33WX (I), 33X 10 (I), 33XY (B), 33YZ (B), 33YZ (A), 33YZ (I), 34F10 (C), 34F 10 (B), 34L' 1 (R).

Figure 3 depicts the operating status of each injection and extraction well during FY 2020-21 and demonstrates that the ABP was in operation throughout the entire reporting period, except when the ABP was shut down in the months of February and April 2021. ABP shutdowns are summarized in Appendix A-18.

West of the San Gabriel River, injection well 33W suffered from surface leakage intermittently after being struck by an automobile in 2003 and a subsequent sink hole later developed in 2007. LACPW staff installed a packer in June 2016, just above the perforations to isolate the injection zone, and the well operated at normal injection rates and pressures until November 2017, when the well started to exhibit surface leakage

again. Injection Well 33W has operated at a minimal flowrate, between 0.10 cfs and 0.15 cfs since that time. This well is slated to be replaced during the upcoming ABP Unit 15 Well Replacement Project. Injection well 33S1, also located west of the San Gabriel River, continues to operate at a limited flow due to potential surface leakage.

East of the San Gabriel River, excessive fill was observed during redevelopment of injection well 34H(I) in May 2014. Video inspection revealed a hole near the top of the perforations at 403 feet bgs. Since this well has a 6-inch casing, a sleeve cannot be installed to cover the hole. The well was put back into service at a lower injection rate due to the hole. It should be noted that injection well 34H(A) has been offline since Spring 2015 because it also has a hole that is not repairable, and the casing is filled with sediment and cannot take water. Well casings 34H(A) and 34H(I) are slated to be replaced during the upcoming ABP Unit 15 Well Replacement Project.

Injection well 34G (A) has been turned off since 2019 due to reoccurring surface leakage. The area around the well was grouted in 2000 and 2004 to prevent surface leakage, which seemed to resolve the issue until 2016. In July 2016, a packer was installed due to reoccurring surface leakage. The goal of the packer was to direct the water below the poor casing welds, which was suspected of how the water was reaching the surface.

During the redevelopment of injection well 34J, LACPW staff noted that gravel was observed in the discharge water. This indicated that there may be a hole in the 12-inch stainless-steel casing. A video survey conducted by Layne Christensen, revealed that a broken louver was allowing gravel to enter the casing. The broken louver may be the result of years of redevelopment from the swab that is used to service well, as this well was commissioned in 1964. This well was repaired with a 3-foot stainless-steel sleeve to cover the hole made by the broken louver and LACPW called upon OCWD to video survey injection well 34J to inspect the condition of the 3-foot sleeve. The video survey showed that this sleeve was successfully placed, and this well has since been back in operation since early January 2021.

In order to redevelop injection well 34S, LACPW staff turned off 19 nearby injection wells (partial shutdown) in an effort to reduce ground water levels that are artesian in nature. To prevent further partial shutdowns of this sort, LACPW is investigating a wellhead modification project that aims to modify these wells into a “self-juttering” well to allow these wells to undergo airlift redevelopment. Project benefits include cost and time savings related to maintaining an effective seawater barrier by eliminating the need for partial shutdowns, wellhead disassembly, and airlift redevelopment as opposed to traditional redevelopment.

FIGURE 3 - Injection and Extraction Well Operating Status

- ( ) - Well in Operation
- X - Barrier Shutdown
- VS - Video Survey
- R - Redevelopment
- D - Disassembled
- W - Water Quality Sampling (wells turned down or off)
- C - Casing Repair
- L - Surface Leakage (operating at a reduced rate)
- N - Not Needed
- O - Other Circumstances

	Well No.	2020 JUL	AUG	SEP	OCT	NOV	DEC	2021 JAN	FEB	MAR	APR	MAY	JUN
1	33G (A,I)								X		X X		
2	33J (A,I)								X		X X		
3	33L (A,I)								X		X X		
4	33N (A,I)								X		X X		D R R
5	33Q (A,I)	R D							X		X X		
6	33Q1 (C,B)	D R D							X		X X		
7	33S (A,I)								X		X X		
8	33S1 (C,B)	L L L L L	L L L L L	L L L L L	L L L L L	L L L L L	L L L L L	L L L L L	X L L L	L L L L L	X X L L L	L L L L L	L L L L L
9	33T (A,I)								X		X X		
10	33U (A,I)								X		X X		
11	33U3 (C,B)								X		X X		
12	33V (A,I)								X		X X		
13	33W (C,B,A,I)	L L L L L	L L L L L	L L L L L	L L L L L	L L L L L	L L L L L	L L L L L	X L L L	L L L L L	X D R R R	R D L L L	L L L L L
14	33X (C,B,A,I)			D R R R R D					X		X X		
15	33Y (C,B,A,I)		D R R R R D						X		X X		
16	33Z (C,B,A,I)	D R R D							X		X X		
17	33Z2 (A)			D R R D D					X		X X		
18	33Z2 (I)			D R R D D					X		X X		
19	34D (C,B,A,I)								X		X X	D R R R R D	
20	34E (C,B)								X		X X		
21	34E (I)								X		X X		
22	34F (A)							VS	X		X X		
23	34F (I)								X		X X		
24	34G (A)	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	X O O O	O O O O O	X X O O O	O O O O O	O O O O O
25	34G2 (C,B)								D R R D	O O O O	X X		
26	34G2 (I)								D R R D		X X		
27	34H (A)	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O VS O O	X O O O	O O O O O	X X O O O	O O O O O	O O O O O
28	34H (I)							VS	X		X X		
29	34J (A)					D R R R R C D D			X	O O O O	X X		
30	34J (I)					D R R R R C D D		O	X		X X		
31	34J2 (C/B)								X	O O W O	X X		
32	34K (C/B)								X	O O O W O	X X		
33	34L (C,B,A,I)								X	O O O W O	X X		
34	34N (C/B)								X	O O O O W O	X X		
35	34N (A)								X	O O O O W O	X X		
36	34N (I)							O	X	O O O O W O	X X		
37	34Q (C/B)								X	O O O O W O	X X		
38	34Q (A)								X	O O O O W O	X X		
39	34Q (I)							O	X	O O O O W O	X X		
40	34S (A)								X	D R R R R D	X X		
41	34S (I)							O	X	D R R R R D	X X		
42	34S (C,B)								X	D R R R R D	X X		
43	34T (C/B)								X	O O O O W O	X X		
44	34T (A)								X	O O O O W O	X X		
45	34T (I)								X	O O O O W O	X X		
46	34V (A)								X	O O O W O	X X		
47	34V (I)								X	O O O W O	X X		
48	34V (C,B)								X	O O O W O	X X		
49	34X (B)								X	O O W O	X X		
50	34X (A)								X	O O W O	X X		
51	34X (I)								X		X X		
52	34Z2 (A)								X		X X		
53	34Z2 (I)								X		X X		
54	34Z (I)								X		X X		
55	35E (I)								X		X X		
56	35F (I)								X		X X		
57	35G (A,I)	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	X O O O	O O O O O	X X O O O	O O O O O	O O O O O
58	35H1 (A)								X		X X		
59	35H1 (I)								X		X X		
60	35H2 (A)								X	D R	R D		
61	33V'15P*	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N	N N N N N	N N N N N	N N N N N	N N N N N
62	34H'17P*	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N	N N N N N	N N N N N	N N N N N	N N N N N
63	34H'18P*	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N	N N N N N	N N N N N	N N N N N	N N N N N
64	34S'22P*	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N N	N N N N	N N N N N	N N N N N	N N N N N	N N N N N

*Extraction Well

HYDROGEOLOGIC EFFECTS

Figures 4 through 8 (pp. 16-20) show the average monthly groundwater elevation relative to the average groundwater elevation of the 10 preceding years (FY 2010-11 to FY 2020-21) in the vicinity of the ABP alignment in the R, C, B, A, and I Zones, respectively. Two graphs were created for each aquifer to account for changes in groundwater elevation trends along two portions of the ABP alignment: wells west of the San Gabriel River and wells east of the San Gabriel River. It is important to note that the 10-year average does not represent a groundwater elevation goal, nor does it specifically reflect the performance of the ABP, but is simply included for comparison purposes. The graph includes all available semi-monthly, monthly, semi-annual, and annual data for wells within the ABP alignment and landward for approximately 2,000 feet from the ABP. As a result, semi-monthly values are "weighted" more heavily than the annuals in the calculation of the monthly average. Also, the months of September and March 2021, consistently have lower values than preceding and succeeding months due to the fact that semi-annual and annual water levels are measured during these months, and these wells are located further from the ABP and thus have lower groundwater elevations.

As shown in the graphs, groundwater elevations along the entire ABP were generally above historical averages, except in months of February and April 2021. Lower groundwater levels during these months were the direct result of the two full shutdowns, as mentioned above. Groundwater elevations west of the San Gabriel River were generally above the 10-year historical average for the first half of the fiscal year, (i.e., July – December). For the latter half of FY2020-21, groundwater levels were generally below the 10-year historical average. Groundwater elevations east of the San Gabriel River followed a similar trend and were generally above the 10-year historical average for the first half of the fiscal year (i.e., July - December), but generally below the 10-year historical average for the latter half of FY 2020-21.

FIGURE 4a RECENT ZONE WEST OF THE SAN GABRIEL RIVER

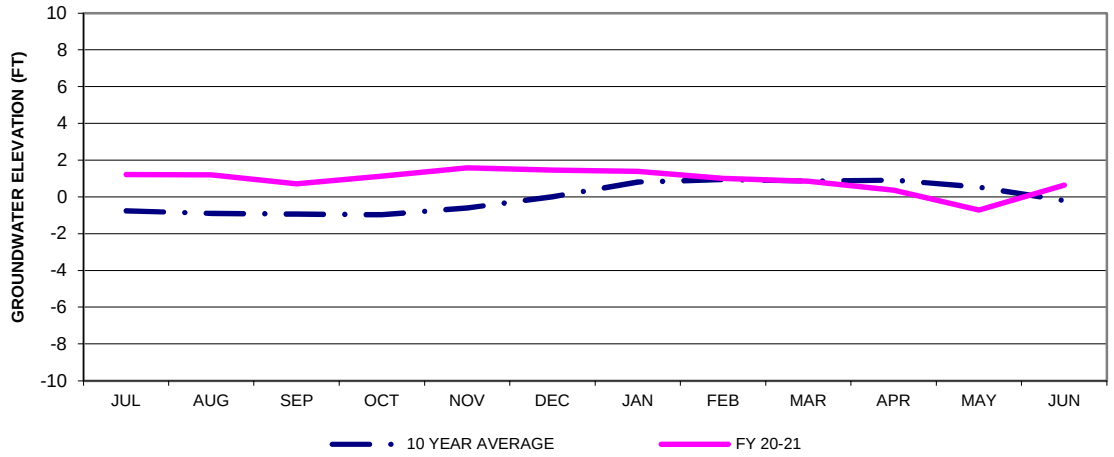
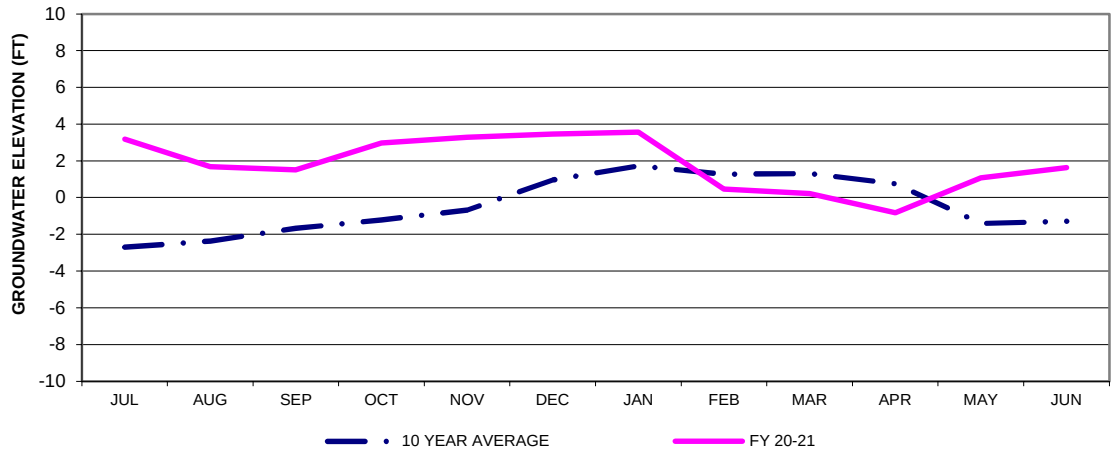


FIGURE 4b RECENT ZONE EAST OF THE SAN GABRIEL RIVER



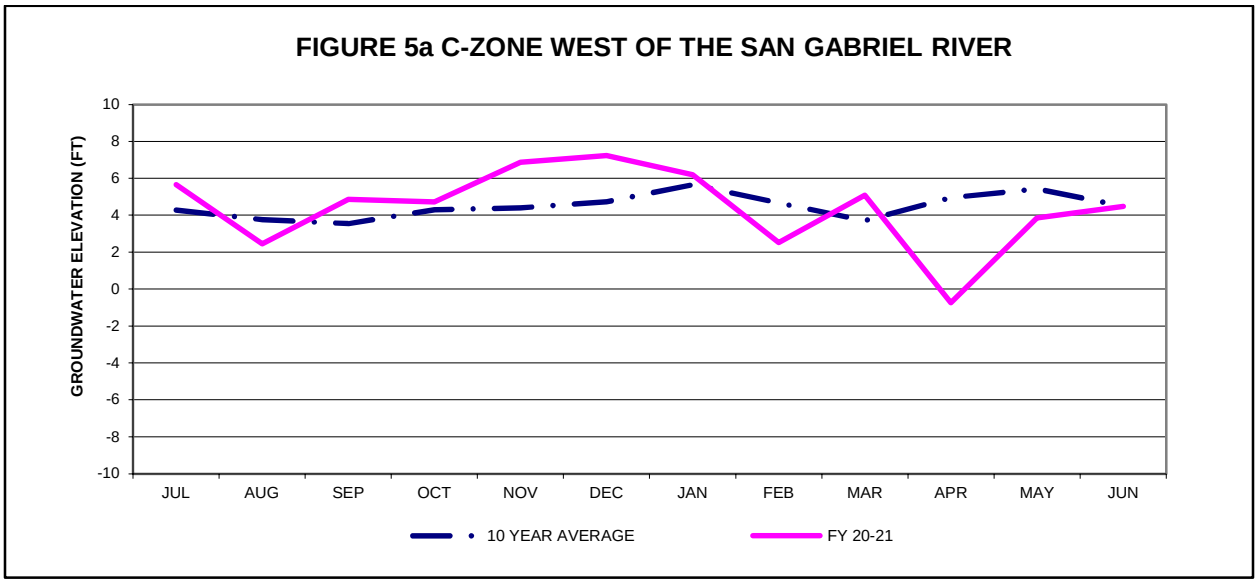


FIGURE 5a C-ZONE WEST OF THE SAN GABRIEL RIVER
GROUNDWATER ELEVATION (FT)
10
8
6
4
2
0
-2
-4
-6
-8
-10
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
10 YEAR AVERAGE
FY 20-21

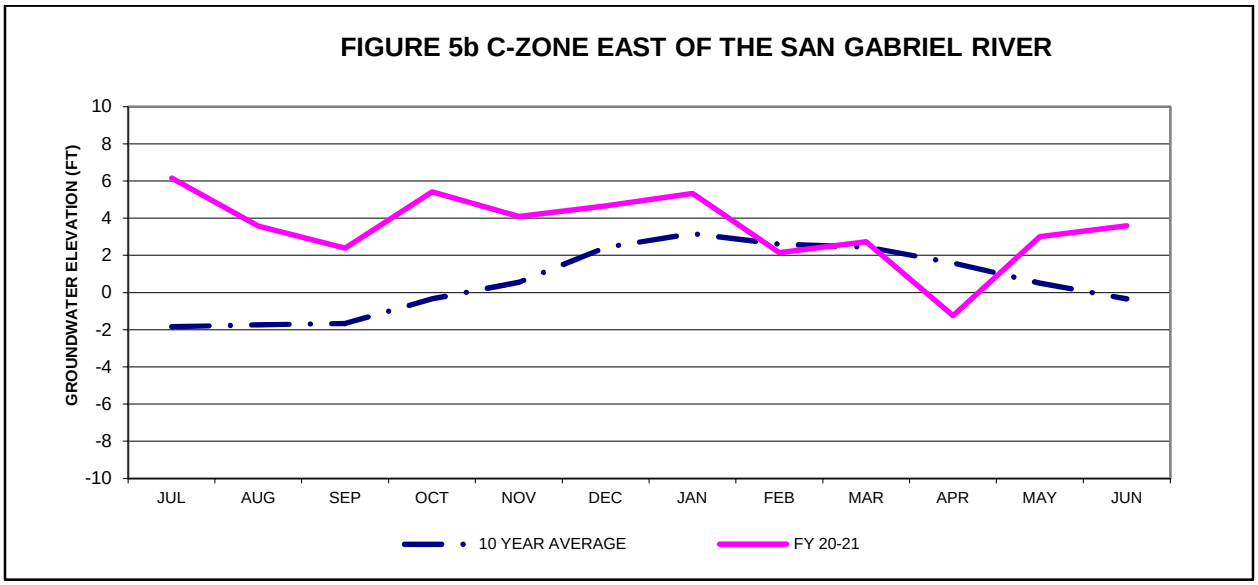


FIGURE 5b C-ZONE EAST OF THE SAN GABRIEL RIVER
GROUNDWATER ELEVATION (FT)
10
8
6
4
2
0
-2
-4
-6
-8
-10
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
10 YEAR AVERAGE
FY 20-21

FIGURE 6a B-ZONE WEST OF THE SAN GABRIEL RIVER

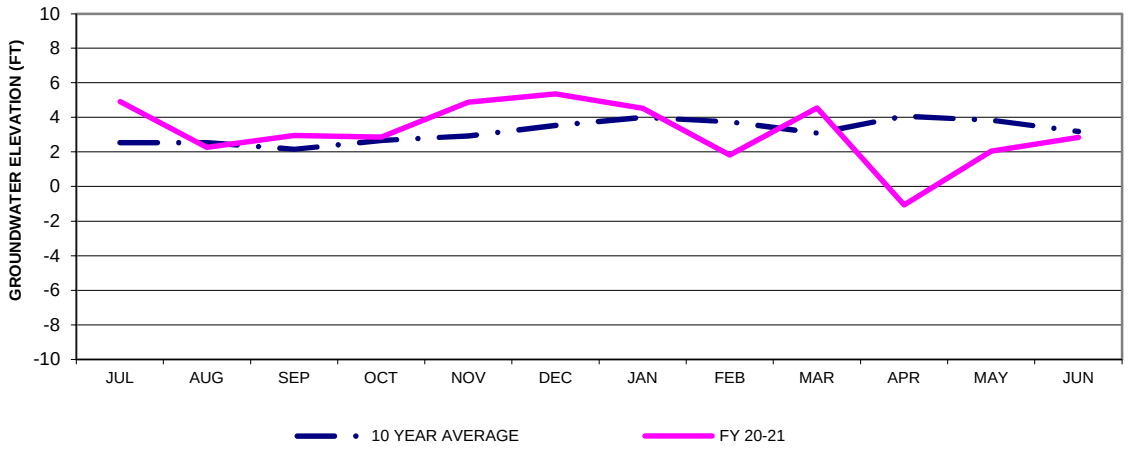


FIGURE 6b B-ZONE EAST OF THE SAN GABRIEL RIVER

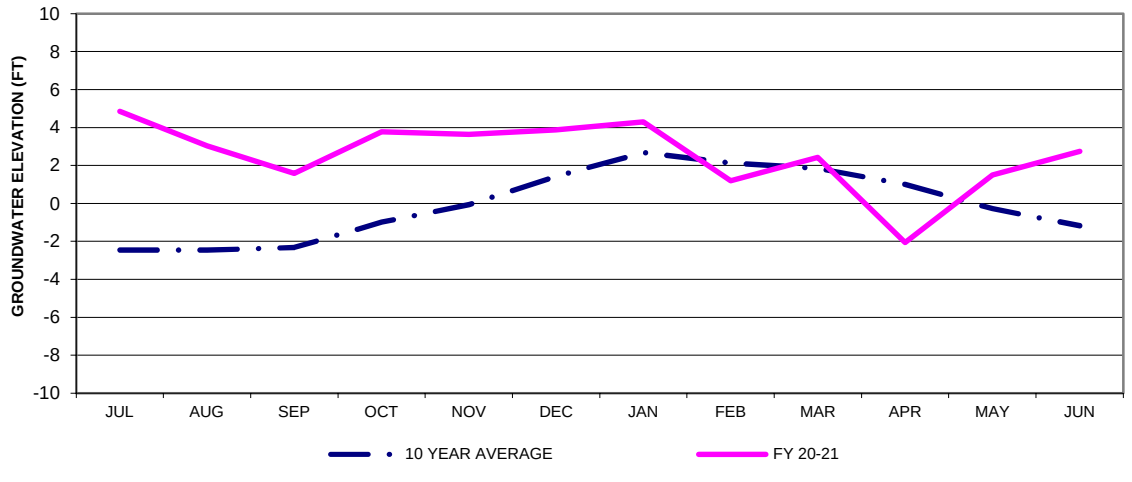


FIGURE 7a A-ZONE WEST OF THE SAN GABRIEL RIVER

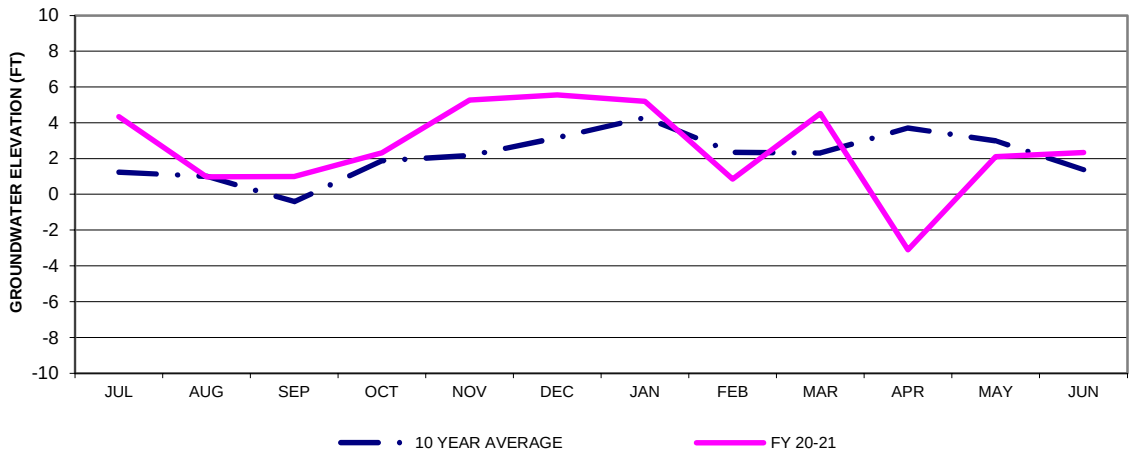
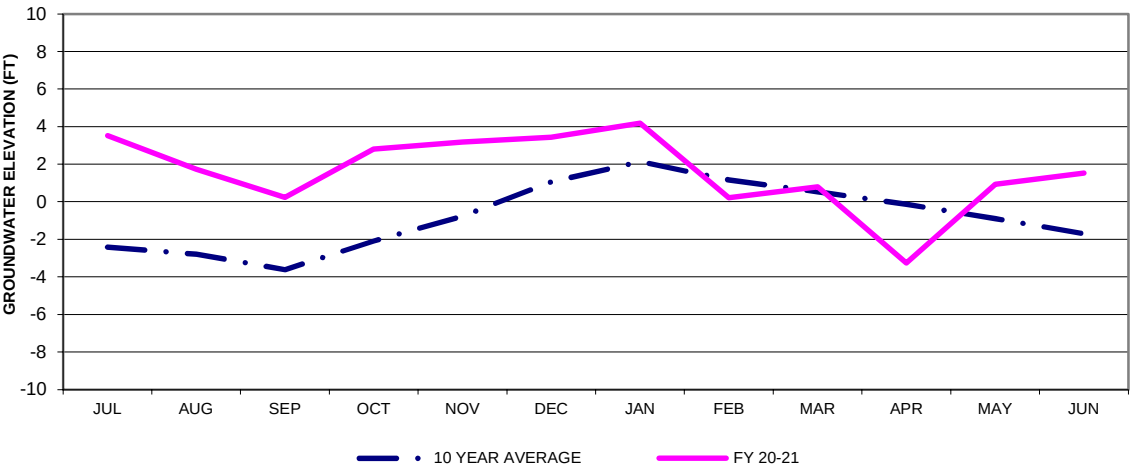


FIGURE 7b A-ZONE EAST OF THE SAN GABRIEL RIVER



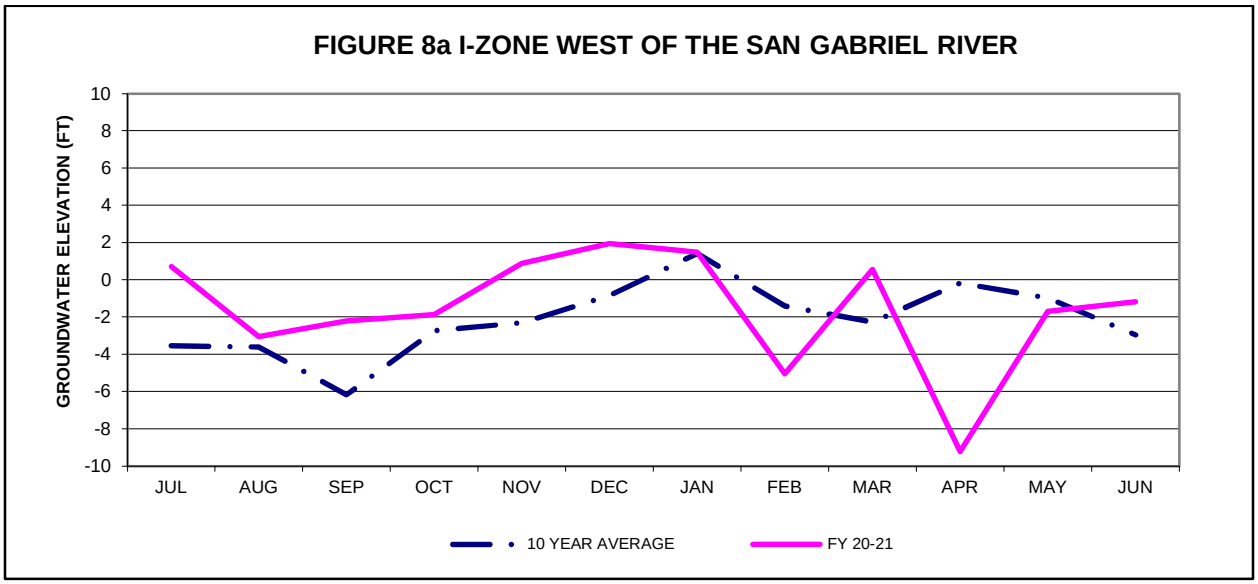


FIGURE 8a I-ZONE WEST OF THE SAN GABRIEL RIVER
GROUNDWATER ELEVATION (FT)
10
8
6
4
2
0
-2
-4
-6
-8
-10
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
10 YEAR AVERAGE
FY 20-21

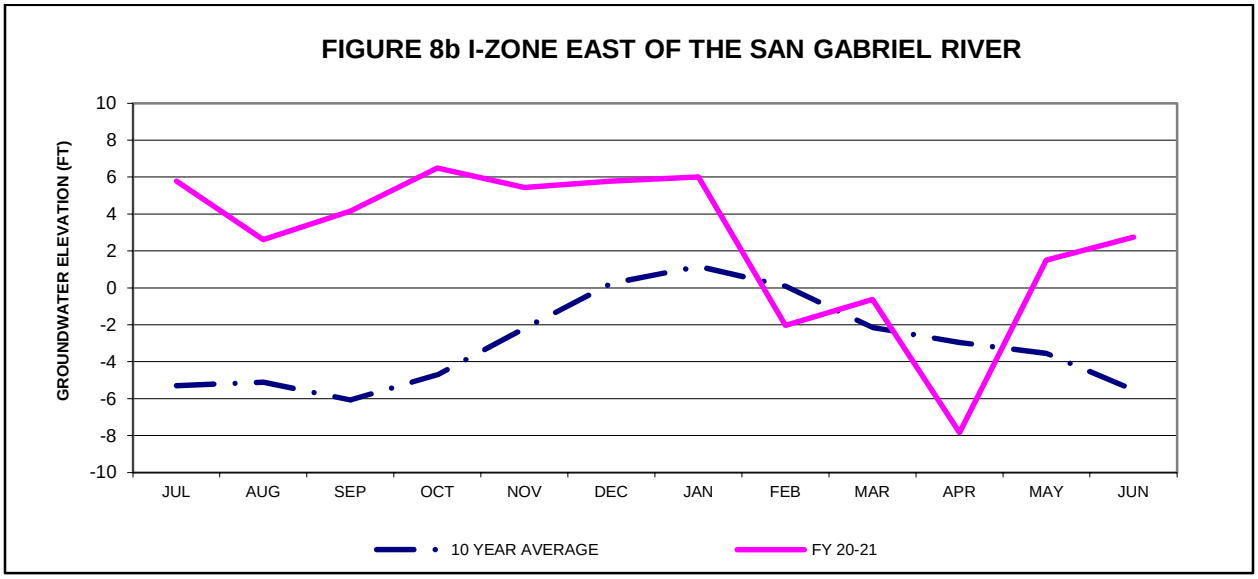


FIGURE 8b I-ZONE EAST OF THE SAN GABRIEL RIVER
GROUNDWATER ELEVATION (FT)
10
8
6
4
2
0
-2
-4
-6
-8
-10
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
10 YEAR AVERAGE
FY 20-21

Groundwater elevation contours for the R, C, B, A, and I Zones have been prepared from data collected in Spring 2021 and are included in Appendix A-1.1, 2.1, 3.1, 4.1, and 5.1. In general, the contours show that the groundwater levels were the highest near the ABP alignment, and typically decrease moving landward. The general shapes of each contour are similar to the previous year and some similar groundwater mounds are seen around certain injection wells. Areas historically having higher groundwater elevations in the C and B Zones, especially near the bend in the ABP alignment near the San Gabriel River, continue to have higher groundwater elevations than their surroundings. Other areas of historically elevated groundwater levels (e.g., near well 33XY and 33YZ) remained relatively constant when compared to the same time last year because the nearby injection wells are screened across four aquifers. These injection wells over inject into C and B Zones, and under inject into A and I Zones.

Contours of changes in groundwater elevations for the R, C, B, A, and I Zones between Spring 2020 and Spring 2021 are shown in A-1.2, 2.2, 3.2, 4.2, and 5.2. The data set is based on available data from Spring 2020, which was then subtracted from the corresponding and available data from Spring 2021 (shown in A-1.3, 2.3, 3.3, 4.3, and 5.3). These contours clearly identify increases and decreases in groundwater elevations from one reporting period to the next. In general, groundwater elevations remained relatively unchanged from the previous reporting period with the exception of localized increases along the north-south alignment related to OCWD's Unit 14 Project. Below is a brief summary and discussion of each aquifer zone:

- <u>R Zone:</u>
    - Groundwater elevations along the ABP alignment generally remained between -1.0 and 8.6 feet above sea level, along the western alignment to the San Gabriel River. The north-south alignment groundwater ranged from -1.3 to 0.6 feet.
    - Compared to last year, groundwater elevations along the western alignment remain relatively unchanged. East of the San Gabriel River, groundwater levels decreased from -0.8 to -4.8 feet.

- C Zone:
    - Groundwater elevations along the western alignment were between 2.0 and 8.0 feet above sea level, with the greatest elevations at wells 33XY and 33YZ. East of the San Gabriel River groundwater elevations along the ABP alignment were observed to be consistently above 4.0 feet, with the highest at well 34DG at 11.0 feet. Groundwater levels across the ABP for this zone were at least 2.0 feet above the protective elevation.
    - Compared to last year, groundwater elevations west of the San Gabriel River generally increased by 2.0 to 3.5 feet. East of the San Gabriel River, groundwater levels generally decreased by no more than a foot.

- B Zone:
    - Groundwater elevations generally were between 4.0 and 10.0 above sea level feet between well 33JL and the San Gabriel River. The north-south alignment was observed to have groundwater elevations between 6.0 and 7.5 feet above sea level, with the highest groundwater elevations of 11.5 feet at well 34DG. Groundwater levels were at least 1.3 feet above the protective elevation.
    - Compared to last year, groundwater levels west of the San Gabriel River decreased about a foot from wells 33JL to 33NQ and increased by at least 1.0 foot from well 33ST to the San Gabriel River. East of the San Gabriel River, increases were observed to be generally between 2.0 and 4.0 feet, with the highest increase of 6.1 feet at well 34T0.1.

- A Zone:
    - Groundwater elevations along the ABP alignment were generally between 5.0 and 8.4 feet above sea level from wells 33GJ to 35E0.1. Internodal wells were observed to be above the protective elevation with the exception of observation wells 33YZ, 34DG, 34HJ, and 34S0.1,
    - Compared to last year, groundwater elevations generally increased 2.5 to 4.6 feet along the western portion of the ABP. East of the San Gabriel River,

groundwater elevations were observed to have increased 0.5 to 3.5 feet between wells 34HJ and 35E0.1.

- I Zone:
    - Groundwater elevations were observed to be between 1.0 and 9.0 feet above sea level for the portion of the ABP west of the San Gabriel River, with the exception of wells 33WX and 33XY, which had groundwater levels of -0.7 and 0.3 feet above sea level, respectfully. East of the San Gabriel River, elevations were measured to be between 2.7 and 7.0 feet above sea level, with elevations greater than 10 feet above sea level observed between wells 34S0.1 and 34Y0.1.
    - Compared to last year, groundwater elevations west of the Los Cerritos Channel generally increased 1.0 to 3.7 feet from wells 33JL to 33UV. Decreases between 0.1 and 0.9 feet were observed at observation wells 33GJ, 33WX, 33XY, and 33YZ. East of the San Gabriel River, decreases between 0.9 and 4.7 feet were observed between wells 34DG and 34LS.

Graphs showing the average, maximum and minimum groundwater elevations at each internodal observation well throughout FY 2020-21 are included in Appendix A-13 through A-16. As shown in the graphs for the C and B Zones, the average groundwater elevations were above or just below the protective elevation at many wells along the ABP. For the A and I Zones, the average groundwater elevations were found to be below the protective elevation for many wells along the ABP for this reporting period. A comparison of FY 2020-21 graphs with FY 2019-20 graphs indicate that average elevations generally increased slightly in the C and B Zone, while the average elevations in the A and I Zones remained relatively unchanged between the two reporting periods. LACPW will look to ensure that groundwater water levels are at or above protective elevations when possible to prevent saltwater intrusion.

CHLORIDES

Figures 9a through 13b (pp. 25-29) show the historical chloride concentrations in each individual aquifer zone. The graphs plot the average of every maximum value measured at each observation well during each sampling event within the target area throughout FY 2020-21. The data includes all available information from the annual and semi-annual chloride sampling events for wells within the ABP alignment and landward for approximately 2,000 feet from the ABP. As a result, the semi-annual values are "weighted" more heavily than the annuals in the calculation of the annual average. Two sets of graphs were created for each aquifer to account for changes in chloride concentration trends in the areas to the west and east of the San Gabriel River, respectively. In each figure, the average of the maximum chloride concentrations per well per event over the last 10 fiscal years (including FY 2020-21) is shown with respect to the freshwater condition (250 mg/L).

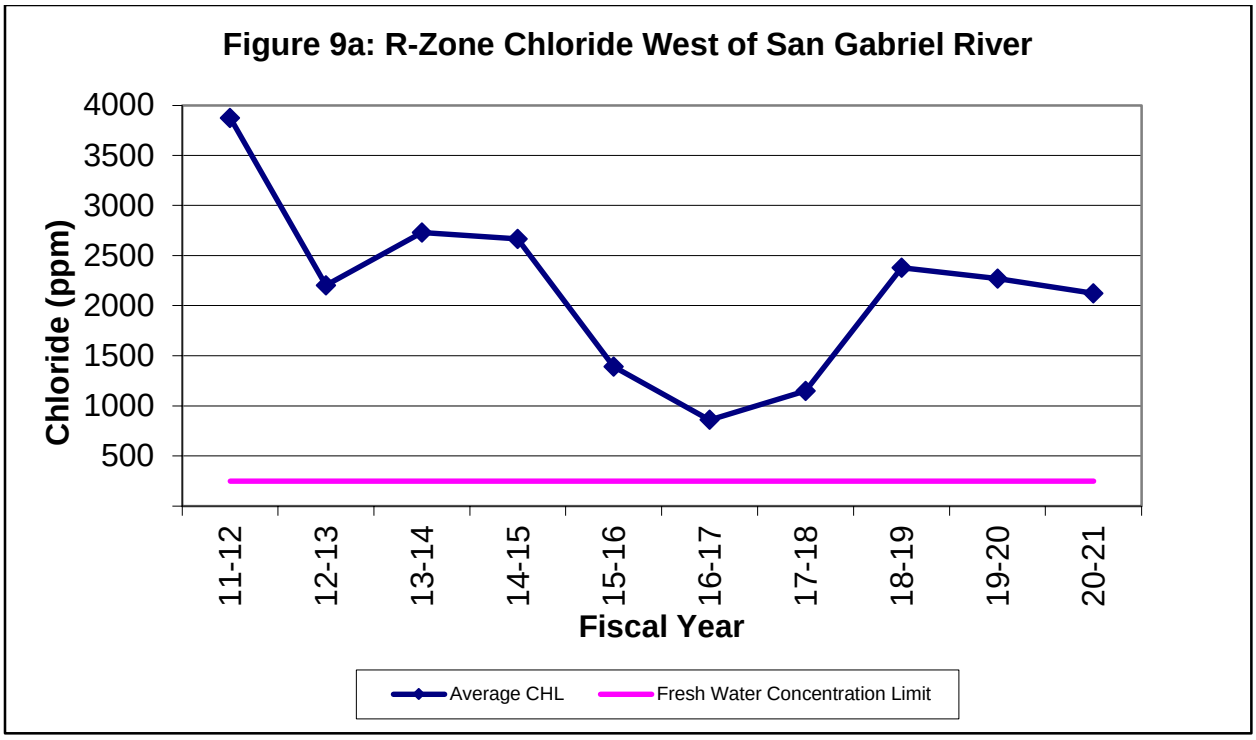


Figure 9a: R-Zone Chloride West of San Gabriel River
Chloride (ppm)
4000
3500
3000
2500
2000
1500
1000
500
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

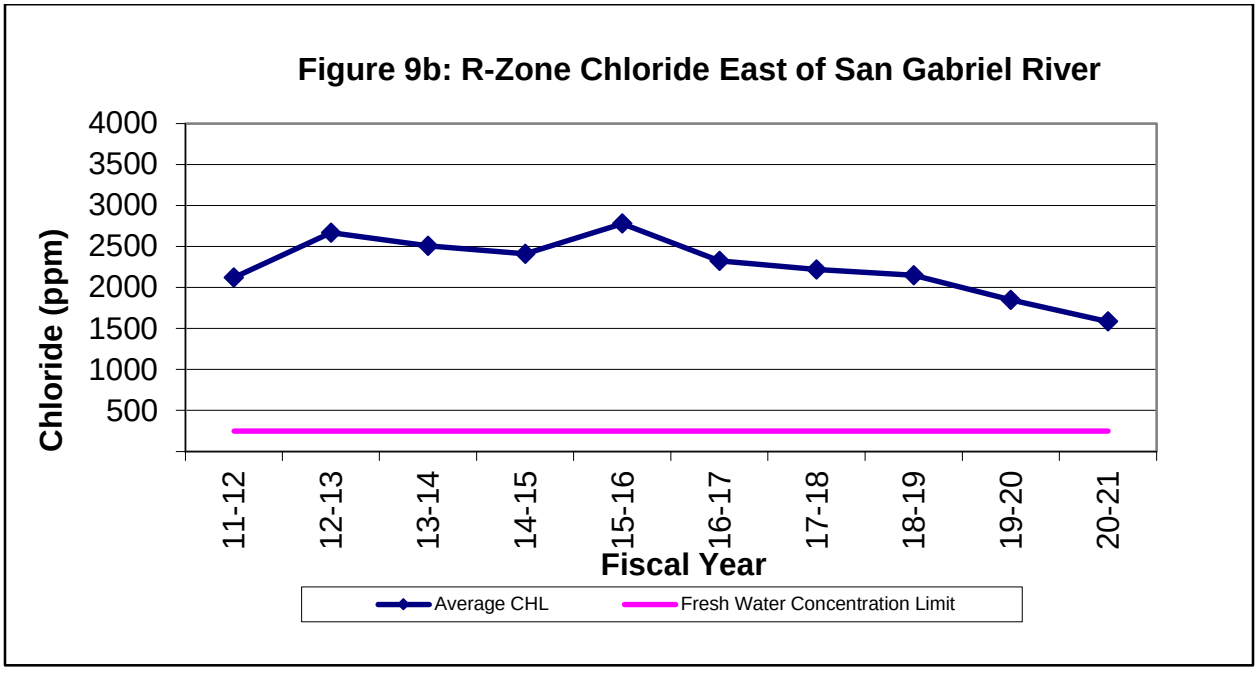


Figure 9b: R-Zone Chloride East of San Gabriel River
Chloride (ppm)
4000
3500
3000
2500
2000
1500
1000
500
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

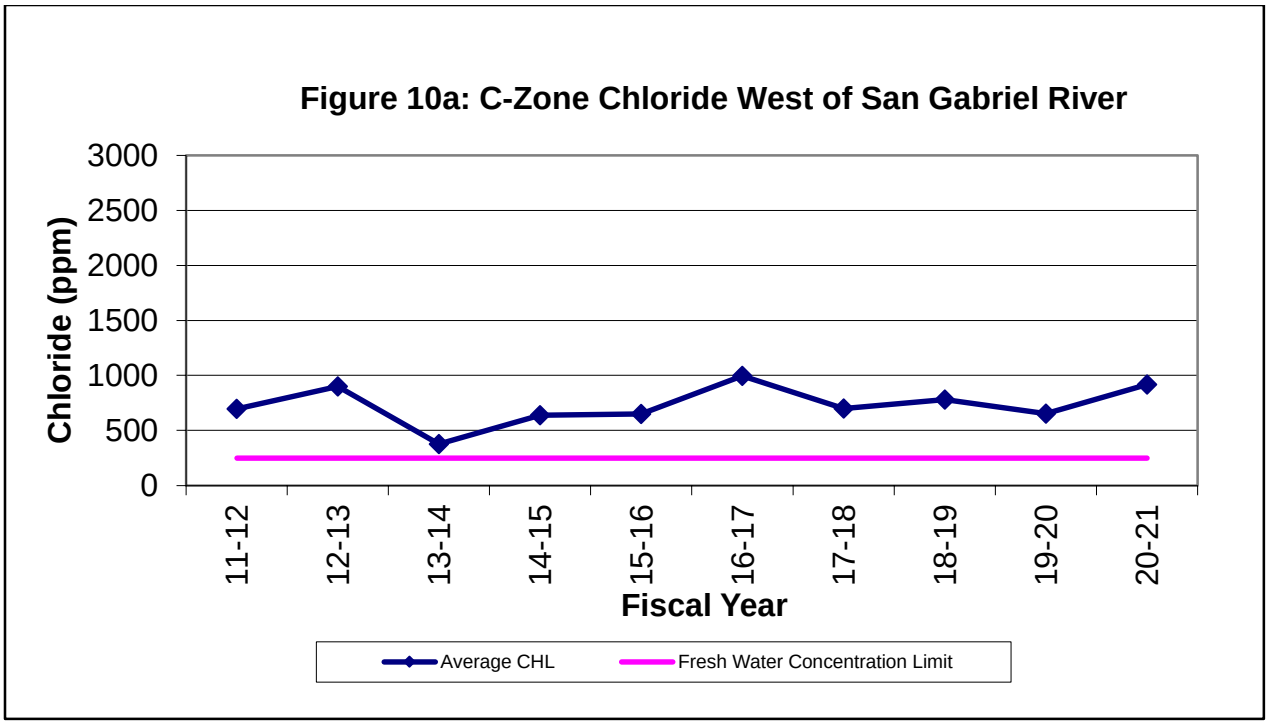


Figure 10a: C-Zone Chloride West of San Gabriel River
Chloride (ppm)
3000
2500
2000
1500
1000
500
0
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

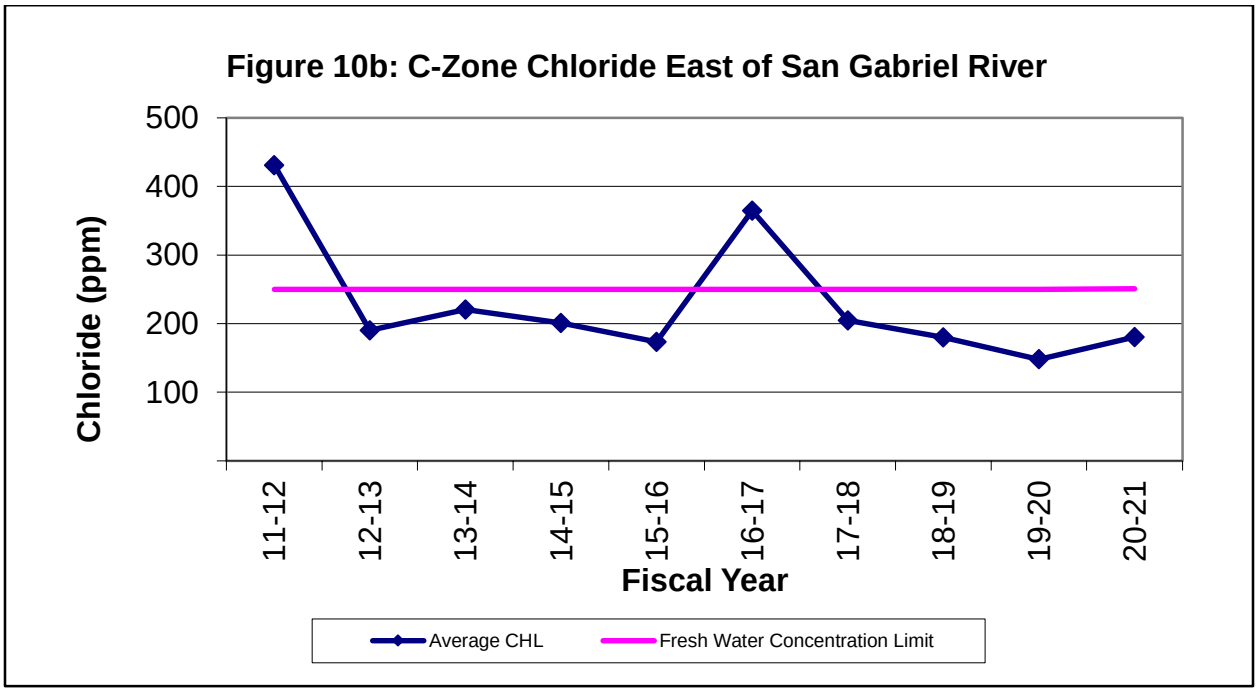


Figure 10b: C-Zone Chloride East of San Gabriel River
Chloride (ppm)
500
400
300
200
100
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

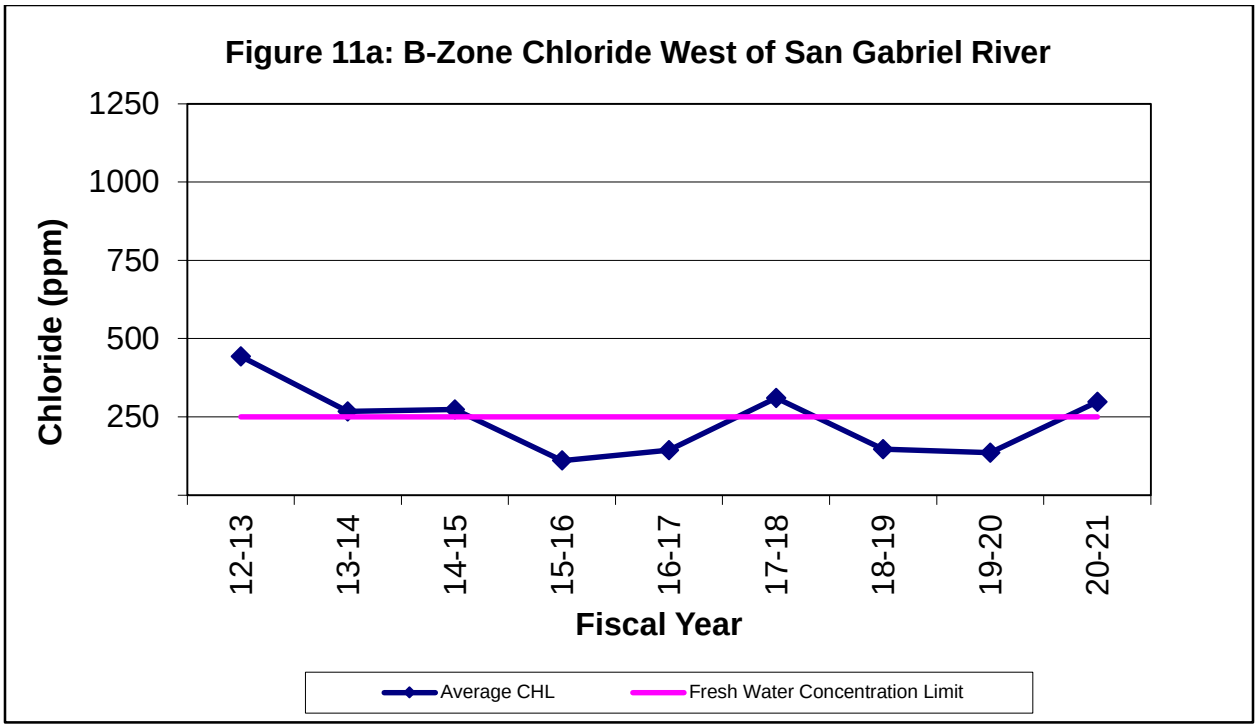


Figure 11a: B-Zone Chloride West of San Gabriel River
Chloride (ppm)
1250
1000
750
500
250
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

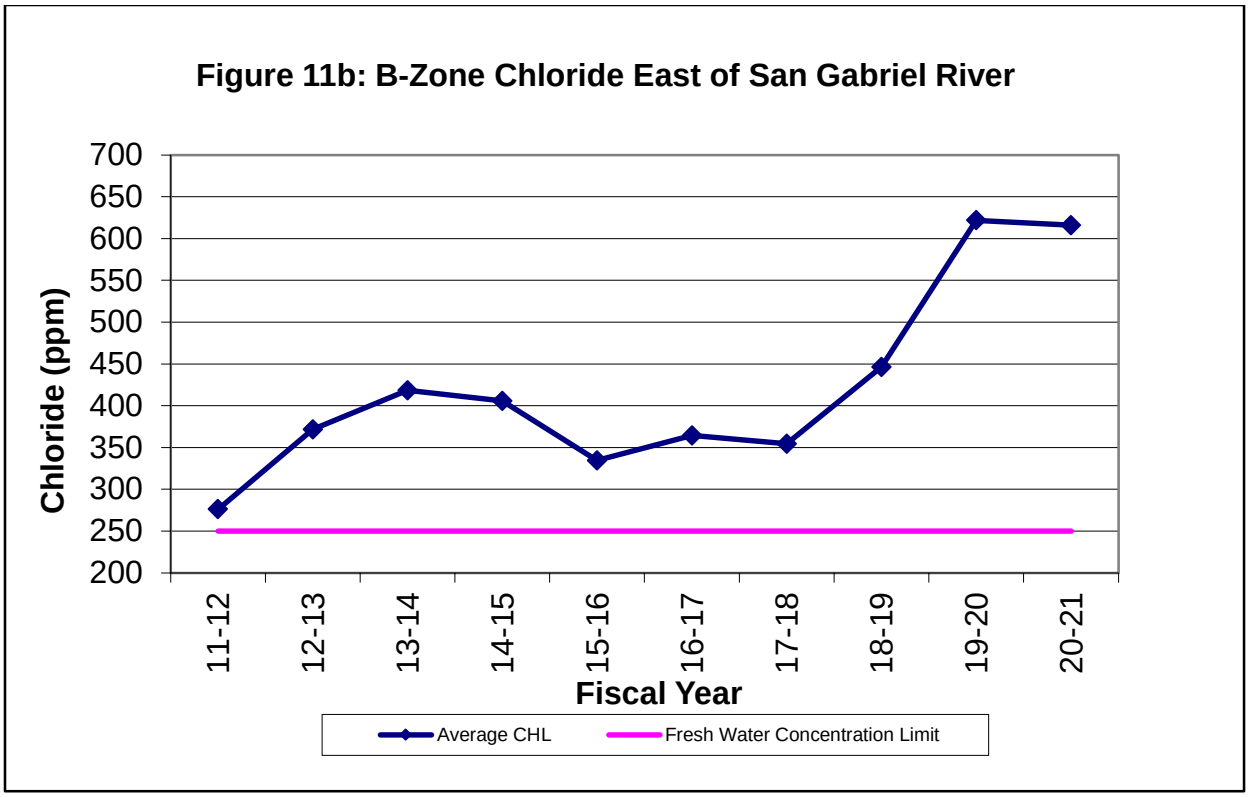


Figure 11b: B-Zone Chloride East of San Gabriel River
Chloride (ppm)
700
650
600
550
500
450
400
350
300
250
200
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

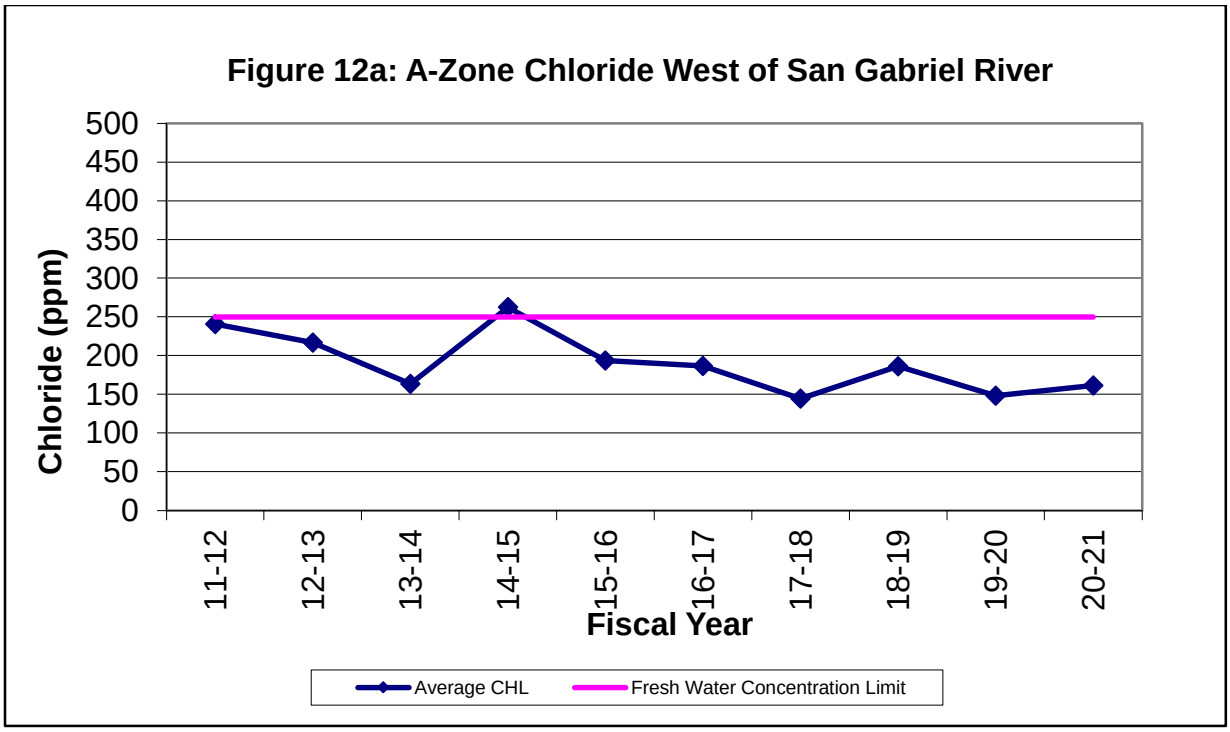


Figure 12a: A-Zone Chloride West of San Gabriel River
Chloride (ppm)
500
450
400
350
300
250
200
150
100
50
0
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

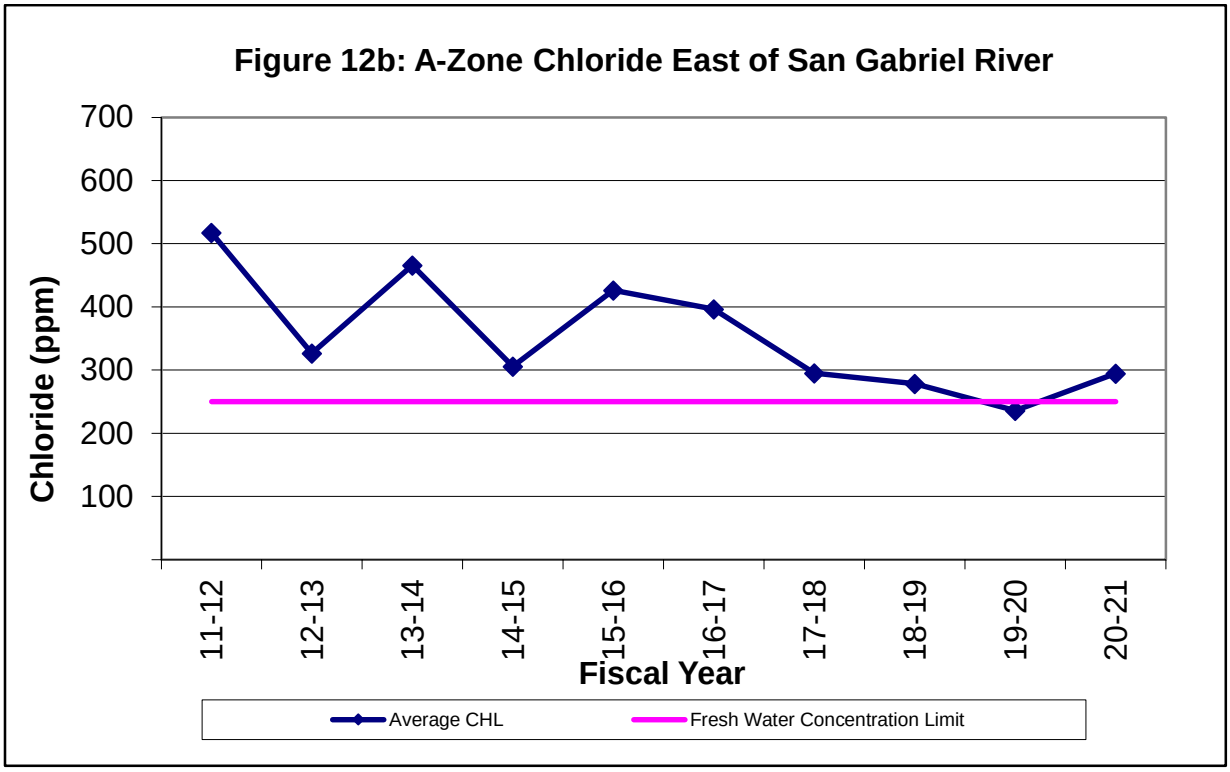


Figure 12b: A-Zone Chloride East of San Gabriel River
Chloride (ppm)
700
600
500
400
300
200
100
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

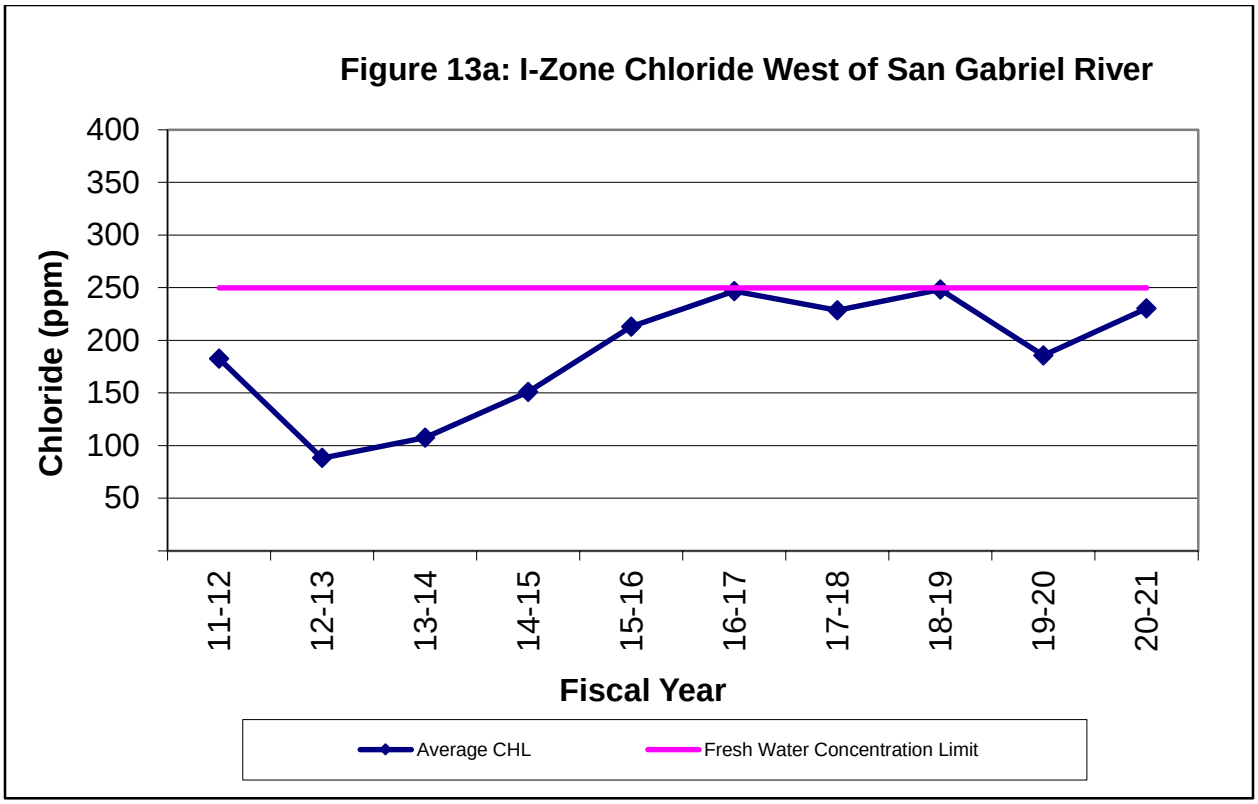


Figure 13a: I-Zone Chloride West of San Gabriel River
Chloride (ppm)
400
350
300
250
200
150
100
50
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

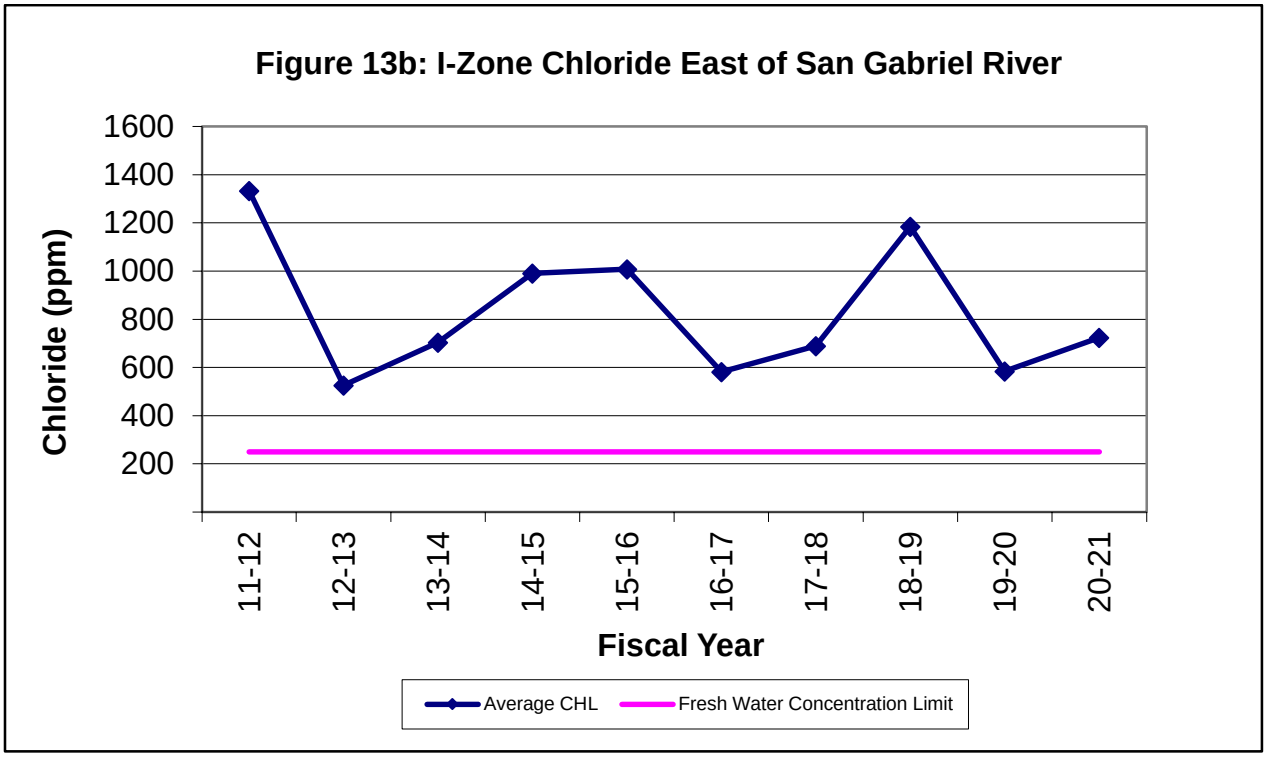


Figure 13b: I-Zone Chloride East of San Gabriel River
Chloride (ppm)
1600
1400
1200
1000
800
600
400
200
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
Fiscal Year
Average CHL
Fresh Water Concentration Limit

West of the San Gabriel River, average maximum chloride concentrations increased in all Zones, except the R Zone, which had a decrease. The increases in chlorides were very minimal, not more than 160 mg/L, with the exception of the C Zone, which had an increase of 266 mg\L.

East of the San Gabriel River, average maximum chloride concentrations increased slightly in the C, A, and I Zones, and the increases were not more than 140 mg\L. The R and B Zones had decreases in chlorides of 263 mg/L and 6 mg/L, respectively.

Chloride concentration contour maps for the R, C, B, A, and I Zones have been prepared from data collected in the Spring of 2021 and are included in Appendix A-6.1, A-7.1, A-8.1, A-9.1, and A-10.1, respectively. The I Zone chloride concentration map (A-10.1) was further analyzed and interpreted by OCWD Hydrogeologists as it pertains to chlorides east of the San Gabriel River. The chloride contour maps are based on the maximum chloride concentration (mg/L) measured at each observation well. Chloride data was gathered from observation wells located within the immediate vicinity of the ABP and does not represent basin-wide conditions for the groundwater basin protected by the ABP. Wells with chloride concentrations of 250 mg/L or less were considered fresh. The chloride measurements used in this report were taken during the semi-annual sampling event between March and April 2021, and the annual event in February and March 2021.

Contours of **changes** in chloride concentration for the R, C, B, A, and I Zones between Spring 2020 and Spring 2021 are shown in Appendices A-6.2, A-7.2, A-8.2, A-9.2, and A-10.2. The data set is based on available data for Spring 2020, which was then subtracted from the corresponding data for Spring 2021. These contours very clearly identify areas where chloride concentrations increased and decreased between these two reporting periods.

The chloride concentration contours for FY 2020-21 are similar in shape and pattern to those of the previous year. The current contours and the corresponding chloride

concentration cross-section (A-11) for this reporting period indicate that intrusion of seawater across the ABP continued to be controlled west of the San Gabriel River. East of the San Gabriel River, several areas recorded elevated chloride concentrations indicating potential seawater intrusion.

- R Zone:
    - Chloride concentrations remained elevated landward and seaward of the ABP.
    - West of the San Gabriel River chloride concentrations increased by 30 mg/L and 540 mg/L at observation wells 33WX and 33Z'1, respectively. The north-south alignment had general decreases, except at observation well 34L'1, which increased by over 500 mg/L.

- C Zone:
    - Chloride concentration along the ABP alignment remained at or just below 250 mg/L. Persistent chlorides remained north of the western alignment near observation well 33T13. East of the San Gabriel River, chloride concentrations remained below 250 mg/L, except at observation well 34U8, which had a chloride concentration of over 500 mg/L.
    - Compared to the last reporting period, this zone remained relatively unchanged. A decrease at of 430 mg/L was observed at observation well 34T0.1. An increase of over 3,000 mg/L was measured at observation well 33T13.

- B Zone:
    - Much of the chloride concentrations along the ABP alignment remained below 250 mg/L with the exception of well 34JL, which had chloride concentrations 480 mg/L. Elevated chlorides remain at well 33Q15 and 34U8 which had chloride concentrations of 5,300 mg/L and 2,100 mg/L respectively.

- Compared to the last reporting period, chloride concentrations along much of the ABP alignment were observed to have mostly decreased, with the largest decreases of 1,320 mg/L and 177 mg/L occurring at observation wells 34JL and 33XY, respectively.

- A Zone:
  - Along the ABP alignment, chloride concentrations were below 250 mg/L, with the exception of observation wells 34DG and 34HJ, which had concentrations of 1,200 mg/L and 950 mg/L, respectfully.
  - Chlorides remain generally unchanged from the last reporting period for most of the ABP alignment with the exception of well 34HJ, which had an increase of 887 mg/L.

- I Zone:
  - Chloride concentrations remained below 250 mg/L along the ABP alignment with the exception of observation wells 34JL and 34S0.1, which had concentrations of 4,000 mg/L and 1,400 mg/L, respectfully.
  - A significant increase in chlorides of 3,911 mg/L was observed at well 34JL. Chloride concentrations at well 35E0.1 decreased by 5,010 mg/L.

Persistent chlorides remain north of the western alignment near observation well 33T13 in the C and B Zones and near observation well 33X20 for the I Zone. A possible reason for the high chloride concentrations in this area could be remaining seawater from previous intrusions. The increase in chlorides at observation wells 34JL may be related to the maintenance activity at injection well 34S, mentioned in this report. High chlorides remain near observation wells 34U8 and 34V3 in the C and B Zones and may be the residual chlorides that passed through during the construction of OCWD's Unit 14 Project. The decrease in chlorides at 35E0.1 may be associated with OCWD's Unit 14 Project.

BARRIER PROJECT COSTS

This section of the report is divided into four parts: Water Costs, Services and Supplies Costs (operation and maintenance), Fixed Assets Costs (capital outlay), and Budget. Under the terms of the 1964 Cooperative Agreement between LACFCD and OCWD, fixed assets are typically divided into facilities paid for by the LACFCD, facilities paid for by the OCWD, and joint facilities paid for by both agencies, depending on their location. Under the same agreement, water costs are divided between the LACFCD (whose portion is paid by the WRD per a separate agreement) and the OCWD. The total cost of the ABP in FY 2020-21 was $11,412,825 which can be broken down as follows: water costs of $7,926,158, Operation and Maintenance costs of $3,419,917 and joint liability insurance cost of $66,750.

WATER COSTS

During FY 2020-21, 6,500.9 AF of water was injected at an estimated total cost of $7,926,158, as shown in Table 2. The monthly unit water cost (dollars per AF) from July 2020 to June 2021 varied periodically as shown above in Table 1. The monthly quantity of water injected and total water costs paid by each agency are shown below in Table 2.

TABLE 2. QUANTITY OF WATER INJECTED AND COSTS

MONTH	AMT BY WRD (AF)	AMT BY OCWD (AF)	TOTAL AMT (AF)
Jul-20	343.7	238.9	582.6
Aug-20	302.6	191.4	494.0
Sep-20	304.2	248.3	552.5
Oct-20	335.4	286.1	621.5
Nov-20	366.4	257.0	623.4
Dec-20	359.0	265.5	624.5
Jan-21	355.2	257.2	612.4
Feb-21	323.9	168.2	492.1
Mar-21	344.8	110.8	455.6
Apr-21	175.2	99.3	274.5
May-21	344.9	212.8	557.7
Jun-21	353.8	256.3	610.1
TOTAL INJECTED	**3,909.1**	**2,591.8**	**6,500.9**
TOTAL COST ($) [From Table 1]	**$4,769,223**	**$3,156,935**	**$7,926,158**

OPERATIONS AND MAINTENANCE COSTS

A total of $3,486,667 was spent on Operations and Maintenance during FY 2020-21. Pursuant to the 1964 Cooperative Agreement, the OCWD pays a percentage of the applicable services and supplies costs for injection operations proportional to the percentage of the total amount of injection water paid for by the OCWD. The distribution of FY 2020-21 services and supplies costs is summarized in Table 3.

TABLE 3. DISTRIBUTION OF SERVICES AND SUPPLIES COSTS FOR INJECTION AND EXTRACTION ACTIVITIES

ITEM	LOS ANGELES COUNTY	ORANGE COUNTY	TOTAL
Service & Supplies of Injection Facilities (including Observation Wells)	$2,342,876	$1,075,909	$3,418,785[1]
Service & Supplies of Extraction Facilities	$1,132	$0	$1,132[2]
Right of Way Acquisition	0	0	0
SUBTOTAL	**$2,344,007**	**$1,075,909**	**$3,419,917**
Liability Insurance	$33,375	$33,375	$66,750
TOTAL	**$2,377,382**	**$1,109,284**	**$3,486,667**

The values in Table 3 come from the ABP FY 2020-21 Costs (see A-19) as follows:

[1] The sum of Items 1, 2, 3, 7, 8, 9, 10, 11, 12, and 13. OCWD is responsible for 39.9% of all costs for these items per the agreement. OCWD is only responsible for 39.9% of costs associated with Item 14, Seawater Barrier Condition Assessment.

[2] The sum of Items 4, 5, and 6; OCWD is not responsible for any portion of the cost for these items.

The yearly cost of the services and supplies (including special programs but excluding water and extraction costs) for the last 10 years of ABP operations are shown in Table 4.

TABLE 4. COSTS OF SERVICES AND SUPPLIES FOR INJECTION

Fiscal Year	Volume of Water Injected (Ac-Ft)	Total Cost	Cost Per Ac-Ft Injected
2011-12	4,334.7	$2,368,788	$546.47
2012-13	5,490.4	$2,477,565	$451.25
2013-14[1]	6,692.3	$3,605,859	$538.81
2014-15	7,113.1	$1,678,123	$235.92
2015-16	6,807.7	$2,237,637	$328.69
2016-17	6,060.0	$1,650,686	$272.39
2017-18	4,414.1	$2,138,420	$484.45
2018-19	5,295.2	$2,293,529	$433.13
2019-20	5,536.9	$2,465,320	$445.25
2020-21	6,500.9	$2,649,077	$407.49

[1] The costs reported in Table 4 prior to the FY 2014-15 period are higher because these years included costs for multiple repairs and/or capital improvement projects.

The costs of the services and supplies for extraction operations for the last 10 years, including electrical costs, are shown in Table 5.

TABLE 5. COSTS OF SERVICES AND SUPPLIES FOR EXTRACTION

Fiscal Year	Volume of Water Extracted (Ac-Ft)	Total Cost	Cost Per Ac-Ft Extracted
2011-12	0.0	$6,219	N/A
2012-13	0.0	$70,408	N/A
2013-14	0.0	$6,768	N/A
2014-15	0.0	$13,714	N/A
2015-16	0.0	$6,961	N/A
2016-17	0.0	$1,510	N/A
2017-18	0.0	$1,538	N/A
2018-19	0.0	$1,556	N/A
2019-20	0.0	$1,512	N/A
2020-21	0.0	$1,132	N/A

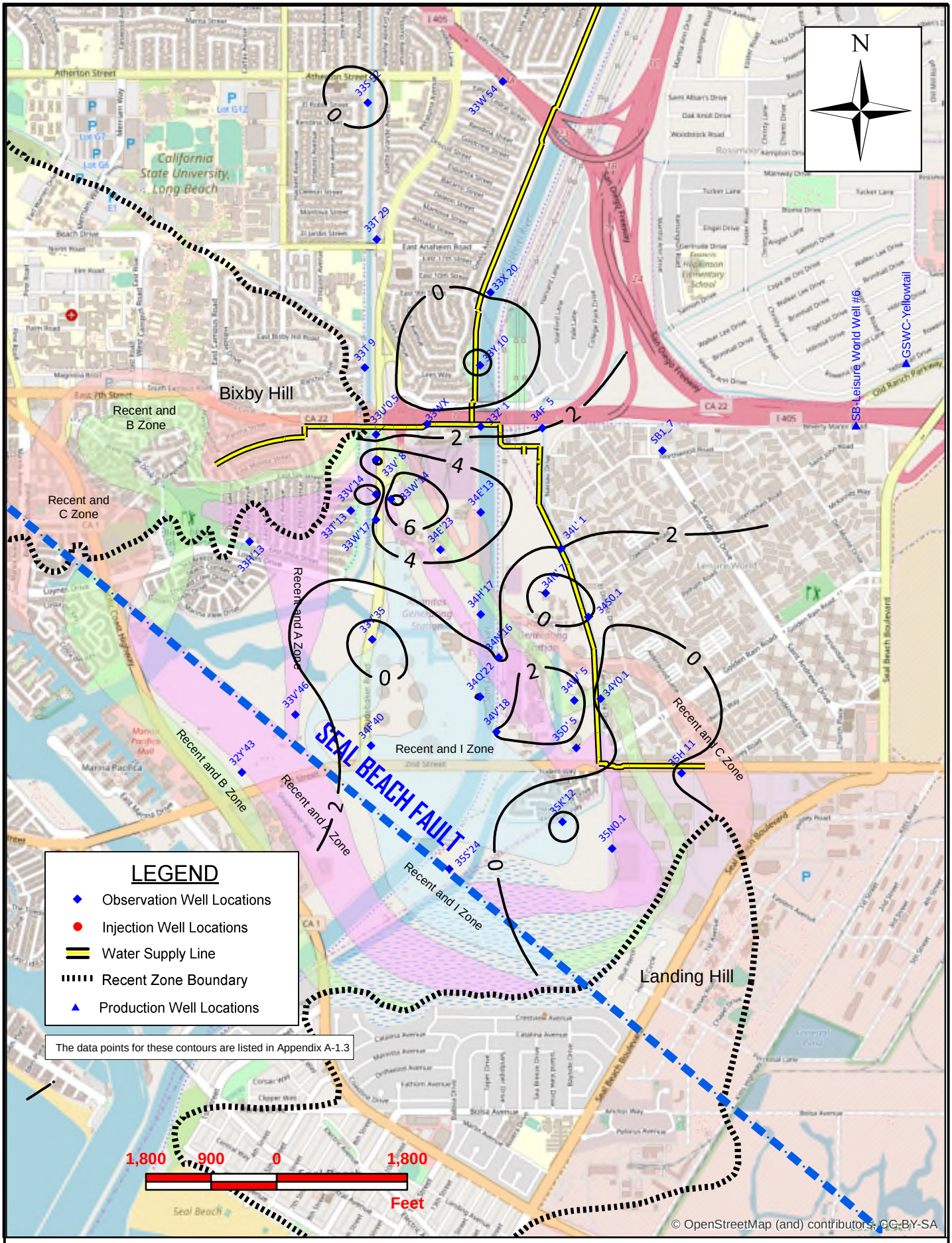
FIXED ASSETS

During Fiscal Year 2020-21, there were no new LACFCD facilities, OCWD facilities, or joint facilities added to the ABP.

BUDGET

The FY 2022-23 budget for the cost of ABP Supplies and Services is $2,805,000. A breakdown of this amount, along with past expenditures per category, is shown in Appendix A-20.

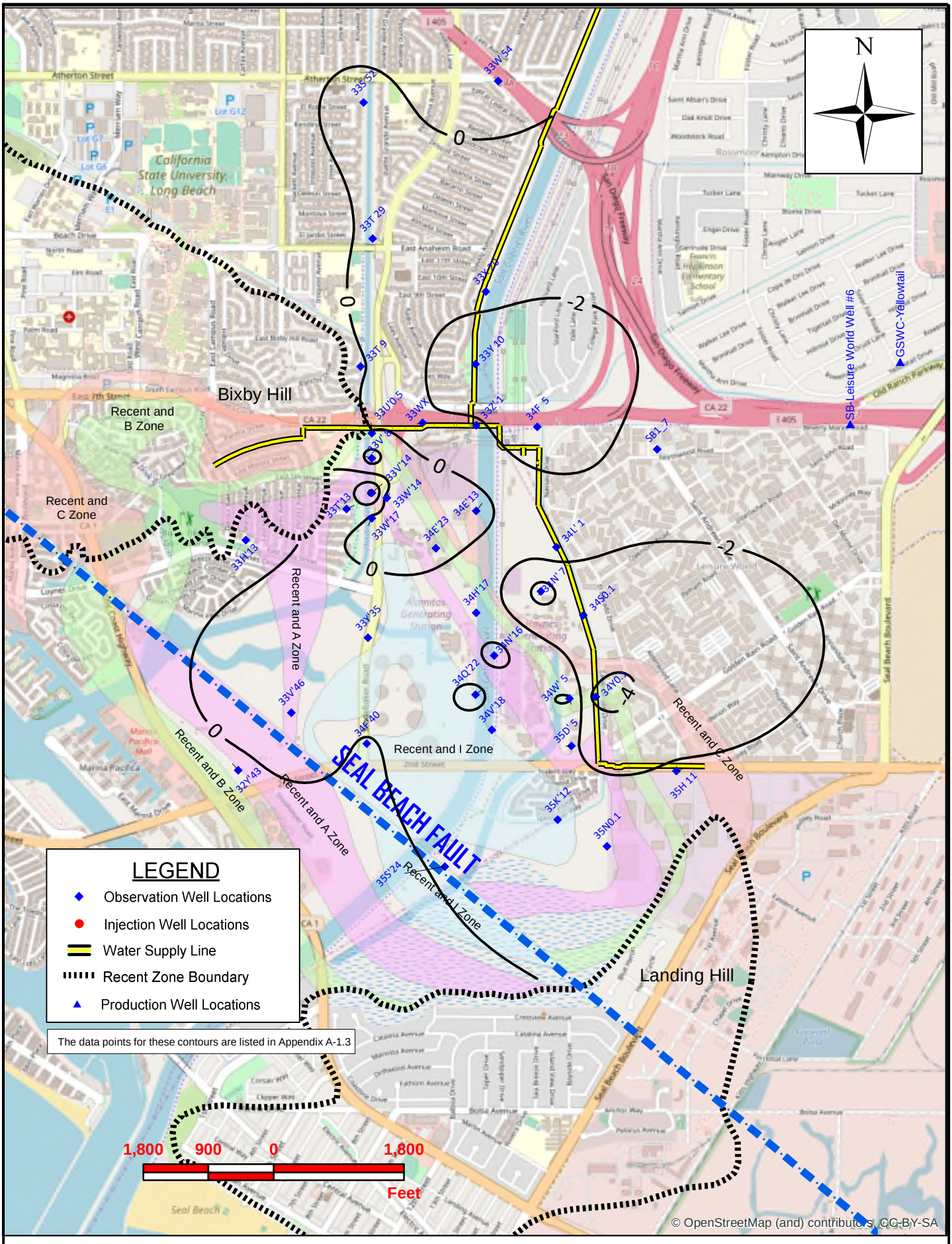
APPENDIX



Alamitos Barrier Project
R Zone Groundwater Elevation (ft) Contours, Spring 2021

A-1.1

R Zone GW.srf



Alamitos Barrier Project
R Zone Change in Elevation (ft), Spring 2020 to Spring 2021

A-1.2

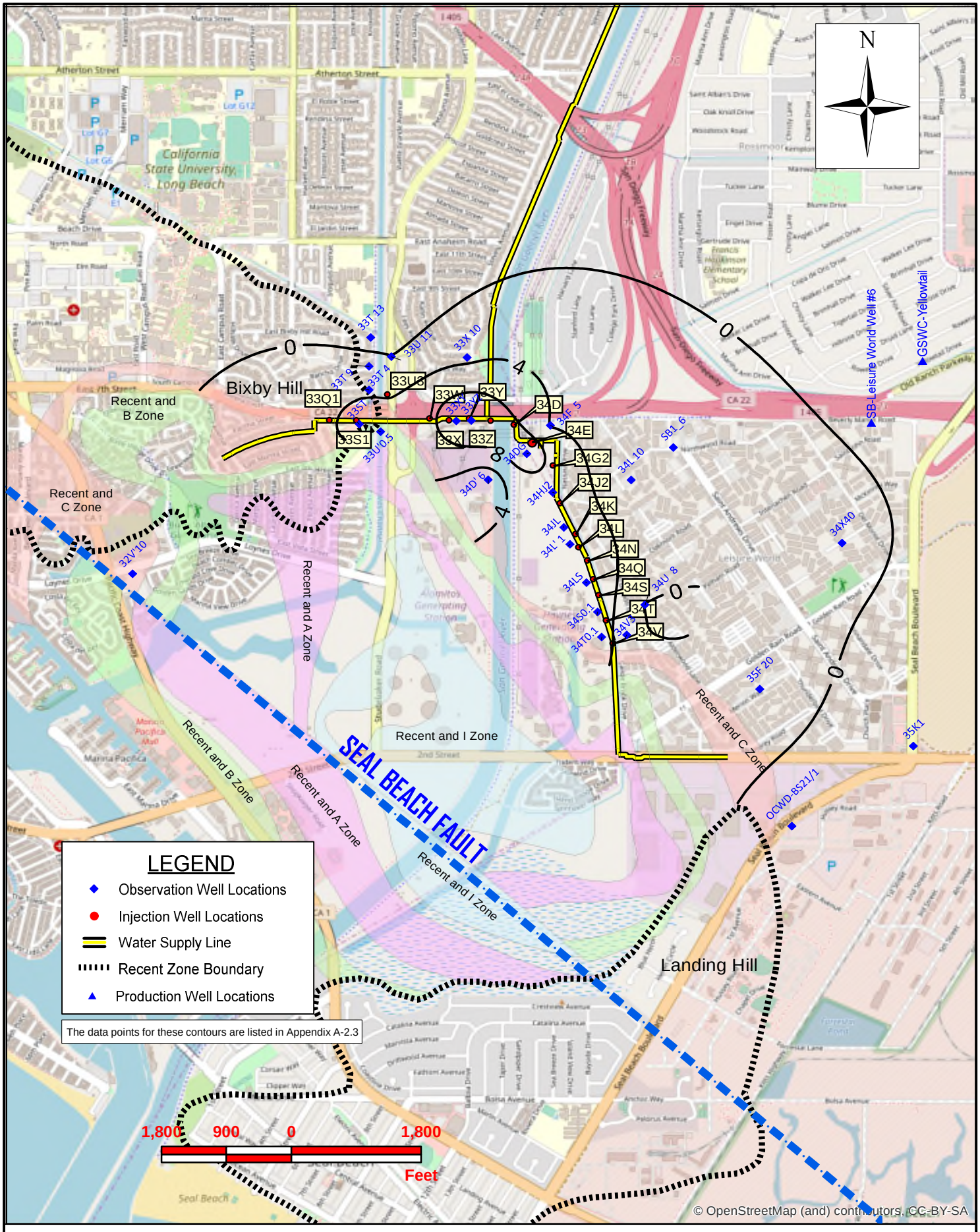
R zone GW.srf

ALAMITOS BARRIER PROJECT
R-Zone
Groundwater Elevation Data for Contours and Tables

POINT	PROJ	FCD	AQUIFER	DATE	FY 20-21 ELEV	P.E.[1]	Δ[2]	FY 19-20 ELEV	CHANGE IN ELEV
1	32Y'43	493WW	Recent	20210223	2.4			2.0	0.4
2	33H'13	493YY	R,A	20210217	3.3			2.8	0.5
3	33S 52	491J	Recent	20210211	-0.3			-0.1	-0.2
4	33T 9	492CV	Recent	20210316	1.1			0.9	0.2
5	33T 29	491D	Recent	20210211	1.1			1.2	-0.1
6	33T'13	492AU	Recent	20210218	2.9			3.6	-0.7
7	33U'0.5	492CB	Recent	20210317	0.5			0.4	0.1
8	33V' 8	492BY	R,A	20210211	6.6			3.5	3.1
9	33V'14	492HH	Recent	20210513	0.1			4.8	-4.7
10	33V'46	493UU	Recent	20210223	3.2			4.7	-1.5
11	33W 54	501C	Recent	20210209	1.8			1.3	0.5
12	33W'14	492AT	Recent	20210216	8.6			7.9	0.7
13	33W'17	493PP	Recent	20210211	4.2			3.8	0.4
14	33WX	502AZ	Recent	20210324	0.6			2.3	-1.7
15	33X 20	502L	Recent	20210301	0.2			1.5	-1.3
16	33Y 10	502BA	Recent	20210208	-2.6			1.2	-3.8
17	33Y'35	493AB	Recent	20210208	-1.2			0.2	-1.4
18	33Z' 1	502AU	Recent	20210302	1.4			3.0	-1.6
19	34E'13	503AU	Recent	20210302	5.4			4.7	0.7
20	34E'23	503X	Recent	20210216	4.5			4.1	0.4
21	34F 5	502BT	Recent	20210322	2.0			5.9	-3.9
22	34F'40	483J	Recent	20210210	1.4			1.2	0.2
23	34H'17	503Y	Recent	20210302	3.0			4.0	-1.0
24	34L' 1	503P	Recent	20210324	2.0			2.8	-0.8
25	34N' 7	503AE	Recent	20210504	-1.7			3.2	-4.9
26	34N'16	503W	Recent	20210513	2.1			1.3	0.8
27	34Q'22	503T	Recent	20210302	-0.1			2.7	-2.8
28	34S0.1	503BT	Recent	20210303	0.0			2.9	-2.9
29	34V'18	503V	Recent	20210211	2.1			2.7	-0.6
30	34W' 5	503AH	Recent	20210204	4.0			3.8	0.2
31	34Y0.1	503CK	Recent	20210324	-1.3			3.5	-4.8
32	35D' 5	503AL	Recent	20210204	1.6			3.4	-1.8
33	35H 11	514F	Recent	20210302	0.1			1.8	-1.7
34	35K'12	504R	Recent	20210203	-2.6			-1.1	-1.5
35	35N0.1	504M	Recent	20210204	-0.7			-0.3	-0.4
36	35S'24	504K	Recent	20210302	1.3			1.4	-0.1
37	SB1_7		Recent	20210325	3.7			4.9	-1.2
				AVG=	1.6		AVG=	2.6	

[1] P.E. represents the protective elevations calcuated for internodal wells.
[2] Δ (+/-) represents how much groundwater level is above/below respective P.E.

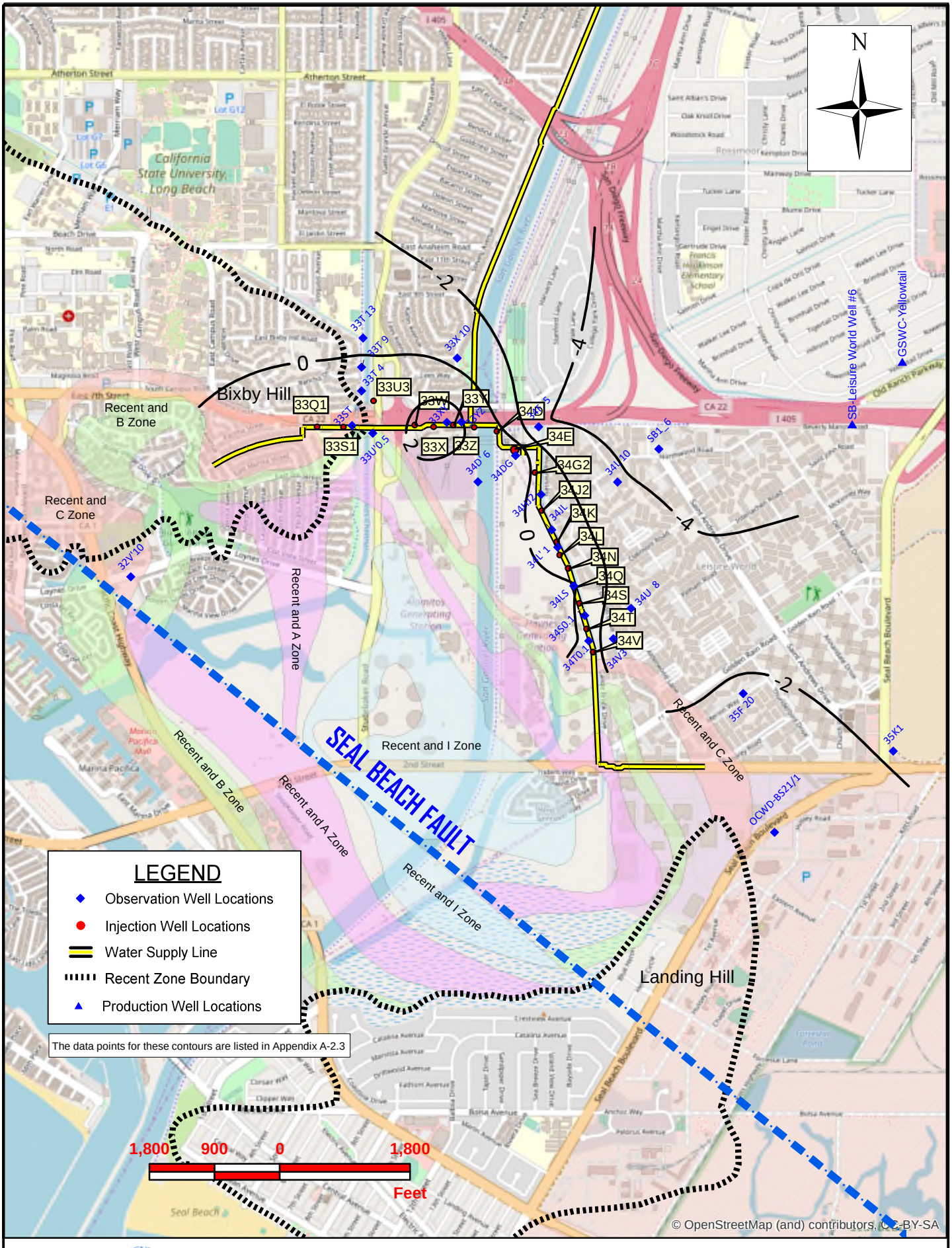
| | = A max. or min. elevation during that period.



Alamitos Barrier Project
C Zone Groundwater Elevation (ft) Contours, Spring 2021

A-2.1

C Zone GW.srf



LEGEND

- Observation Well Locations
- Injection Well Locations
- Water Supply Line
- Recent Zone Boundary
- Production Well Locations

The data points for these contours are listed in Appendix A-2.3

Alamitos Barrier Project
C Zone Change in Elevation (ft), Spring 2020 to Spring 2021

A-2.2

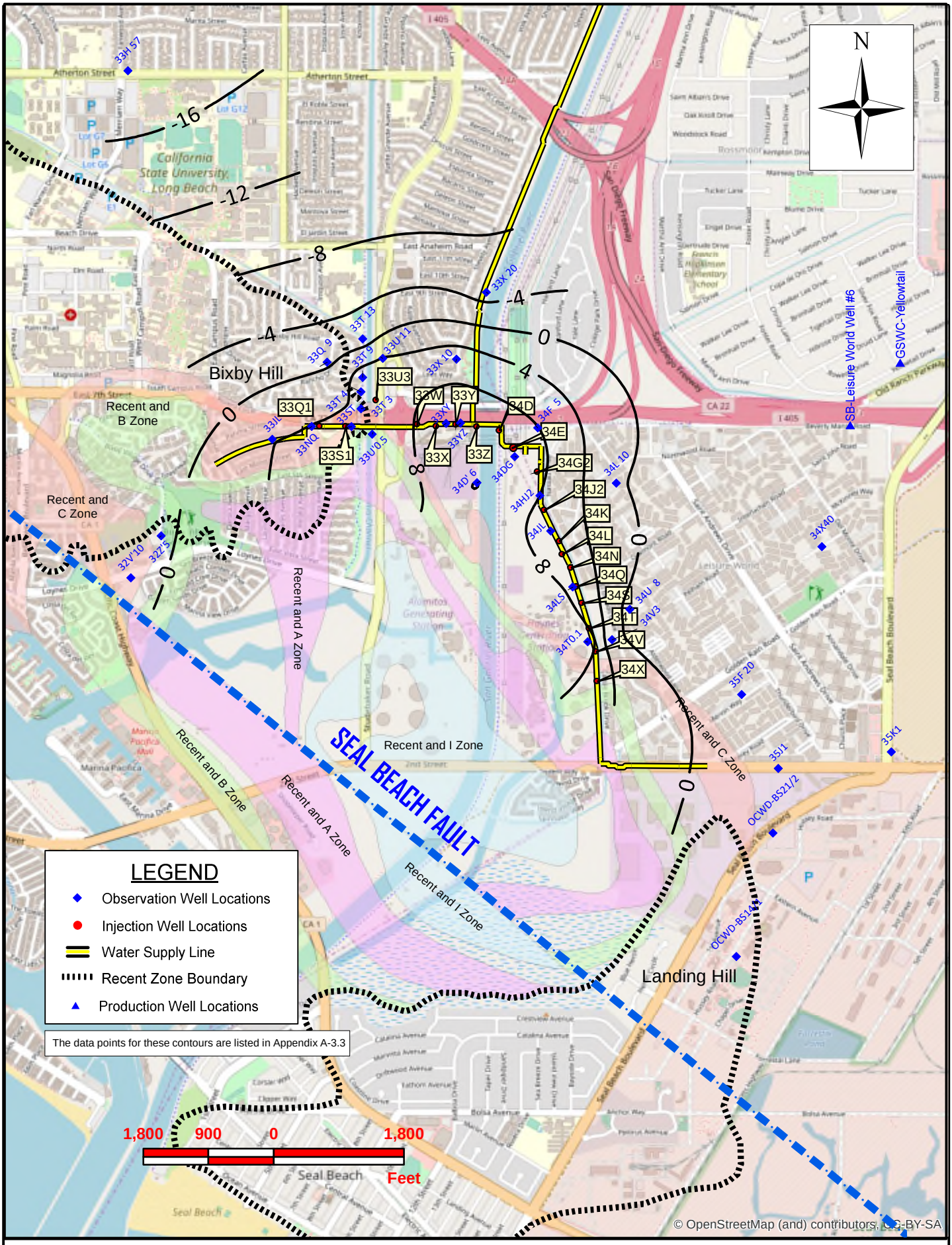
C zone GW.srf

ALAMITOS BARRIER PROJECT
C-Zone
Groundwater Elevation Data for Contours and Tables

POINT	PROJ	FCD	AQUIFER	DATE	FY 20-21 ELEV	P.E.[1]	Δ[2]	FY 19-20 ELEV	CHANGE IN ELEV
1	32V'10	483H	C Zone	20210203	-0.6			-0.3	-0.3
2	33ST	492BK	C,B	20210324	4.9	0.9	4.0	3.2	1.7
3	33T 4	492CT	C Zone	20210302	3.8			3.5	0.3
4	33T 9	492CU	C Zone	20210302	2.6			2.0	0.6
5	33T 13	492AC	C Zone	20210316	-2.1			-1.2	-0.9
6	33U 11	492AL	C Zone	20210317	0.1				n/a
7	33U'0.5	492CA	C Zone	20210302	2.6			1.5	1.1
8	33X 10	502BB	C Zone	20210301	3.2			3.7	-0.5
9	33XY	502BL	C Zone	20210302	10.9	5.4	5.5	7.4	3.5
10	33YZ	502AB	C Zone	20210324	11.7	5.4	6.3	9.6	2.1
11	34D' 6	502BF	C Zone	20210302	1.1			1.1	0.0
12	34DG	502X	C Zone	20210324	11.0	5.4	5.6	9.5	1.5
13	34F 5	502BU	C Zone	20210302	3.8			7.7	-3.9
14	34HJ2	502CH	C Zone	20210324	6.5	4.1	2.4	7.0	-0.5
15	34JL	503AR	C Zone	20210324	6.3	4.2	2.1	6.8	-0.5
16	34L' 1	503N	C Zone	20210324	7.1	4.8	2.3	8.1	-1.0
17	34L 10	502AK	C Zone	20210302	0.7			4.5	-3.8
18	34LS	503BF	C Zone	20210324	7.3	4.5	2.8	7.2	0.1
19	34S0.1	503BU	C Zone	20210324	6.4	3.7	2.7	6.9	-0.5
20	34T0.1	503AB	C Zone	20210324	6.5	3.6	2.9	6.8	-0.3
21	34U 8	513D	C Zone	20210302	-0.1			3.6	-3.7
22	34V3	503CB	C Zone	20210302	0.9			4.8	-3.9
23	34X40	513R	C Zone	20210301	0.5				n/a
24	35F 20	513L	C Zone	20210324	1.4			2.9	-1.5
25	35K1	523D	C Zone	20210325	-1.9	4.3	-6.2	0.2	-2.1
26	SB1_6		C Zone	20210325	1.2			5.5	-4.4
27	OCWD-BS21/1		C Zone	20210311	-1.3			0.0	-1.3
				AVG=	3.5		AVG=	4.5	

[1] P.E. represents the protective elevations calcuated for internodal wells.
[2] Δ (+/-) represents how much groundwater level is above/below respective P.E.

[ ] = A max. or min. elevation during that period.

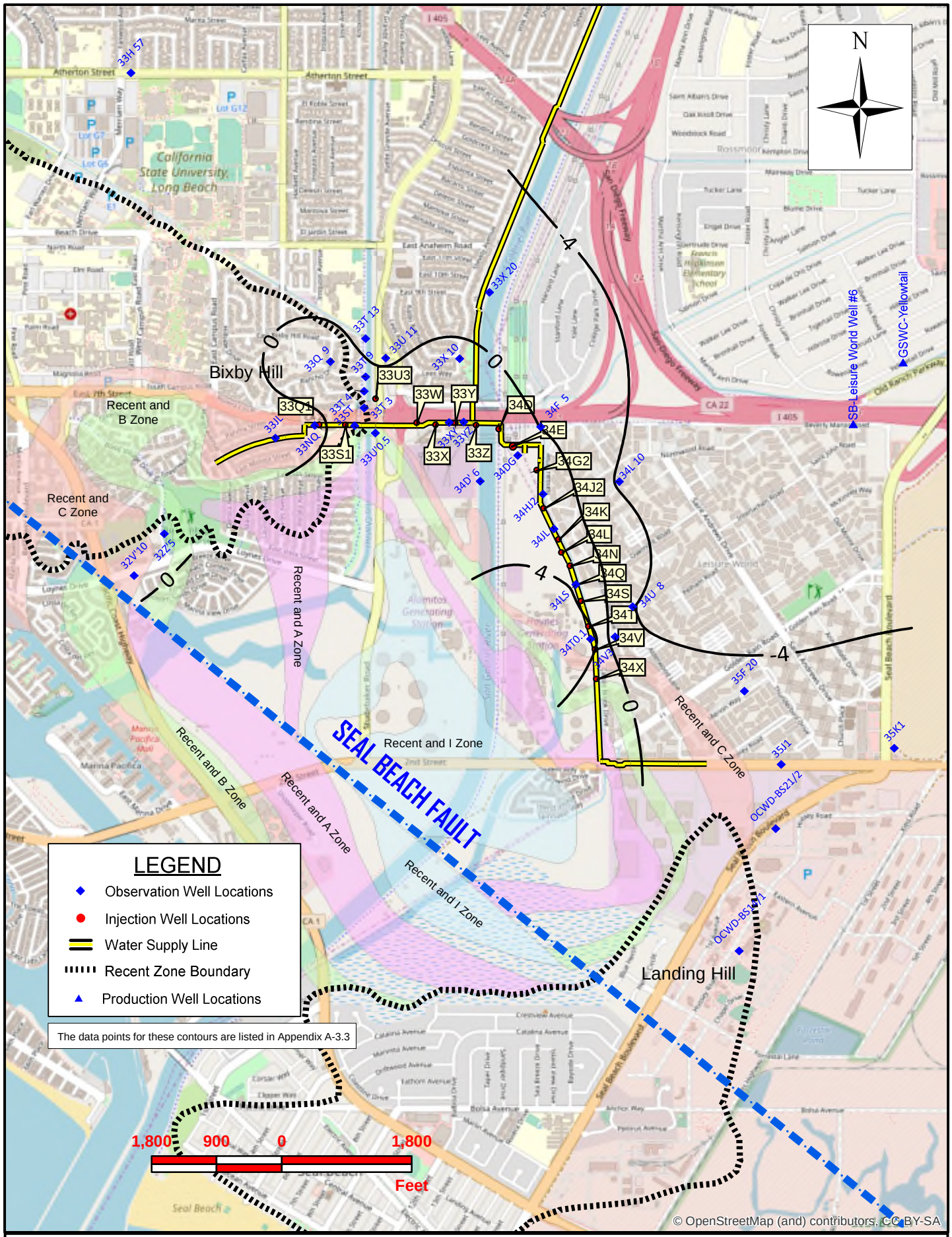


Public Works
LOS ANGELES COUNTY

Alamitos Barrier Project
B Zone Groundwater Elevation (ft) Contours, Spring 2021

A-3.1

B Zone GW.srf



Public Works
LOS ANGELES COUNTY

Alamitos Barrier Project
B Zone Change in Elevation (ft), Spring 2020 to Spring 2021

A-3.2

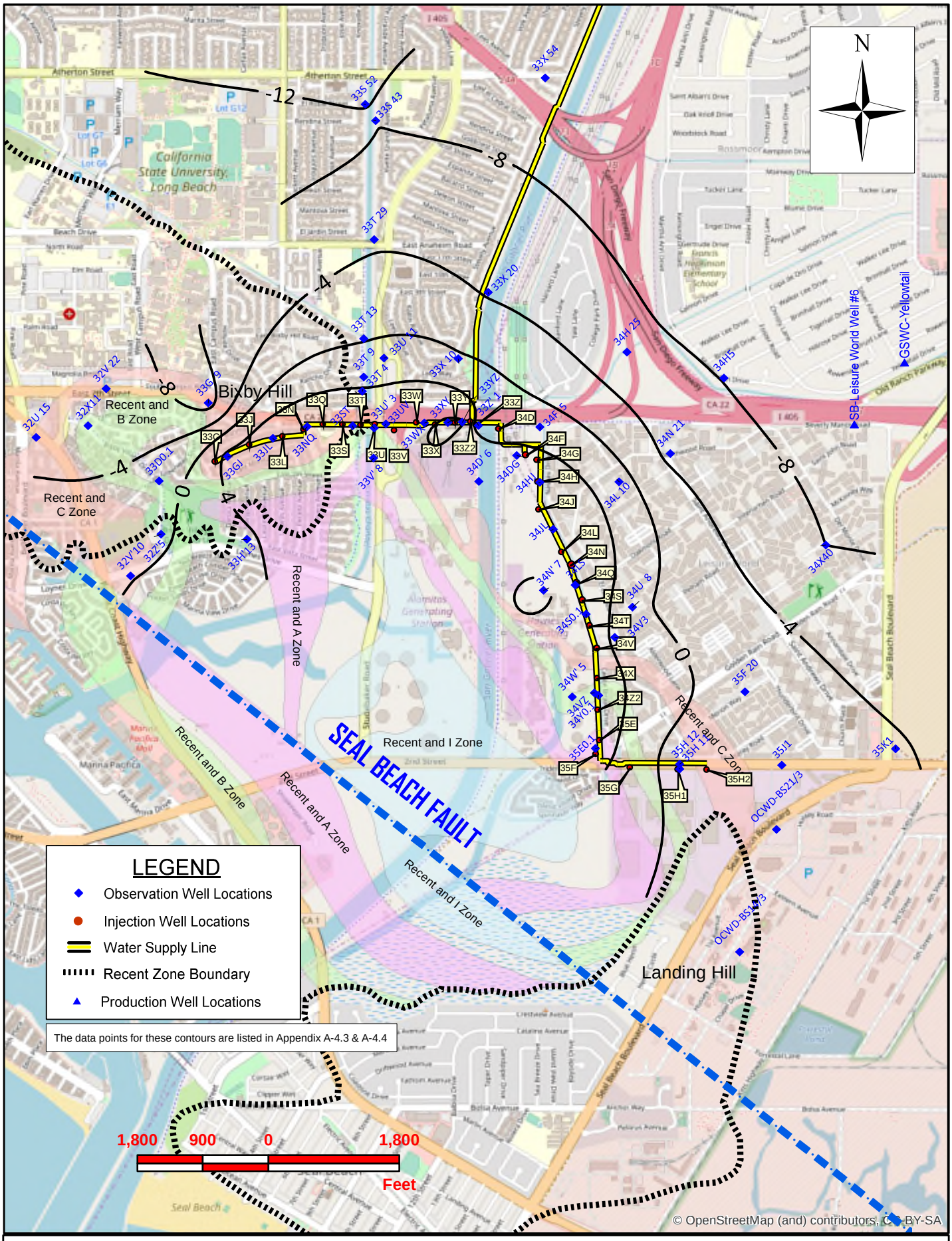
B zone GW.srf

ALAMITOS BARRIER PROJECT
B-Zone
Groundwater Elevation Data for Contours and Tables

POINT	PROJ	FCD	AQUIFER	DATE	FY 20-21 ELEV	P.E.[1]	Δ[2]	FY 19-20 ELEV2	CHANGE IN ELEV
1	32V'10	483G	B ZONE	20210203	-1.3			-1.0	-0.3
2	32Z'5	482W	B,A	20210204	-0.7			-0.3	-0.4
3	33H 57	481	B ZONE	20210513	-18.9			-15.3	-3.6
4	33JL	492BQ	B ZONE	20210324	3.9	0.8	3.1	4.3	-0.4
5	33NQ	492BN	B ZONE	20210324	4.1	0.7	3.4	4.9	-0.8
6	33Q 9	492CM	B ZONE	20210302	-0.8			-2.8	2.0
7	33ST	492BK	C,B	20210324	4.9	0.9	4.0	3.2	1.7
8	33T 3	492CL	B ZONE	20210302	4.2			2.5	1.7
9	33T 4	492CS	B ZONE	20210316	4.8			3.8	1.0
10	33T 9	492YY	B ZONE	20210316	6.1			5.6	0.5
11	33T 13	492AB	B ZONE	20210316	-1.8			-1.0	-0.8
12	33U 11	492AK	B ZONE	20210317	4.2			4.6	-0.4
13	33U'0.5	492BZ	B ZONE	20210302	4.9			3.3	1.6
14	33X 10	502BC	B ZONE	20210301	6.2			5.0	1.2
15	33X 20	502K	B ZONE	20210318	-5.6			-3.0	-2.6
16	33XY	502BM	B ZONE	20210324	10.1	6.3	3.8	7.3	2.9
17	33YZ	502AC	B ZONE	20210324	10.1	7.1	3.0	8.3	1.8
18	34D' 6	502BG	B ZONE	20210302	7.9			7.3	0.6
19	34DG	502Y	B ZONE	20210324	11.5	6.6	4.9	8.7	2.8
20	34F 5	502BS	B ZONE	20210302	8.1			8.2	-0.1
21	34HJ2	502CJ	B ZONE	20210324	8.0	5.9	2.1	4.9	3.1
22	34JL	503AQ	B ZONE	20210324	6.6	5.3	1.3	4.5	2.1
23	34L 10	502AL	B ZONE	20210302	0.4			4.9	-4.5
24	34LS	503BE	B ZONE	20210324	7.3	5.4	1.9	3.7	3.6
25	34T0.1	503AC	B ZONE	20210324	10.7	6.1	4.6	4.6	6.1
26	34U 8	513E	B ZONE	20210302	-1.3			2.6	-3.9
27	34V3	503CC	B ZONE	20210302	1.2			3.5	-2.3
28	34X40	513Q	B ZONE	20210301	-1.6				n/a
29	35F 20	513K	B ZONE	20210302	-1.2			2.0	-3.2
30	35J1	514M	B ZONE	20210324	-2.0	5.8	-7.8	0.6	-2.6
31	35K1	523A	B ZONE	20210325	-2.6	5.8	-8.4	-0.5	-2.1
32	OCWD-BS14/1		B ZONE	20210311	-2.5			-1.0	-1.5
33	OCWD-BS21/2		B ZONE	20210311	-3.1			-0.4	-2.7
				AVG=	2.5		AVG=	2.6	

[1] P.E. represents the protective elevations calcuated for internodal wells.
[2] Δ (+/-) represents how much groundwater level is above/below respective P.E.

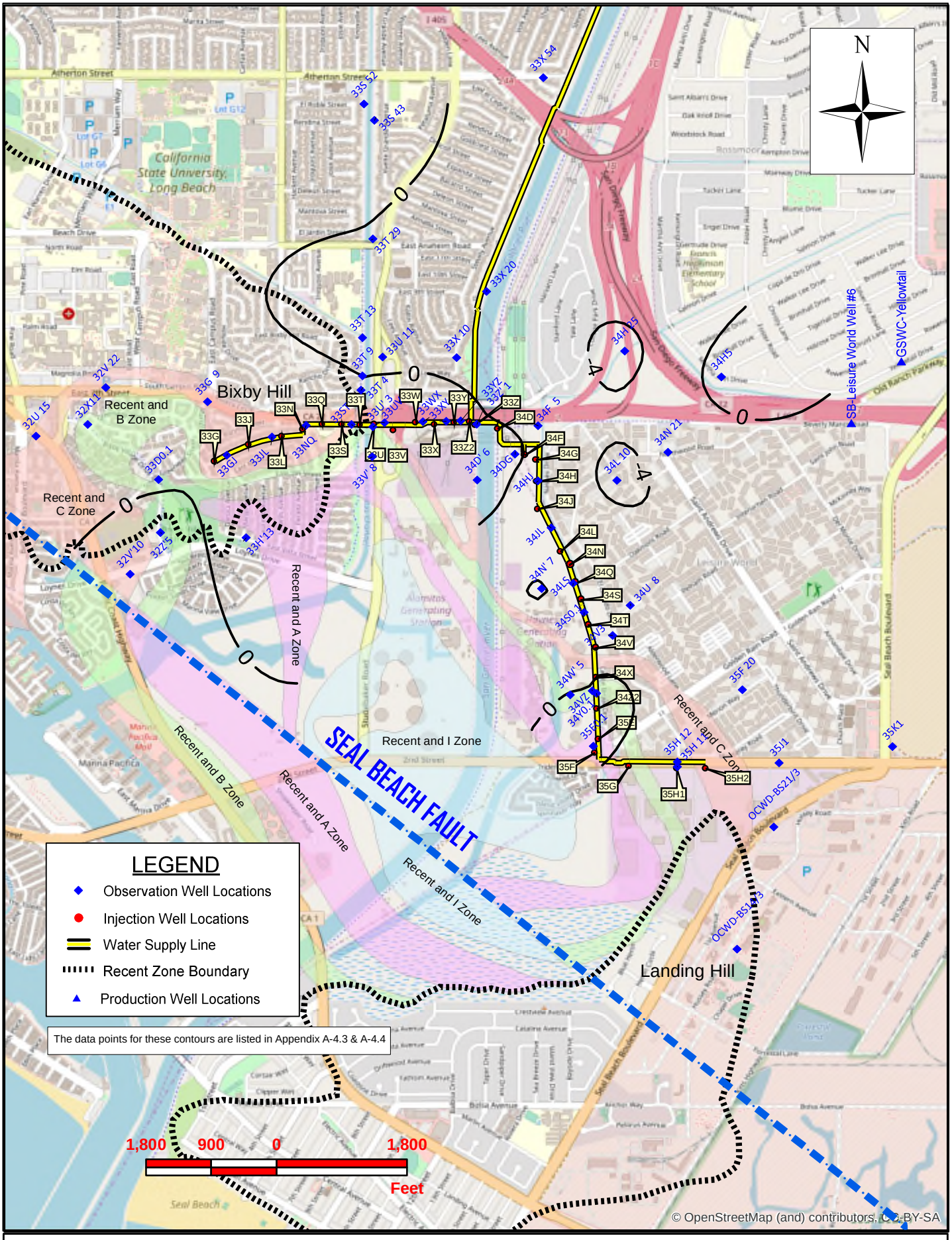
= A max. or min. elevation during that period.



Alamitos Barrier Project
A Zone Groundwater Elevation (ft) Contours, Spring 2021

A-4.1

A Zone GW.srf



Alamitos Barrier Project
A Zone Change in Elevation (ft), Spring 2020 to Spring 2021

A-4.2

A zone GW.srf

ALAMITOS BARRIER PROJECT
A-Zone
Groundwater Elevation Data for Contours and Tables (Page 1 of 2)

POINT	PROJ	FCD	AQUIFER	DATE	FY 20-21 ELEV	P.E.[1]	Δ[2]	FY 19-20 ELEV	CHANGE IN ELEV
1	32U 15	482M	A ZONE	20210203	-4.6			-5.9	1.3
2	32V 22	482P	A ZONE	20210204	-5.5			-5.3	-0.2
3	32V'10	483F	A ZONE	20210203	-0.1			0.6	-0.7
4	32X11	482S	A ZONE	20210301	-6.4			-7.8	1.4
5	32Z'5	482W	B,A	20210204	-0.7			-0.7	0.0
6	33D0.1	482U	A,I	20210311	-1.9			-2.5	0.6
7	33G 9	482F	A ZONE	20210204	-9.5			-11.7	2.2
8	33GJ	482X	A ZONE	20210302	5.0	1.4	3.6	0.9	4.1
9	33H'13	493YY	R,A	20210217	3.3			2.3	1.0
10	33JL	492BW	A,I	20210311	7.4	3.1	4.3	2.8	4.6
11	33NQ	492BP	A,I	20210324	7.2	3.6	3.6	3.2	4.0
12	33S 43	491E	A ZONE	20210211	-8.2			-8.4	0.2
13	33S 52	491H	A ZONE	20210211	-12.8			-13.0	0.2
14	33ST	492BL	A ZONE	20210311	7.9	2.8	5.1	3.3	4.6
15	33T 4	492CR	A ZONE	20210316	4.6			3.4	1.2
16	33T 9	492TT	A ZONE	20210316	2.3			2.6	-0.3
17	33T 13	492ZZ	A ZONE	20210316	-0.2			-1.0	0.8
18	33T 29	491C	A ZONE	20210211	-4.4			-4.2	-0.2
19	33U 11	492AJ	A ZONE	20210317	1.6			1.2	0.4
20	33U' 3	492WW	A ZONE	20210218	7.2			7.1	0.1
21	33UV	492BH	A ZONE	20210302	7.3	4.0	3.3	4.8	2.5
22	33V' 8	492BY	R,A	20210211	6.6			3.7	2.9
23	33WX	502AF	A ZONE	20210302	7.7	7.6	0.1	4.3	3.3
24	33X 10	502BD	A ZONE	20210301	0.5			-0.3	0.8
25	33X 20	502J	A ZONE	20210301	-4.3			-2.6	-1.7
26	33X 54	501	A,I	20210513	-10.0				n/a
27	33XY	502BN	A ZONE	20210302	8.4	8.0	0.4	5.5	2.9
28	33YZ	502AD	A ZONE	20210324	8.4	8.7	-0.3	5.4	3.0
29	33Z' 1	502G	A ZONE	20210315	2.5			2.4	0.1
30	34D' 6	502BH	A ZONE	20210302	6.6			4.1	2.5
31	34DG	502Z	A ZONE	20210324	5.1	8.5	-3.4	6.6	-1.5
32	34F 5	502BR	A ZONE	20210302	2.0			5.1	-3.1
33	34H 25	502AH	A ZONE	20210322	-6.8			-5.2	-1.6
34	34H5	512E	A ZONE	20210308	-8.1			-4.4	-3.7
35	34HJ	502BX	A ZONE	20210324	6.8	8.6	-1.8	4.3	2.5
36	34JL	503AP	A ZONE	20210324	7.9	7.8	0.1	4.5	3.3
37	34L 10	502AM	A ZONE	20210302	1.5			2.9	-1.4
38	34LS	503BD	A ZONE	20210324	8.3	7.8	0.5	5.0	3.3
39	34N 21	512B	A ZONE	20210209	-4.9			-0.9	-4.0
40	34N' 7	503AF	A ZONE	20210504	2.4			5.0	-2.6

[1] P.E. represents the protective elevations calcuated for internodal wells.
[2] Δ (+/-) represents how much groundwater level is above/below respective P.E.

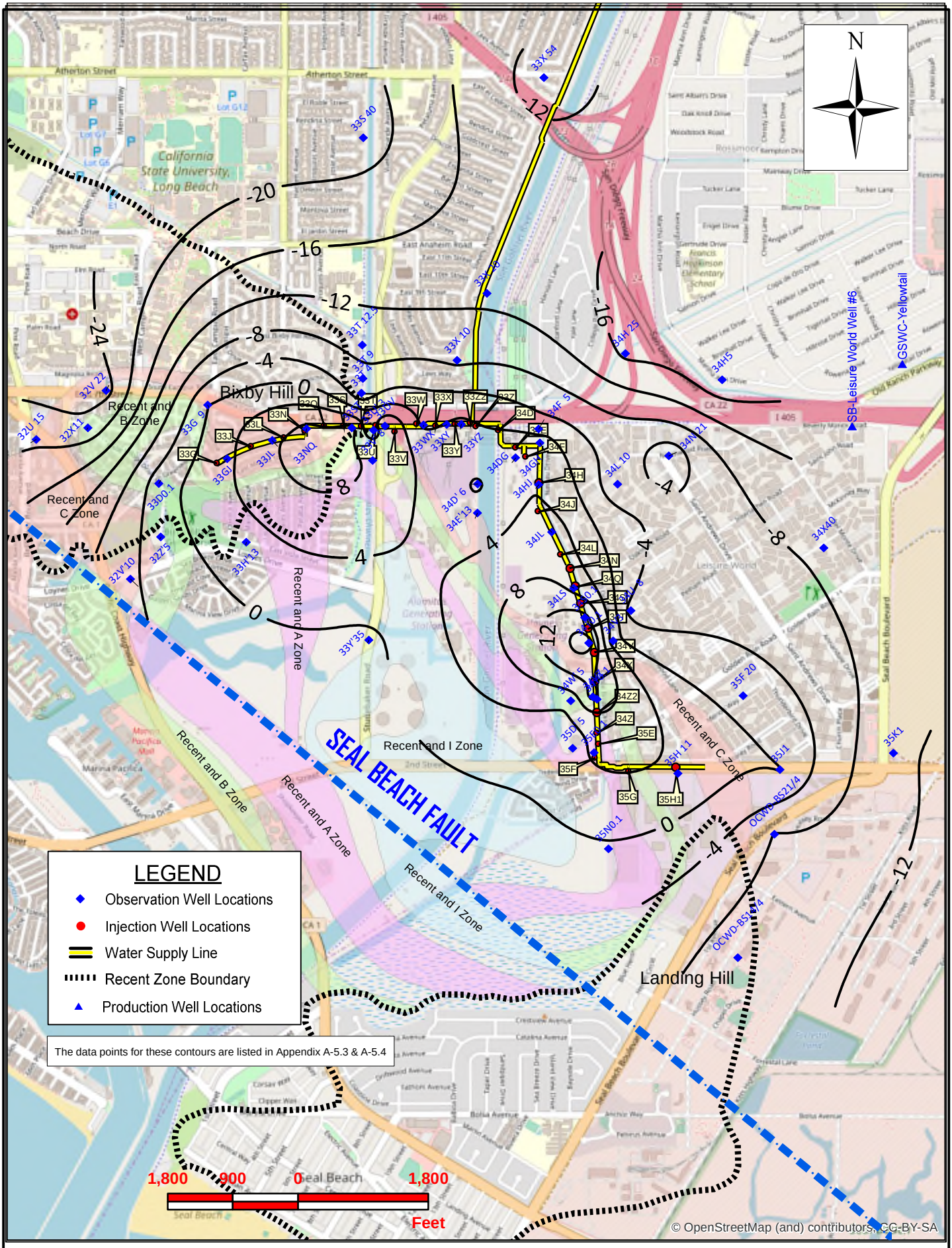
= A max. or min. elevation during that period.

ALAMITOS BARRIER PROJECT
A-Zone
Groundwater Elevation Data for Contours and Tables (Page 2 of 2)

POINT	PROJ	FCD	AQUIFER	DATE	FY 20-21 ELEV	P.E.[1]	Δ[2]	FY 19-20 ELEV	CHANGE IN ELEV
41	34S0.1	503BV	A ZONE	20210324	6.6	6.7	-0.1	6.2	0.5
42	34U 8	513F	A ZONE	20210302	0.6			3.2	-2.6
43	34V3	503CD	A ZONE	20210302	3.5			4.8	-1.3
44	34X40	513P	A	20210301	-8.0				n/a
45	34VZ	503BH	A ZONE	20210324	6.9	4.4	2.5	4.1	2.8
46	34W' 5	503AJ	A ZONE	20210204	5.9			5.1	0.8
47	34Y0.1	503CL	A ZONE	20210324	6.1	2.8	3.3	3.7	2.4
48	35E0.1	503BK	A ZONE	20210324	5.6	2.4	3.2	2.1	3.5
49	35F 20	513J	A ZONE	20210324	-0.7			1.3	-2.0
50	35H 11	514G	A ZONE	20210324	-1.3	3.8	-5.1	1.2	-2.5
51	35H 12	514D	A ZONE	20210324	-2.3	3.8	-6.1	-0.1	-2.2
52	35J1	514L	A ZONE	20210324	-2.1	6.2	-8.3	0.7	-2.8
53	35K1	523B	A ZONE	20210315	-3.6	6.2	-9.8	0.0	-3.6
54	OCWD-BS14/3		A ZONE	20210311	-3.7			-0.7	-3.0
55	OCWD-BS21/3		A ZONE	20210311	-3.1			0.2	-3.3
				AVG=	0.9		AVG=	0.9	

[1] P.E. represents the protective elevations calcuated for internodal wells.
[2] Δ (+/-) represents how much groundwater level is above/below respective P.E.

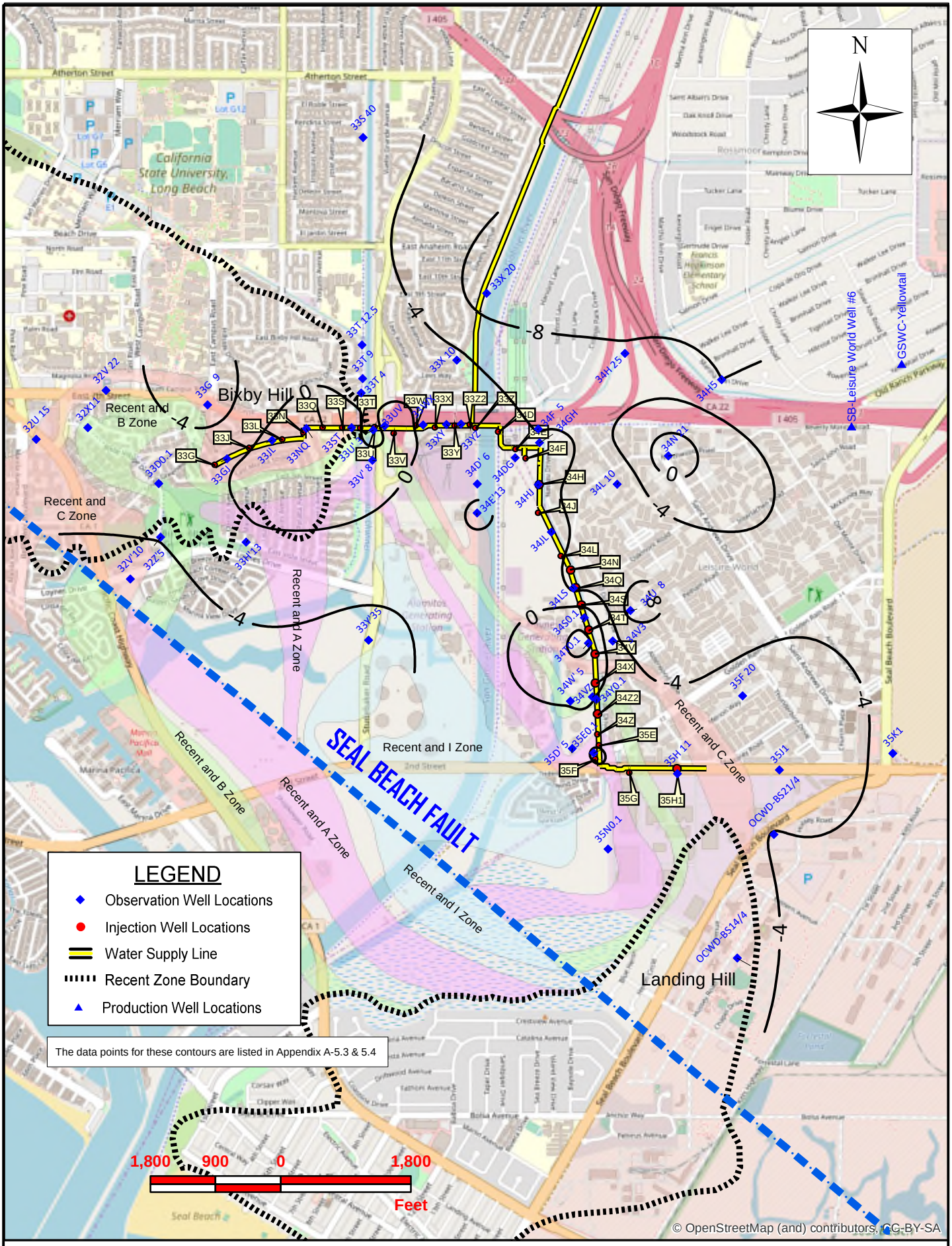
= A max. or min. elevation during that period.



Alamitos Barrier Project
I Zone Groundwater Elevation (ft) Contours, Spring 2021

A-5.1

I Zone GW.srf



Alamitos Barrier Project
I Zone Change in Elevation (ft), Fall 2020 to Fall 2021

A-5.2

I zone GW.srf

ALAMITOS BARRIER PROJECT
I-Zone
Groundwater Elevation Data for Contours and Tables (Page 1 of 2)

POINT	PROJ	FCD	AQUIFER	DATE	FY 20-21 ELEV	P.E.[1]	Δ[2]	FY 19-20 ELEV	CHANGE IN ELEV
1	32U 15	482L	I ZONE	20210203	-20.6			-18.4	-2.2
2	32V 22	482N	I ZONE	20210204	-25.3			-22.5	-2.8
3	32V'10	483E	I ZONE	20210203	-4.6			1.7	-6.3
4	32X11	482R	I ZONE	20210301	-22.5			-20.7	-1.8
5	32Z'5	482V	I ZONE	20210204	-2.1			1.7	-3.8
6	33D0.1	482U	A,I	20210311	-1.9			-2.0	0.1
7	33G 9	482G	I ZONE	20210204	-0.1			6.6	-6.7
8	33GJ	482Y	I ZONE	20210302	3.2	2.6	0.6	3.6	-0.4
9	33H'13	493XX	I ZONE	20210217	2.1			2.7	-0.6
10	33JL	492BW	A,I	20210311	7.4	3.1	4.3	6.4	1.0
11	33NQ	492BP	A,I	20210311	8.8	3.6	5.2	6.4	2.4
12	33S 40	491F	I ZONE	20210211	-21.9			-20.3	-1.6
13	33ST	492BM	I ZONE	20210311	9.0	4.2	4.8	5.3	3.7
14	33T 4	492CQ	I ZONE	20210302	-6.9			-5.2	-1.7
15	33T 9	492XX	I ZONE	20210316	-6.9			-5.0	-1.9
16	33T 12.5	492BT	I ZONE	20210222	-9.3			-8.8	-0.5
17	33U' 3	492QQ	I ZONE	20210224	0.4			5.1	-4.7
18	33UV	492BJ	I ZONE	20210317	9.0	6.1	2.9	6.0	3.0
19	33V' 8	492BX	I ZONE	20210211	7.4			5.5	1.9
20	33WX	502AG	I ZONE	20210323	-0.7	10.4	-11.1	0.2	-0.9
21	33X 10	502BE	I ZONE	20210301	-8.7			-5.6	-3.1
22	33X 20	502H	I ZONE	20210318	-12.7			-2.7	-10.0
23	33X 54	501	A,I	20210513	-10.0				n/a
24	33XY	502BP	I ZONE	20210324	0.3	11.0	-10.8	0.4	-0.1
25	33Y'35	493ZZ	I ZONE	20210208	-0.9			4.7	-5.6
26	33YZ	502AE	I ZONE	20210324	0.9	11.1	-10.2	1.6	-0.7
27	34D' 6	502BI	I ZONE	20210302	-0.4			3.0	-3.4
28	34DG	502AA	I ZONE	20210324	3.1	11.1	-8.0	4.3	-1.2
29	34E'13	503AT	I ZONE	20210302	0.6			5.2	-4.6
30	34F 5	502BQ	I ZONE	20210302	-1.9			2.7	-4.6
31	34GH	502BV	I ZONE	20210324	2.7	11.3	-8.6	3.6	-0.9
32	34H 25	502AJ	I ZONE	20210322	-16.7			-9.1	-7.6
33	34H5	512D	I ZONE	20210308	-19.1			-11.1	-8.0
34	34HJ	502BW	I ZONE	20210324	3.9	11	-7.1	7.2	-3.3
35	34JL	503AN	I ZONE	20210324	5.9	10.5	-4.6	8.3	-2.4
36	34L 10	502AN	I ZONE	20210302	-6.7			1.0	-7.7
37	34LS	503BC	I ZONE	20210324	7.0	9.5	-2.5	11.7	-4.7

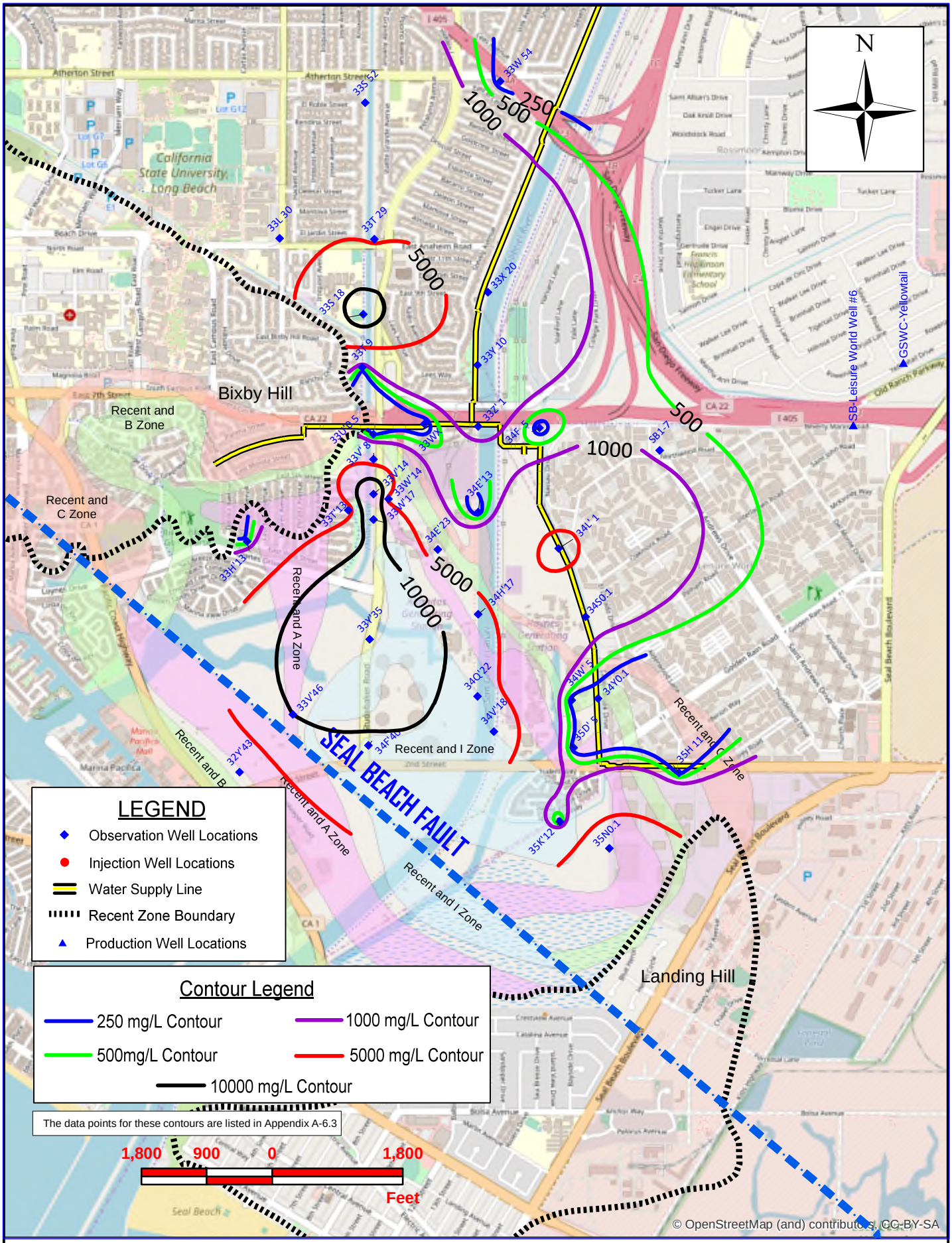
[1] P.E. represents the protective elevations calcuated for internodal wells.
[2] Δ (+/-) represents how much groundwater level is above/below respective P.E.
[ ] = A max. or min. elevation during that period.

ALAMITOS BARRIER PROJECT
I-Zone
Groundwater Elevation Data for Contours and Tables (Page 2 of 2)

POINT	PROJ	FCD	AQUIFER	DATE	FY 20-21 ELEV	P.E.[1]	Δ[2]	FY 19-20 ELEV	CHANGE IN ELEV
38	34N 21	512C	I ZONE	20210209	-1.2			-4.4	3.2
39	34S0.1	503BW	I ZONE	20210324	13.3	8.1	5.2	10.1	3.2
40	34T0.1	503AD	I ZONE	20210324	17.9	8.4	9.5	13.2	4.7
41	34U 8	513G	I ZONE	20210302	-5.3			4.1	-9.4
42	34V3	503CE	I ZONE	20210302	1.7			4.5	-2.8
43	34VZ	503BG	I ZONE	20210324	13.4	5.9	7.5	10.1	3.2
44	34W' 5	503AK	I ZONE	20210204	4.7			4.3	0.4
45	34Y0.1	503CM	I ZONE	20210324	10.2	4.8	5.4	13.1	-2.9
46	35D' 5	503AM	I ZONE	20210204	1.0			4.0	-3.0
47	35E0.1	503BJ	I ZONE	20210324	5.1	3.0	2.1	4.5	0.6
48	35F 20	513H	I ZONE	20210324	-1.6			0.9	-2.5
49	35H 11	514H	I ZONE	20210324	3.2	5.5	-2.3	5.2	-2.0
50	35J1	513M	I ZONE	20210324	0.1	4.8	-4.7	1.8	-1.7
51	35K1	523C	I ZONE	20210321	-11.3	4.8	-16.1	-6.8	-4.5
52	35N0.1	504N	I ZONE	20210204	-0.4			0.7	-1.1
53	OCWD-BS14/4		I ZONE	20210311	-9.9			-6.2	-3.7
54	OCWD-BS21/4		I ZONE	20210311	-8.1			-4.0	-4.1
				AVG=	-1.8		AVG=	0.5	

[1] P.E. represents the protective elevations calcuated for internodal wells.
[2] Δ (+/-) represents how much groundwater level is above/below respective P.E.

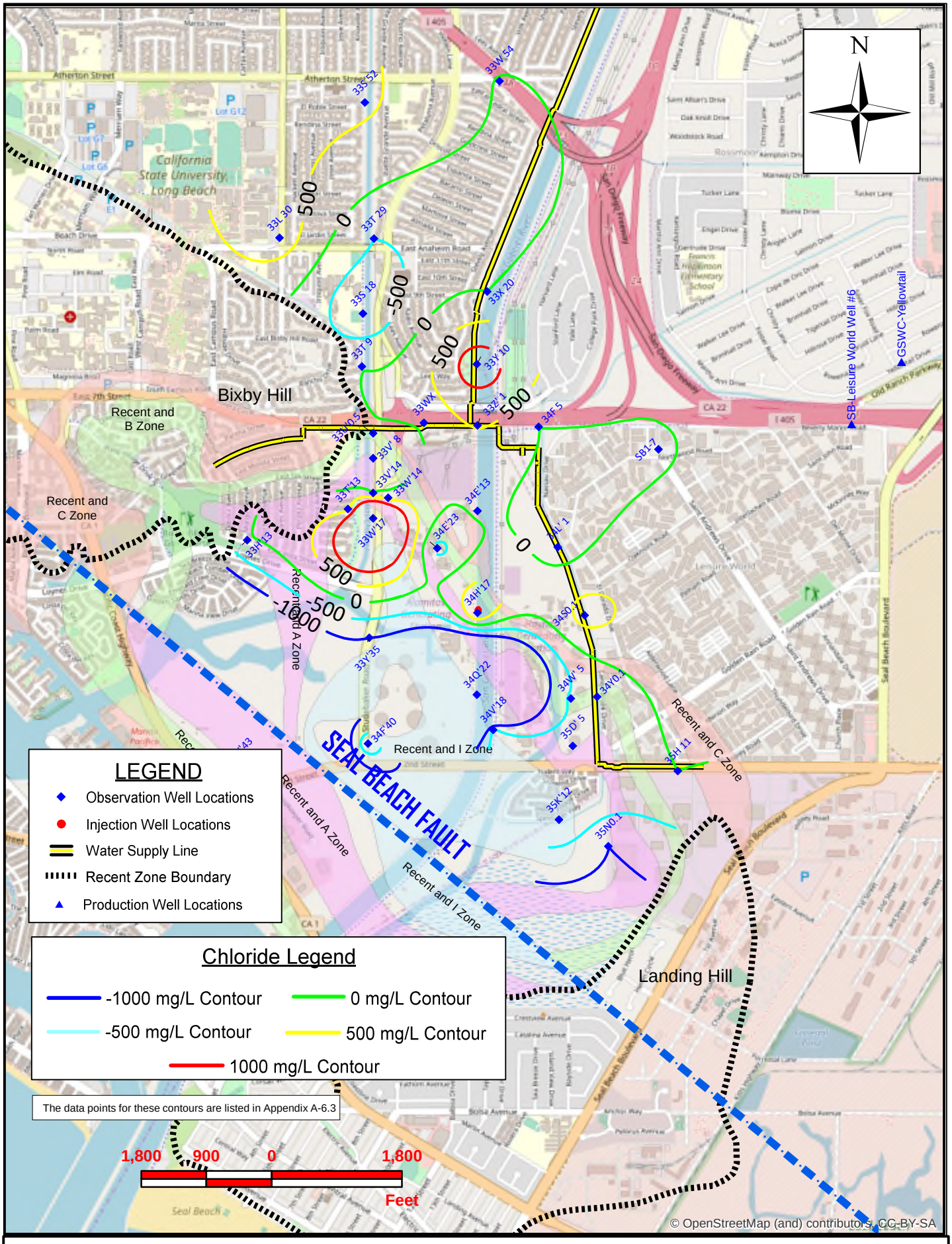
= A max. or min. elevation during that period.



Alamitos Barrier Project
R Zone Chloride Concentration (mg/L) Contours, Spring 2021

A-6.1

R Zone Cl.srf



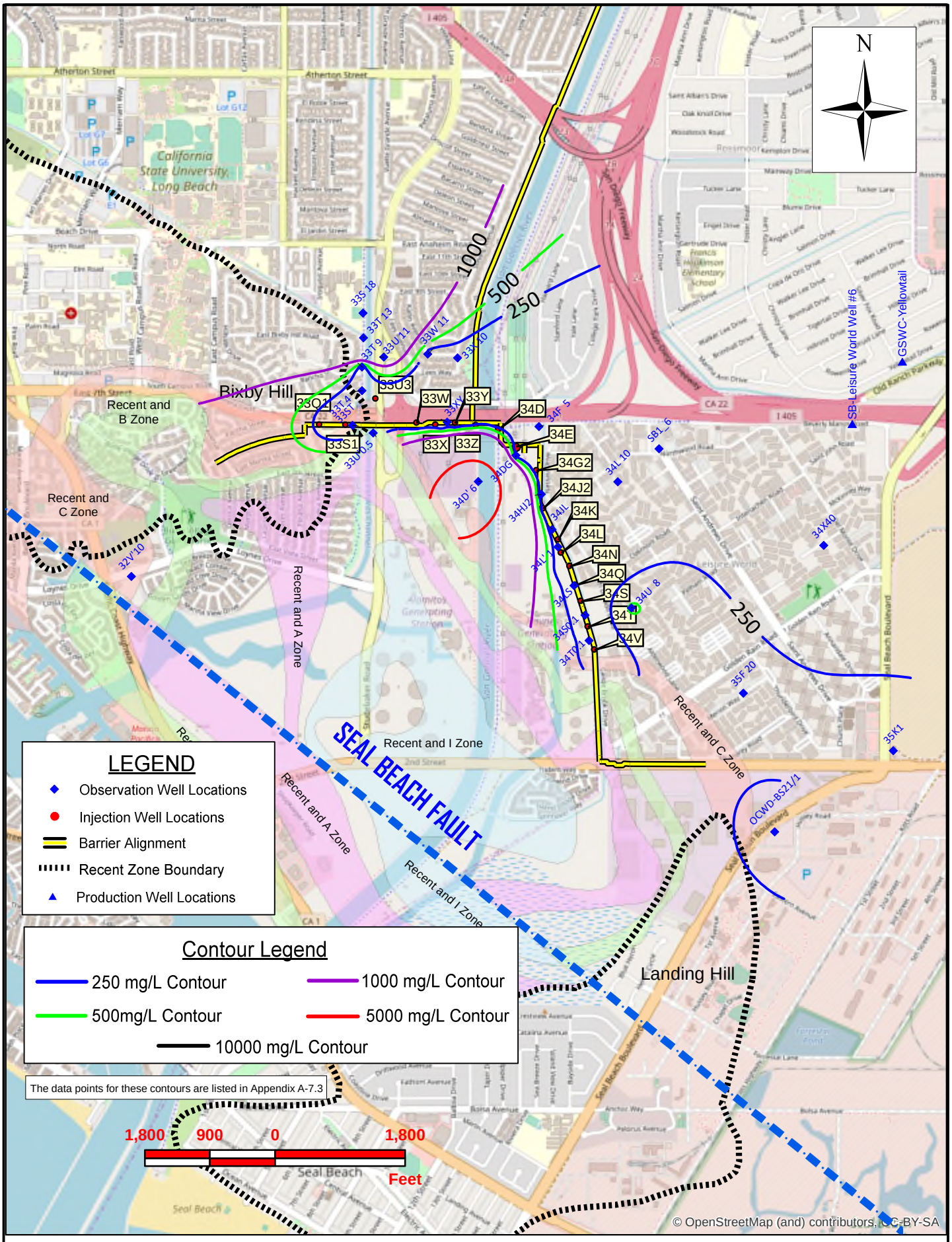
Alamitos Barrier Project
R Zone Change in Chloride Concentration, Spring 2020 to Spring 2021

A-6.2

R Zone Cl.srf

ALAMITOS BARRIER PROJECT
R-ZONE CHLORIDE CONCENTRATIONS
Chloride Data Used for Contours and Cross-Section

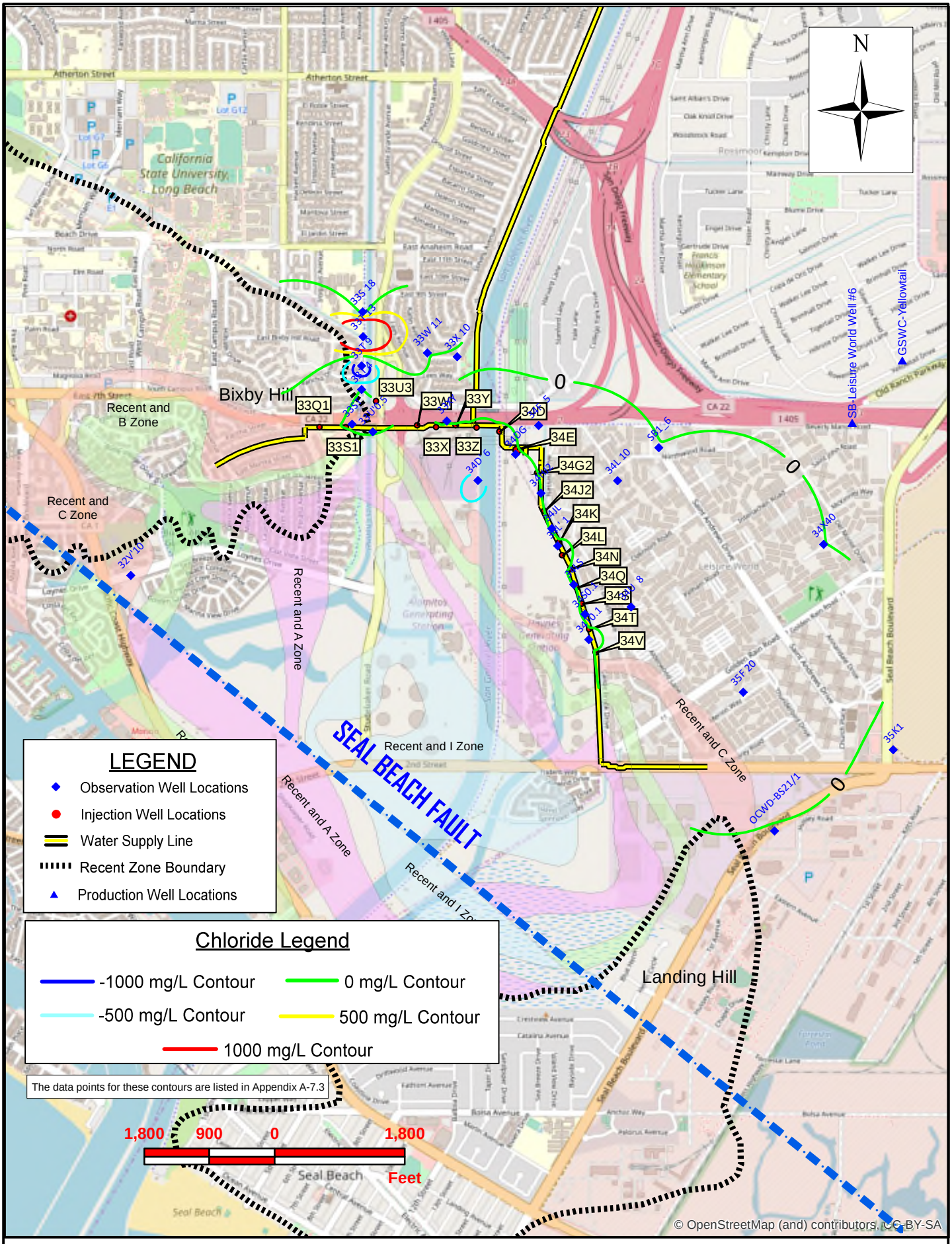
No.	PROJ	FCD	AQUIFER	DATE	For Cross-Section (Internodal Wells in **Bold**)						For Contours	MAX CHLORIDE	Change in Chloride
					ELEV 1 (ft)	CHL 1 (mg/L)	ELEV 2 (ft)	CHL 2 (mg/L)	ELEV 3 (ft)	CHL 3 (mg/L)	MAX CHL. 20-21	19-20	(FY20-21 - FY19-20)
1	32Y'43	493WW	Recent	20210223	-43	2,000					2,000	9,900	-7,900
2	33H'13	493YY	R,A	20210217	-18	300	-38	300	-58	330	330	370	-40
3	33L 30	491G	Recent	20210208	-50	2,200					2,200	1,400	800
4	33S 18	492AH	Recent	20210208	-67	13,000					13,000	14,000	-1,000
5	33S 52	491J	Recent	20210211	-54	3,000					3,000	2,400	600
6	33T 9	492CV	Recent	20210316	-21	290					290	300	-10
7	33T'13	492AU	Recent	20210218	-41	2,400	-51	3,100			3,100	2,700	400
8	33T 29	491D	Recent	20210211	-56	4,600					4,600	5,100	-500
9	**33U'0.5**	**492CB**	**Recent**	**20210317**	**-15**	**170**					**170**	**200**	**-30**
10	33V' 8	492BY	Recent	20210211	-24	3,400	-48	3,200			3,400	3,700	-300
11	33V'14	492JJ	Recent	20210211	-67	18,000					18,000	18,000	0
12	33V'46	493UU	Recent	20210223	-61	10,000					10,000		n/a
13	33W 54	501C	Recent	20210209	-33	120	-53	120			120	140	-20
14	33W'14	492AT	Recent	20210216	-46	3,800	-66	2,300			3,800	3,500	300
15	33W'17	493PP	Recent	20210211	-41	5,800	-51	13,000			13,000	9,200	3,800
16	**33WX**	**502AZ**	**Recent**	**20210323**	**-45**	**53**					**53**	**11**	**42**
17	33X 20	502L	Recent	20210318	-68	2,800					2,800	2,800	0
18	33Y 10	502BA	Recent	20210208	-58	610	-83	3,500			3,500	2,100	1,400
19	33Y'35	493AB	Recent	20210208	-36	22,000					22,000	23,000	-1,000
20	**33Z' 1**	**502AU**	**Recent**	**20210315**	**-46**	**1,200**	**-56**	**1,500**			**1,500**	**960**	**540**
21	34E'13	503AU	Recent	20210209	-19	73	-52	100			100	37	63
22	34E'23	503X	Recent	20210216	-43	2,800					2,800	3,500	-700
23	34F 5	502BT	Recent	20210322	-136	79	-146	76	-156	74	79	75	4
24	34F'40	483J	Recent	20210210	-40	8,400					8,400	8,500	-100
25	34H'17	503Y	Recent	20210210	-46	5,700					5,700	4,600	1,100
26	**34L' 1**	**503P**	**Recent**	**20210308**	**-57**	**6,400**					**6,400**	**6,700**	**-300**
27	34Q'22	503T	Recent	20210218	-42	4,400	-57	5,800			5,800	13,000	-7,200
28	**34S0.1**	**503BT**	**Recent**	**20210303**	**-59**	**1,500**	**-69**	**1,600**			**1,600**	**880**	**720**
29	34V'18	503V	Recent	20210211	-48	8,300					8,300	8,700	-400
30	34W' 5	503AH	Recent	20210204	-51	100					100	530	-430
31	**34Y0.1**	**503CK**	**Recent**	**20210303**	**-60**	**87**	**-70**	**140**			**140**	**620**	**-480**
32	35D' 5	503AL	Recent	20210204	-57	120					120	390	-270
33	**35H 11**	**514F**	**Recent**	**20210315**	**-42**	**140**	**-65**	**150**			**150**	**150**	**0**
34	35K'12	504R	Recent	20210203	-44	150	-54	150			150	170	-20
35	35N0.1	504M	Recent	20210204	-38	10,000	-62	10,000			10,000	11,000	-1,000
36	SB1-7		Recent	20210325		820					820	870	-50



Alamitos Barrier Project
C Zone Chloride Concentration (mg/L) Contours, Spring 2021

A-7.1

C Zone Cl.srf



Alamitos Barrier Project
C Zone Change in Chloride Concentration, Spring 2020 to Spring 2021

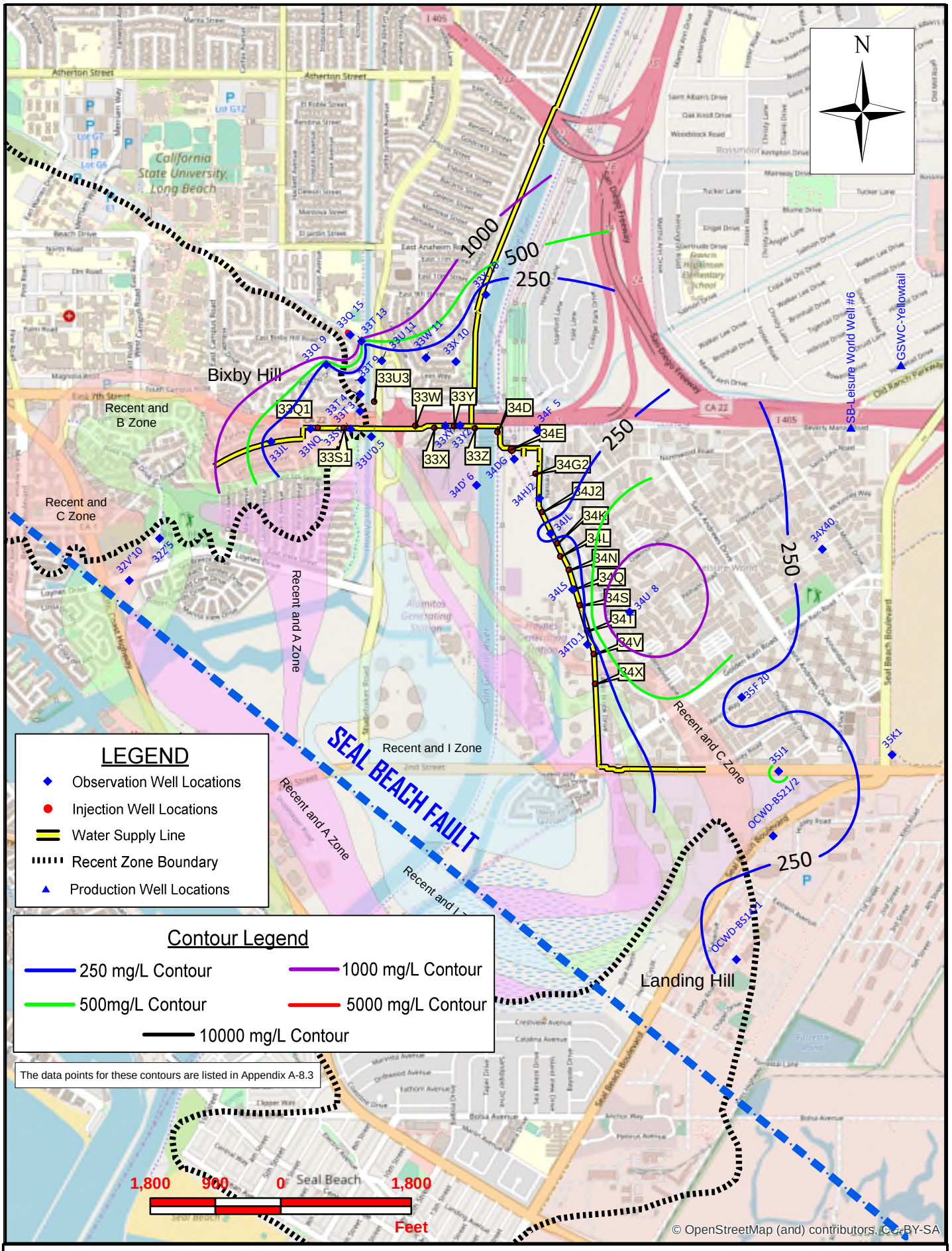
A-7.2

C Zone Cl.srf

ALAMITOS BARRIER PROJECT
C-ZONE CHLORIDE CONCENTRATIONS
Chloride Data Used for Contours and Cross-Section

No.	PROJ	FCD	AQUIFER	DATE	For Cross-Section (Internodal Wells in **Bold**)						For Contours	MAX CHLORIDE 19-20	Change in Chloride (FY20-21 - FY19-20)
					ELEV 1 (ft)	CHL 1 (mg/L)	ELEV 2 (ft)	CHL 2 (mg/L)	ELEV 3 (ft)	CHL 3 (mg/L)	MAX CHL. 20-21		
1	32V'10	483H	C ZONE	20210203	-37	650					650	830	-180
2	33S 18	492AG	C ZONE	20210208	-225	2,700					2,700	2,900	-200
3	**33ST**	**492BK**	**C,B**	**20210311**	**-25**	**69**					**69**	**64**	**5**
4	33T 13	492AC	C ZONE	20210316	-199	4,100					4,100	580	3,520
5	33T 4	492CT	C ZONE	20210316	-56	150					150	110	40
6	33T 9	492CU	C ZONE	20210316	-129	70	-144	70			70	1,900	-1,830
7	33U 11	492AL	C ZONE	20210317	-188	1,700					1,700		n/a
8	33U'0.5	492CA	C ZONE	20210317	-39	83					83	76	7
9	33W 11	502R	C ZONE	20210412	-183	85	-216	81			85	75	10
10	33X 10	502BB	C ZONE	20210208	-190	85	-215	86			86	94	-8
11	**33XY**	**502BL**	**C ZONE**	**20210323**	**-194**	**74**	**-210**	**74**			**74**	**67**	**7**
12	34D' 6	502BF	C ZONE	20210210	-125	9,100					9,100	9,700	-600
13	**34DG**	**502X**	**C ZONE**	**20210323**	**-190**	**76**	**-205**	**76**			**76**	**95**	**-19**
14	34F 5	502BU	C ZONE	20210322	-191	78	-201	72	-211	71	78	71	7
15	**34HJ2**	**502CH**	**C ZONE**	**20210303**	**-148**	**84**	**-158**	**84**			**84**	**80**	**4**
16	**34JL**	**503AR**	**C ZONE**	**20210303**	**-160**	**100**					**100**	**80**	**20**
17	**34L' 1**	**503N**	**C ZONE**	**20210308**	**-162**	**71**					**71**	**230**	**-159**
18	34L 10	502AK	C ZONE	20210216	-166	250					250	81	169
19	**34LS**	**503BF**	**C ZONE**	**20210303**	**-133**	**99**	**-151**	**72**	**-163**	**95**	**99**	**92**	**7**
20	**34S0.1**	**503BU**	**C ZONE**	**20210303**	**-129**	**110**	**-139**	**100**			**110**	**69**	**41**
21	**34T0.1**	**503AB**	**C ZONE**	**20210303**	**-134**	**200**					**200**	**630**	**-430**
22	34U 8	513D	C ZONE	20210325	-150	550	-165	280			550	100	450
23	34X40	513R	C ZONE	20210412	-85	55	-101	61			61	59	2
24	35F 20	513L	C ZONE	20210324	-70	160	-78	300	-85	170	300	84	216
25	**35K1**	**523D**	**C ZONE**	**20210315**	**-88**	**260**	**-98**	**350**			**350**	**390**	**-40**
26	OCWD-BS21/1		C ZONE	20210223		204					204	213	-9
27	SB1_6		C ZONE	20210325		71					71	68	3
28	33Q1	DP1									50	50	n/a
29	33S1	DP2									50	50	n/a
30	33U3	DP3									50	50	n/a
31	33W	DP4									50	50	n/a
32	33X	DP5									50	50	n/a
33	33Y	DP6									50	50	n/a
34	33Z	DP7									50	50	n/a
35	34D	DP8									50	50	n/a
36	34E	DP9									50	50	n/a
37	34G2	DP10									50	50	n/a
38	34J2	DP11									50	50	n/a
39	34K	DP12									50	50	n/a
40	34L	DP13									50	50	n/a
41	34N	DP14									50	50	n/a
42	34Q	DP15									50	50	n/a
43	34T	DP16									50	50	n/a
44	34S	DP17									50	50	n/a
45	34V	DP18									50	50	n/a

DP = Dummy Point with an assumed chloride concentration of 50 mg/L placed at wells that were injecting into this zone during this reporting period.

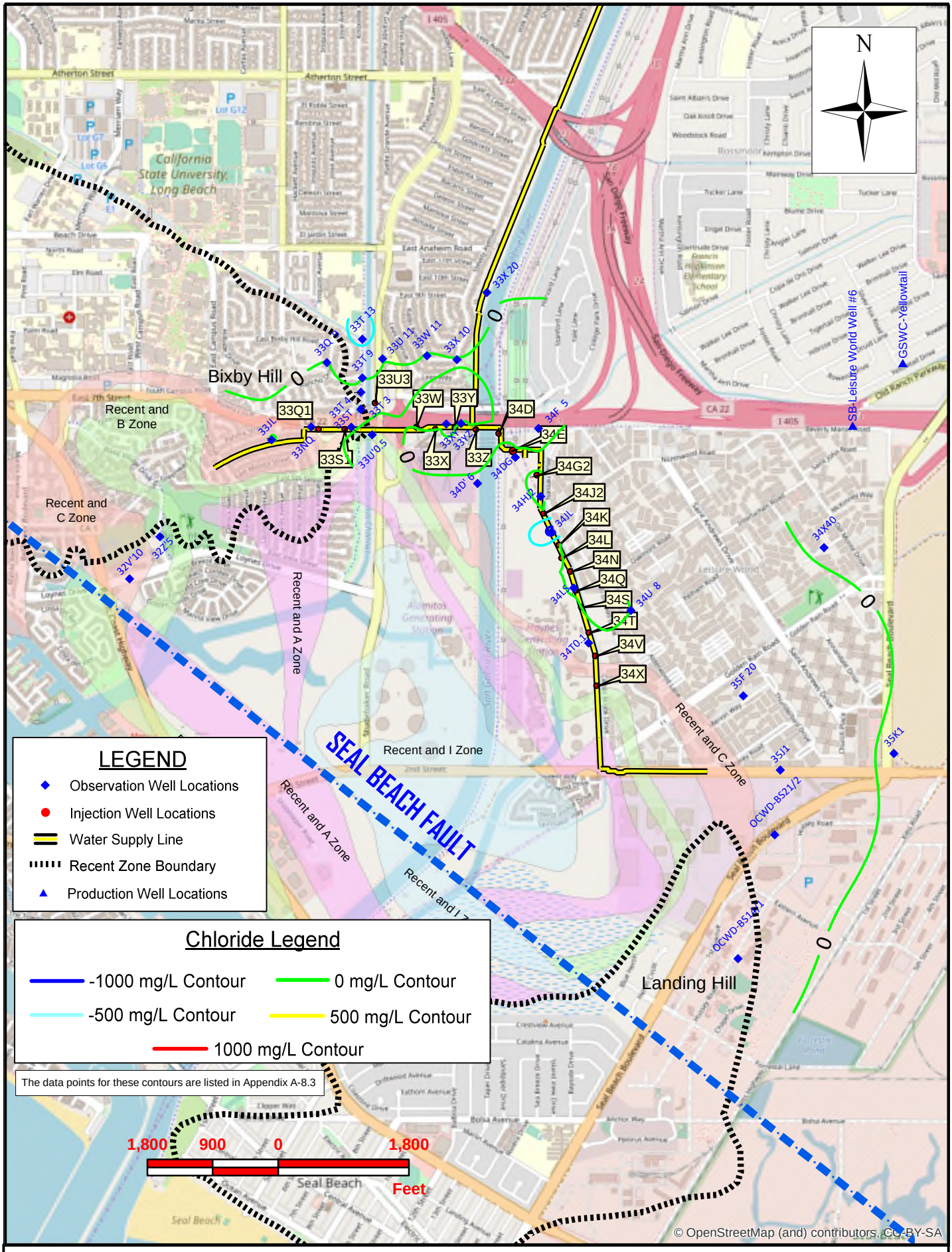


Public Works
LOS ANGELES COUNTY

Alamitos Barrier Project
B Zone Chloride Concentration (mg/L) Contours, Spring 2021

A-8.1

B zone Cl.srf



Alamitos Barrier Project
B Zone Change in Chloride Concentration, Spring 2020 to Spring 2021

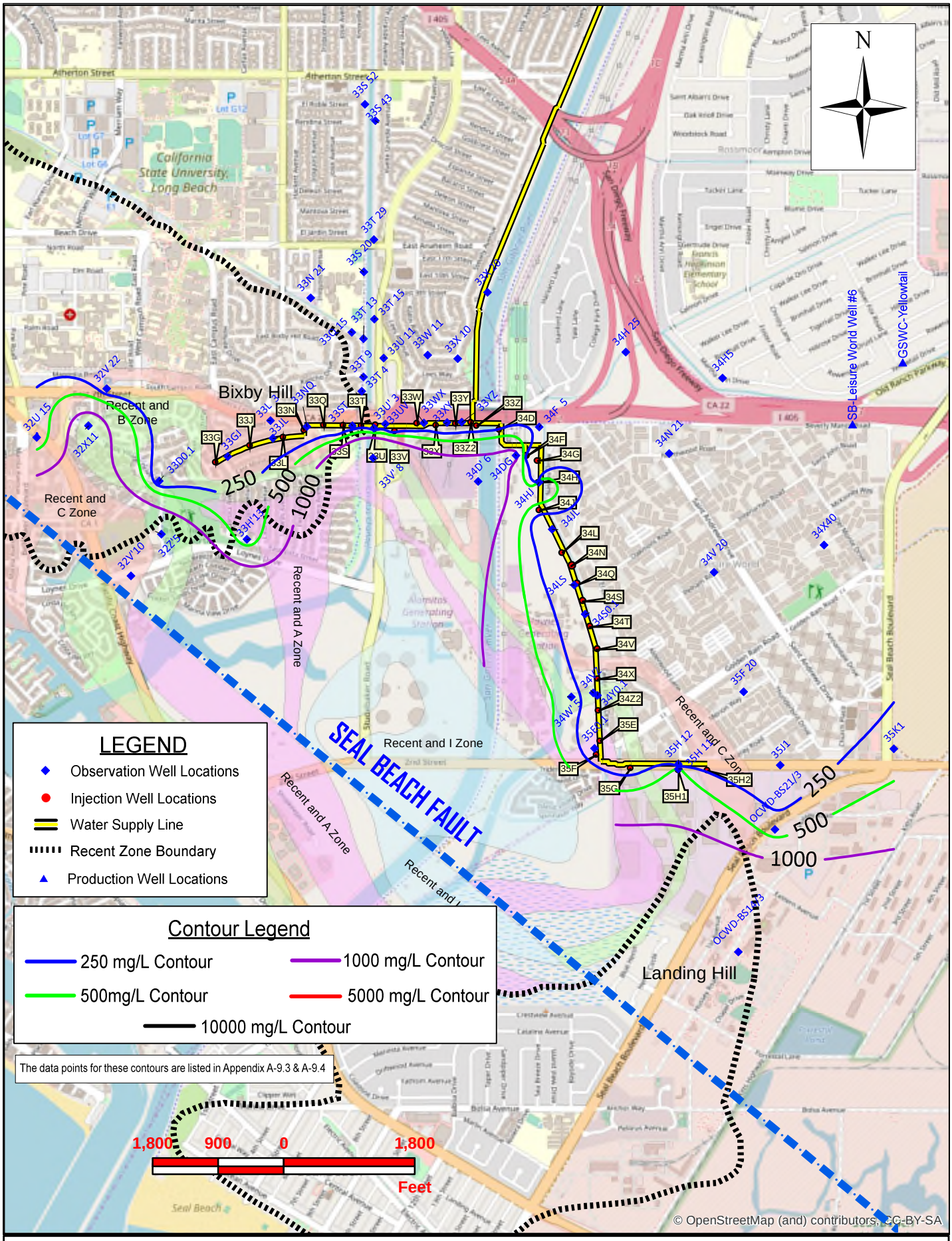
A-8.2

B Zone Cl.srf

ALAMITOS BARRIER PROJECT
B-ZONE CHLORIDE CONCENTRATIONS
Chloride Data Used for Contours and Cross-Section

No.	PROJ	FCD	DATE	AQUIFER	For Cross-Section (Internodal Wells in **Bold**)						For Contours	MAX CHLORIDE	Change in Chloride
					ELEV 1 (ft)	CHL 1 (mg/L)	ELEV 2 (ft)	CHL 2 (mg/L)	ELEV 3 (ft)	CHL 3 (mg/L)	MAX CHL. 20-21	19-20	(FY20-21 - FY19-20)
1	32V'10	483G	B ZONE	20210203	-62	3,100					3,100	3,100	0
2	32Z'5	482W	B,A	20210204	-20	880	-30	920	-40	1,900	1,900	1,600	300
3	**33JL**	**492BQ**	**B ZONE**	**20210311**	**3**	**97**	**-7**	**97**			**97**	**100**	**-3**
4	**33NQ**	**492BN**	**B ZONE**	**20210311**	**-3**	**80**	**-14**	**78**			**80**	**57**	**23**
5	33Q 9	492CM	B ZONE	20210208	-85	82	-95	86	-105	110	110	95	15
6	33Q 15	492AN	B ZONE	20210224	-263	5,300					5,300		n/a
7	**33ST**	**492BK**	**C,B**	**20210311**	**-25**	**69**					**69**	**64**	**5**
8	33T 13	492AB	B ZONE	20210316	-254	320					320	77	243
9	33T 3	492CL	B ZONE	20210211	-40	95	-57	93	-75	94	95	61	34
10	33T 4	492CS	B ZONE	20210316	-91	62					62	110	-48
11	33T 9	492YY	B ZONE	20210316	-163	110					110	980	-870
12	33U 11	492AK	B ZONE	20210317	-260	78					78	74	4
13	33U'0.5	492BZ	B ZONE	20210317	-57	53					53	88	-35
14	33W 11	502S	B ZONE	20210412	-241	100	-269	130			130	120	10
15	33X 10	502BC	B ZONE	20210208	-275	76					76	75	1
16	33X 20	502K	B ZONE	20210318	-266	76					76	86	-10
17	**33XY**	**502BM**	**B ZONE**	**20210323**	**-244**	**73**					**73**	**250**	**-177**
18	**33YZ**	**502AC**	**B ZONE**	**20210324**	**-214**	**77**	**-263**	**77**			**77**	**64**	**13**
19	34D' 6	502BG	B ZONE	20210210	-180	140	-194	92			140	150	-10
20	**34DG**	**502Y**	**B ZONE**	**20210323**	**-232**	**70**	**-257**	**71**			**71**	**92**	**-21**
21	34F 5	502BS	B ZONE	20210322	-231	73	-260	75			75	69	6
22	**34HJ2**	**502CJ**	**B ZONE**	**20210303**	**-203**	**74**	**-215**	**74**	**-228**	**93**	**93**	**75**	**18**
23	**34JL**	**503AQ**	**B ZONE**	**20210303**	**-195**	**480**	**-211**	**430**			**480**	**1,800**	**-1,320**
24	**34LS**	**503BE**	**B ZONE**	**20210303**	**-188**	**76**					**76**	**66**	**10**
25	**34T0.1**	**503AC**	**B ZONE**	**20210303**	**-174**	**86**	**-207**	**85**	**-239**	**86**	**86**	**92**	**-6**
26	34U 8	513E	B ZONE	20210325	-225	2,100					2,100	2,100	0
27	34X40	513Q	B ZONE	20210412	-137	26					26	16	10
28	35F 20	513K	B ZONE	20210324	-115	110					110	240	-130
29	**35J1**	**514M**	**B ZONE**	**20210408**	**-128**	**380**	**-143**	**450**	**-148**	**550**	**550**	**720**	**-170**
30	**35K1**	**523A**	**B ZONE**	**20210315**	**-127**	**100**	**-142**	**130**	**-157**	**150**	**150**	**120**	**30**
31	OCWD-BS14/1		B ZONE	20210203		219					219	237	-18
32	OCWD-BS21/2		B ZONE	20210223		277					277	307	-30
33	33Q1	DP1									50	50	n/a
34	33U3	DP2									50	50	n/a
35	33W	DP3									50	50	n/a
36	33X	DP4									50	50	n/a
37	33Y	DP5									50	50	n/a
38	33Z	DP6									50	50	n/a
39	34D	DP7									50	50	n/a
40	34E	DP8									50	50	n/a
41	34G2	DP9									50	50	n/a
42	34J2	DP10									50	50	n/a
43	34K	DP11									50	50	n/a
44	34L	DP12									50	50	n/a
45	34N	DP13									50	50	n/a
46	34Q	DP14									50	50	n/a
47	34S	DP15									50	50	n/a
48	34T	DP16									50	50	n/a
49	34V	DP17									50	50	n/a
50	34X	DP18									50	50	n/a

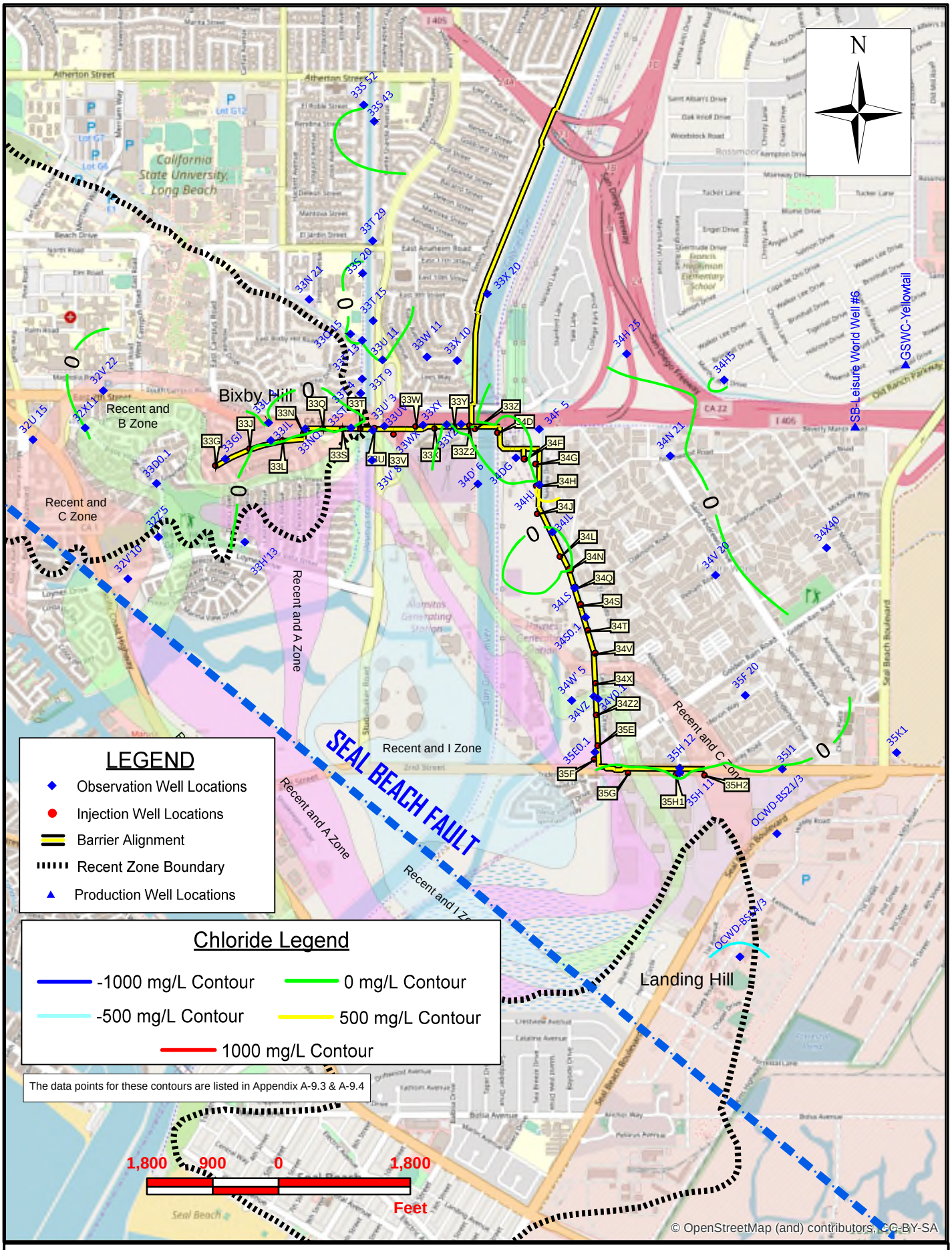
DP = Dummy Point with an assumed chloride concentration of 50 mg/L. Placed at wells that were injecting into this zone during this reporting period.



Alamitos Barrier Project
A Zone Chloride Concentration (mg/L) Contours, Spring 2021

A-9.1

A Zone Cl.srf



Alamitos Barrier Project
A Zone Change Chloride Concentration, Spring 2020 to Spring 2021

A-9.2

A Zone Cl.srf

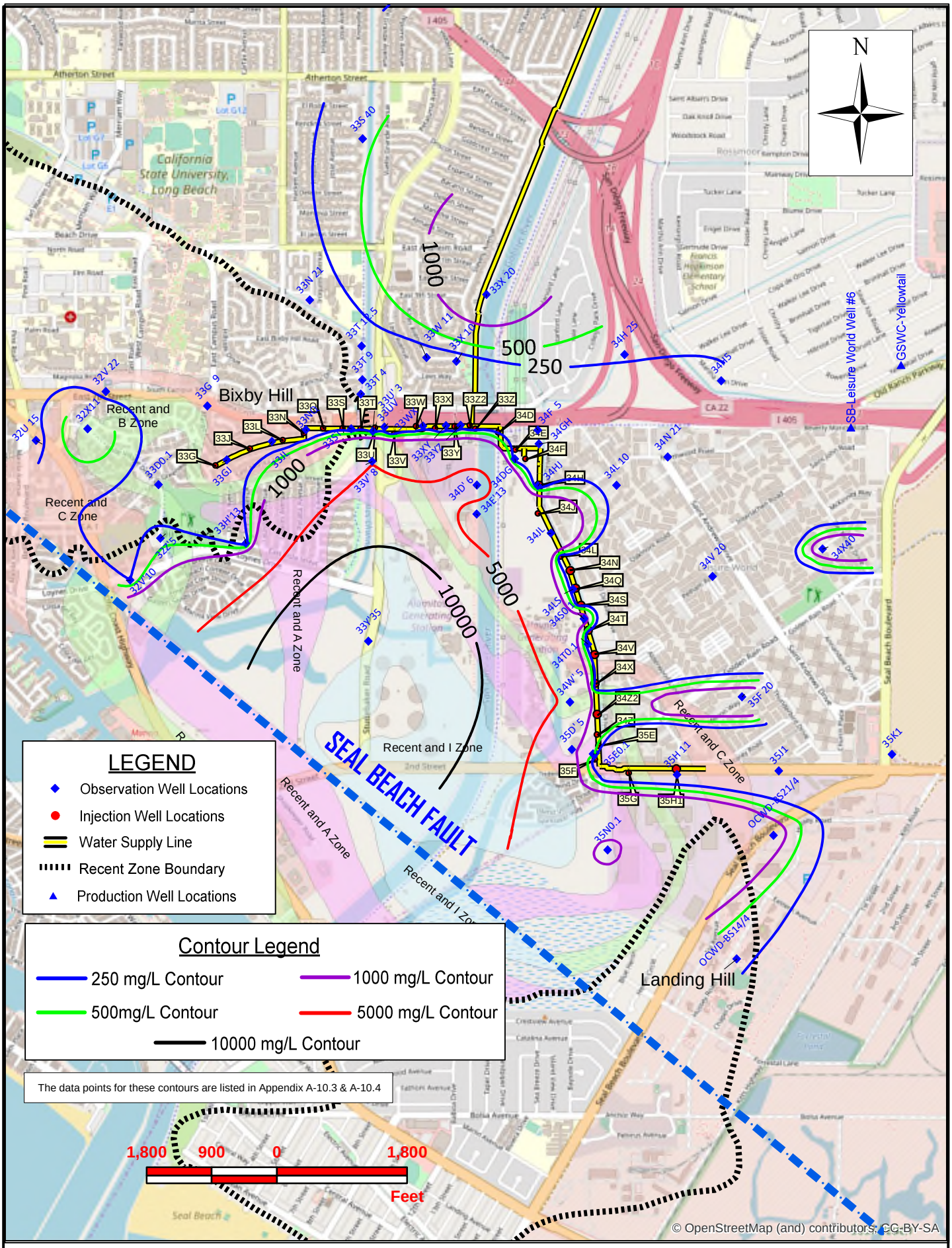
ALAMITOS BARRIER PROJECT
A-ZONE CHLORIDE CONCENTRATIONS
Chloride Data Used for Contours and Cross-Section

No.	PROJ	FCD	AQUIFER	DATE	For Cross-Section (Internodal Wells in **Bold**)						For Contours	MAX CHLORIDE 19-20	Change in Chloride (FY20-21 - FY19-20)
					ELEV 1 (ft)	CHL 1 (mg/L)	ELEV 2 (ft)	CHL 2 (mg/L)	ELEV 3 (ft)	CHL 3 (mg/L)	MAX CHL. 20-21		
1	32U 15	482M	A ZONE	20210203	-17	220					220	260	-40
2	32V 22	482P	A ZONE	20210204	-11	89					89	64	25
3	32V'10	483F	A ZONE	20210203	-90	3,200	-105	3,400			3,400	3,500	-100
4	32X11	482S	A ZONE	20210225	-9	190	-24	1,500			1,500	1,500	0
5	32Z'5	482W	B,A	20210204	-20	880	-30	920	-40	1,900	1,900	1,600	300
6	33D0.1	482U	A,I	20210311	-24	80	-49	81	-74	82	82	80	2
7	**33GJ**	**482X**	**A ZONE**	**20210225**	**-35**	**78**					**78**	**63**	**15**
8	33H'13	493YY	R,A	20210217	-18	300	-38	300	-58	330	330	370	-40
9	**33JL**	**492BW**	**A,I**	**20210311**	**-41**	**68**	**-79**	**65**	**-116**	**66**	**68**	**65**	**3**
10	33L 3	492	A ZONE	20210222	-60	69					69	70	-1
11	33N 21	492BU	A ZONE	20210208	-305	170	-330	170	-346	170	170	240	-70
12	**33NQ**	**492BP**	**A,I**	**20210311**	**-48**	**71**	**-92**	**69**	**-136**	**69**	**71**	**63**	**8**
13	33Q 15	492AM	A ZONE	20210224	-337	91					91	87	4
14	33S 20	492BR	A ZONE	20210208	-317	120	-336	130	-355	140	140	96	44
15	33S 43	491E	A ZONE	20210211	-333	150	-344	140			150	87	63
16	33S 52	491H	A ZONE	20210211	-284	140	-289	180			180	190	-10
17	**33ST**	**492BL**	**A ZONE**	**20210311**	**-65**	**68**	**-86**	**66**	**-100**	**67**	**68**	**64**	**4**
18	33T 13	492ZZ	A ZONE	20210316	-128	110					110	110	0
19	33T 15	492SS	A ZONE	20210224	-334	180					180	170	10
20	33T 29	491C	A ZONE	20210211	-350	100					100	180	-80
21	33T 4	492CR	A ZONE	20210316	-146	69	-166	70	-186	70	70	100	-30
22	33T 9	492TT	A ZONE	20210316	-262	77					77	87	-10
23	33U 11	492AJ	A ZONE	20210317	-348	98					98	97	1
24	33U' 3	492WW	A ZONE	20210218	-89	92					92	100	-8
25	**33UV**	**492BH**	**A ZONE**	**20210317**	**-106**	**69**	**-131**	**70**	**-155**	**71**	**71**	**120**	**-49**
26	33V' 8	492BY	R,A	20210211	-24	3,400	-48	3,200			3,400	3,700	-300
27	33W 11	502T	A ZONE	20210412	-321	70	-349	75	-376	73	75	90	-15
28	**33WX**	**502AF**	**A ZONE**	**20210323**	**-258**	**74**	**-281**	**72**	**-297**	**74**	**74**	**110**	**-36**
29	33X 10	502BD	A ZONE	20210208	-320	89	-340	73	-356	73	89	110	-21
30	33X 20	502J	A ZONE	20210318	-353	120					120	130	-10
31	**33XY**	**502BN**	**A ZONE**	**20210323**	**-278**	**71**	**-296**	**72**	**-311**	**73**	**73**	**69**	**4**
32	**33YZ**	**502AD**	**A ZONE**	**20210324**	**-296**	**70**	**-327**	**69**			**70**	**89**	**-19**
33	34D' 6	502BH	A ZONE	20210210	-270	1,400	-303	1,700	-335	1,700	1,700	1,500	200
34	**34DG**	**502Z**	**A ZONE**	**20210323**	**-292**	**410**	**-324**	**1,200**			**1,200**	**1,500**	**-300**
35	34F 5	502BR	A ZONE	20210322	-297	70	-322	200	-347	210	210	130	80
36	34H 25	502AH	A ZONE	20210322	-297	90	-312	110	-331	120	120	160	-40
37	34H5	512E	A ZONE	20210308	-298	89	-313	89	-328	95	95	91	4
38	**34HJ**	**502BX**	**A ZONE**	**20210308**	**-310**	**94**	**-321**	**110**	**-331**	**950**	**950**	**63**	**887**
39	**34JL**	**503AP**	**A ZONE**	**20210308**	**-262**	**90**	**-288**	**100**	**-308**	**120**	**120**	**180**	**-60**
40	**34LS**	**503BD**	**A ZONE**	**20210303**	**-238**	**80**	**-283**	**73**			**80**	**67**	**13**

ALAMITOS BARRIER PROJECT
A-ZONE CHLORIDE CONCENTRATIONS
Chloride Data Used for Contours and Cross-Section

No.	PROJ	FCD	AQUIFER	DATE	For Cross-Section (Internodal Wells in **Bold**)						For Contours	MAX CHLORIDE 19-20	Change in Chloride (FY20-21 - FY19-20)
					ELEV 1 (ft)	CHL 1 (mg/L)	ELEV 2 (ft)	CHL 2 (mg/L)	ELEV 3 (ft)	CHL 3 (mg/L)	MAX CHL. 20-21		
41	34N 21	512B	A ZONE	20210209	-328	97	-354	100			100	91	9
42	**34S0.1**	**503BV**	**A ZONE**	**20210303**	**-239**	**82**	**-249**	**84**	**-256**	**86**	**86**	**80**	**6**
43	34V 20	513B	A ZONE	20210325	-234	150	-265	120	-292	120	150	130	20
44	**34VZ**	**503BH**	**A ZONE**	**20210309**	**-146**	**69**	**-156**	**73**			**73**	**140**	**-67**
45	34W' 5	503AJ	A ZONE	20210204	-81	66	-101	390	-119	260	390	170	220
46	34X40	513P	A ZONE	20210412	-202	53	-232	66			66	180	-114
47	**34Y0.1**	**503CL**	**A ZONE**	**20210303**	**-107**	**290**					**290**	**180**	**110**
48	**35E0.1**	**503BK**	**A ZONE**	**20210309**	**-74**	**78**					**78**	**62**	**16**
49	35F 20	513J	A ZONE	20210324	-129	86	-158	220			220	98	122
50	**35H 11**	**514G**	**A ZONE**	**20210315**	**-123**	**280**	**-146**	**620**			**620**	**610**	**10**
51	**35H 12**	**514D**	**A ZONE**	**20210408**	**-137**	**78**					**78**	**79**	**-1**
52	**35J1**	**514L**	**A ZONE**	**20210408**	**-193**	**80**	**-208**	**87**	**-228**	**92**	**92**	**97**	**-5**
53	**35K1**	**523B**	**A ZONE**	**20210315**	**-197**	**15**	**-212**	**320**	**-227**	**350**	**350**	**390**	**-40**
54	OCWD-BS14/3		A ZONE	20210223		3,190					3,190	3,750	-560
55	OCWD-BS21/3		A ZONE	20210223		331					331	371	-40
56	33G	DP1									50	50	n/a
57	33J	DP2									50	50	n/a
58	33L	DP3									50	50	n/a
59	33N	DP4									50	50	n/a
60	33Q	DP5									50	50	n/a
61	33S	DP6									50	50	n/a
62	33U	DP7									50	50	n/a
63	33V	DP8									50	50	n/a
64	33W	DP9									50	50	n/a
65	33X	DP10									50	50	n/a
66	33Y	DP11									50	50	n/a
67	33Z	DP12									50	50	n/a
68	33Z2	DP13									50	50	n/a
69	34D	DP14									50	50	n/a
70	34F	DP15									50	50	n/a
71	34H	DP16									50	50	n/a
72	34J	DP17									50	50	n/a
73	34L	DP18									50	50	n/a
74	34N	DP19									50	50	n/a
75	34Q	DP20									50	50	n/a
76	34S	DP21									50	50	n/a
77	34T	DP22									50	50	n/a
78	34V	DP23									50	50	n/a
79	34X	DP24									50	50	n/a
80	34Z2	DP25									50	50	n/a
81	35G	DP26									50	50	n/a
82	35H1	DP27									50	50	n/a
83	35H2	DP28									50	50	n/a

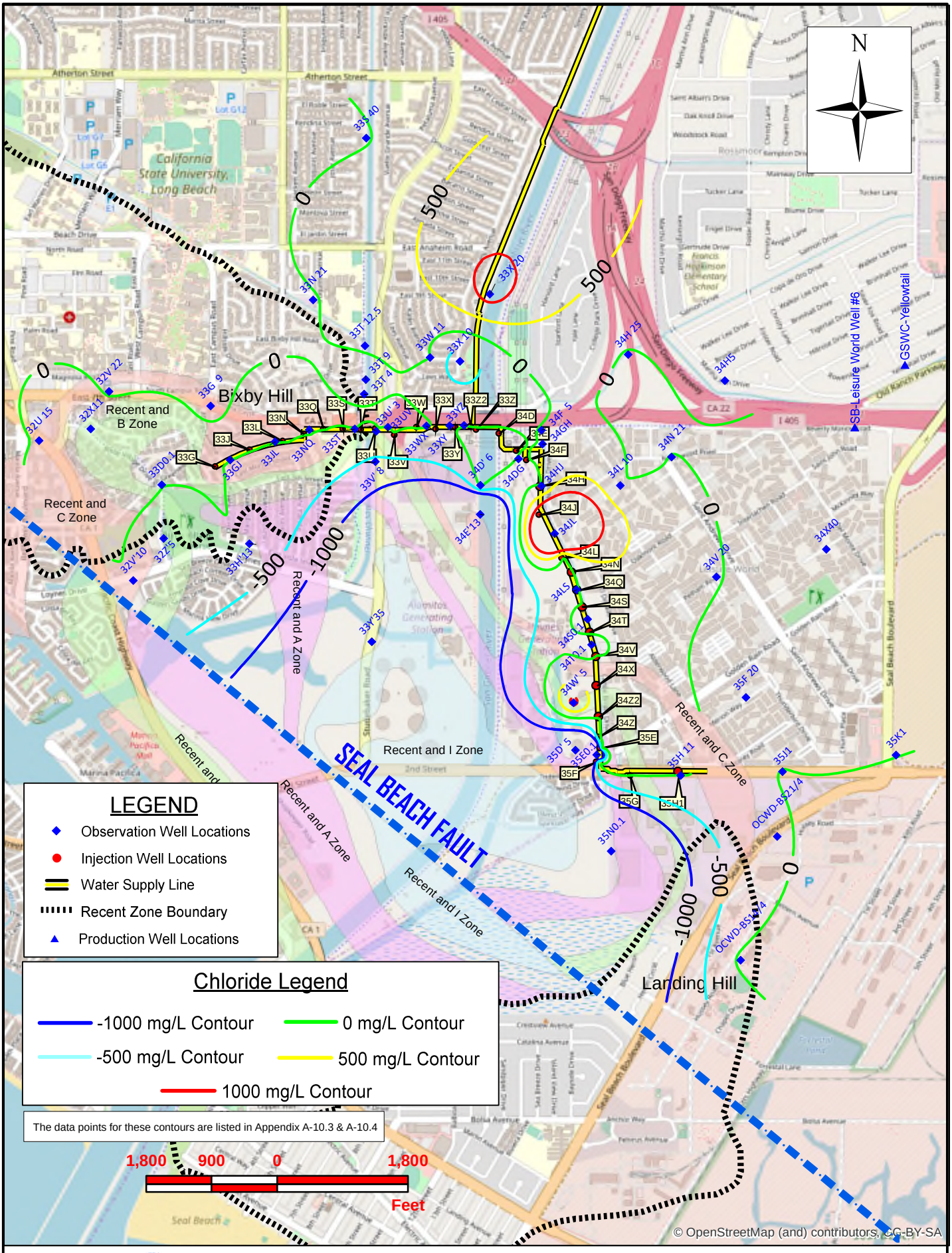
DP = Dummy Point with an assumed chloride concentration of 50 mg/L. Placed at wells that were injecting into this zone during this reporting period.



Alamitos Barrier Project
I Zone Chloride Concentration (mg/L) Contours, Spring 2021

A-10.1

I Zone Cl.srf



Alamitos Barrier Project
I Zone Change in Chloride Concentration, Spring 2020 to Spring 2021

A-10.2

I Zone Cl.srf

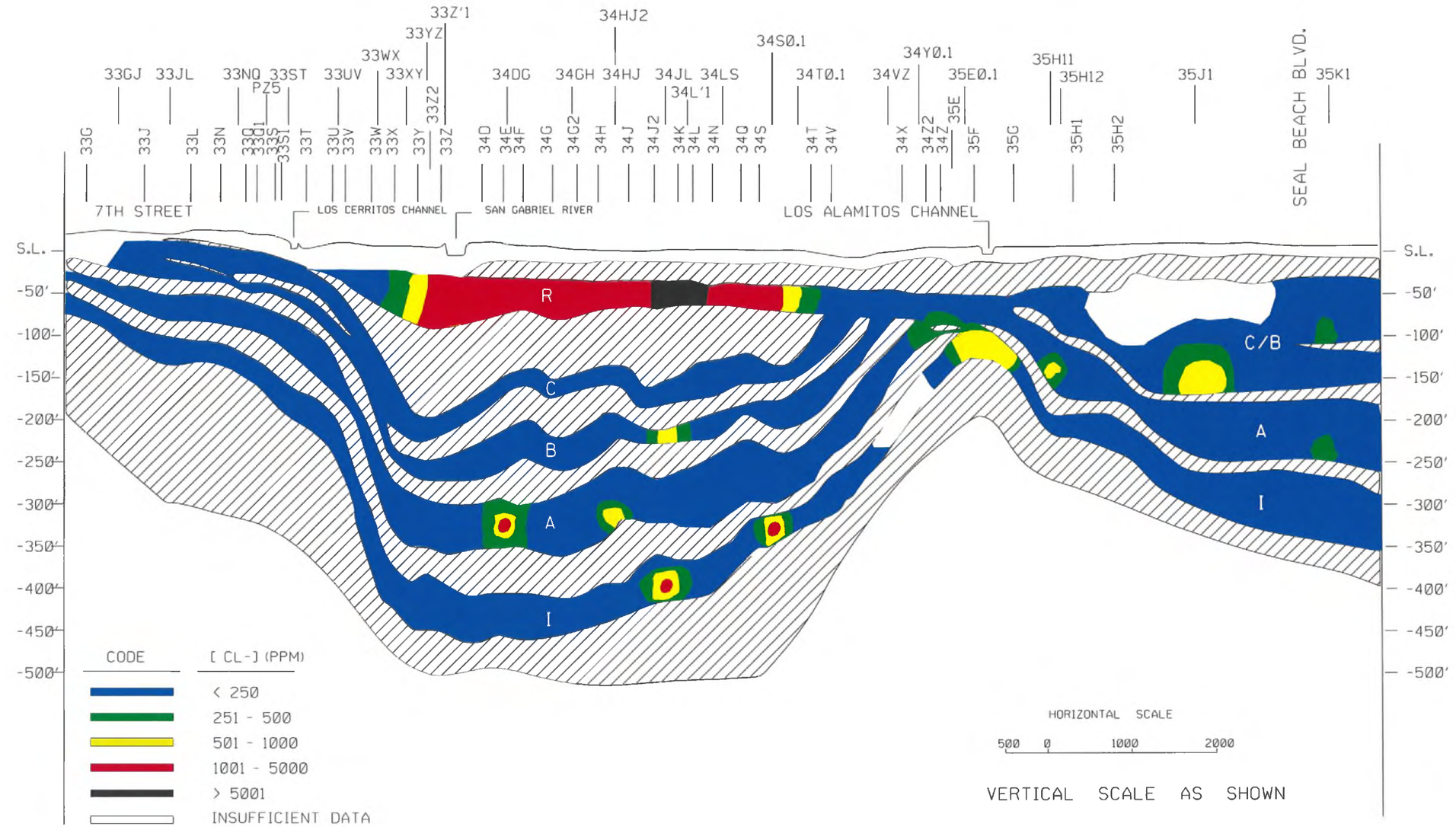
ALAMITOS BARRIER PROJECT
I-ZONE CHLORIDE CONCENTRATIONS
Chloride Data Used for Contours and Cross-Section

No.	PROJ	FCD	AQUIFER	DATE	For Cross-Section (Internodal Wells in **Bold**)						For Contours	MAX CHLORIDE FY19-20	Change in Chloride (FY20-21 - FY19-20)
					ELEV 1 (ft)	CHL 1 (mg/L)	ELEV 2 (ft)	CHL 2 (mg/L)	ELEV 3 (ft)	CHL 3 (mg/L)	MAX CHL. 20-21		
1	32U 15	482L	I ZONE	20210203	-74	150					150	140	10
2	32V 22	482N	I ZONE	20210204	-51	140					140	170	-30
3	32V'10	483E	I ZONE	20210203	-140	250	-152	250	-165	250	250	250	0
4	32X11	482R	I ZONE	20210225	-51	890	-61	900			900	620	280
5	32Z'5	482V	I ZONE	20210204	-68	270	-83	410	-98	430	430	540	-110
6	33D0.1	482U	A,I	20210311	-24	80	-49	81	-74	82	82	80	2
7	33G 9	482G	I ZONE	20210204	-34	60	-68	71	-78	70	71	85	-14
8	**33GJ**	**482Y**	**I ZONE**	**20210225**	**-75**	**78**	**-95**	**77**			**78**	**78**	**0**
9	33H'13	493XX	I ZONE	20210217	-89	140					140	150	-10
10	**33JL**	**492BW**	**A,I**	**20210311**	**-41**	**68**	**-79**	**65**	**-116**	**66**	**68**	**65**	**3**
11	33N 21	492BV	I ZONE	20210208	-457	64	-468	64			64	80	-16
12	**33NQ**	**492BP**	**A,I**	**20210311**	**-48**	**71**	**-92**	**69**	**-136**	**69**	**71**	**63**	**8**
13	33U' 3	492QQ	I ZONE	20210224	-147	140					140	230	-90
14	33S 40	491F	I ZONE	20210211	-470	450					450	480	-30
15	**33ST**	**492BM**	**I ZONE**	**20210311**	**-130**	**67**	**-148**	**71**	**-163**	**71**	**71**	**68**	**3**
16	33T 4	492CQ	I ZONE	20210316	-277	75	-292	77			77	120	-43
17	33T 9	492XX	I ZONE	20210316	-364	62					62	170	-108
18	33T 12.5	492BT	I ZONE	20210222	-423	120	-438	120	-443	120	120	96	24
19	**33UV**	**492BJ**	**I ZONE**	**20210317**	**-209**	**72**	**-228**	**72**	**-246**	**72**	**72**	**78**	**-6**
20	33V' 8	492BX	I ZONE	20210211	-109	3,800	-130	4,900			4,900	5,500	-600
21	33W 11	502U	I ZONE	20210412	-423	79	-446	84	-468	79	84	80	4
22	**33WX**	**502AG**	**I ZONE**	**20210323**	**-374**	**86**	**-391**	**85**	**-405**	**86**	**86**	**77**	**9**
23	33X 10	502BE	I ZONE	20210208	-420	81	-440	86	-460	83	86	1,000	-914
24	33X 20	502H	I ZONE	20210318	-442	1,800					1,800	580	1,220
25	**33XY**	**502BP**	**I ZONE**	**20210323**	**-403**	**93**	**-417**	**110**	**-431**	**97**	**110**	**150**	**-40**
26	33Y'35	493ZZ	I ZONE	20210208	-67	22,000					22,000	24,000	-2,000
27	**33YZ**	**502AE**	**I ZONE**	**20210324**	**-402**	**120**	**-433**	**73**			**120**	**120**	**0**
28	34D' 6	502BI	I ZONE	20210210	-400	3,700	-410	7,600	-418	7,500	7,600	7,500	100
29	**34DG**	**502AA**	**I ZONE**	**20210323**	**-402**	**72**	**-432**	**74**			**74**	**83**	**-9**
30	34E'13	503AT	I ZONE	20210209	-289	2,600	-308	2,800			2,800	6,700	-3,900
31	34F 5	502BQ	I ZONE	20210322	-411	71	-426	71	-441	71	71	65	6
32	**34GH**	**502BV**	**I ZONE**	**20210308**	**-411**	**76**	**-427**	**78**	**-437**	**75**	**78**	**74**	**4**
33	34H 25	502AJ	I ZONE	20210322	-407	290	-427	290	-446		290	320	-30
34	34H5	512D	I ZONE	20210308	-408	220	-423	200	-443	190	220	140	80
35	**34HJ**	**502BW**	**I ZONE**	**20210308**	**-407**	**72**	**-417**	**72**	**-427**	**72**	**72**	**92**	**-20**
36	**34JL**	**503AN**	**I ZONE**	**20210308**	**-382**	**160**	**-403**	**4,000**			**4,000**	**89**	**3,911**
37	34L 10	502AN	I ZONE	20210216	-404	87	-426	81			87	64	23
38	**34LS**	**503BC**	**I ZONE**	**20210303**	**-338**	**89**	**-368**	**90**			**90**	**110**	**-20**
39	34N 21	512C	I ZONE	20210209	-423	84	-448	82			84	80	4
40	**34S0.1**	**503BW**	**I ZONE**	**20210303**	**-306**	**1,000**	**-310**	**1,400**			**1,400**	**1,000**	**400**
41	**34T0.1**	**503AD**	**I ZONE**	**20210303**	**-289**	**95**	**-312**	**89**	**-334**	**81**	**95**	**420**	**-325**
42	34V 20	513C	I ZONE	20210325	-386	93					93	56	37

ALAMITOS BARRIER PROJECT
I-ZONE CHLORIDE CONCENTRATIONS
Chloride Data Used for Contours and Cross-Section

No.	PROJ	FCD	AQUIFER	DATE	For Cross-Section (Internodal Wells in **Bold**)						For Contours	MAX CHLORIDE FY19-20	Change in Chloride (FY20-21 - FY19-20)
					ELEV 1 (ft)	CHL 1 (mg/L)	ELEV 2 (ft)	CHL 2 (mg/L)	ELEV 3 (ft)	CHL 3 (mg/L)	MAX CHL. 20-21		
43	34W' 5	503AK	I ZONE	20210204	-156	4,700					4,700	3,500	1,200
44	34X40	513N	I ZONE	20210412	-331	1,200	-346	1,100			1,200	1,600	-400
45	35D' 5	503AM	I ZONE	20210204	-89	1,200					1,200	3,800	-2,600
46	**35E0.1**	**503BJ**	**I ZONE**	**20210309**	**-114**	**590**					**590**	**5,600**	**-5,010**
47	35F 20	513H	I ZONE	20210324	-235	1,400	-245	3,200	-255	3,200	3,200	3,700	-500
48	**35H 11**	**514H**	**I ZONE**	**20210315**	**-203**	**120**					**120**	**120**	**0**
49	**35J1**	**513M**	**I ZONE**	**20210408**	**-261**	**100**	**-271**	**99**	**-281**	**100**	**100**	**88**	**12**
50	**35K1**	**523C**	**I ZONE**	**20210315**	**-363**	**37**	**-373**	**37**			**37**	**41**	**-4**
51	35N0.1	504N	I ZONE	20210204	-71	680					680	3,600	-2,920
52	OCWD-BS14/4		I ZONE	20210223		376					376	299	77
53	OCWD-BS21/4		I ZONE	20210223		1,260					1,260	1,320	-60
54	33G	DP1									50	50	n/a
55	33J	DP2									50	50	n/a
56	33L	DP3									50	50	n/a
57	33N	DP4									50	50	n/a
58	33Q	DP5									50	50	n/a
59	33U	DP6									50	50	n/a
60	33V	DP7									50	50	n/a
61	33W	DP8									50	50	n/a
62	33X	DP9									50	50	n/a
63	33Y	DP10									50	50	n/a
64	33Z	DP11									50	50	n/a
65	33Z2	DP12									50	50	n/a
66	34D	DP13									50	50	n/a
67	34E	DP14									50	50	n/a
68	34F	DP15									50	50	n/a
69	34G2	DP16									50	50	n/a
70	34H	DP17									50	50	n/a
71	34L	DP18									50	50	n/a
72	34N	DP19									50	50	n/a
73	34Q	DP20									50	50	n/a
74	34S	DP21									50	50	n/a
75	34T	DP22									50	50	n/a
76	34V	DP23									50	50	n/a
77	34X	DP24									50	50	n/a
78	34Z2	DP25									50	50	n/a
79	34Z	DP26									50	50	n/a
80	35E	DP27									50	50	n/a
81	35F	DP28									50	50	n/a
82	35G	DP29									50	50	n/a
83	35H1	DP30									50	50	n/a

DP = Dummy Point with an assumed chloride concentration of 50 mg/L. Placed at wells that were injecting into this zone during this reporting period.



CHLORIDE SECTION ALONG THE BARRIER

Spring 2021

Note: The data points used to create this cross section are listed in the Appendix A-6.3, 7.3, 8.3, 9.3, 9.4, 10.3, & 10.4

ALAMITOS BARRIER PROJECT
Overview Map

Public Works
LOS ANGELES COUNTY

N

POINT A

POINT B

POINT C

POINT D

Leo J. Vander Lans Water Treatment Facility

LONG BEACH
LOS ANGELES COUNTY

LOS ALAMITOS
ORANGE COUNTY

SEAL BEACH
ORANGE COUNTY

SEAL BEACH FAULT

33W110
33U170
33H 57
33S52
33S43
33S40
33S20
33S18
33T15
33Q15
33T13
33T12.5
33U11
33W11
33X10
33Y10
33Z11
33X20
33W54
33X54
33T29
33L30
33L23
33N21
34H25
34H5
34F10
34D
34F
34F5
34N21
34L10
34X40
34V20
34U8
34S0.1
34T0.1
34V3
34VZ
34W'5
34Y0.1
34Q'22
34S'22P
34S'16
34V'18
34F'40
34K'47
35F20
35K1
35J1
35H11
35H12
35H1
35K'12
35N0.1
36F'14
35S'24
35V'32
35E0.1
35D'5
34Z2
34Z
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34HJ2
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34H'17P
34H'18P
34N'16
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PZ-7
PZ-8
PZ-9
33V'15P
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32Z'5
PZ-1
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33Q1
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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

0 3,000 6,000 Feet

Legend

- Alamitos_Observation_Wells
- Alamitos_Injection_Wells
- Alamitos Water Supply Line

A-12.1

ALAMITOS BARRIER PROJECT
Project Location Map

Public Works
LOS ANGELES COUNTY

N

POINT A

POINT B

POINT C

POINT D

Leo J. Vander Lans Water Treatment Facility

LONG BEACH
LOS ANGELES COUNTY

LOS ALAMITOS
ORANGE COUNTY

SEAL BEACH
ORANGE COUNTY

SEAL BEACH FAULT

Condition Assessment - Assessment of Portions of the ABP supply line, laterals, appurtenances, and wells.

Wells: 33N, 33S, 33U, 33U3, 33Y, 34G, 34S, 34V, and 35G

Supply line segments to be assessed:

ABP Unit 15 Project -
Construct 5 injection wells and 2 observation wells

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

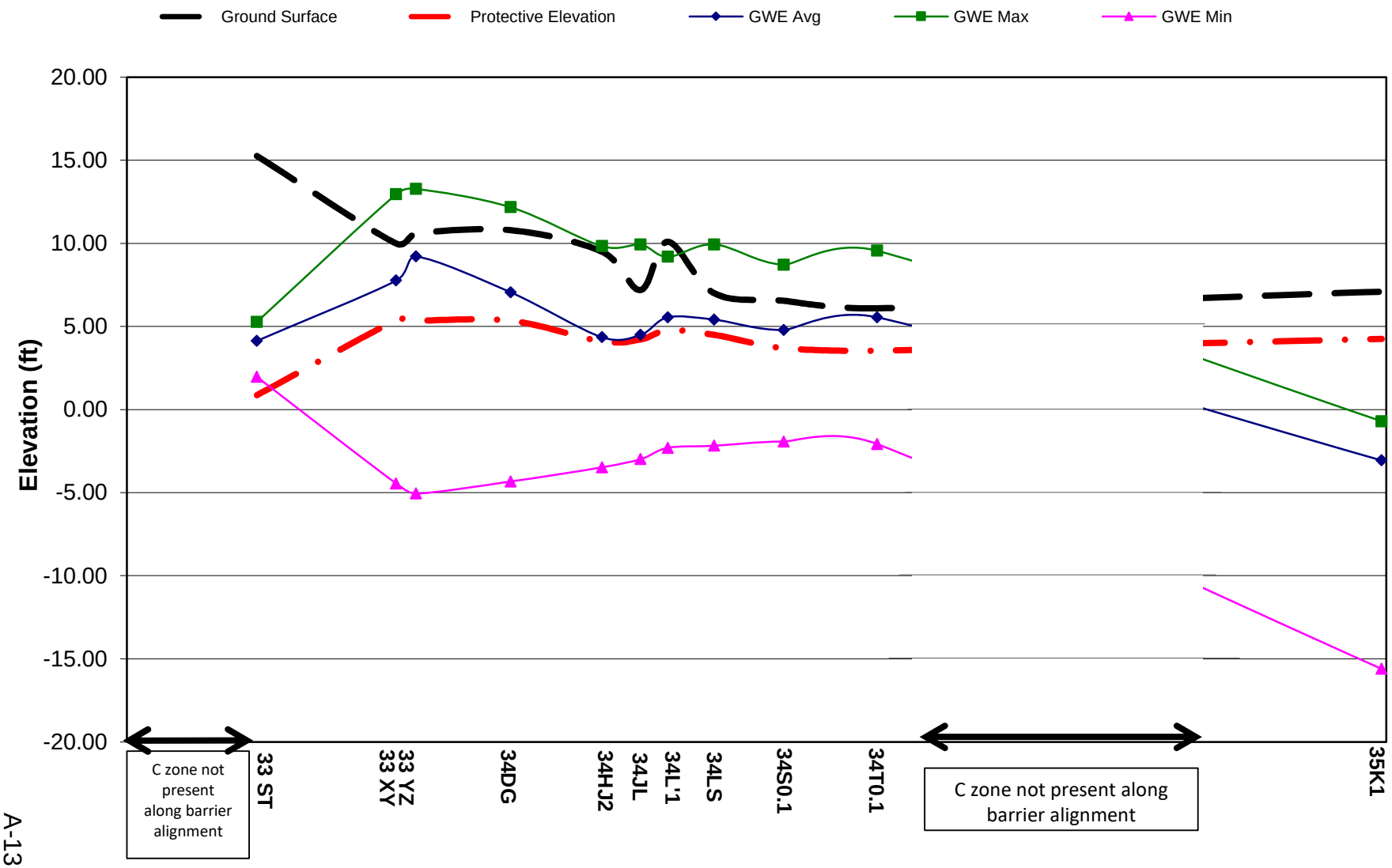
0 3,000 6,000 Feet

Legend

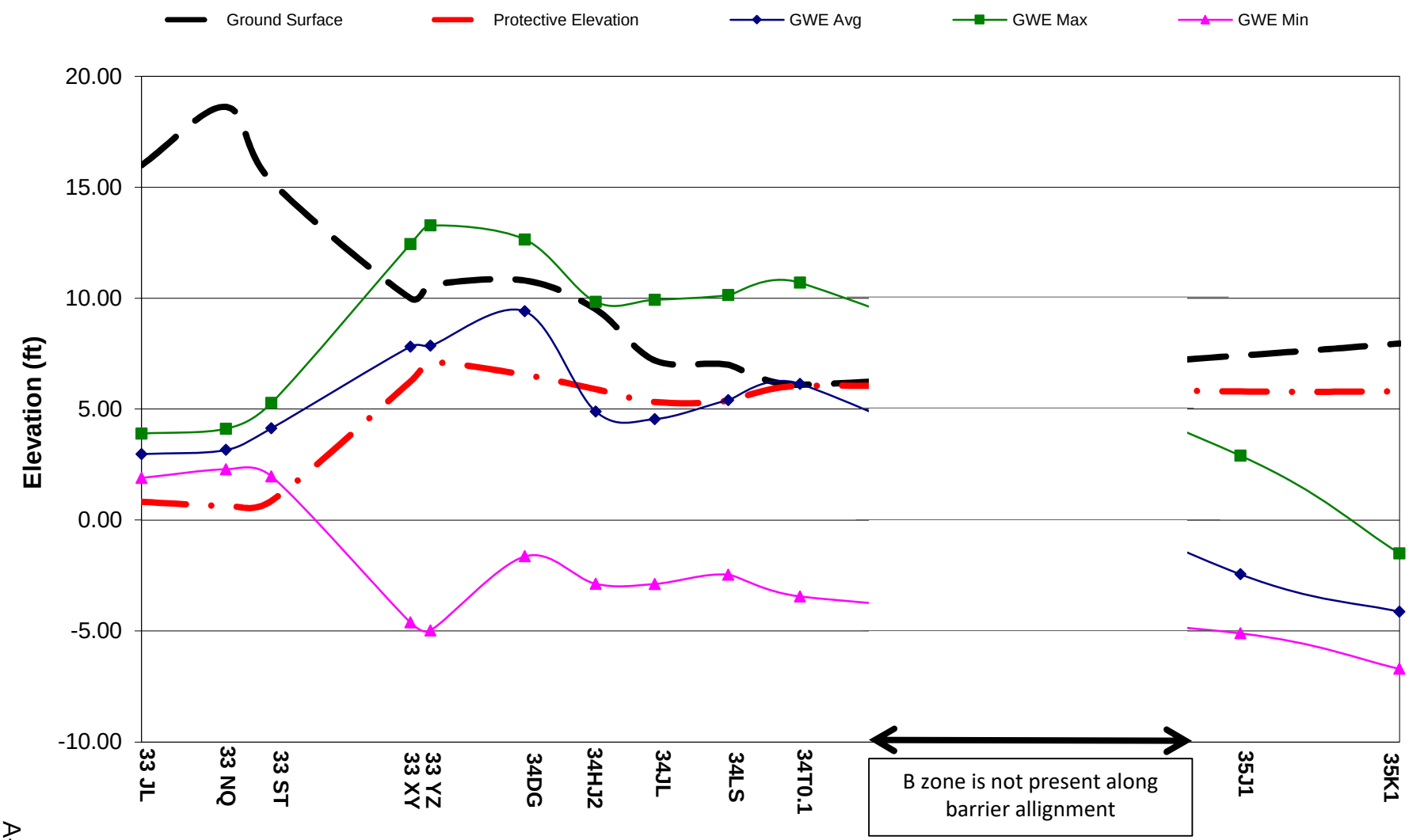
- Alamitos_Observation_Wells
- Alamitos_Injection_Wells
- Alamitos Water Supply Line

A-12.2

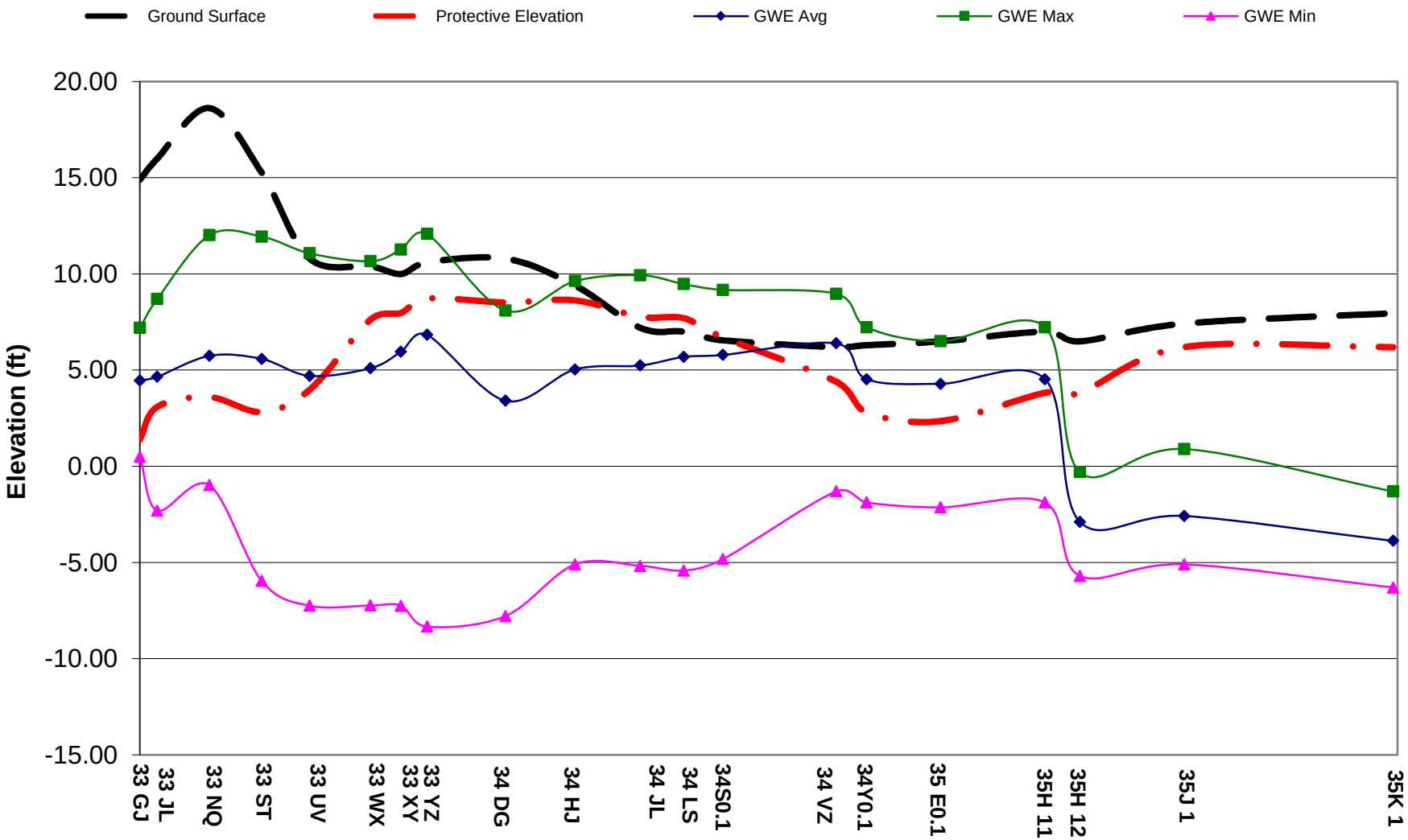
C Zone - Groundwater Elevation (GWE) Along the ABP FY20-21



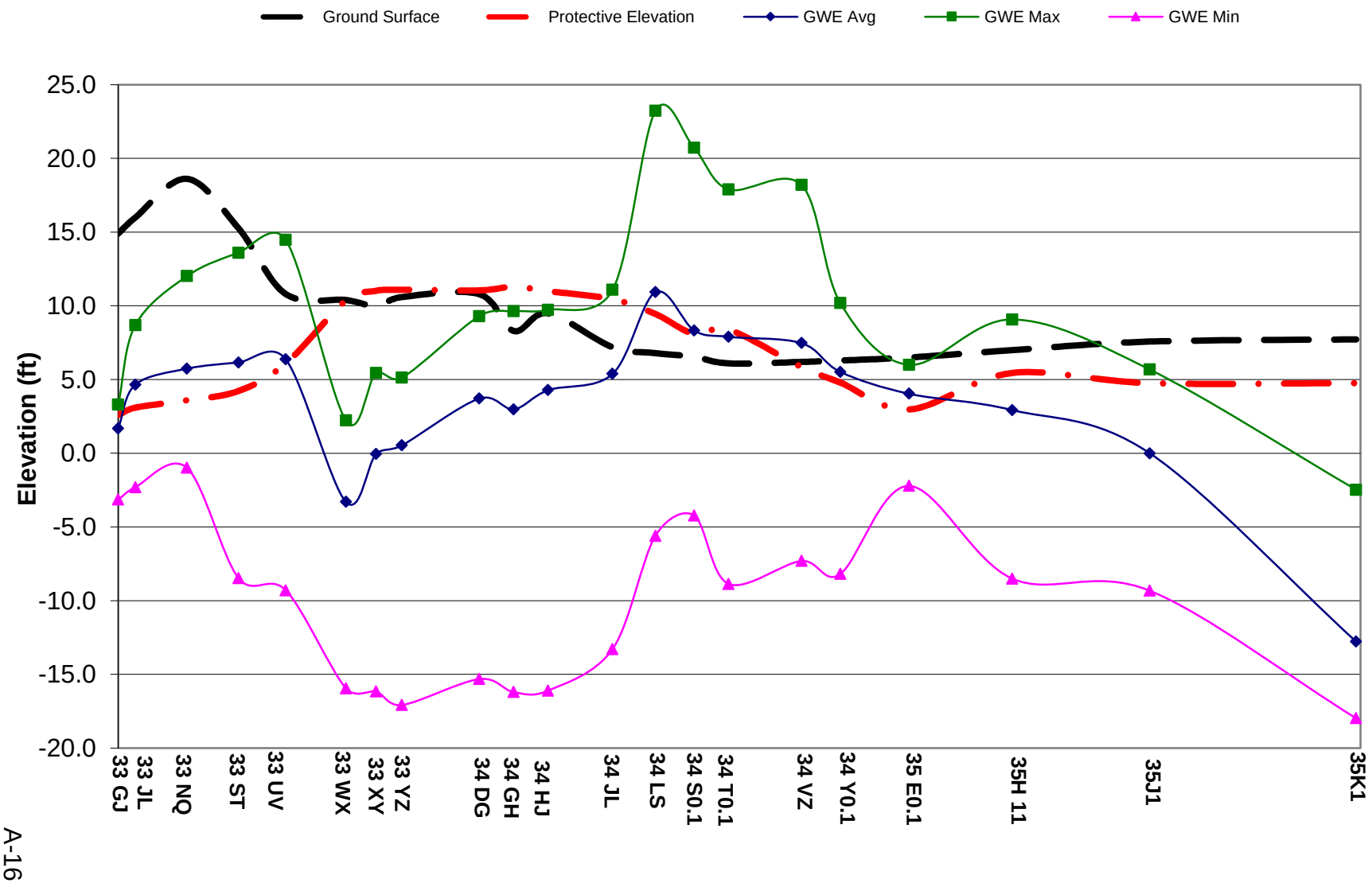
B Zone - Groundwater Elevation (GWE) Along the ABP FY20-21



A Zone - Groundwater Elevation (GWE) Along the ABP FY20-21



I Zone - Groundwater Elevation (GWE) Along the ABP FY20-21



Capital Improvement Projects and Contracts

Board Award Date	Project Title	Description	Contractor	Final Contract Amount	Field Acceptance
11/16/2021	ABP Unit 15 Replacement Wells	Construction of 5 new injection wells and 2 nested observation wells	TBD	TBD	December 2022 [Estimated]
N/A	Seawater Barrier Condition Assessment	Assessment of Portions of the ABP supply line, appurtenances, and wells	CH2M Hill (now Jacobs)	TBD	Field work completion: December 2021. Final Report: August 2022

Note: For a full history of improvement projects and contracts on record, please contact LACPW.

Summary of the Alamitos Barrier Project Shutdowns

Shutdown	Startup	Duration (days)	Impacted Portion of ABP	Reason	Addressed By	Means of Repair/Remediation
5/15/2014	N/A	N/A	34H (A)	Well is filled with sediment due to hole near top of perforations and will not take water.	LACPW	Well remains off and is slated to be destroyed and replaced during the ABP Unit 15 Project.
12/3/2020	1/5/2021	33	34J (A,I)	During well redevelopment, a hole was suspected in the casing. A well video survey revealed that there is a broken louver	LACPW	Well was repaired with a 3-foot sleeve to cover broken louver/hole. Resumed injection
2/1/2021	2/4/2021	3	Entire Barrier	Metropolitan Water District (MWD) shutdown of LB-7A Connection for a valve inspection on 2/2/2021.	MWD/LACPW/LACFCD	Reopened PRV on 2/2 and began charging segments of the barrier on 2/2 through 2/4. Operation of Barrier resumed on 2/4.
3/31/2021	4/13/2021	13	Entire Barrier	Metropolitan Water District (MWD) shutdown of LB-7A Connection for an inspection of the South Coast Feeder Line	MWD/LACPW/LACFCD	Reopened PRV on 4/12 and began charging segments of the barrier on 4/12 through 4/13. Operation of Barrier resumed on 4/14.
2/22/2021	3/22/2021	28	34G2 (C,B), 34J (A), 34J2 (C/B), 34K (C/B), 34L (C,B,A,I), 34N (C/B, A, I), 34Q (C/B, A, I), 34T (C/B. A, I), 34V (C/B, A, I), 34X (B), and 34X (A)	The 3 nested wellheads at 34S (C/B, A, I) sit about 7-feet the surface grade. To redevelop this well, groundwater levels needed to be reduced. The listed wells needed to be taken offline in order to reduce the groundwater levels.	LACFCD	Redevelopment complete. Operation of the Barrier resumed on 3/22

Notes:

* Routine and/or minor shutdowns of individual wells are not listed here but are included in Figure 3 of the Annual JMC Report and Table 2 for the Semi-Annual Meeting.

ABP EXPENDITURES
FY 2020-21

ITEM NO.	DESCRIPTION	JOB NO.	DESCRIPTION	SERVICES AND SUPPLIES	FY 2020-21 BUDGET	% BUDGET FY 20-21	OCWD SHARE 39.9%	OCWD BUDGET FY 20-21	% OCWD BUDGET FY 20-21	LADPW SHARE	LACPW BUDGET FY 20-21	% LACPW BUDGET FY 20-21
1.	Analysis and direction of injection operations	H0321550	BARRIER PROJECT OPERATION-GEN	170,877.51								
		H0321551	ABP ANALY&DIR OF INJECTION O	57,023.80								
			Subtotal #1	**227,901.31**	150,000	151.9%	**90,864.25**	60,000	151.4%	137,037.06	90,000	152.3%
2.	Maintenance and repair of injection wells	F5064011	INJECT. WELLS-MAINTAIN(ALAMITO	47,350.22								
		F6004011	MAINT INJECTION WELLS - ABP	236,770.09								
		F6980080F	MAINT ENGR - BARRIER PROJ	27,712.73								
		H0321911	Alamitos Barrier Proj-Telemetry Maint.	14,523.86								
		HF01511000	DGBP Automated System (LEED maintenance contract/ABP portion)	27,678.41								
			OCPW Permit No. FE20-0024	214.26								
			Subtotal #2	**354,249.57**	450,000	78.7%	**141,239.30**	180,000	78.5%	213,010.26	270,000	78.9%
3.	Operation of injection	F6004000	RECHARGE OPER U/S - ABP	71,921.85								
			Subtotal #3	**71,921.85**	70,000	102.7%	**28,675.24**	28,000	102.4%	43,246.61	42,000	103.0%
4.	Analysis and direction of extraction operations (No cost to OCWD)	H0321555	ABP ANALY&DIR OF EXTRACT OPE	0.00								
			Subtotal #4	**0.00**	0.0	0.0%	**0.00**	0.0	0.0	0.00	0.0	0.0
5.	Maintenance, and repair of extraction wells (No cost to OCWD)			0.00								
			Subtotal #5	**0.00**	10,000	0.0%	**0.00**	0.0	0.0	0.00	10,000	0.0%
6.	Operation of extraction wells (No cost to OCWD)	F6000090	NON-LABOR EXP BARRIER (ALMT)	1,131.75								
			Subtotal #6	**1,131.75**	5,000	22.6%	**0.00**	0.0	0.0	1,131.75	5,000	22.6%
7.	Maintenance and repair of distribution system	F6001907	INSPECT CRANE PRES REDUCE - ABP	1,340.64								
		F6004012	MAINT PRS - ABP	51,794.74								
		F6004014F	ABP Locate & Mark Barrier Proj. U/grd. Lines	40,118.46								
		F6009118	Disassemble/Reassemble of Wells ABP	81,019.81								
		H0321016	Seawater Barriers Administrative Support	77,210.90								
		H0321569	ALAMITOS BARRIER PROJECT	160,893.66								
			Subtotal #7	**412,378.21**	370,000	111.5%	**164,415.19**	148,000	111.1%	247,963.02	222,000	111.7%
8.	Maintenance of observation wells	F5064044	OBSERV. WELLS-CLEANOUT(ALAMITO	239,232.94								
			Subtotal #8	**239,232.94**	50,000	478.5%	**95,382.17**	20,000	476.9%	143,850.77	30,000	479.5%
9.	Collection of groundwater data	H0321552	ABP COLL OF GR WTR DATA FOR	127,056.21								
			OCPW Permit No. FE20-0100	360.50								
			Seal Beach Permit No. DPW04180	540.00								
			Seal Beach Permit No. DPW04255	558.33								
			Subtotal #9	**128,515.04**	200,000	64.3%	**51,238.95**	80,000	64.0%	77,276.09	120,000	64.4%
10.	Yard Maintenance	F6001904	CONDUCT QUARTERLY INSPECTION	229.08								
		F6001920	CONDUCT QUARTERLY INSPECTION	137.45								
		F6003123	BUILDING MAINTENANCE NONRESI	13,365.33								
		F6003124	BUILDING MAITENANCE-NONRESI	13,114.51								
		F6060643	ALAMITOS Yard Remodel	-20.17								
		FFM34107	Facility Maintenance Alamitos Yd F107	16,408.57								
			Subtotal #10	**43,234.77**	75,000	57.6%	**17,237.70**	10,000	172.4%	25,997.07	65,000	40.0%
11.	Well redevelopment	F4046963	Redevelop injection well 35E (I) - ABP	4,597.06								
		F4046985	Redevelop injection well 33Q - ABP	13,855.30								
		F4046986	Redevelop injection well 33Q1 - ABP	16,523.58								
		F4046991	Rdevelop injection well 33Z - ABP	52,105.00								
		F4046992	Rdevelop injection well 33Y - ABP	53,514.65								
		F4046997	Rdevelop injection well 33Z2 - ABP	67,301.88								
		F4046998	Rdevelop injection well 33X - ABP	55,804.66								
		F4047023	Redevelop injection well 34J - ABP	130,344.23								
		F4047024	Redevelop injection well 34G2 CB-Zone - ABP	50,891.51								
		F4047025	Redevelop injection well 34G2 I-Zone - ABP	31,133.51								
		F4047055	Redevelop injection well 34S (CB-Zone) - ABP	33,763.96								
		F4047056	Redevelop injection well 34S (A-Zone) - ABP	29,953.28								
		F4047057	Redevelop injection well 34S (I-Zone) - ABP	26,873.35								
		F4047069	Redevelop injection well 35H2 - ABP	40,893.02								
		F4047073	Redevelop injection well 34D - ABP	101,180.12								
		F4047074	Redevelop injection well 33W - ABP	88,471.42								
		F4047086	Redevelop injection well 33N - ABP	32,836.68								
		F5064022	Redevelop injections wells - ABP	99,857.29								
		H0321554	ABP WELL REDEVELOPMENT PROGRAM	147,081.87								
		H0321565	ABP NPDES MONI & REPORT INJ WE	36,606.97								
			OCPW Permit No. FE20-0103	1,545.00								
			Seal Beach Permit No. DPW04282	2,628.60								
			Subtotal #11	**1,117,762.94**	1,000,000	111.8%	**445,652.08**	400,000	111.4%	672,110.86	600,000	112.0%
12.	Processing of data and preparation of reports	H0321553	ABP DATA PRO & PRE OF REPORT	34,813.32								
			Subtotal #12	**34,813.32**	80,000	43.5%	**13,880.07**	32,000	43.4%	20,933.25	48,000	43.6%
13.	Reclaim Water Program	H0321556	ABP RECLAIMED WATER SUPPLY	19,067.09								
			Subtotal #13	**19,067.09**	50,000	38.1%	**7,602.05**	20,000	38.0%	11,465.04	30,000	38.2%
14.	Projects & Studies (Reimbursable amounts include labor expenses, plus approved contract expenses that are not addressed under a separate agreement).	HF01521000	Seawater Barrier Condition Assessment	49,466.32								
		EF02620001	Alamitos Barrier Project Unit 15 Replacement Injection	720,241.55								
			Subtotal #14	**769,707.87**	20,000	3848.5%	**19,722.22**	8,000	246.5%	749,985.65	12,000	6249.9%
15.	ABP Liabilty Insurance Premiums paid separately by OCWD	N/A	ABP General Liability Coverage	66,750.00								
			Subtotal #15	**66,750.00**	66,750	100.0%	**33,375.00**	33,375	100.0%	33,375.00	33,375	100.0%
			TOTAL	**3,486,666.65**	**2,596,750.00**	134.3%	**1,109,284.23**	1,019,375.00	108.8%	2,377,382.42	1,577,375.00	150.7%

NOTES:

1 OCWD share represents 39.9% of the total costs in all Items except for 4, 5, and 6. The percentage is based on amount of overall barrier injection water provided to the Orange County portion of the ABP during this fiscal year.

2 Per Agreement No. 8458 between the LACFCD and the OCWD, all costs included in Items 4, 5, and 6 are not reimburseable with respect to OCWD.

3 OCWD will not be responsible for Item 14, Alamitos Barrier Project Unit 15 Replacement Injection project.

4 Per Agreement No. 8458 between the LACFCD and the OCWD, the cost of liability insurance (item 15) shall be split equally among the Parties.

TOTAL OPERATION AND MAINTENANCE COST (not including insurance premium)	$ 3,419,916.65
ORANGE COUNTY'S SHARE OF THE OPERATION AND MAINTENANCE COST (not including insurance premium)	$ 1,075,909.23
Less: Los Angeles County's Share of the FY 2020-21 Liability Insurance	$ 33,375.00
Less: Permit fees paid by OCWD	$ 5,846.69
Less: Advance Deposit Paid by OCWD	$ 493,000.00
Less: Usage of OCWD Well Video Survey Camera/Equpiment	$ 530.00
BALANCE DUE FROM ORANGE COUNTY WATER DISTRICT	**$ 543,157.54**

ABP FY 2022-23 Operation and Maintenance Budget

JMC No.	Fiscal Year	LACFCD		OCWD		WRD		TOTAL	
		Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual
1.		Analysis and direction of injection operation ($)							
	2018-19	65,000	97,978	35,000	59,797			100,000	157,775
	2019-20	55,000	132,029	45,000	80,578			100,000	212,607
	2020-21	90,000	141,961	60,000	86,529			150,000	228,490
	2021-22	120,000		80,000				200,000	
	2022-23	*150,000*		*100,000*				*250,000*	
2.		Maintenance and repair of injection wells ($)							
	2018-19	292,500	263,657	157,500	160,912			450,000	424,569
	2019-20	247,500	327,656	202,500	199,970			450,000	527,626
	2020-21	270,000	220,155	180,000	134,190			450,000	354,345
	2021-22	330,000		220,000				550,000	
	2022-23	*270,000*		*180,000*				*450,000*	
3.		Operations of Injection Well Facilities ($)							
	2018-19	32,500	37,411	17,500	22,832			50,000	60,243
	2019-20	38,500	40,376	31,500	24,642			70,000	65,018
	2020-21	42,000	44,685	28,000	27,237			70,000	71,922
	2021-22	42,000		28,000				70,000	
	2022-23	*45,000*		*30,000*				*75,000*	
4.		Analysis and direction of extraction operation ($)							
	2018-19	0	0	0	0			0	0
	2019-20	0	0	0	0			0	0
	2020-21	0	0	0	0			0	0
	2021-22	0		0				0	
	2022-23	*0*		*0*				*0*	
5.		Redevelopment, maintenance, and repair of extraction wells ($)							
	2018-19	10,000	0	0	0			10,000	0
	2019-20	10,000	0	0	0			10,000	0
	2020-21	10,000	0	0	0			10,000	0
	2021-22	10,000		0				10,000	
	2022-23	*10,000*		*0*				*10,000*	
6.		Operations of Extraction Wells ($)							
	2018-19	5,000	1,556	0	0			5,000	1,556
	2019-20	5,000	1,512	0	0			5,000	1,512
	2020-21	5,000	1,132	0	0			5,000	1,132
	2021-22	5,000		0				5,000	
	2022-23	*5,000*		*0*				*5,000*	
7.		Maintenance and repair of ABP ($)							
	2018-19	195,000	224,174	105,000	136,815			300,000	360,989
	2019-20	165,000	231,775	135,000	141,454			300,000	373,229
	2020-21	222,000	256,376	148,000	156,268			370,000	412,644
	2021-22	225,000		150,000				375,000	
	2022-23	*240,000*		*160,000*				*400,000*	
8.		Maintenance of Observation Wells ($)							
	2018-19	32,500	6,403	17,500	3,908			50,000	10,310
	2019-20	82,500	15,225	67,500	9,292			150,000	24,517
	2020-21	30,000	148,635	20,000	90,598			50,000	239,233
	2021-22	90,000		60,000				150,000	
	2022-23	*120,000*		*80,000*				*200,000*	
9.		Collection of groundwater data ($)							
	2018-19	130,000	111,940	70,000	68,318			200,000	180,257
	2019-20	96,250	99,931	78,750	60,989			175,000	160,920
	2020-21	120,000	79,846	80,000	48,669			200,000	128,515
	2021-22	120,000		80,000				200,000	
	2022-23	*120,000*		*80,000*				*200,000*	
10.		Yard Maintenance ($)							
	2018-19	66,250	54,965	8,750	8,750			75,000	63,715
	2019-20	35,750	58,686	29,250	35,816			65,000	94,503
	2020-21	65,000	25,997	10,000	17,238			75,000	43,235
	2021-22	65,000		10,000				75,000	
	2022-23	*30,000*		*20,000*				*50,000*	
11.		Injection Well Redevelopment ($)							
	2018-19	325,000	551,322	175,000	336,475			500,000	887,796
	2019-20	550,000	548,711	450,000	334,882			1,000,000	883,592
	2020-21	600,000	694,466	400,000	423,297			1,000,000	1,117,763
	2021-22	600,000		400,000				1,000,000	
	2022-23	*600,000*		*400,000*				*1,000,000*	
12.		Processing of data and preparation of reports ($)							
	2018-19	39,000	42,207	21,000	25,759			60,000	67,967
	2019-20	44,000	35,606	36,000	21,731			80,000	57,337
	2020-21	48,000	21,630	32,000	13,184			80,000	34,813
	2021-22	42,000		28,000				70,000	
	2022-23	*42,000*		*28,000*				*70,000*	
13.		Oversight of Reclaim Water Program ($)							
	2018-19	32,500	10,701	17,500	6,531			50,000	17,232
	2019-20	27,500	4,814	22,500	2,938			50,000	7,752
	2020-21	30,000	11,846	20,000	7,221			50,000	19,067
	2021-22	18,000		12,000				30,000	
	2022-23	*18,000*		*12,000*				*30,000*	
14.		Projects and Studies ($)							
	2018-19	6,500	62,613	3,500	0			10,000	62,613
	2019-20	5,500	60,442	4,500	0			10,000	60,442
	2020-21	12,000	749,986	8,000	19,722			20,000	769,708
	2021-22	55,000		8,000				63,000	
	2022-23	*39,000*		*26,000*				*65,000*	
15.		ABP Liability Insurance ($)							
	2018-19	38,000	32,162	38,000	32,162			76,000	64,324
	2019-20	40,000	33,288	40,000	33,288			80,000	66,575
	2020-21	35,000	33,375	35,000	33,375			70,000	66,750
	2021-22	40,000		40,000				80,000	
	2022-23	*40,000*		*40,000*				*80,000*	
16.		Total ABP Expenditure ($)							
	2018-19	1,269,750	1,497,089	666,250	862,257			1,936,000	2,359,346
	2019-20	1,402,500	1,590,052	1,142,500	945,579			2,545,000	2,535,630
	2020-21	1,579,000	2,430,090	1,021,000	1,057,527			2,600,000	3,487,617
	2021-22	1,762,000		1,116,000				2,878,000	
	2022-23	*1,729,000*		*1,156,000*				*2,885,000*	
TOTALS		Total ABP Operations and Maintenance ($) [Item 16-Item 15]							
	2018-19	1,231,750	1,464,927	628,250	830,095			1,860,000	2,295,023
	2019-20	1,362,500	1,556,764	1,102,500	912,291			2,465,000	2,469,055
	2020-21	1,544,000	2,396,715	986,000	1,024,152			2,530,000	3,420,867
	2021-22	1,722,000		1,076,000				2,798,000	
	2022-23	*1,689,000*		*1,116,000*				*2,805,000*	
		Volume of Water (ac-ft)							
	2018-19			2,960	2,009	4,440	3,287	7,400	5,295
	2019-20			2,800	2,100	4,200	3,437	7,000	5,537
	2020-21			3,000	2,592	4,500	3,909	7,500	6,501
	2021-22			2,800		4,200		7,000	
	2022-23			*3,000*		*4,500*		*7,500*	