

Alamitos Barrier Project

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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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Joint Management Committee

**Annual report on the control of seawater intrusion
2013 - 2014**

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INTRODUCTION

The Alamitos Barrier Project (ABP) was designed and constructed to protect the groundwater supplies of the Central Basin of the County of Los Angeles and the southwest portion of the Coastal Plain area in Orange County 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.

The County of Los Angeles Department of 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, groundwater and chloride concentrations, and project costs for Fiscal Year (FY) 2013-14 (i.e., July 1, 2013 through June 30, 2014).

SUMMARY

During FY 2013-14, a total of 6,692.3 acre-feet (AF) of water was injected into the ABP (an average rate of 9.2 cubic feet per second). Of that total, OCWD purchased 2,406.3 acre-feet (36%) and the Water Replenishment District of Southern California (WRD) purchased 4,286.0 acre-feet (64%). This total injected amount was 21.9% more than FY 2012-13, and was more than 20% higher than the average of 5,130.1AF for the previous five fiscal years. Declines in regional groundwater levels due to drought conditions are the primary reasons for the need to increase injection. No major shutdowns have occurred since FY 2006-07. All minor shutdowns for FY 2013-14 are detailed in Appendix A-18.

The total costs associated with the ABP in FY 2013-14 were \$10,116,899 (\$10,110,131 for injection-related operations, maintenance, water, and approved LACFCD and OCWD project expenses and \$6,768 for operation and maintenance of idle extraction wells). Of the total injection-related expenses, the estimated cost of the injected water was \$6,511,040 (\$2,341,345 paid by OCWD and \$4,169,695 paid by WRD) and the total cost of services and supplies for injection was \$3,605,859 (\$775,291 paid by OCWD and \$2,830,568 paid by the LACFCD). The corresponding services and supplies cost to inject one acre-foot of water was \$538.81. This cost was consistent with recent years, even though a costly capital improvement project was completed during this reporting period. The project costs are expected to vary from year to year depending on the need to repair or improve the barrier facilities. The observation well cleanout costs and injection well redevelopment costs vary each fiscal year because they are cyclical activities.

Overall, groundwater levels adjacent to the barrier decreased slightly or showed little change from the previous year. There were also localized decreases that were related to operational activities. In all cases, the southeast portion of the barrier remained below protective elevations due to the limited injection capabilities (quantity of wells,

pressure limitations, maintenance, etc). West of the San Gabriel River, chloride concentrations generally decreased with the exception of various localized increases. East of the San Gabriel River, widespread high chloride concentrations were still present with some wells exhibiting decreased chloride concentrations and other wells exhibiting increased chloride concentrations. Detailed analyses of the reporting period's groundwater elevations and chloride concentrations are provided in the "Hydrogeologic Effects" and "Chlorides" sections below.

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

PROJECTS AND STUDIES

Studies and capital improvement projects over this reporting period are briefly summarized below. The general location of each project is identified on the map in Appendix A-12 and further project details are included in Appendix A-17.

New ABP Observation Wells in Los Angeles County (ABP Unit 13)

This project was jointly funded by LACFCD and WRD, but was managed by LACFCD. It originally involved the design and construction of 8 new observation well sites, with 21 well casings, located in Los Angeles County. Construction began on June 14, 2013 and was completed on November 12, 2013. The goal of the project was to obtain new data to serve as reference for operations near injection well 33G, fill data gaps on the western end of the ABP in each of the aquifer zones, confirm whether seawater intrusion is occurring through the B-zone merge area (as suggested by the INTERA model, scenario 3), and replace the recently destroyed observation well 34H'38(R). The following is a summary of each new well, including the well location, number of casings, aquifer of each casing, and preliminary chloride concentrations. Locations of the new

wells are shown in Appendix A12.2.

34F'40 (Recent Zone)

- Located along the eastern right of way of Studebaker Road approximately 300 feet north of 2nd Street in the City of Long Beach.
- Drilled using hollow stem auger on June 10, 2013.
- Developed one 4" PVC casing on June 13, 2013.
- Preliminary chloride concentration ~9,000 mg/L

33T9 (C zone)

- Located along the western levee of Los Cerritos Channel, approximately 900 feet north of 7th Street in the City of Long Beach
- Drilled using reverse circulation on July 3, 2013.
- Developed one 4" PVC casing on July 22, 2013.
- Preliminary chloride concentration ~500 mg/L

33T9 (Recent zone)

- Located along the western levee of Los Cerritos Channel, approximately 950 feet north of 7th Street in the City of Long Beach
- Drilled using hollow stem auger on August 5, 2013.
- Developed one 4" casing on August 15, 2013.
- Preliminary chloride concentration ~340 mg/L

33T4 (C zone, B zone, A zone and I zone)

- Located along the western levee of Los Cerritos Channel, approximately 340 feet north of 7th Street in the City of Long Beach
- Drilled using reverse circulation on July 17, 2013.
- Developed four 4" casings on August 1, 2013.
- Preliminary Chloride concentration:
 - C Zone: ~100 mg/L
 - B Zone: ~100 mg/L
 - A Zone: ~100 mg/L
 - I Zone: ~100 mg/L

32V'10 (C Zone, B Zone, A Zone, and I Zone)

- Located within the southern sidewalk of Loynes Avenue, approximately 430 feet northeast of Pacific Coast Highway in the City of Long Beach.
- Drilled using reverse circulation on August 13, 2013.
- Developed four 4" casings on August 26 and 27, 2013.
- Preliminary Chloride concentration:
 - C Zone: ~2,400 mg/L
 - B Zone: ~4,600 mg/L
 - A Zone: ~3,000 mg/L
 - I Zone: ~800 mg/L

32Z'5 (B/A Zone and I Zone)

- Located within the eastern parkway of Bixby Village Drive, approximately 380 feet north of Loynes Avenue in the City of Long Beach.
- Drilled using reverse circulation on August 28 and 29, 2013.
- Developed two 4" casings on September 10, 2013.
- Preliminary Chloride concentration:
 - B/A Zone: ~3,000 mg/L
 - I Zone: ~800 mg/L

33D0.1 (A/I Zone and Main Zone)

- Located within the eastern parkway of Bixby Village Drive, approximately 60 feet south of South Greenway Avenue in the City of Long Beach.
- Drilled using reverse circulation on September 13, 2013.
- Developed two 4" PVC casings on September 25, 2013.
- Preliminary Chloride concentration:
 - A/I Zone: ~500 mg/L
 - Main Zone: ~50 mg/L

32X11 (A Zone, I Zone, and Main Zone)

- Located within the eastern sidewalk of Bixby Village Drive, approximately 60 feet north of North Greenway Avenue in the City of Long Beach.
- Drilled using reverse circulation on September 27, 2013.
- Developed three 4" PVC casings on October 10, 2013.
- Preliminary Chloride concentration:
 - A Zone: ~1,000 mg/L
 - I Zone: ~700 mg/L
 - Main Zone ~500 mg/L

33GJ (A Zone and I Zone)

- Located within the southern parkway of 6th Street approximately 60 feet east of Margo Avenue in the City of Long Beach.
- Drilled using reverse circulation on October 11, 2013.
- Developed two 4" PVC casings on October 22, 2013.
- Preliminary Chloride concentration:
 - A Zone: ~50 mg/L
 - I Zone: ~80 mg/L

New ABP Injection and Observation Wells in Orange and Los Angeles Counties (ABP Unit 14)

This project is jointly funded by OCWD and LACFCD and managed by OCWD. It consists of 17 new clustered injection wells, four nested observation wells and two shallow piezometers along the east leg of ABP. Two injection wells and one nested observation well are proposed to be installed between points B and C. These new injection wells will provide additional capacity to maintain protective elevations along the east leg of the ABP. The observation wells will fill data gaps in each of the aquifer zones and help better guide injection operations. During this reporting period, LACFCD and OCWD drafted a cost-sharing agreement to split the cost of wells between Points B and C. In addition, OCWD prepared technical specifications for drilling new wells, and their consultant prepared plans and specifications for wellhead design and expansion of the existing ABP telemetry system to include all of the new wells along the Barrier. Also, OCWD worked on securing an access agreement with Los Angeles Department of Water and Power to allow access and temporary equipment staging on the Haynes Power Generating Station. Construction is anticipated to begin in Spring 2015.

INJECTION OPERATIONS

The total amount of water injected into the ABP during FY 2013-14 was 6,692.3 AF. Of this total, 14 percent (915.8 AF) was reclaimed water and 86 percent (5,776.5 AF) was imported water. The maximum monthly injection during this reporting period was 687.6 AF (609.6 AF imported and 78.0 AF reclaimed) which occurred in April 2014. The minimum monthly injection of 438.6 AF (335.8 AF imported and 102.8 AF reclaimed) occurred in November 2013 due to slightly higher groundwater levels most likely resulting from decreased pumping.

The percentage of reclaimed injection decreased from the previous year primarily because the reclamation plant did not operate continuously during the entire reporting period. The plant was offline from mid-September to mid-November due to mechanical issues, and again from mid-April to the end of the reporting period due to ongoing expansion of the Leo J. Vander Lans Advanced Water Treatment Facility (AWTF).

According to the California Regional Water Quality Control Board (CRWQCB) permit, File No. 93-076 of Order No. R4-2005-0061, the 60-month running average of reclaimed water into the ABP cannot exceed 50 percent of the total water volume injected. Through this reporting period, WRD's calculated 60-month running percentage of reclaimed water into the ABP was 34.9 percent and was therefore in compliance with the CRWQCB permit. Public Works' calculation through this period (which is consistent with the volumes identified throughout this report) is 36.6 percent. The slight discrepancy is due to differences in the calculation methods of the monthly meter readings for both imported and recycled deliveries.

The injection volumes and costs for FY 2012-13 and FY 2013-14 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 at the ABP during FY 2013-14 increased by 21.9 percent from the previous year. The amount of water

injected at the ABP in FY 2013-14 is considerably higher than historical volumes and is the third highest injection volume in the past 30 years. The volume injected is also about 20 percent higher than the average injection amount over the previous five fiscal years (5,681.3 AF) and over 30% higher than the average injection volume over the previous ten fiscal years (5009.5 AF). Declines in regional groundwater levels due to drought conditions are the primary reason for increased injection. Also, no major shutdowns on the Alamitos Barrier contributed to the increase of flows.

All ABP shutdowns from FY 2013-14 are summarized in Appendix A-18. There were no major shutdowns during this reporting period.

TABLE 1. INJECTION OPERATIONS

	Imported Water Injections			Reclaimed Water Injections			Total Injections		
	FY12-13	FY13-14	Percent Change From Previous Year	FY12-13	FY13-14	Percent Change From Previous Year	FY12-13	FY13-14	Percent Change From Previous Year
VOLUME OF WATER INJECTED IN ACRE-FEET									
OCWD ¹	1,072.5	2,078.0	93.8	649.0	328.3	-49.4	1,721.5	2,406.3	39.8
WRD ²	2,313.3	3,698.5	59.9	1,455.6	587.5	-59.6	3,768.9	4,286.0	13.7
TOTAL	3,385.8	5,776.5	70.6	2,104.6	915.8	-56.5	5,490.4	6,692.3	21.9
UNIT COST OF WATER PER ACRE-FEET³									
JULY - DEC	\$922.23	\$970.24	5.2	\$922.23	\$970.24	5.2			
JAN - JUN	\$968.92	\$975.24	0.7	\$968.92	\$975.24	0.7			
COST OF WATER PURCHASED									
OCWD ¹	\$1,009,915	\$2,022,039	100.2	\$610,139	\$319,306	-47.7	\$1,620,054	\$2,341,345	44.5
WRD ²	\$2,187,653	\$3,598,445	64.5	\$1,375,954	\$571,250	-58.5	\$3,563,607	\$4,169,695	17.0
TOTAL	\$3,197,569	\$5,620,484	75.8	\$1,986,093	\$890,556	-55.2	\$5,183,662	\$6,511,040	25.6
AVERAGE INJECTION RATE IN CFS									
OCWD ¹	1.5	2.9	93.8	0.9	0.5	-49.4	2.4	3.3	39.8
WRD ²	3.2	5.1	59.9	2.0	0.8	-59.6	5.2	5.9	13.7
TOTAL	4.7	8.0	70.6	2.9	1.3	-56.5	7.6	9.2	21.9

¹ Orange County Water District (OCWD)

² Water Replenishment District (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 **Reclaimed Water** Per Acre-Foot is equal to that of the imported water and is shown in the calculations by the WRD.

ADDITIONAL NOTES:

- The Unit Cost of Reclaimed Water for January through June 2014 was not yet available at the time of the Annual JMC Meeting. This value was estimated to be \$975.24 by adding the July through December 2013 RTS & CC charges to the January through June 2014 imported unit cost. Therefore, both the cost of reclaimed water and the overall total cost of injection water for FY13-14 are estimates only and should not be used for any other purposes.

Figure 1 presents the monthly amounts of water injected during FY 2013-14. Figure 2 illustrates the annual amounts of water injected over the last 20 years.

FIGURE 1 - MONTHLY AMOUNT OF WATER INJECTED

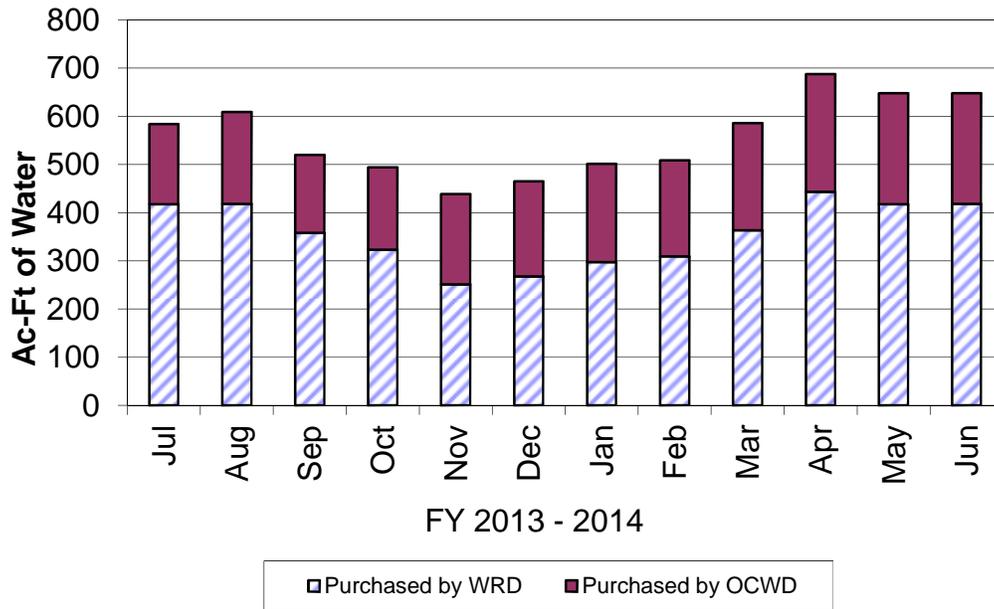
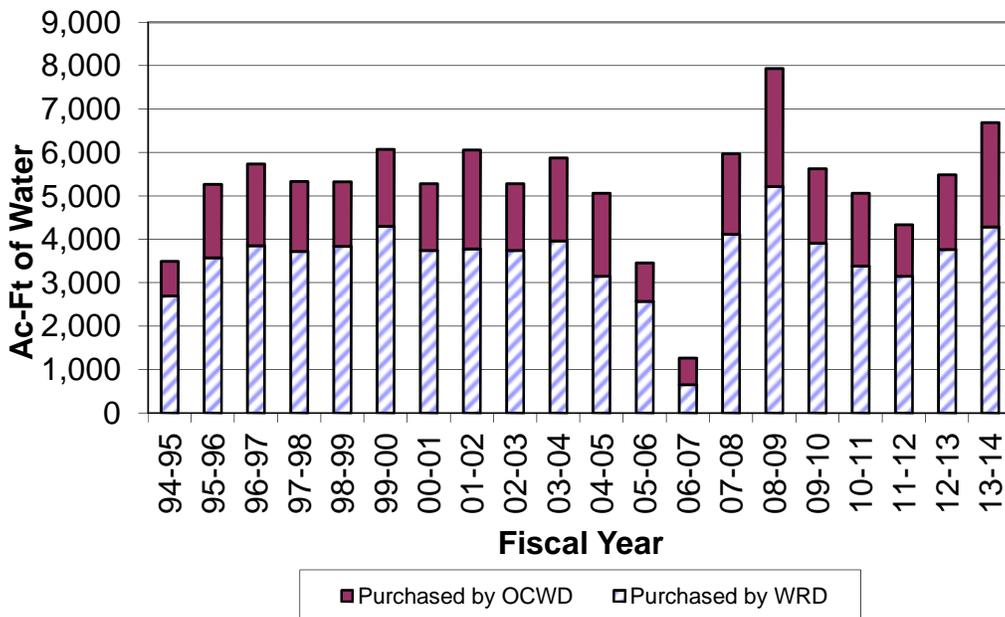


FIGURE 2 - ANNUAL AMOUNT OF WATER INJECTED



EXTRACTION OPERATIONS

There were no extraction activities during FY 2013-14. As recommended by the JMC, these wells were taken out of operation in FY 2002-03. This decision was based on the results of a one-year extraction well efficiency study, which demonstrated that the chloride levels in the area actually decreased when the extraction wells were turned off. The extraction wells will continue to receive minimal maintenance so that they can be converted to monitoring wells in the future.

MAINTENANCE

Typical well maintenance at the ABP includes observation well cleanouts and injection well redevelopments. The purpose of observation well cleanouts is to remove accumulated sediment at the bottom of the well casings. Removing the sediment ensures the full lengths of the well screens are in communication with the aquifer, and also allows chloride sampling to occur at all designated depths. All 220 active observation wells are typically analyzed for sediment accumulation every two years. Following the analysis, every observation well determined to have significant sediment accumulation (i.e., covering a portion of the well screen) then receives the necessary cleanout services. Once cleanout activities are completed, each casing is bottom sounded to determine whether or not sediments were removed successfully. Recommendations are developed for the casings where cleanouts are unsuccessful, such as sediment refilling the well due to a hole in the casing or the well is packed with foreign material. The results of unsuccessful cleanouts will be combined with the results of the ABP Condition Assessment to create a prioritized list of observation wells to be replaced. During FY 2013-14, 89 observation well casings were successfully cleaned out and 7 observation wells were unsuccessful. Cleanouts are deemed successful if the maintenance crew was able to clear accumulated debris from the entire length of screen. The current cleanout cycle is anticipated to finish in late 2014, and a

new cycle is scheduled to start in 2015.

The purpose of injection well redevelopments is to remove accumulated sediments and microbiological build-up within the well casings to restore each well's ability to operate at its maximum injection capacity. Each of the 41 injection well casings are routinely redeveloped once every two years. During FY 2013-14, Public Works completed redevelopment activities at the following 25 well casings¹: 33G(A,I), 33J(A,I), 33L(A,I), 33N(A,I), 33Q(A,I), 33Q1(C,B), 33S(A,I), 33S1(C,B), 33T(A,I), 33U(A,I), 33U3(C,B), 33V(A,I), 33W(C,B,A,I), 33X(C,B,A,I), 33Y(C,B,A,I), 33Z(C,B,A,I), 33Z2(A&I), 34G(A), 34G2(I), 34G2(B,C), 34J(A&I), 34L(C,B,A,I), 35H1(I), 35H1(A), 35H2(A).

Figure 3 depicts the operating status of each injection and extraction well during FY 2013-14 and demonstrates that the barrier was in operation throughout the entire reporting period. There were no ABP shutdowns, as explained in Appendix A-18.

However, injection wells 34G, 33S1 and 33W are operating at a limited flow due to surface leakage. Grouting operations for 34G are scheduled for early 2015.

Injection well 34H(A) continues to remain offline during this reporting period due to high casing pressure. The well had been operating at a minimal flow because the well over-pressurized when the flow increased slightly. A video log will be scheduled in the near future to investigate the issue and determine whether the well collapsed. The recent MWH Injection Well Condition Assessment showed that the well was in poor condition due to the following: holes in the casing leaving the gravel pack exposed, mild steel casing constructed in 1991 and nearing the end of its usable life, and a poor bond between the casing and annular seal. Since the well has a 6" diameter casing, using a sleeve to patch holes in the casing is not feasible.

¹ The capital letters in parenthesis represent the aquifer(s) associated with that particular injection well casing. For example, (A) = A Zone aquifer, (A,I) = A and I Zone aquifers, and so forth.

HYDROGEOLOGIC EFFECTS

Figures 4 through 8 (pp. 16-20) show the average monthly groundwater elevation in FY 13-14 relative to the average groundwater elevations of the 10 preceding years (FY 2003-04 to 2012-13) in the vicinity of the barrier 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 barrier 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 barrier performance, but is simply included for comparison purposes. For example, the 10-year historical average included in the graphs for the FY 2013-14 report is generally higher than the one shown in the FY 2012-13 report because the FY 2012-13 data now included was generally higher than the FY 2002-03 data that it replaced. The graphs include all available semi-monthly, monthly, semi-annual, and annual data for wells within the barrier alignment and landward for approximately 2,000 feet from the barrier. As a result, semi-monthly values are “weighted” more heavily than the annuals in the calculation of the monthly average.

As shown in the graphs, groundwater elevations during FY 2013-14 were typically at or above historical averages. This was likely due to increased injection rates compared to those in FY 2012-13. East of the San Gabriel River, groundwater elevations were above 10-year historical averages for the entire reporting period. West of the San Gabriel River, groundwater elevations were above the 10-year historical averages in all aquifer zones except the Recent zone during January, February and March of 2014. September and March consistently have lower values than preceding and succeeding months due to the fact that semi-annual and annual water levels are measured, and water level data obtained from the semi-annual sampling events are also included in the averages during these months. In general, all the figures show the expected seasonal trends of higher groundwater elevations in the winter months (decreased pumping) and lower groundwater elevations in the summer months (increased pumping).

FIGURE 4a RECENT ZONE WEST OF THE SAN GABRIEL RIVER

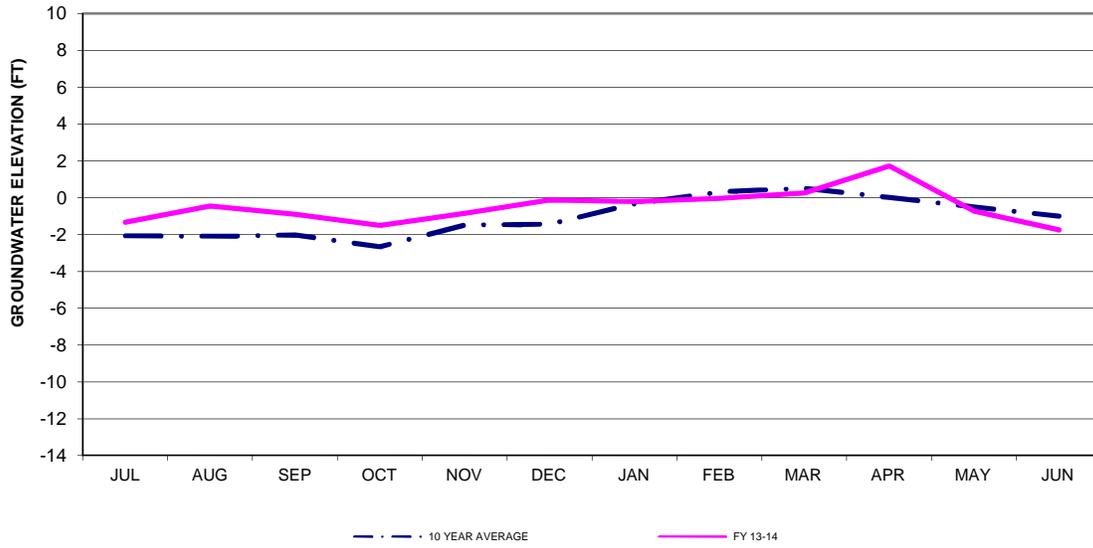


FIGURE 4b RECENT ZONE EAST OF THE SAN GABRIEL RIVER

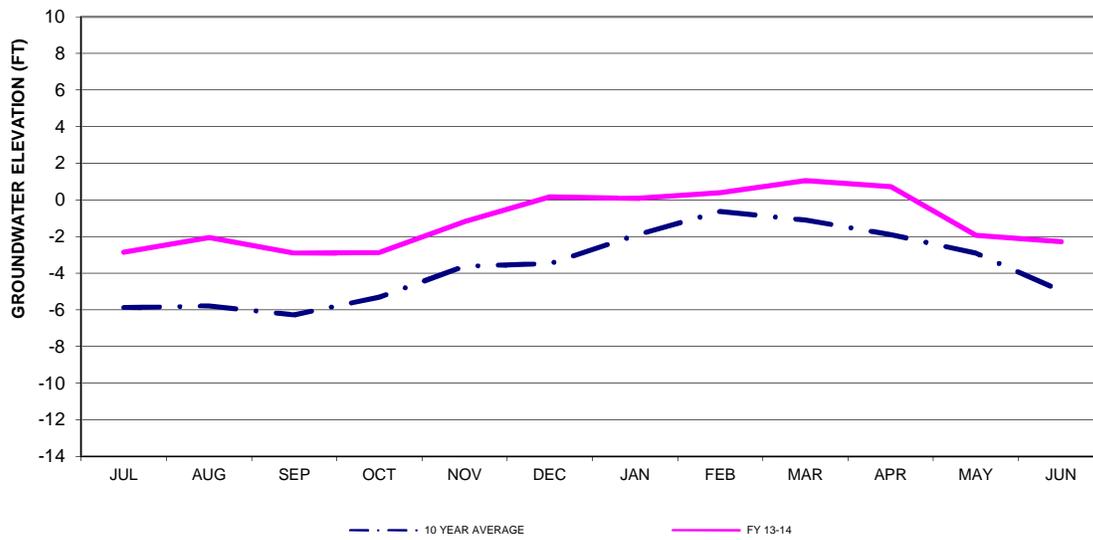


FIGURE 5a C-ZONE WEST OF THE SAN GABRIEL RIVER

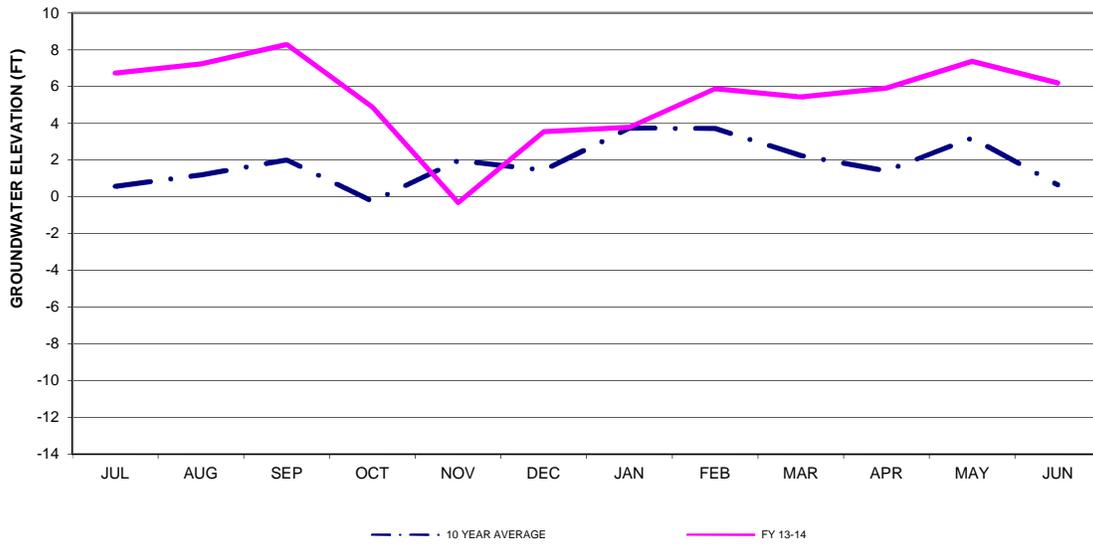


FIGURE 5b C-ZONE EAST OF THE SAN GABRIEL RIVER

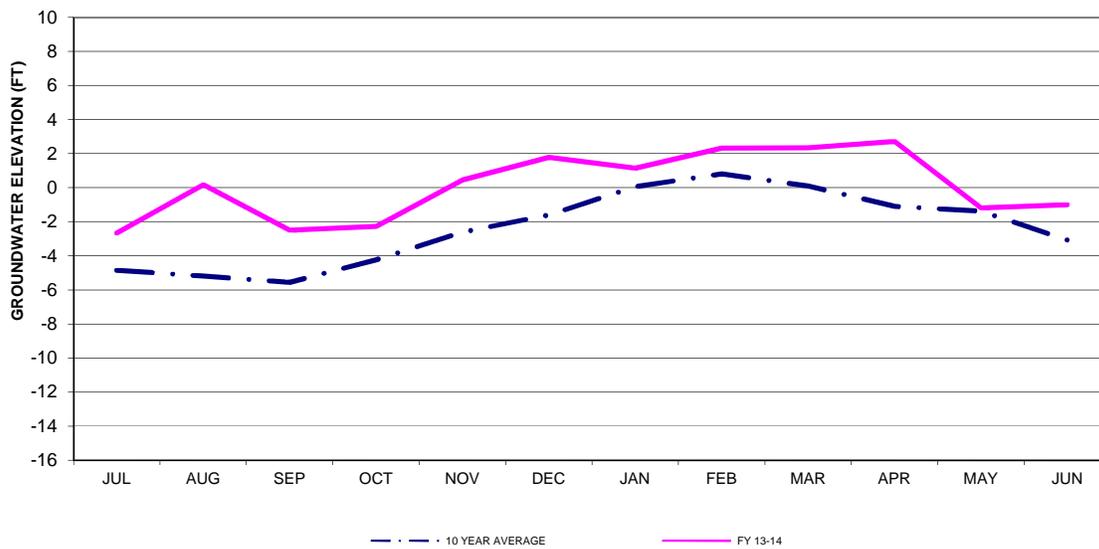


FIGURE 6a B-ZONE WEST OF THE SAN GABRIEL RIVER

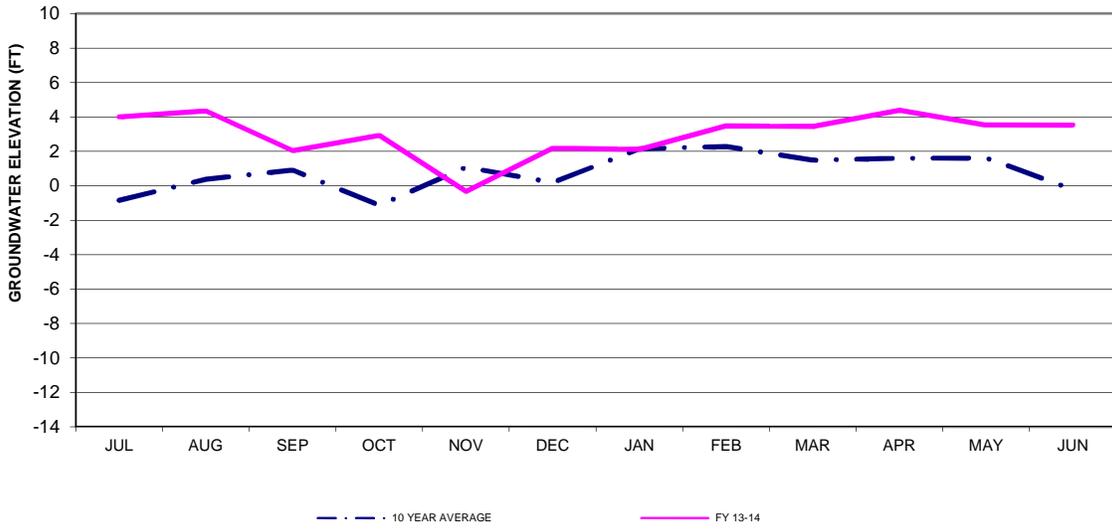


FIGURE 6b B-ZONE EAST OF THE SAN GABRIEL RIVER

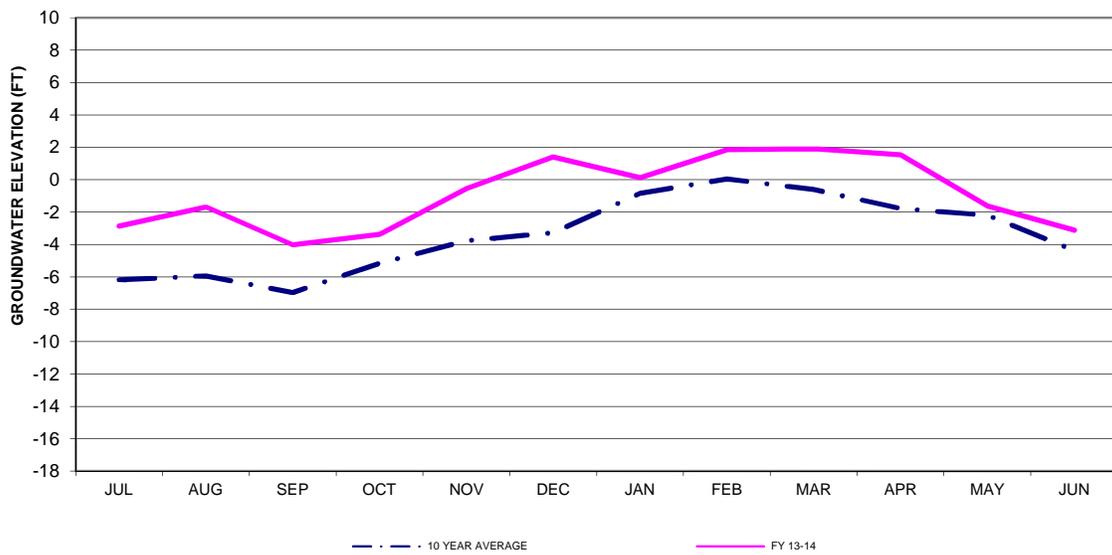


FIGURE 7a A-ZONE WEST OF THE SAN GABRIEL RIVER

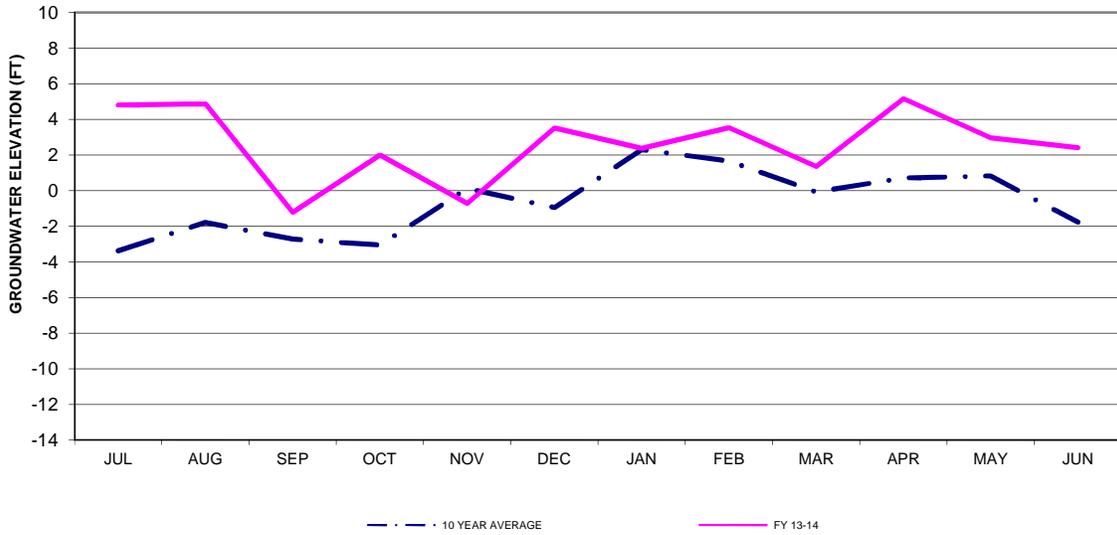


FIGURE 7b A-ZONE EAST OF THE SAN GABRIEL RIVER

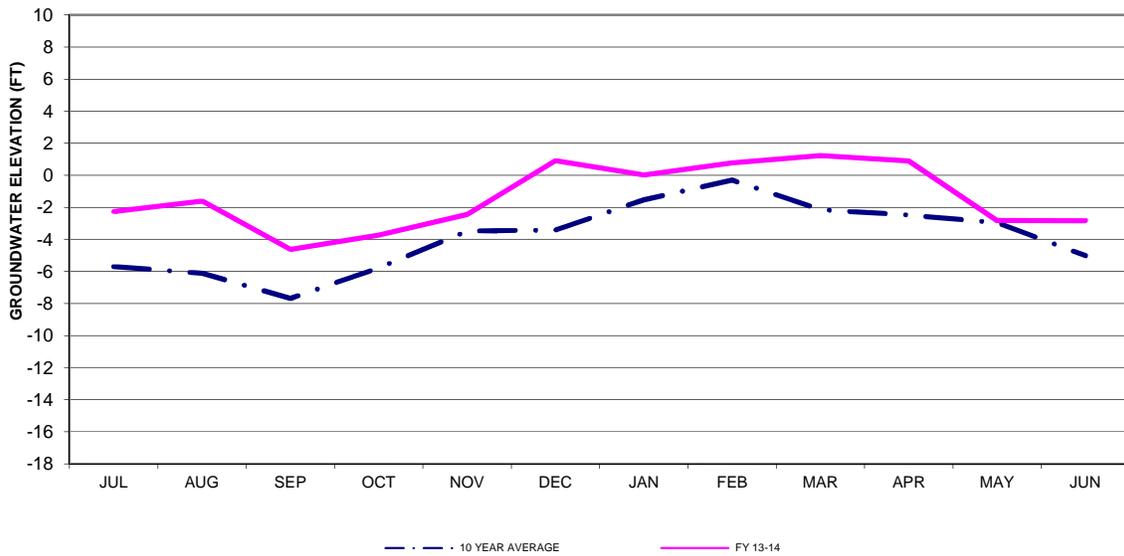


FIGURE 8a I-ZONE WEST OF THE SAN GABRIEL RIVER

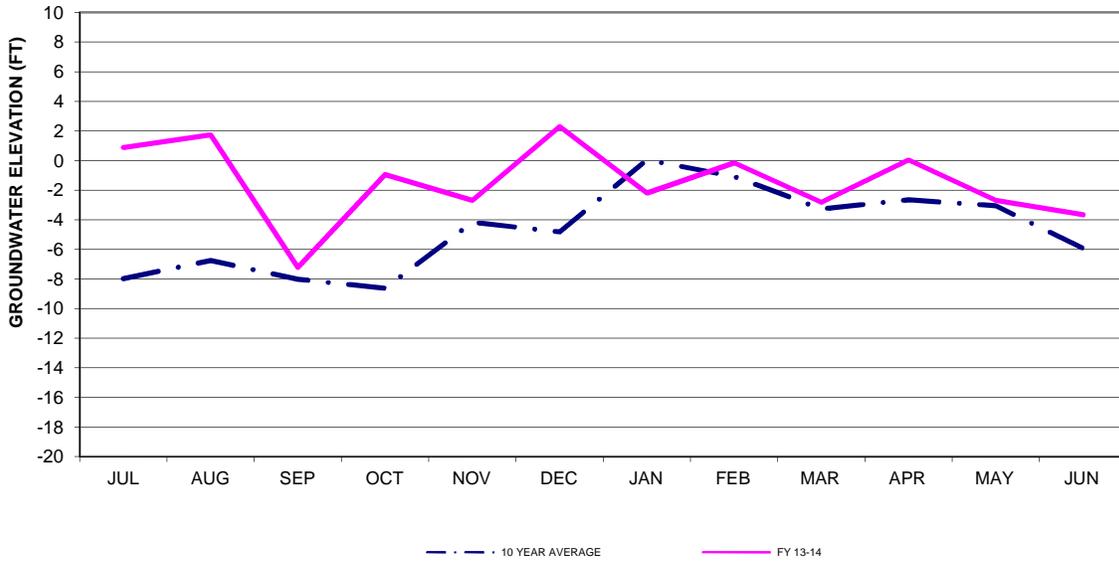
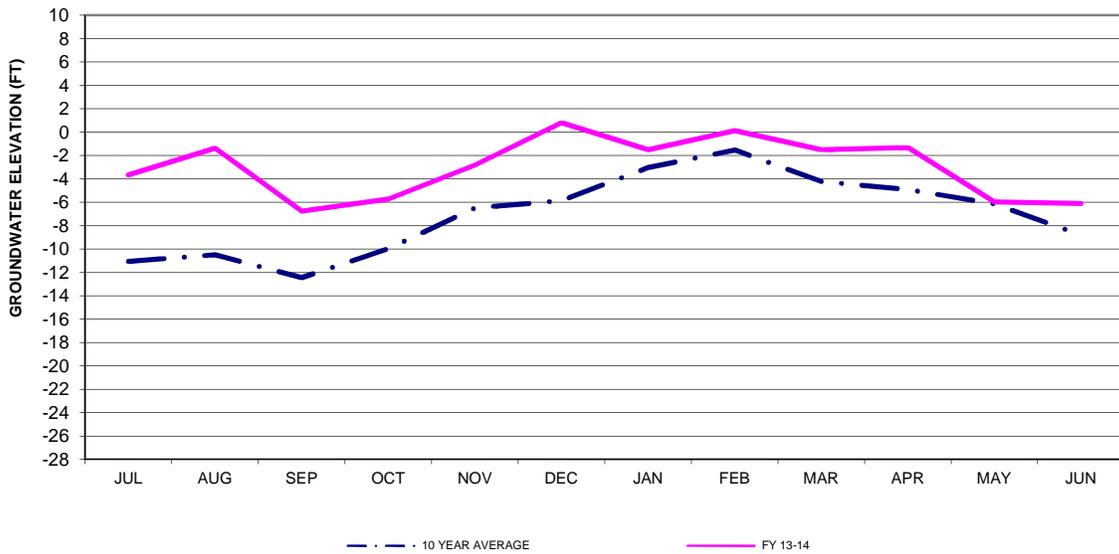


FIGURE 8b I-ZONE EAST OF THE SAN GABRIEL RIVER



Groundwater elevation contours for the R, C, B, A, and I Zones have been prepared from data collected in Spring 2014 and are included in Appendix A-1.1, 2.1, 3.1, 4.1, and 5.1. As expected, the contours show that the groundwater levels were the highest near the barrier 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. Also, it should be noted that areas historically having higher groundwater elevations in the C and B zones, especially near the bend at the San Gabriel River, continued to have higher groundwater elevations than their surroundings. Other areas of historically elevated groundwater levels (e.g., near 33XY and 33YZ) remained relatively constant when compared to the same time last year. This is likely due to the barrier remaining in full operation during the entire reporting period.

Contours of changes in groundwater elevations for the R, C, B, A, and I Zones between Spring 2013 and Spring 2014 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 2014, which was then subtracted from the corresponding and available data from Spring 2013 (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, most areas saw very little changes in groundwater elevation. Below is a brief summary and discussion of each aquifer zone:

- R Zone:
 - Groundwater elevations remained fairly consistent in the vicinity of the ABP, with decreases of about 0.5 feet along the west leg of the barrier.
 - Groundwater elevations increased about 2 feet along the barrier alignment between the San Gabriel River and the Los Alamitos Channel, and decreased about 1 foot along the east leg of the barrier.
- C Zone:
 - Groundwater elevations decreased slightly along west of the Los Cerritos

Channel.

- Groundwater elevations decreased approximately 1 foot along the east leg of the barrier adjacent to Los Alamitos Channel, and decreased further towards the end of the barrier's east leg.
- B Zone:
 - Groundwater elevations increased slightly along the west leg, and increased up to 2 feet between Los Cerritos Channel and San Gabriel River (e.g. 33XY and 33YZ).
 - Groundwater elevations decreased slightly at the eastern end of the barrier (e.g. 34LS and 34T0.1)
- A Zone:
 - Groundwater elevations decreased slightly along the west leg of the Barrier.
 - Groundwater elevations remained constant or increased slightly along the barrier alignment just east of the San Gabriel River.
 - Groundwater elevations decreased along the east leg, with decreases over 2 feet towards the end of the barrier's east leg.
- I Zone:
 - Groundwater elevations generally decreased along the west leg.
 - Groundwater elevations remained constant along the northern portion of the east leg, and increased up to 4 feet along the Los Alamitos Channel (e.g. 34VZ).

Graphs showing the average, maximum and minimum groundwater elevations at each internodal observation well throughout FY 2013-14 are included in Appendix A13 through A-16. As shown in the graphs, the average groundwater elevation was below the protective elevation at many wells along the barrier during FY 2013-14. However, areas of high chloride concentrations did not necessarily correlate with areas where the average elevations were below the protective elevation. A comparison of FY 2013-14 graphs with FY 2012-13 graphs indicates that overall elevations generally decreased,

even though the barrier injected more water in FY 2013-14 than FY 2012-13. In all cases, the southeastern portion of the barrier remained below protective elevations due to the limited injection capabilities in this area (quantity of wells, pressure limitations, maintenance, etc.). It is important to note that the JMC is seeking to remediate the limited injection capabilities in the southeastern region through additional wells, modeling studies, grouting operations, and condition assessments to anticipate and minimize shutdowns.

CHLORIDES

Figures 9 through 13 (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 (i.e. east or west of the San Gabriel River) throughout FY 2013-14. The data includes all available information from the annual and semi-annual chloride sampling events for wells within the barrier alignment and landward for approximately 2,000 feet from the barrier. 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 annual maximum chloride concentrations for the last 10 fiscal years (including this year) is shown with respect to the freshwater condition (250 mg/L).

Figure 9a: R-Zone Chloride West of San Gabriel River

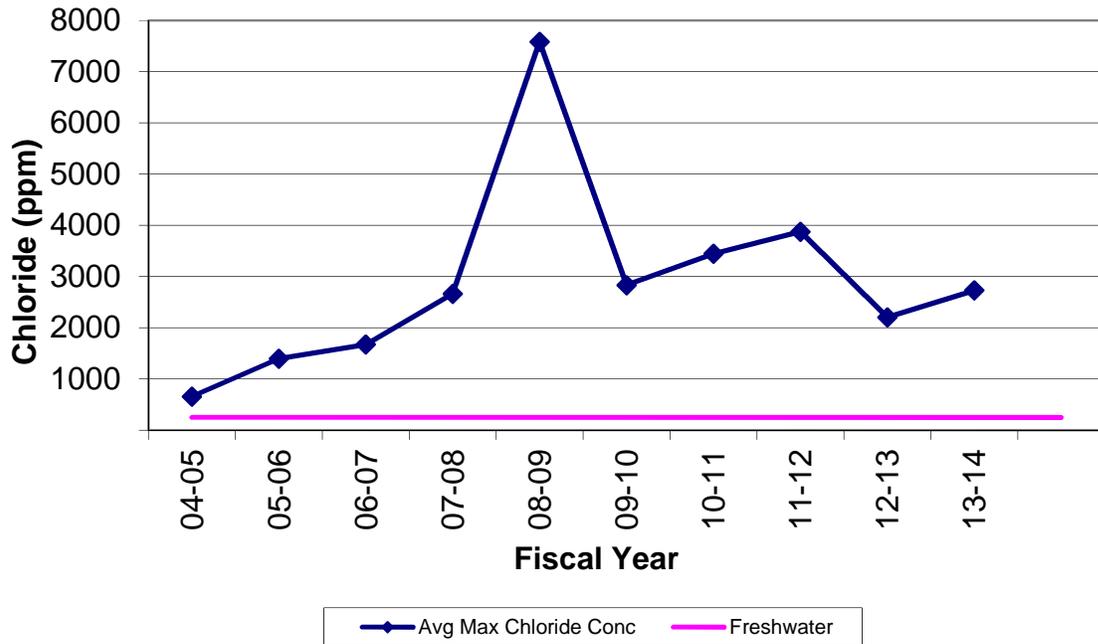


Figure 9b: R-Zone Chloride East of San Gabriel River

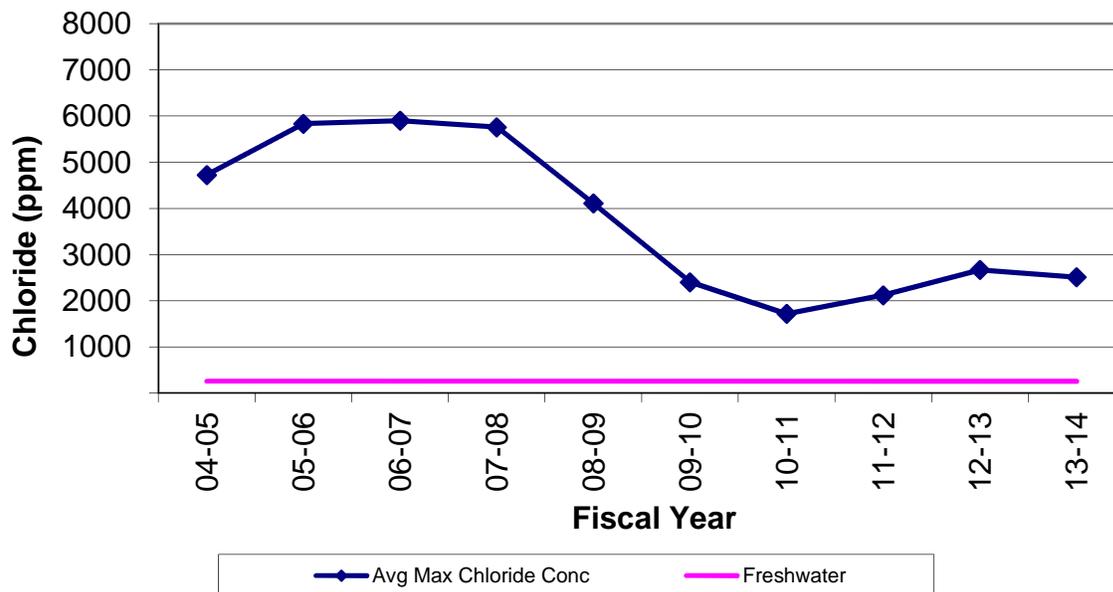


Figure 10a: C-Zone Chloride West of San Gabriel River

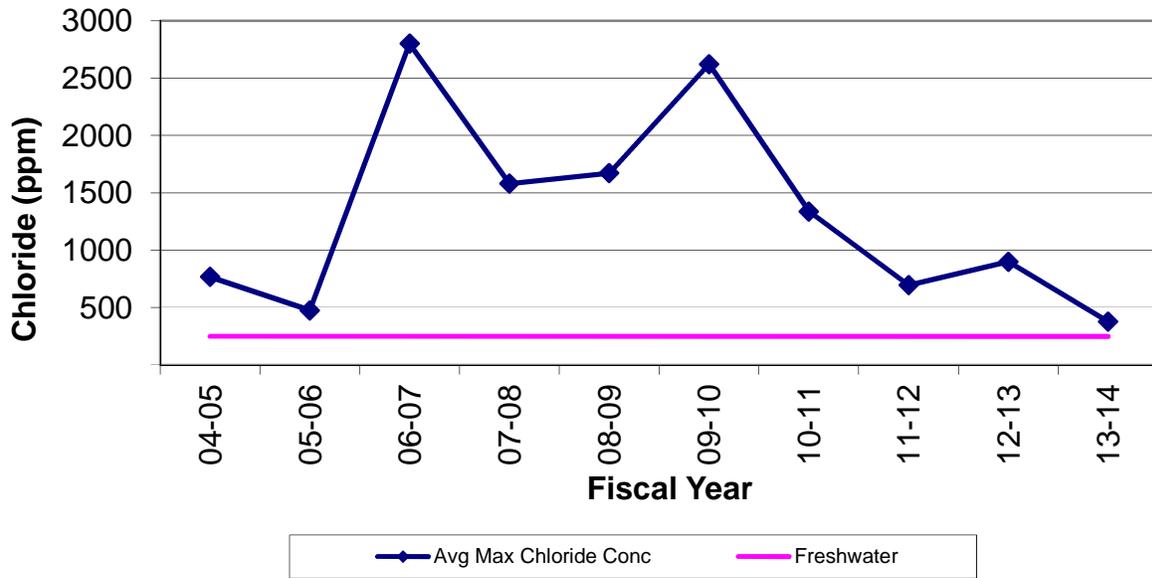


Figure 10b: C-Zone Chloride East of San Gabriel River

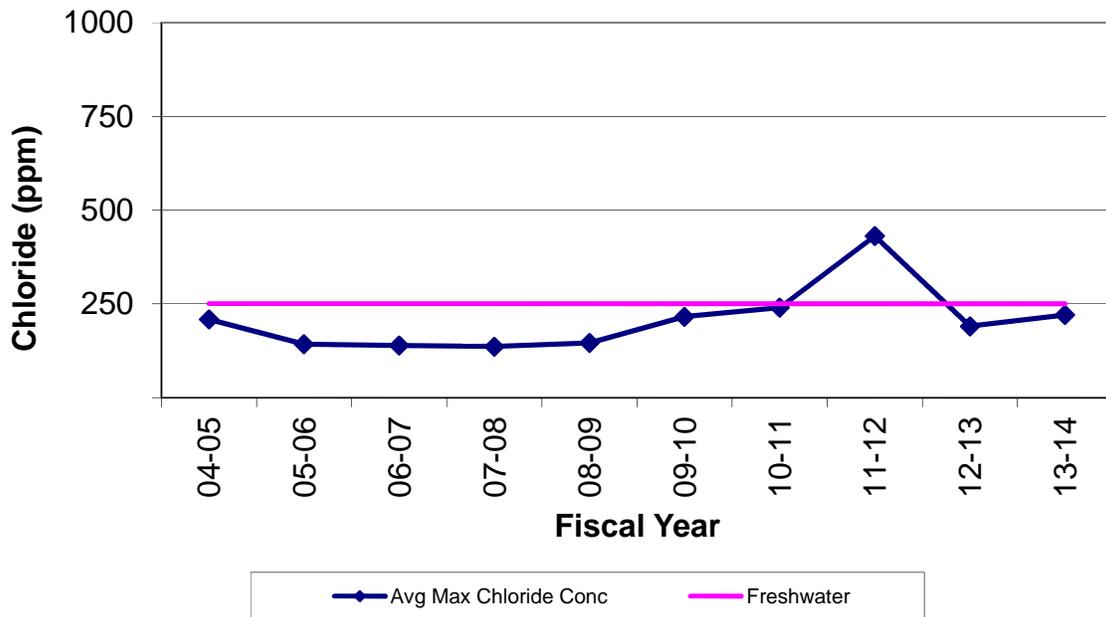


Figure 11a: B-Zone Chloride West of San Gabriel River

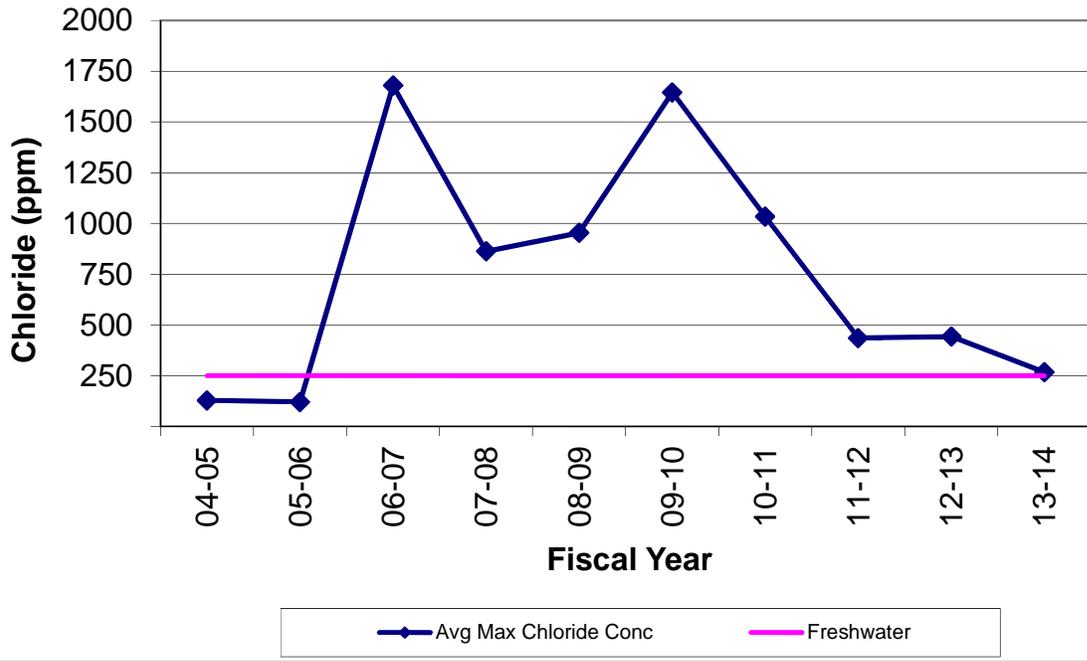


Figure 11b: B-Zone Chloride East of San Gabriel River

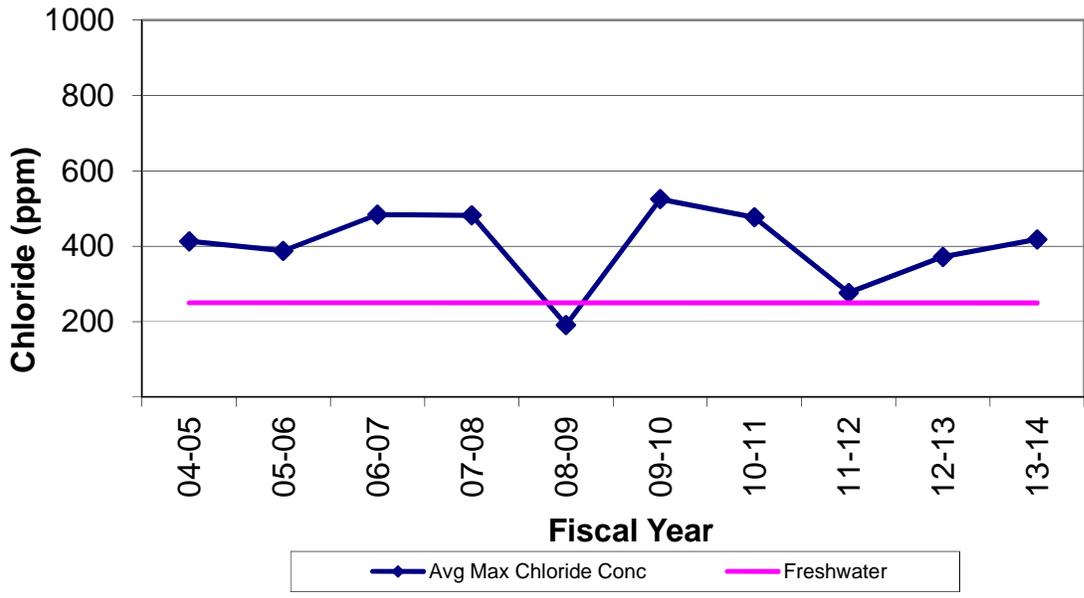


Figure 12a: A-Zone Chloride West of San Gabriel River

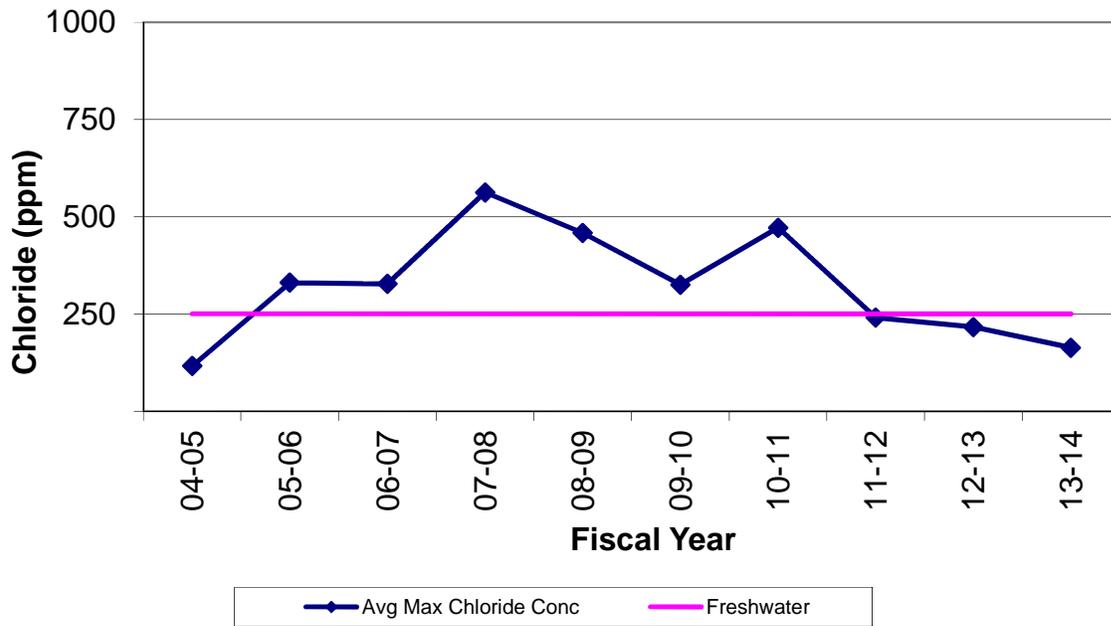


Figure 12b: A-Zone Chloride East of San Gabriel River

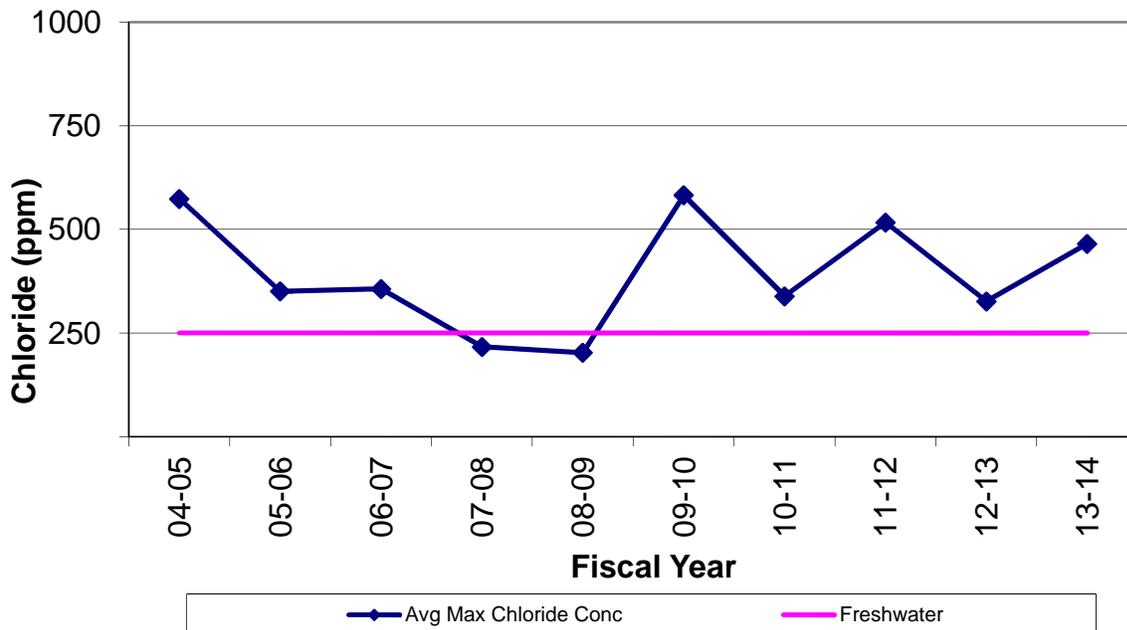


Figure 13a: I-Zone Chloride West of San Gabriel River

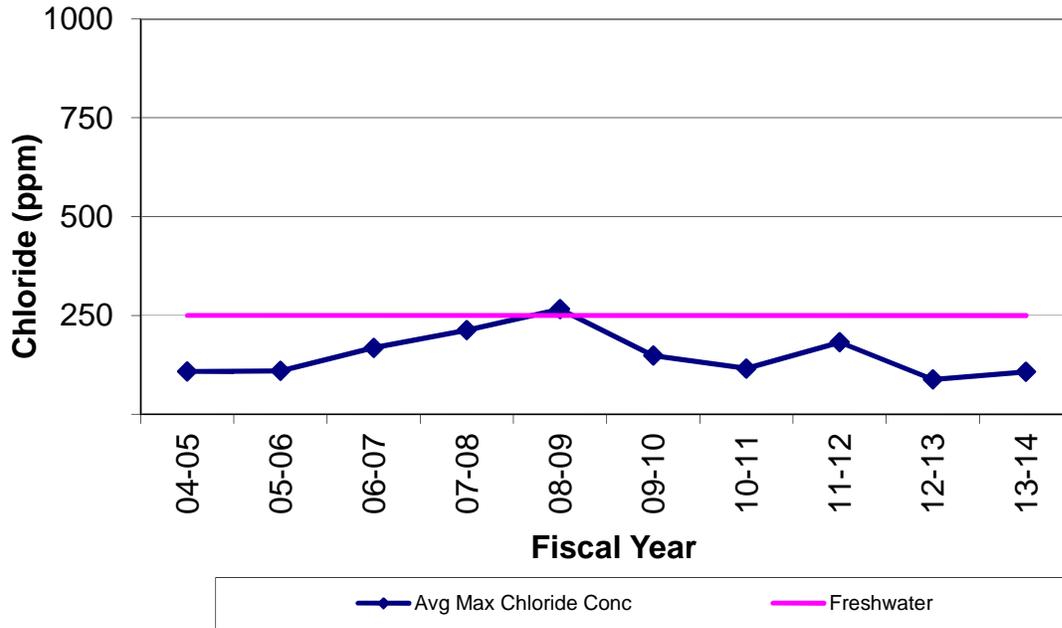
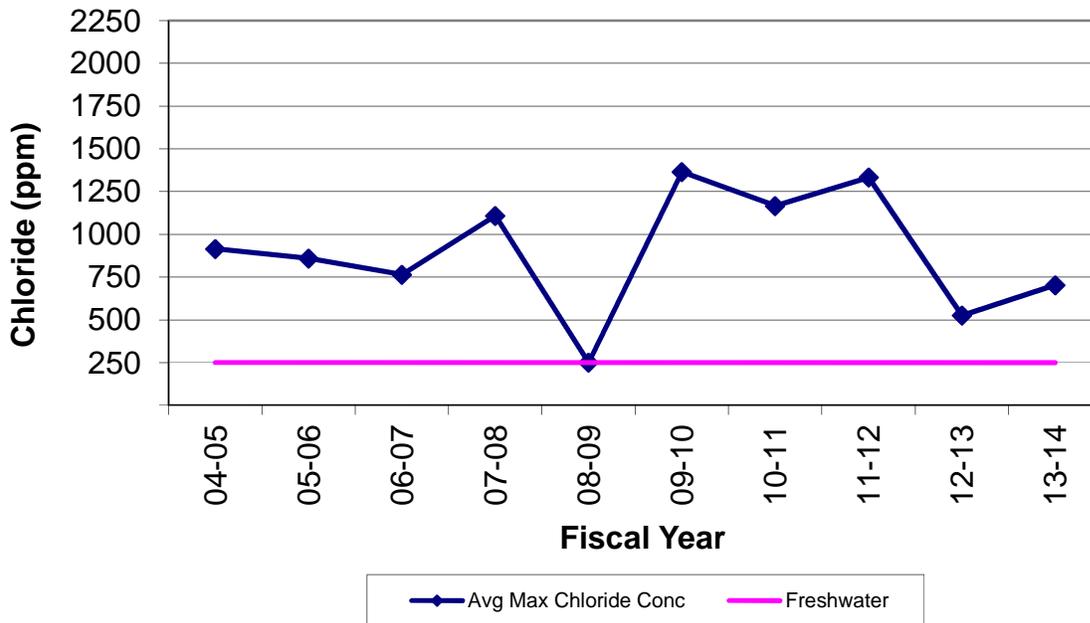


Figure 13b: I-Zone Chloride East of San Gabriel River



West of the San Gabriel River, FY 2013-14 average maximum chloride concentrations in the C, B, and A Zones decreased. The decrease was greater than 500 mg/L in the C zone. Average maximum chloride concentration in the I Zone showed a slight increase, while the average maximum chloride concentration increased dramatically in the R zone.

East of the San Gabriel River, FY 2013-14 average maximum chloride concentrations increased slightly in the C, and B zones, and showed a decrease on the order of 200 mg/L in the R Zone. However, the average maximum chloride concentrations increased approximately 200 mg/L in the A and I zones.

Chloride concentration contour maps for the R, C, B, A, and I Zones have been prepared from data collected in the Spring of 2014 and are included in Appendix A-6.1, A-7.1, A-8.1, A-9.1, and A-10.1, respectively. The chloride contour maps are based on the maximum chloride ion concentration (mg/L) measured at each observation well. Chloride data was gathered from observation wells located within the immediate vicinity of the barrier and does not represent basin-wide conditions for the groundwater basin protected by the barrier. 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 in April and May 2014 and the annual event in March and April 2014.

Contours of **changes** in chloride concentration for the R, C, B, A, and I Zones between Spring 2013 and Spring 2014 are shown in Appendices A-6.2, A-7.2, A-8.2, A-9.2, and A-10.2, respectively. The data set is based on available data for Spring 2014, which was then subtracted from the corresponding data for Spring 2013. These contours very clearly identify areas where chloride concentrations increased and decreased between these two reporting periods.

The chloride concentration contours for FY 2013-14 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 barrier continued to be controlled west of the San Gabriel River. East of the San Gabriel River, several areas recorded elevated chloride concentrations indicating seawater intrusion. Additional areas of high chloride concentrations and/or notable changes in concentration (since the FY 2012-13 report) are as follows:

- R Zone – High chloride concentrations continued to remain present north of the west leg along Los Cerritos Channel and in the immediate vicinity of well 34L'1 on the east leg. Chloride concentrations increased significantly at wells 34F5 and 33S18, on the order of 2,000 and 5,000 mg/L respectively.
- C Zone – High chloride concentrations observed during the FY 2009-10, FY 2010-11, and FY 2012-13 reporting periods along the west leg at the Los Cerritos Channel (33ST) disappeared quite dramatically during FY 2013-14. While chloride concentrations remained low along most of the east leg, elevated concentrations remained near observation well 34T0.1 during FY 2013-14 indicating that injection is insufficient to control sea water intrusion in that area.
- B Zone – West of the Los Cerritos Channel, dramatic increases in chloride concentrations during the FY 2012-13 reporting period reversed course, with chloride concentrations at 33ST and 33T3 decreasing dramatically. Chloride concentrations also decreased significantly at well 33T13, while remaining significantly elevated at well 33Q15. Along the east leg of the barrier, chloride concentrations at well 34JL decreased slightly while remaining elevated, even though northerly and southerly injection wells 34G2 and 34L, respectively, were operational during the entire reporting period. Monitoring well 34JL is approximately 400ft from 34L and 900ft from 34G2. Continued high chloride concentrations at 34JL, while decreasing slightly during this reporting period, demonstrate that the distance between injection wells 34G2 and 34L is too great to control seawater intrusion. Although lower chloride concentrations were observed during the FY 2013-14 reporting period, elevated chloride

concentrations continue to increase in the area surrounding well 34U8.

- A Zone – The high chloride concentrations northwest of the ABP's west leg identified in previous reporting periods continue to decrease as evidenced by notable decreases in chloride concentration at well 33L23. Chloride concentrations have also decreased or remained consistent along the west leg between the Los Cerritos Channel and San Gabriel River, particularly at 33WX, 33XY, and 33YZ, while 33UV and 33Z'1 increased slightly. Well 34DG exhibited a significant decrease in chloride concentration, after a large increase in chloride concentration from the previous year. Chloride concentrations increased significantly along and landward of the east leg of the Barrier, with increases of approximately 2,000 mg/L at wells 35H11 and 34U8.
- I Zone – In general, chloride concentrations remained below 250 mg/L along the west leg and northward of the barrier, with a notable increase in chloride concentration at well 33X10. Along the east leg of the barrier, chloride concentrations remained consistently elevated at well 34H25 while increasing dramatically at 34LS after a dramatic decrease was reported in FY 2012-13. While chloride concentrations decreased significantly at well 35E0.1, continuing high concentrations at 35F20 suggest that the barrier continues to provide insufficient protection from seawater intrusion in this area.

There continue to be three possible causes of the high chloride concentrations in all zones north of, northwest of, and along portions of the ABP west leg (which was in steady operation during this reporting period). These include the remaining seawater from previous intrusions, migration of seawater inland through the Los Cerritos Channel, and intrusion around the west end of the barrier.

OCWD is in the process of improving the north-south barrier alignment along the east leg with the installation of 17 new clustered injection wells. OCWD is also planning the installation of four multi-depth observation wells in the same area to improve the monitoring well network. In addition, LACFCD completed construction of eight additional

observation wells to aid in further understanding the hydrogeologic conditions within Los Angeles County, particularly to the north and west of the west leg.

FINANCING AND 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 2013-14 was \$10,123,668, which can be broken down as follows: water costs of \$6,511,040, services and supplies costs of \$2,037,907, approved LACFCD and OCWD project expenses of \$1,227,246, and right-of-way acquisition \$340,707; \$6,768 for maintenance of extraction wells.

WATER COSTS

During FY 2013-14, a total of 6,692.3 acre-feet of water were injected at an estimated total cost of \$6,511,040. The monthly water rates (dollars per AF) from July 2013 to June 2014 varied periodically as shown earlier 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-13	417.8	166.5	584.3
Aug-13	418.2	190.7	608.9
Sep-13	358.4	161.8	520.2
Oct-13	323.0	171.5	494.5
Nov-13	251.3	187.3	438.6
Dec-13	268.0	197.2	465.2
Jan-14	297.5	204.3	501.8
Feb-14	309.4	199.3	508.7
Mar-14	363.4	222.8	586.2
Apr-14	443.2	244.4	687.6
May-14	417.7	230.5	648.2
Jun-14	418.1	230.0	648.1
TOTAL INJECTED	4,286.0	2,406.3	6,692.3
TOTAL COST (\$) [From Tbl. 1]	\$4,169,695.14	\$2,341,345.01	\$6,511,040

SERVICES AND SUPPLIES COSTS

As shown in Appendix A-19, a total of \$3,612,627 was spent on services and supplies and special programs during the 2013-14 fiscal year (excluding water costs). 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 District. The distribution of FY 2013-14 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) ¹	\$1,336,682	\$701,224	\$2,037,907
Service & Supplies of Extraction Facilities ²	\$6,768	\$0	\$6,768
Special Programs ³	\$1,227,246	\$0	\$1,227,246
Right of Way Acquisition ⁴	\$266,640	\$74,067	\$340,707
SUBTOTAL	\$2,837,336	\$775,291	\$3,612,627
Liability Insurance	\$17,834	\$17,834	\$35,668
TOTAL	\$2,855,170	\$793,125	\$3,648,295

The values in Table 3 come from the ABP FY 2013-14 Costs (see A-19) as follows:

¹ The sum of Items 1, 2, 3, 7, 8, 9, 10, 11, 12, 14, and 15. OCWD is responsible for 36.0% of all costs for these items based on the water split between LACFCD and OCWD, except for Item 10 (flat \$375 per Agreement)

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

³ Item 13. OCWD is not responsible for any portion of the cost for this item.

⁴ Item 17. Cost to acquire Right of Way along San Gabriel River is split according to pipeline ownership (5/23, 18/23) based on the 1964 Implementation Agreement.

The yearly cost of all the services and supplies (including special programs but excluding water and extraction costs) for the last 20 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
1993-94	4,144.8	\$584,975	\$141.13
1994-95	3,495.7	\$651,845	\$186.47
1995-96	5,269.0	\$509,377	\$96.67
1996-97	5,739.4	\$408,064	\$71.10
1997-98	5,335.8	\$923,342	\$173.05
1998-99	5,330.4	\$795,044	\$149.15
1999-00	6,077.9	\$589,168	\$96.94
2000-01	5,398.8	\$961,649	\$178.12
2001-02	6,061.7	\$713,299	\$117.67
2002-03	5,012.3	\$1,555,921	\$310.42
2003-04	5,879.7	\$730,652	\$124.27
2004-05	5,066.1	\$918,020	\$181.21
2005-06	3,457.8	\$1,605,456	\$464.30
2006-07	1,265.1	\$2,309,300	\$1,825.39
2007-08	5,971.1	\$3,513,957	\$588.49
2008-09	7,936.2	\$1,875,902	\$236.37
2009-10	5,629.2	\$3,135,608	\$557.03
2010-11	5,066.1	\$2,830,801	\$558.77
2011-12	4,334.7	\$2,368,788	\$546.47
2012-13	5,490.4	\$2,477,565	\$451.25
2013-14	6,692.3	\$3,605,859	\$538.81

¹ The cost per AF injected since FY05-06 is typically higher because these years included costs for multiple repairs and/or capital improvement projects which were not included in previous years. The cost per AF is especially high in FY06-07 because of improvement projects, observation well cleanouts, costs related to the reclaimed water program, and various fixed costs that were incurred in a year of reduced injections due to the extended shutdowns for repairs.

The costs of the services and supplies for extraction operations for the last 20 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
1993-94	992.0	\$169,621	\$170.99
1994-95	940.7	\$148,122	\$157.46
1995-96	998.4	\$130,901	\$131.11
1996-97	1,200.9	\$51,077	\$42.53
1997-98	883.5	\$64,774	\$73.32
1998-99	775.6	\$52,043	\$67.10
1999-00	679.9	\$41,320	\$60.77
2000-01	404.8	\$49,769	\$122.95
2001-02	495.0	\$53,153	\$107.38
2002-03	262.7	\$63,165	\$240.45
2003-04	0.0	\$6,068	N/A
2004-05	0.0	\$3,043	N/A
2005-06	0.0	\$2,857	N/A
2006-07	0.0	\$3,224	N/A
2007-08	0.0	\$4,224	N/A
2008-09	0.0	\$14,742	N/A
2009-10	0.0	\$20,223	N/A
2010-11	0.0	\$4,552	N/A
2011-12	0.0	\$6,219	N/A
2012-13 ¹	0.0	\$70,408	N/A
2013-14	0.0	\$6,768	N/A

¹ FY 2012-13 costs were higher than previous years due to extraction well redevelopment.

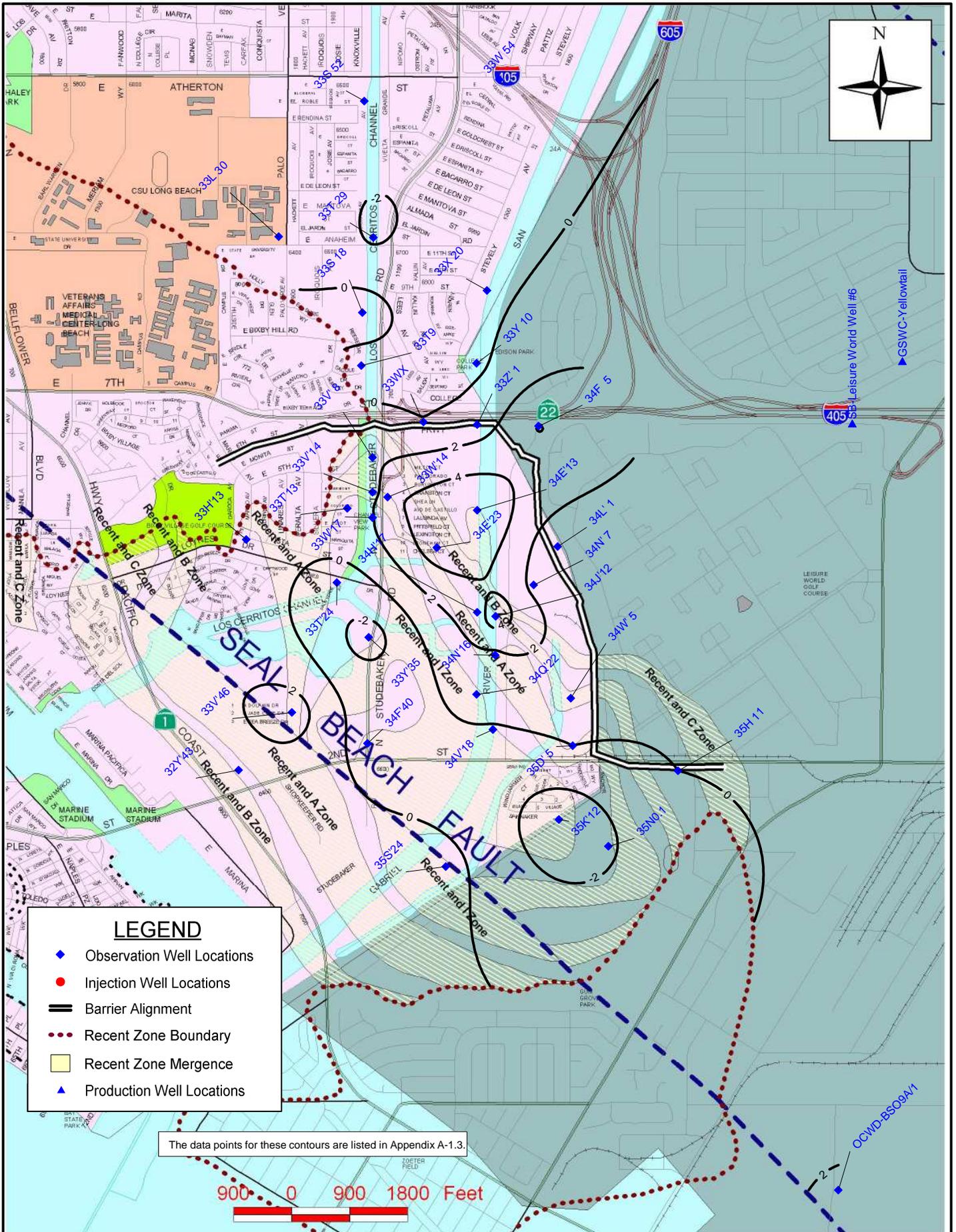
FIXED ASSETS

During FY 2013-14, LACFCD constructed the ABP Unit 13 Observation Wells Project which included eight new wells at a cost of \$1,206,056.67. New OCWD facilities (ABP Unit 14 injection and observation wells) are in the planning phase.

BUDGET

The FY 2015-16 budget for the ABP Supplies and Services and fixed Assets Costs is \$2,756,000. A breakdown of this amount, along with past expenditures per category, is shown in Appendix A-20. Note that amounts for WRD are shown in addition to those for LACFCD and OCWD.

APPENDIX



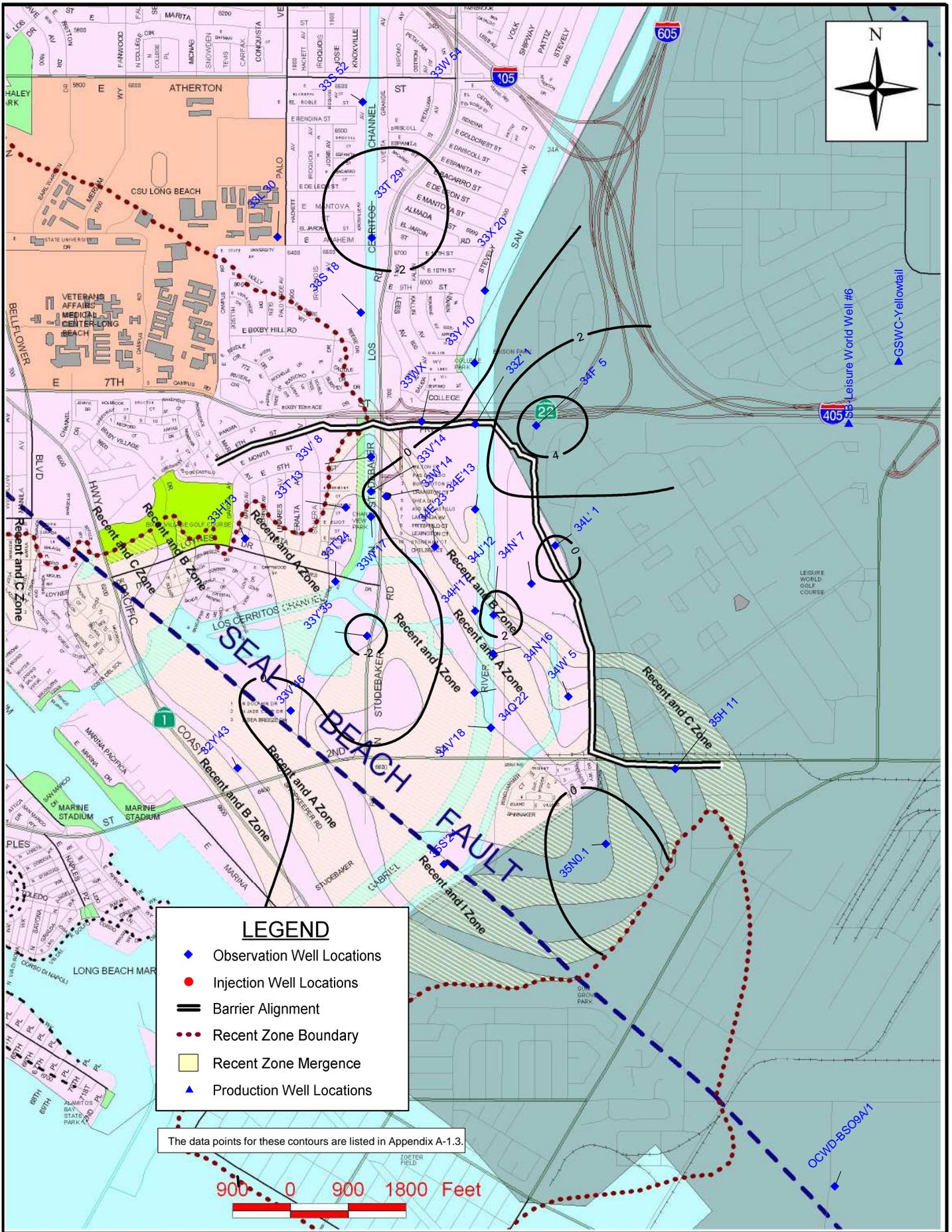
LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- Barrier Alignment
- ⋯ Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations

The data points for these contours are listed in Appendix A-1.3.



Alamitos Barrier Project
R Zone Groundwater Elevation (ft) Contours Spring 2014



Alamitos Barrier Project
 R Zone: Change in Elevation(ft), Spring 2013 to Spring 2014



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

POINT	PROJ	FCD	AQUIFER	DATE	FY 13-14 ELEV	P.E. ¹	Δ^2	FY 12-13 ELEV2	CHANGE IN ELEV
1	32Y'43	493WW	R	20140325	0.7			1.3	-0.6
2	33H'13	493YY	R,A	20140320	1.4			1.5	-0.1
3	33L 30	491G	R	20140325	-0.4			0.7	-1.1
4	33S 18	492AH	R	20140317	1.0			1.4	-0.4
5	33S 52	491J	R	20140317	-1.7			-0.2	-1.5
6	33T 9	492CV	R	20140630	-0.6				n/a
7	33T 29	491D	R	20140312	-2.3			0.8	-3.1
8	33T'13	492AU	R	20130912	1.6			2.4	-0.8
9	33T'24	493SS	R	20130916	-1.1			-0.3	-0.8
10	33V' 8	492BY	R,A	20130917	1.7			3.3	-1.6
11	33V'14	492JJ	R	20130917	1.0			0.4	0.6
12	33V'46	493UU	R	20140326	3.2			2.5	0.7
13	33W 54	501C	R	20140326	-0.6			0.8	-1.4
14	33W'14	492AT	R	20140403	3.7			1.5	2.2
15	33W'17	493PP	R	20140326	1.9			2.5	-0.6
16	33WX	502AZ	R	20140326	0.1	2.0	-1.9	0.5	-0.4
17	33X 20	502L	R	20140318	-0.4			0.7	-1.1
18	33Y 10	502BA	R	20140326	-0.4			0.6	-1.0
19	33Y'35	493AB	R	20140401	-3.0			-0.2	-2.8
20	33Z' 1	502AU	R	20140318	0.9			0.4	0.5
21	34E'13	503AU	R	20140318	6.0			4.4	1.6
22	34E'23	503X	R	20140403	5.1			4.4	0.7
23	34F 5	502BT	R	20140318	4.1			-1.6	5.7
24	34F'40	483J	R	20140630	-0.9				n/a
25	34H'17	503Y	R	20140318	3.0			1.9	1.1
26	34J'12	503U	R	20140331	5.4			1.3	4.1
27	34L' 1	503P	R	20140326	0.3			0.8	-0.5
28	34N' 7	503AE	R	20140327	1.4			1.2	0.2
29	34N'16	503W	R	20140401	1.6			0.9	0.7
30	34Q'22	503T	R	20140318	1.0			-0.1	1.1
31	34V'18	503V	R	20140331	-0.2			-0.5	0.3
32	34W' 5	503AH	R	20140327	1.0			0.7	0.3
33	35D' 5	503AL	R	20140327	0.0				n/a
34	35H 11	514F	R	20140324	0.0	2.0	-2.0	-0.7	0.7
35	35K'12	504R	R	20140320	-3.4				n/a
36	35N0.1	504M	R	20140331	-2.2			-1.7	-0.5
37	35S'24	504K	R	20140326	0.7			-0.2	0.9
38	OCWD- BSO9A/1		R	20140306	2.19			1.9	0.3

AVG=

0.8

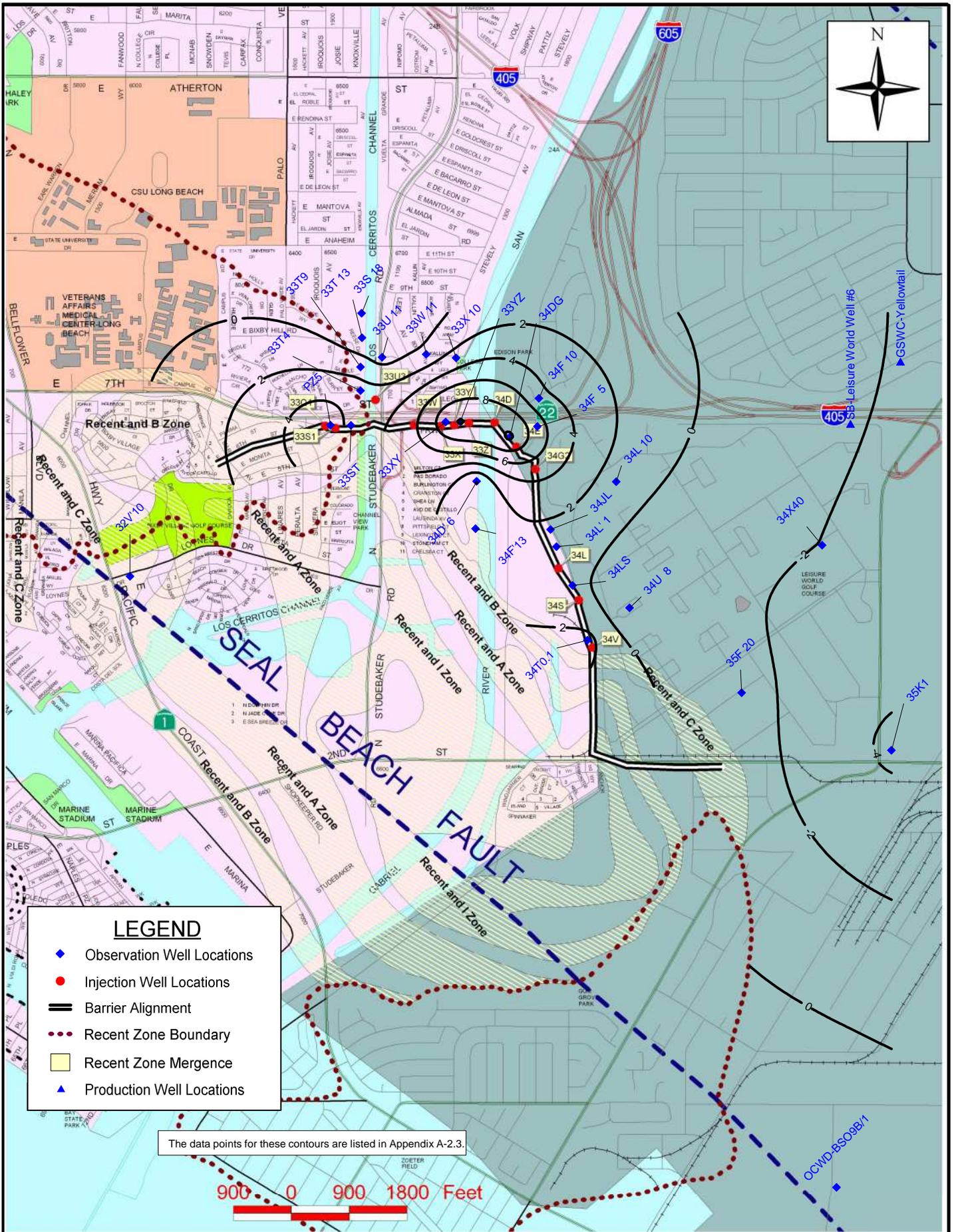
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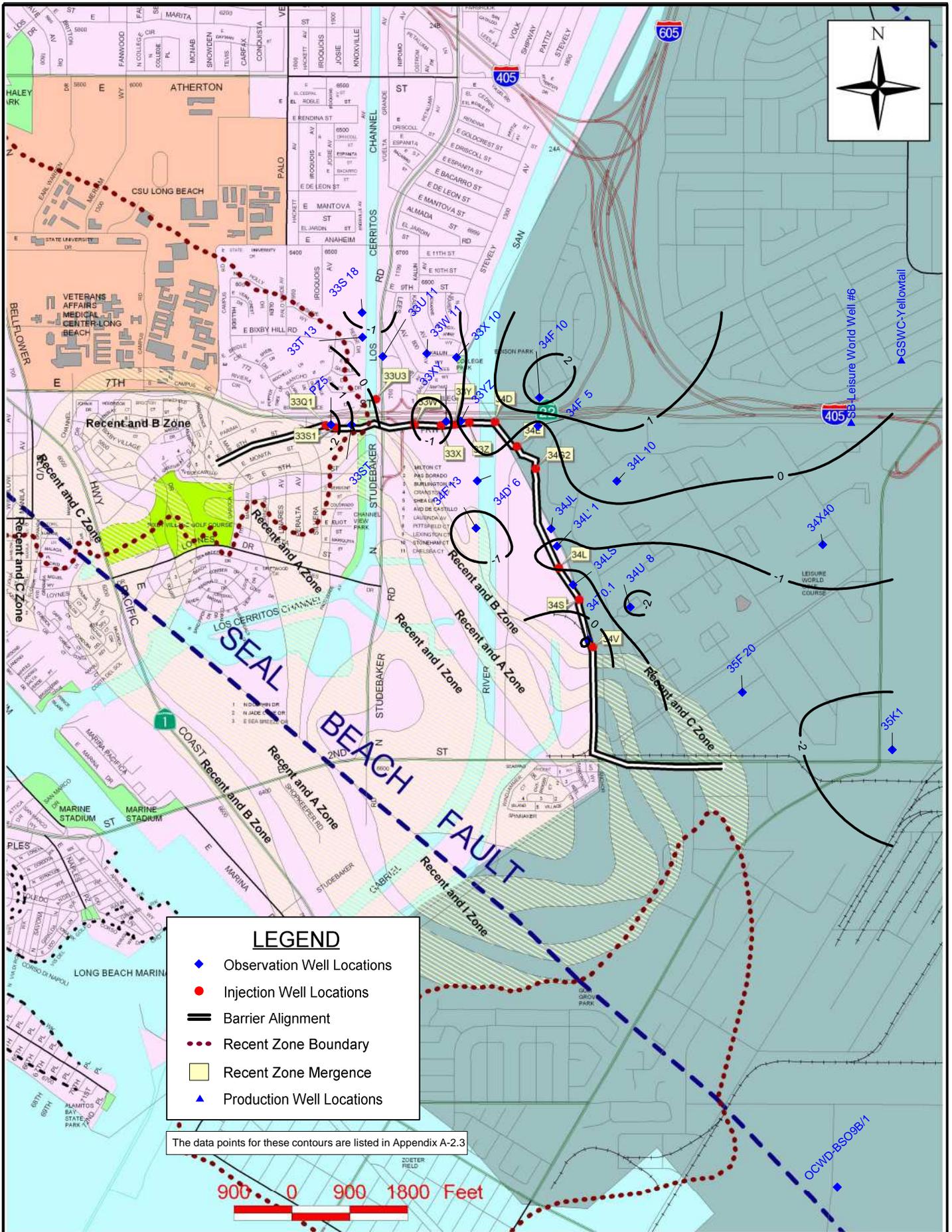
¹ P.E. represents the protective elevations calculated for internodal wells.

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 2014



Alamitos Barrier Project
 C Zone: Change in Elevation (ft), Spring 2013 to Spring 2014



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

POINT	PROJ	FCD	AQUIFER	DATE	FY 13-14 ELEV	P.E. ¹	Δ ²	FY 12-13 ELEV	CHANGE IN ELEV
1	32V'10	483H	C	20140626	-1.8				n/a
2	33S 18	492AG	C	20140317	-1.9			-0.4	-1.5
3	33ST	492BK	C,B	20140326	3.0	0.9	2.1	2.0	1.0
4	33T 4	492CT	C	20140630	2.6				n/a
5	33T 9	492CU	C	20140630	1.4				n/a
6	33T 13	492AC	C	20140417	-1.5			-0.8	-0.7
7	33U 11	492AL	C	20140410	-0.9			0.0	0.9
8	33W 11	502R	C	20140410	0.6			0.8	-0.2
9	33X 10	502BB	C	20140318	2.8			3.1	-0.3
10	33XY	502BL	C	20140326	9.3	5.4	3.9	11.2	-1.9
11	33YZ	502AB	C	20140326	10.2	5.4	4.8	9.7	0.5
12	34D' 6	502BF	C	20140402	-0.1			0.0	-0.1
13	34DG	502X	C	20140326	10.4	4.0	6.4		n/a
14	34F 5	502BU	C	20140410	6.9			7.4	-0.5
15	34F 10	502AP	C	20140421	4.5			1.8	2.7
16	34F'13	503R	C	20130916	1.7			3.2	-1.5
17	34JL	503AR	C	20140326	1.7	4.2	-2.5	2.0	-0.3
18	34L' 1	503N	C	20140326	1.7	4.8	-3.1	3.1	-1.4
19	34L 10	502AK	C	20140410	1.1			0.5	0.6
20	34LS	503BF	C	20140326	0.4	4.5	-4.1	1.1	-0.7
21	34T0.1	503AB	C	20140324	2.6	3.6	-1.0	1.5	1.1
22	34U 8	513D	C	20140410	-1.9			0.4	-2.3
23	34X40	513R	C	20140429	-2.0			-1.6	-0.4
24	35F 20	513L	C	20140410	-1.3			0.6	-1.9
25	35K1	523D	C	20140324	-4.4	4.3	-8.7	-2.0	-2.4
26	OCWD- BSO9B/1		C	20140306	2.0			2.6	-0.6
27	PZ5	492CH	C,B	20140403	6.1			3.4	2.7

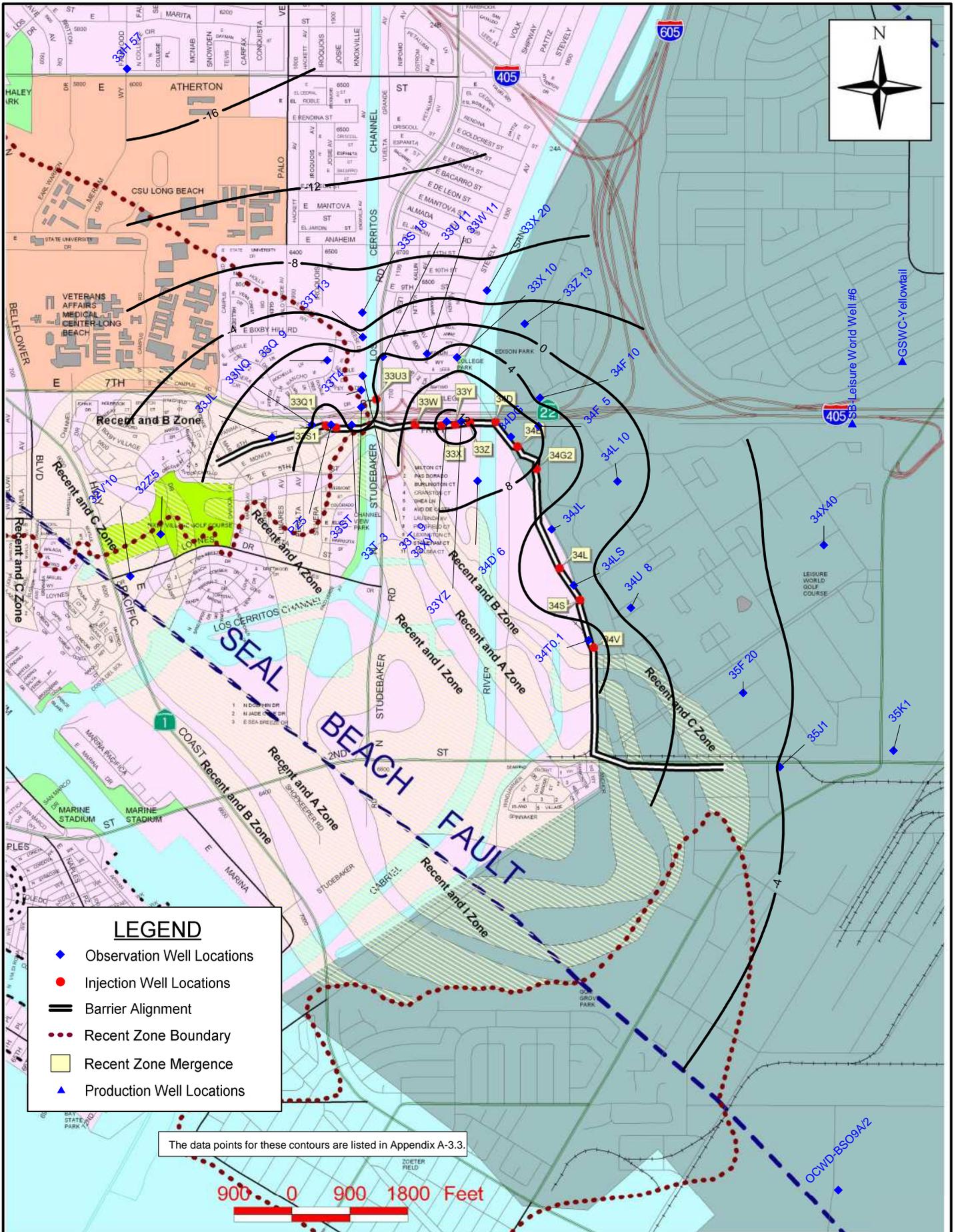
AVG= 2.0

AVG= 2.2

¹ P.E. represents the protective elevations calculated for internodal wells.

² Δ (+/-) represents how much groundwater level is above/below respective P.E.

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



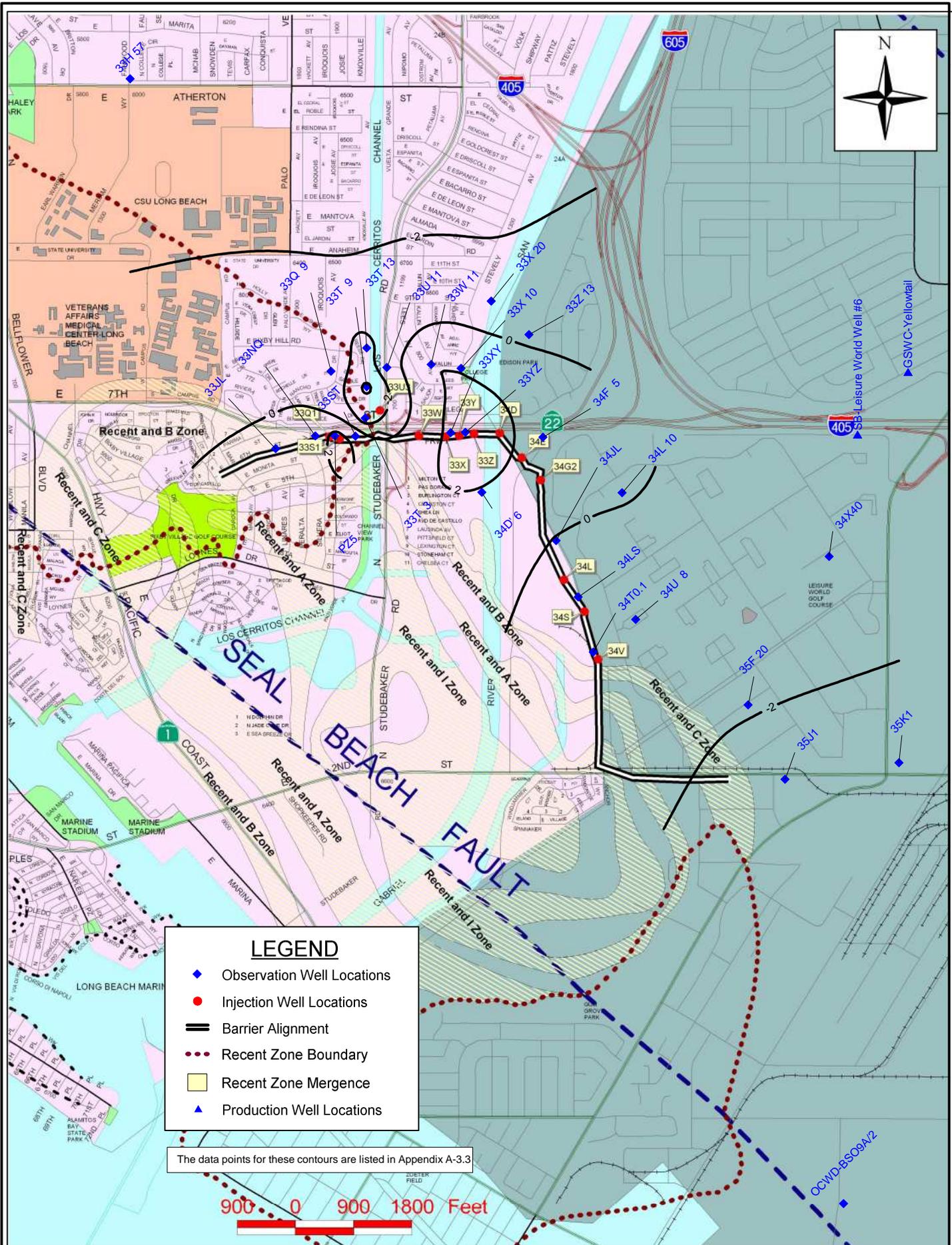
LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- Barrier Alignment
- ⋯ Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations

The data points for these contours are listed in Appendix A-3.3.



Alamitos Barrier Project
 B Zone Groundwater Elevation (ft) Contours Spring 2014



LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- == Barrier Alignment
- ⋯ Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations

The data points for these contours are listed in Appendix A-3.3



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

POINT	PROJ	FCD	AQUIFER	DATE	FY 13-14 ELEV	P.E. ¹	Δ^2	FY 12-13 ELEV2	CHANGE IN ELEV
1	32V'10	483G	B	20140626	-2.0				n/a
2	32Z'5	482W	B,A	20140626	-1.4				n/a
3	33H 57	481	B	20140331	-19.2			-15.4	-3.8
4	33JL	492BQ	B	20140326	2.7	0.9	1.8	2.3	0.4
5	33NQ	492BN	B	20140326	3.9	0.7	3.2	3.4	0.5
6	33Q 9	492CM	B	20140415	3.0			3.2	-0.2
7	33S 18	492AF	B	20130912	-5.9				n/a
8	33ST	492BK	C,B	20140409	3.4	0.9	2.5	2.0	1.4
9	33T 3	492CL	B	20140325	1.4			4.5	-3.1
10	33T 4	492CS	B	20140630	3.7				n/a
11	33T 9	492YY	B	20140408	2.8			7.3	-4.5
12	33T 13	492AB	B	20140408	-3.4			-0.9	-2.5
13	33U 11	492AK	B	20140410	4.8			5.5	-0.7
14	33W 11	502S	B	20140410	2.9			0.9	2.0
15	33X 10	502BC	B	20140415	6.9			5.0	1.9
16	33X 20	502K	B	20140414	-6.3			-4.8	-1.5
17	33XY	502BM	B	20140415	13.5	6.3	7.2	11.2	2.3
18	33YZ	502AC	B	20140415	12.2	7.1	5.1	8.8	3.4
19	33Z 13	502E	B	20140402	-1.3			-0.9	-0.4
20	34D' 6	502BG	B	20140402	8.9			7.0	1.9
21	34DG	502Y	B	20140415	12.0	6.6	5.4		n/a
22	34F 5	502BS	B	20140410	8.2			7.0	1.2
23	34F 10	502AQ	B	20140421	2.8				n/a
24	34JL	503AQ	B	20140326	2.2	5.3	-3.1	2.3	-0.1
25	34L 10	502AL	B	20140318	1.8			1.6	0.2
26	34LS	503BE	B	20140326	0.7	5.4	-4.7	1.8	-1.1
27	34T0.1	503AC	B	20140324	6.3			7.0	-0.7
28	34U 8	513E	B	20140318	-1.8			0.2	-2.0
29	34X40	513Q	B	20140429	-5.2			-5.0	-0.2
30	35F 20	513K	B	20140318	-2.6			-0.7	-1.9
31	35J1	514M	B	20140324	-4.1	5.8	-9.9	-1.5	-2.6
32	35K1	523A	B	20140324	-5.7	5.8	-11.5	-2.4	-3.3
33	OCWD- BSO9A/2		B	20140306	-7.5			-3.9	-3.6
34	PZ5	492CH	C,B	20140403	6.1			3.4	2.7

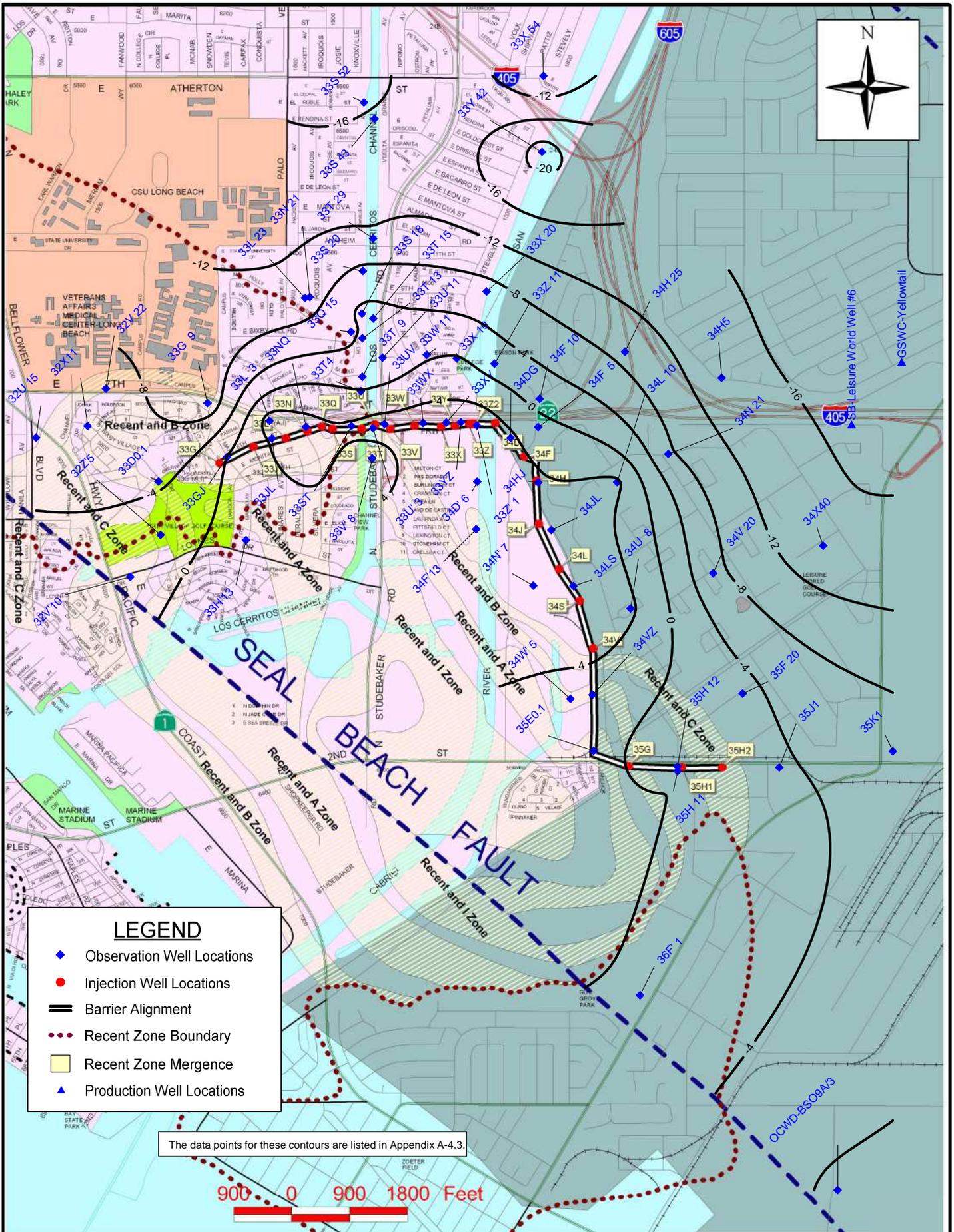
AVG= 1.3

AVG= 1.7

¹ P.E. represents the protective elevations calculated for internodal wells.

² Δ (+/-) represents how much groundwater level is above/below respective P.E.

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



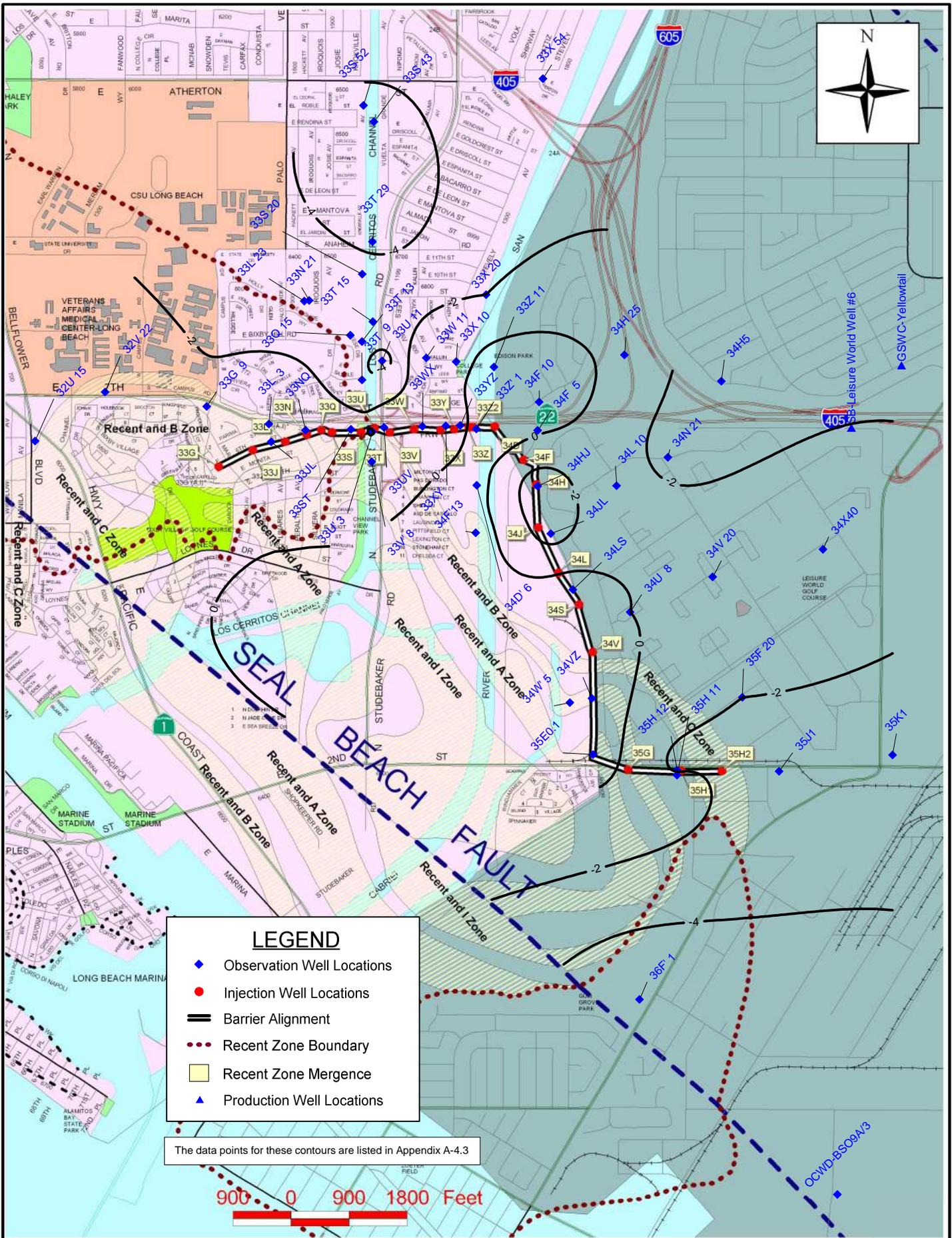
LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- Barrier Alignment
- Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations

The data points for these contours are listed in Appendix A-4.3.



Alamitos Barrier Project
A Zone Groundwater Elevation (ft) Contours Spring 2014



LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- == Barrier Alignment
- ⋯ Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations

The data points for these contours are listed in Appendix A-4.3



Alamitos Barrier Project
 A Zone: Change in Elevation (ft), Spring 2013 to Spring 2014

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

POINT	PROJ	FCD	AQUIFER	DATE	FY 13-14 ELEV	P.E. ¹	Δ^2	FY 12-13 ELEV	CHANGE IN ELEV
1	32U 15	482M	A	20140319	-5.0			-4.8	-0.2
2	32V 22	482P	A	20140319	-5.4			-4.9	-0.5
3	32V'10	483F	A	20140626	-1.3				n/a
4	32X11	482S	A	20140626	-7.4				n/a
5	32Z'5	482W	B,A	20140626	-1.4				n/a
6	33D0.1	482U	A,I	20140626	-4.7				n/a
7	33G 9	482F	A	20140318	-10.8			-8.8	-2.0
8	33GJ	482X	A	20140630	0.1	1.4	-1.3		n/a
9	33H'13	493YY	R,A	20140320	1.4				n/a
10	33JL	492BW	A,I	20140326	4.3	3.1	1.2	4.4	-0.1
11	33L 3	492	A	20140403	5.7			5.8	-0.1
12	33L 23	492RR	A	20140319	-10.7			-7.9	-2.8
13	33N 21	492BU	A	20140313	-9.5			-6.6	-2.9
14	33NQ	492BP	A,I	20140326	5.1	3.6	1.5	5.7	-0.6
15	33Q 15	492AM	A	20140320	-5.3			-3.0	-2.3
16	33S 18	492AE	A	20130912	-2.8				n/a
17	33S 20	492BR	A	20140317	-7.1			-5.0	-2.1
18	33S 43	491E	A	20140317	-13.8			-9.5	-4.3
19	33S 52	491H	A	20140317	-18.1			-14.0	-4.1
20	33ST	492BL	A	20140326	4.4	2.8	1.6	5.6	-1.2
21	33T 9	492TT	A	20140408	-1.7			1.8	-3.5
22	33T 13	492ZZ	A	20140417	-2.9			-0.4	-2.5
23	33T 15	492SS	A	20140325	-2.9			0.4	-3.3
24	33T 29	491C	A	20140312	-11.4			-6.4	-5.0
25	33T4	492CR	A	20140630	0.2				n/a
26	33U 11	492AJ	A	20131104	-3.7			1.3	-5.0
27	33U' 3	492WW	A	20130917	5.2			7.4	-2.2
28	33UV	492BH	A	20140326	5.1	4.0	1.1	5.6	-0.5
29	33V' 8	492BY	R,A	20130917	1.7			3.3	-1.6
30	33W 11	502T	A	20140410	-0.5			-0.5	0.0
31	33WX	502AF	A	20140326	5.7	7.6	-1.9	6.5	-0.8
32	33X 10	502BD	A	20140318	0.3			1.0	-0.7
33	33X 20	502J	A	20140318	-6.5			-4.5	-2.0
34	33X 54	501	A,I	20140327	-8.0			-5.1	-2.9
35	33XY	502BN	A	20140326	5.6	8.0	-2.4	6.6	-1.0
36	33Y 42	501A	A	20130916	-21.9				n/a
37	33YZ	502AD	A	20140326	6.0	8.7	-2.7	7.0	-1.0
38	33Z' 1	502G	A	20140318	6.5			5.2	1.3

ALAMITOS BARRIER PROJECT

A-Zone

Groundwater Elevation Data for Contours and Tables

POINT	PROJ	FCD	AQUIFER	DATE	FY 13-14 ELEV	P.E. ¹	Δ ²	FY 12-13 ELEV	CHANGE IN ELEV
39	33Z 11	502V	A	20140415	-1.9			-2.9	1.0
40	34D' 6	502BH	A	20140318	5.6			5.1	0.5
41	34DG	502Z	A	20140326	4.6	8.5	-3.9		n/a
42	34F 5	502BR	A	20140318	1.4			1.2	0.2
43	34F 10	502AR	A	20140416	-1.5			-3.2	1.7
44	34F'13	503Q	A	20140318	7.2			6.2	1.0
45	34H 25	502AH	A	20140423	-9.1			-8.6	-0.5
46	34H5	512E	A	20140522	-14.4			-11.3	-3.1
47	34HJ	502BX	A	20140326	4.3	8.6	-4.3	7.6	-3.3
48	34JL	503AP	A	20140326	4.2	7.8	-3.6	7.0	-2.8
49	34L 10	502AM	A	20140318	4.6			5.0	-0.4
50	34LS	503BD	A	20140326	7.7	7.6	0.1	6.6	1.1
51	34N 21	512B	A	20140320	-7.4			-4.5	-2.9
52	34N' 7	503AF	A	20140318	5.4				n/a
53	34U 8	513F	A	20140318	4.6			4.6	0.0
54	34V 20	513B	A	20140428	-7.0			-6.9	-0.1
55	34VZ	503BH	A	20140326	2.9	4.4	-1.5	2.0	0.9
56	34W' 5	503AJ	A	20140327	2.3			1.6	0.7
57	34X40	513P	A	20140429	-15.0			-14.8	-0.2
58	35E0.1	503BK	A	20140326	0.7	2.4	-1.7	-0.2	0.9
59	35F 20	513J	A	20140318	-2.8			-0.8	-2.0
60	35H 11	514G	A	20140324	0.0	3.8	-3.8	0.7	-0.7
61	35H 12	514D	A	20140324	-3.1	2.8	-5.9	-0.3	-2.8
62	35J1	514L	A	20140324	-3.6	6.2	-9.8	-0.8	-2.8
63	35K1	523B	A	20140324	-5.5	5.8	-11.3	-2.2	-3.3
64	36F' 1	505D	A	20140402	-0.5			5.5	-6.0
65	OCWD- BSO9A/3		A	20140306	-8.7			-4.6	-4.1

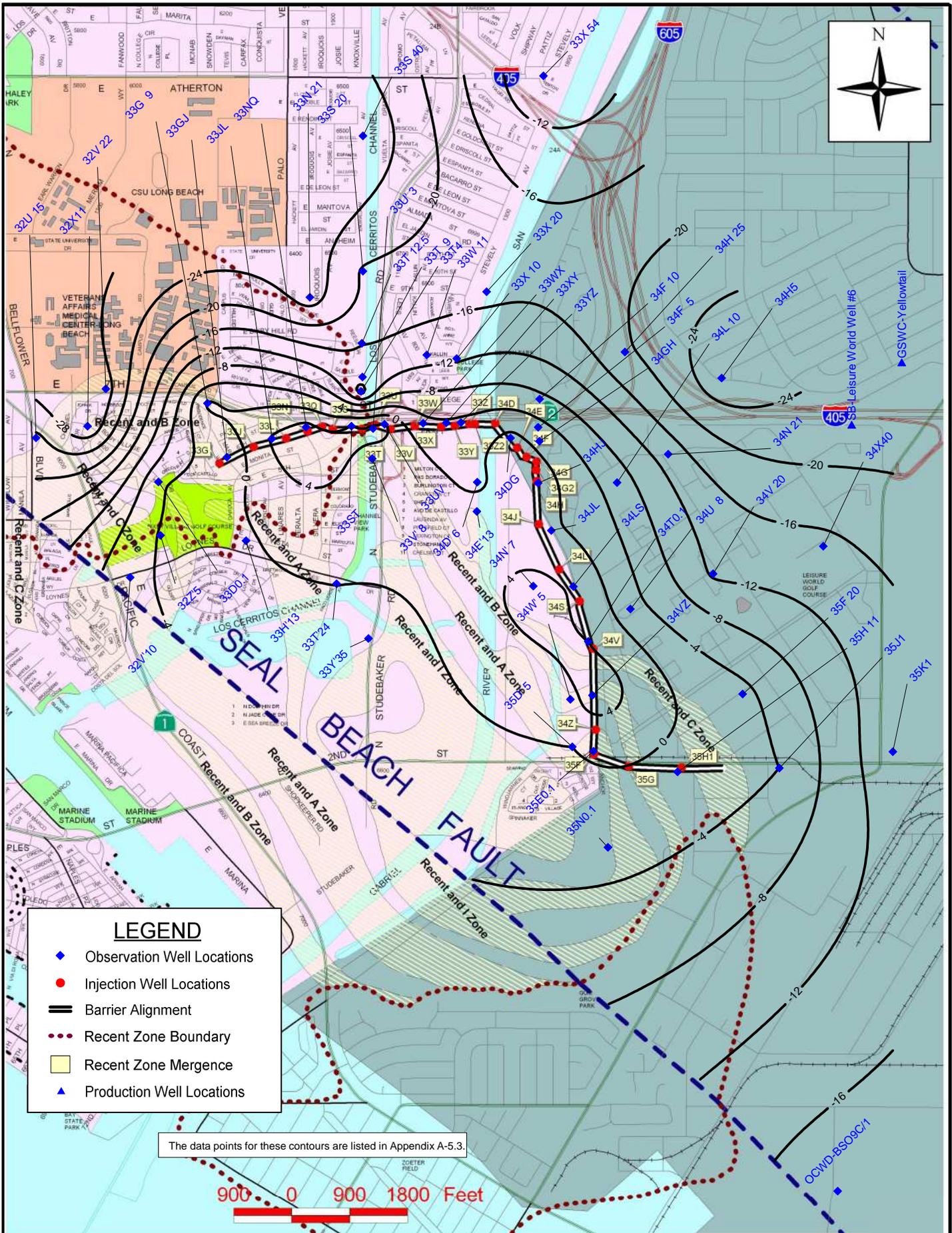
AVG= -2.0

AVG= -0.4

¹ P.E. represents the protective elevations calculated for internodal wells.

² Δ (+/-) represents how much groundwater level is above/below respective P.E.

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



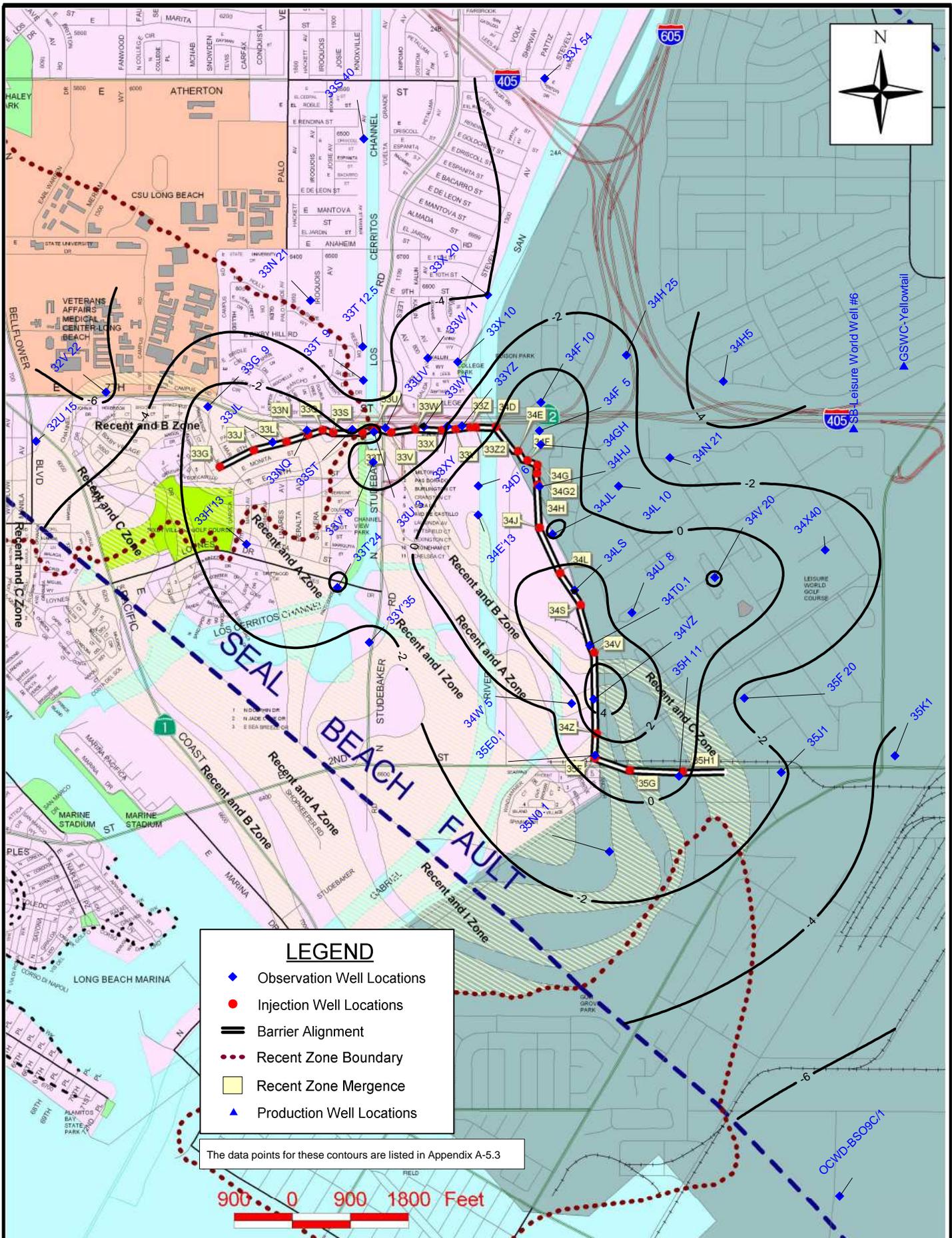
LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- Barrier Alignment
- ⋯ Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations

The data points for these contours are listed in Appendix A-5.3.



Alamitos Barrier Project
I Zone Groundwater Elevation (ft) Contours Spring 2014



LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- Barrier Alignment
- ⋯ Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations

The data points for these contours are listed in Appendix A-5.3



Alamitos Barrier Project
I Zone: Change in Elevation (ft), Spring 2013 to Spring 2014

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

POINT	PROJ	FCD	AQUIFER	DATE	FY 13-14 ELEV	P.E. ¹	Δ^2	FY 12-13 ELEV	CHANGE IN ELEV
1	32U 15	482L	I	20140319	-23.0			-18.3	-4.7
2	32V 22	482N	I	20140319	-29.5			-23.1	-6.4
3	32V'10	483E	I	20140626	-5.3				n/a
4	32X11	482R	I	20140626	-31.5				n/a
5	32Z'5	482V	I	20140626	-3.7				n/a
6	33D0.1	482U	A,I	20140626	-4.7				n/a
7	33G 9	482G	I	20140318	0.5			1.6	-1.1
8	33GJ	482Y	I	20140630	-3.4	2.6	-6.0		n/a
9	33H'13	493XX	I	20140320	-0.6			0.8	-1.4
10	33JL	492BW	A,I	20140326	4.3	3.1	1.2	4.4	-0.1
11	33N 21	492BV	I	20140313	-25.9			-20.3	-5.6
12	33NQ	492BP	A,I	20140326	5.1	3.6	1.5	5.7	-0.6
13	33S 20	492BS	I	20130912	-19.5				n/a
14	33S 40	491F	I	20140317	-27.2			-21.4	-5.8
15	33ST	492BM	I	20140326	4.3	4.2	0.1	6.4	-2.1
16	33T 4	492CQ	I	20140630	-17.7				n/a
17	33T 9	492XX	I	20140408	-14.3			-8.5	-5.8
18	33T 12.5	492BT	I	20140325	-16.1			-11.5	-4.6
19	33T'24	493RR	I	20130916	0.1			-0.1	0.2
20	33U' 3	492QQ	I	20130917	4.9			6.2	-1.3
21	33UV	492BJ	I	20140326	4.5	6.1	-1.6	7.1	-2.6
22	33V' 8	492BX	I	20130917	1.2			4.5	-3.3
23	33W 11	502U	I	20140410	-13.4			-11.4	-2.0
24	33WX	502AG	I	20140326	-3.0	10.4	-13.4	1.1	-4.1
25	33X 10	502BE	I	20140318	-12.5			-8.8	-3.7
26	33X 20	502H	I	20140318	-16.9			-12.9	-4.0
27	33X 54	501	A,I	20140327	-8.0			-5.1	-2.9
28	33XY	502BP	I	20140326	-3.6	11.0	-14.6	-1.7	-1.9
29	33Y'35	493ZZ	I	20140401	-3.5			-0.6	-2.9
30	33YZ	502AE	I	20140326	-3.3	11.1	-14.4	-1.8	-1.5
31	34D' 6	502BI	I	20140318	-0.7			-2.3	1.6
32	34DG	502AA	I	20140326	1.1	4.0	-2.9		n/a
33	34E'13	503AT	I	20140318	1.2			-0.8	2.0
34	34F 5	502BQ	I	20140318	-2.7			-3.6	0.9
35	34F 10	502AS	I	20140416	-7.1			-9.0	1.9
36	34GH	502BV	I	20140326	-1.0	11.3	-12.3	-1.7	0.7
37	34H 25	502AJ	I	20140423	-19.3			-17.7	-1.6
38	34H5	512D	I	20140522	-26.9			-21.6	-5.3

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

POINT	PROJ	FCD	AQUIFER	DATE	FY 13-14 ELEV	P.E. ¹	Δ ²	FY 12-13 ELEV	CHANGE IN ELEV
39	34HJ	502BW	I	20140430	1.9	11.0	-9.1	0.9	1.0
40	34JL	503AN	I	20140326	0.4	10.5	-10.1	0.7	-0.3
41	34L 10	502AN	I	20140318	-5.9			-5.1	-0.8
42	34LS	503BC	I	20140326	3.5	9.5	-6.0	-0.6	4.1
43	34N 21	512C	I	20140320	-13.7			-10.5	-3.2
44	34N' 7	503AG	I	20140327	5.1				n/a
45	34T0.1	503AD	I	20140324	4.0	8.4	-4.4	0.3	3.7
46	34U 8	513G	I	20140318	-2.6			-2.7	0.1
47	34V 20	513C	I	20140428	-12.5			-14.8	2.3
48	34VZ	503BG	I	20140326	6.9	5.9	1.0	0.9	6.0
49	34W' 5	503AK	I	20140327	2.1		2.1	1.8	0.3
50	34X40	513N	I	20140429	-14.8			-14.1	-0.7
51	35D' 5	503AM	I	20140327	0.0				n/a
52	35E0.1	503BJ	I	20140326	0.6	3	-2.4	-0.1	0.7
53	35F 20	513H	I	20140318	-2.9			-0.3	-2.6
54	35H 11	514H	I	20140324	-1.7	5.5	-7.2	-2.0	0.3
55	35J1	513M	I	20140324	-4.0			-2.2	-1.8
56	35K1	523C	I	20140324	-15.1			-10.7	-4.4
57	35N0.1	504N	I	20140331	-2.7			-1.7	-1.0
58	OCWD- BSO9C/1		I	20140306	-18.5			-10.7	-7.8

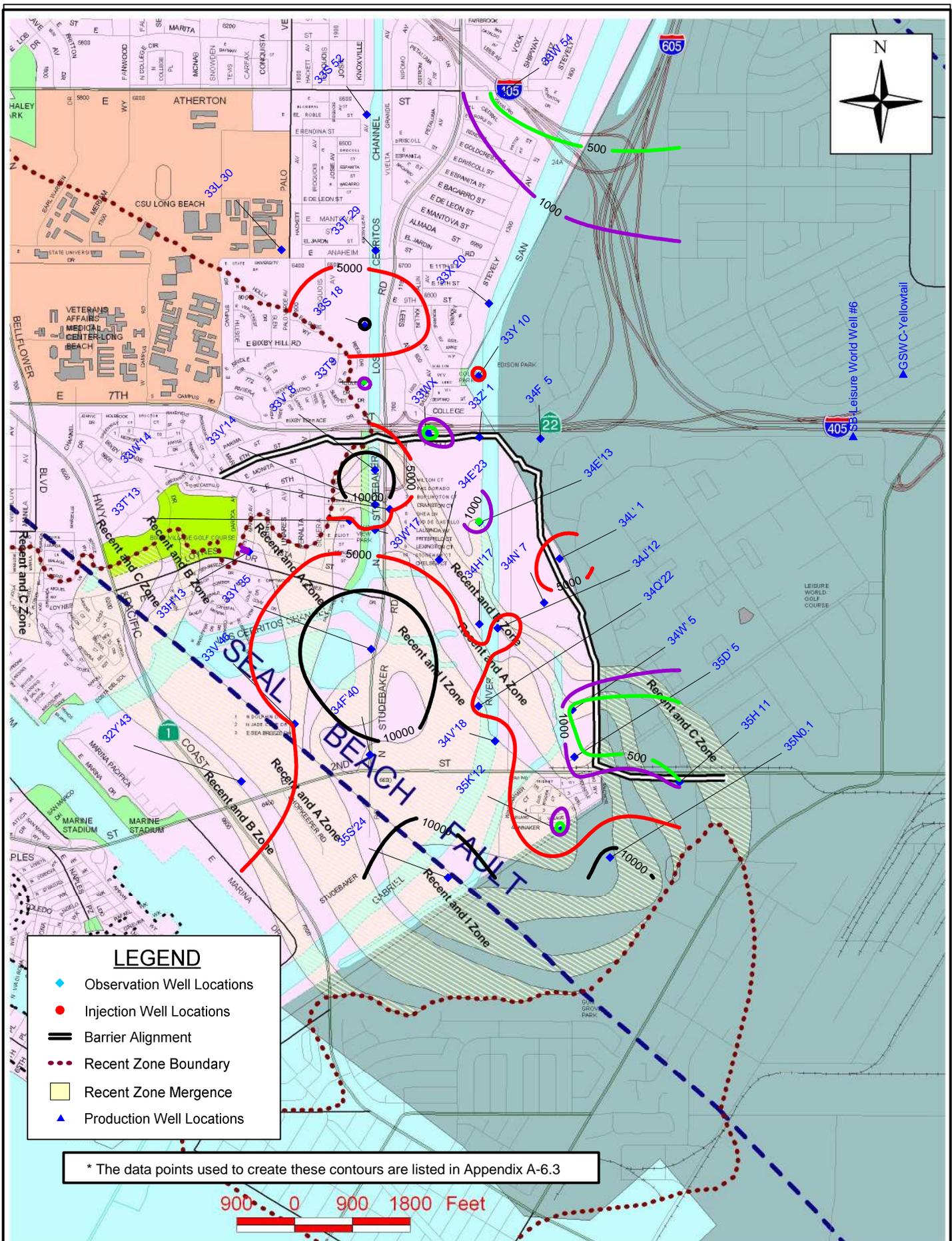
AVG= -6.7

AVG= -4.9

¹ P.E. represents the protective elevations calculated for internodal wells.

² Δ (+/-) represents how much groundwater level is above/below respective P.E.

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

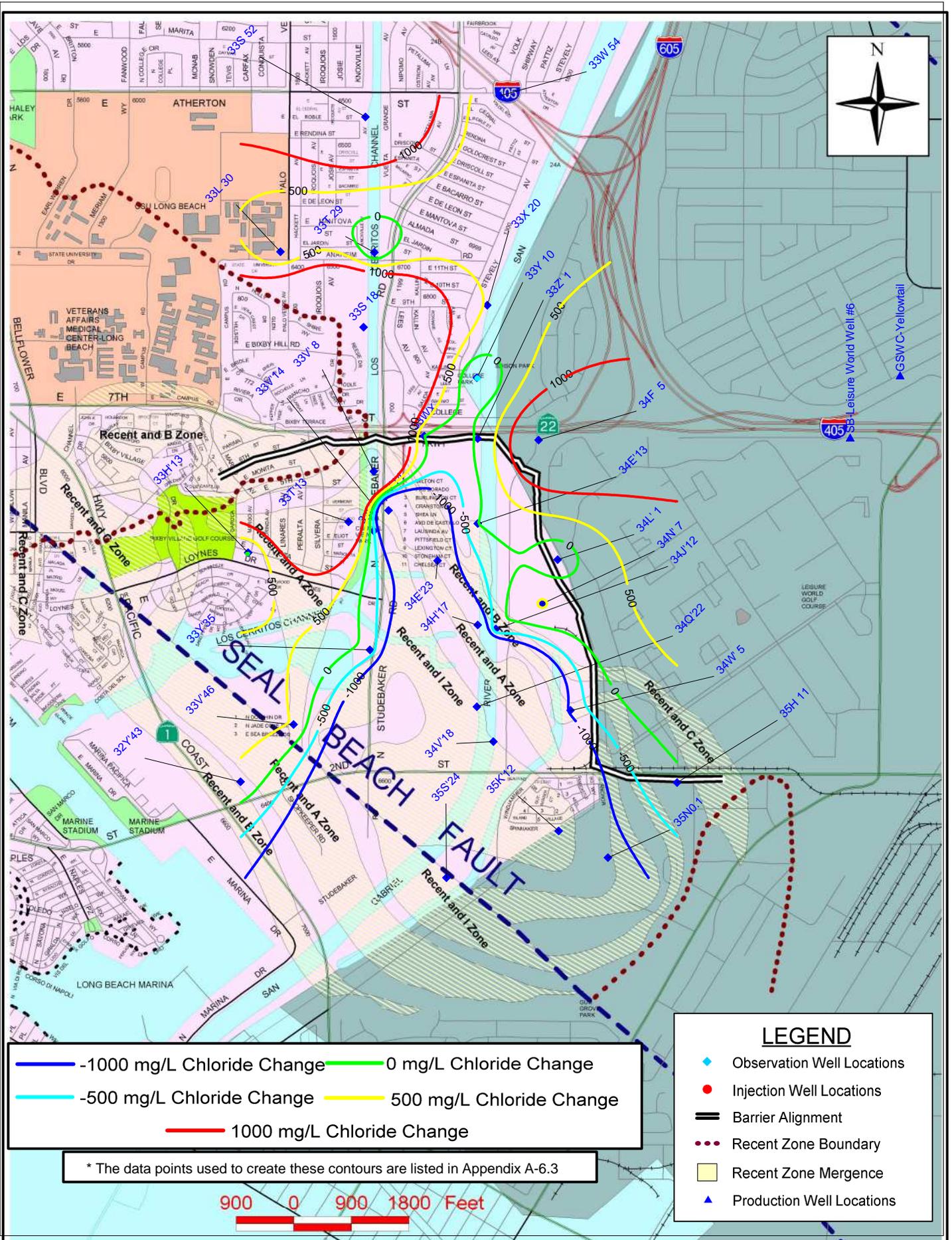


- LEGEND**
- ◆ Observation Well Locations
 - Injection Well Locations
 - Barrier Alignment
 - ⋯ Recent Zone Boundary
 - Recent Zone Mergence
 - ▲ Production Well Locations

* The data points used to create these contours are listed in Appendix A-6.3



Alamitos Barrier Project
R Zone Chloride Concentration (mg/L) Contours: Spring 2014

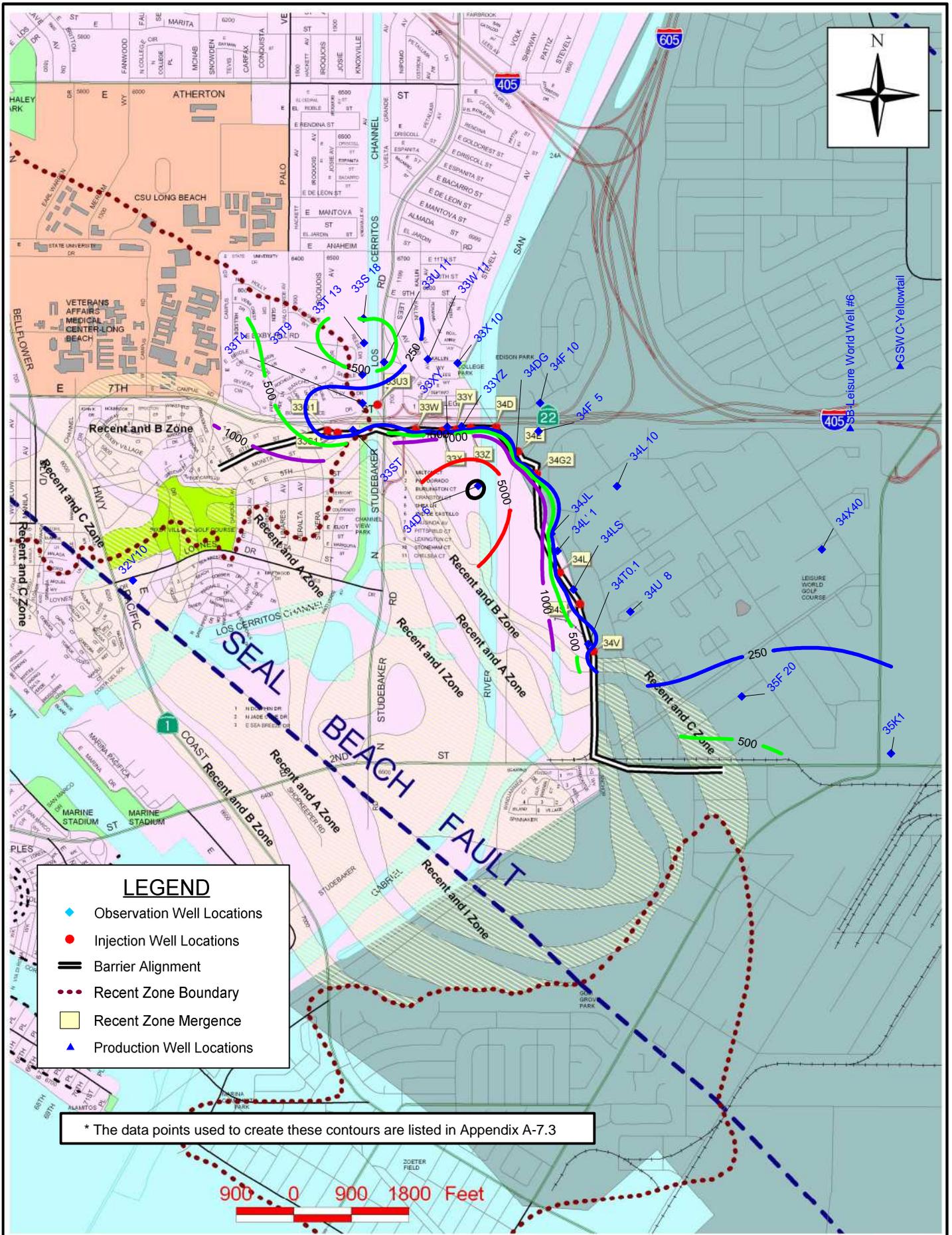


Alamitos Barrier Project
 R Zone: Change in Chloride Concentration, Spring 2013 to Spring 2014



ALAMITOS BARRIER PROJECT
R-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. 13-14	12-13	(FY13-14 - FY12-13)
1	32Y43	493WW	20140325	R	-43	2,060					2,060	1,710	350
2	33H13	493YY	20140320	R,A	-18	395	-38	716	-58	972	972	993	-21
3	33L 30	491G	20140325	R	-50	3,180					3,180	3,170	10
4	33S 18	492AH	20140317	R	-67	10,700					10,700	5,160	5,540
5	33S 52	491J	20140317	R	-54	2,990					2,990	638	2,352
6	33T 9	492CV	20140630	R	-21	338					338		n/a
7	33T 29	491D	20140312	R	-56	3,210					3,210	3,620	-410
8	33T13	492AU	20140326	R	-41	2,580	-51	4,020			4,020	1,210	2,810
9	33V 8	492BY	20140326	R,A	-24	13,800	-48	6,640			13,800	9,280	4,520
10	33V14	492JJ	20140326	R	-67	18,100					18,100	18,000	100
11	33V46	493UU	20140326	R	-61	5,120					5,120	4,670	450
12	33W 54	501C	20140326	R	-33	186	-53	299			299	216	83
13	33W14	492AT	20140403	R	-46	3,280	-66	5,300			5,300	8,880	-3,580
14	33W17	493PP	20140326	R	-41	3,900	-51	4,090			4,090	4,520	-430
15	33WX	502AZ	20140409	R	-45	72					72	70	2
16	33X 20	502L	20140414	R	-68	1,860					1,860	1,390	470
17	33Y 10	502BA	20140326	R	-58	5,350	-83	1,420			5,350	5,900	-550
18	33Y35	493AB	20140401	R	-36	22,400					22,400	22,600	-200
19	33Z 1	502AU	20140410	R	-46	1,090	-56	1,600			1,600	1,540	60
20	34E13	503AU	20140310	R	-19	432	-52	122			432	436	-4
21	34E23	503X	20140403	R	-43	3,150					3,150	4,560	-1,410
22	34F 5	502BT	20140415	R	-136	73	-146	75	-156	2,170	2,170	63	2,107
23	34F40	483J	20140630	R	-40	8,860					8,860		n/a
24	34H17	503Y	20140310	R	-46	3,030					3,030	4,960	-1,930
25	34J12	503U	20140331	R	-28	5,850	-36	6,070			6,070	6,220	-150
26	34L 1	503P	20140422	R	-57	6,480					6,480	6,100	-430
27	34N 7	503AE	20140327	R	-51	3,370	-61	3,450	-70	4,560	4,560	3,980	580
28	34Q22	503T	20140310	R	-42	4,200	-57	3,020			4,200	14,000	-9,800
29	34V18	503V	20140331	R	-48	7,200					7,200	13,300	-6,100
30	34W 5	503AH	20140327	R	-51	306					306	1,150	-844
31	35D 5	503AL	20140327	R	-57	693					693		n/a
32	35H 11	514F	20140430	R	-42	36	-65	529			529	641	-112
33	35K12	504R	20140320	R	-44	76	-54	86			86	1,880	-1,794
34	35N0.1	504M	20140331	R	-38	12,000	-62				12,000	13,300	-1,794
35	35S24	504K	20140326	R	-14	13,400					13,400	17,700	-4,300



* The data points used to create these contours are listed in Appendix A-7.3

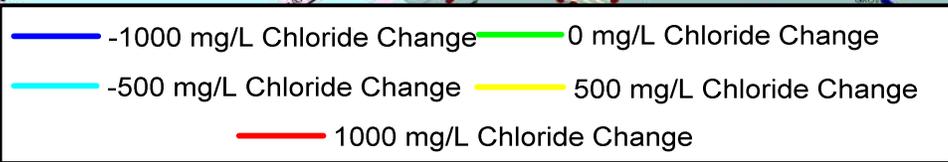
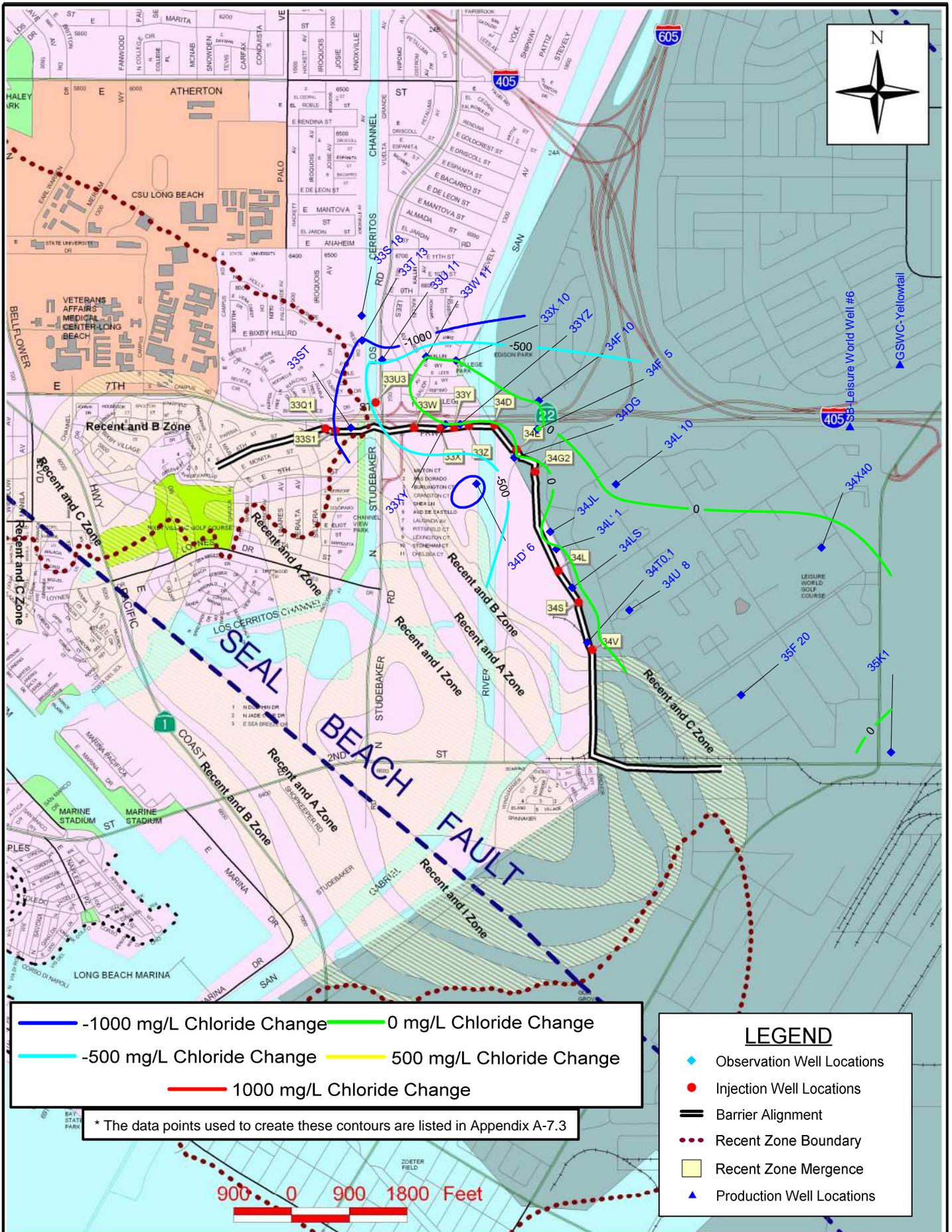


LEGEND

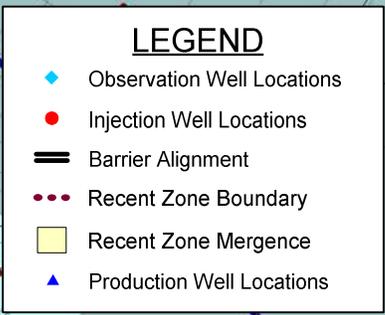
- ◆ Observation Well Locations
- Injection Well Locations
- ▬ Barrier Alignment
- ⋯ Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations



Alamitos Barrier Project
C Zone Chloride Concentration (mg/L) Contours: Spring 2014



* The data points used to create these contours are listed in Appendix A-7.3



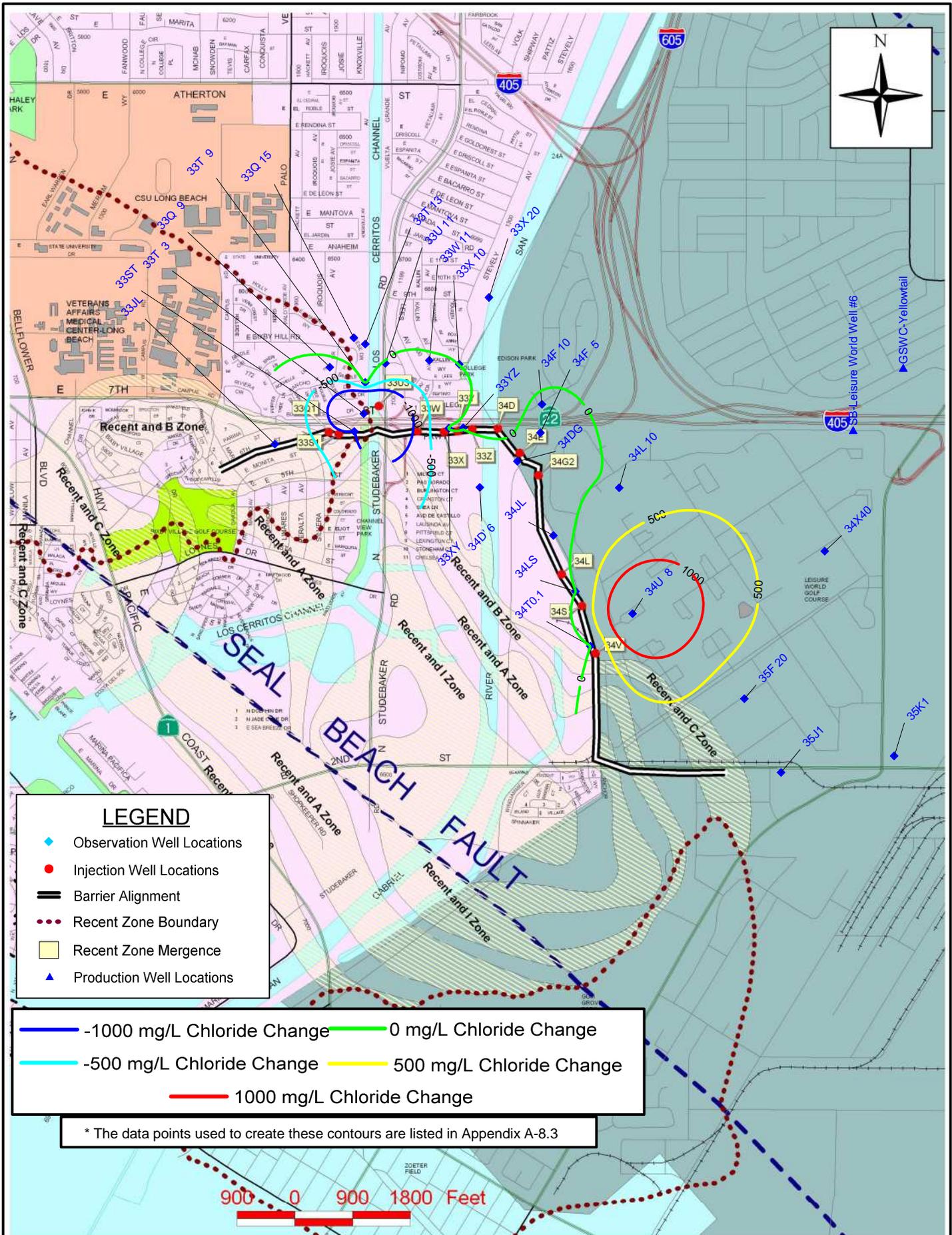
Alamitos Barrier Project
 C Zone: Change in Chloride Concentration, Spring 2013 to Spring 2014



ALAMITOS BARRIER PROJECT
C-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. 13-14	12-13	(FY12-13 - FY11-12)
1	32V10	483H	20140626	C	-37	2,370					2,370		n/a
2	33S 18	492AG	20140317	C	-225	474					474	6,150	-5,676
3	33ST	492BK	20140409	C,B	-25	108					108	1,050	-942
4	33T 13	492AC	20140417	C	-199	894					894	1,550	-656
5	33T4	492CT	20140630	C	-56	96					96		n/a
6	33T9	492CU	20140630	C	-129	145	-144	460			460		n/a
7	33U 11	492AL	20140410	C	-188	624					624	1,200	-576
8	33W 11	502R	20140410	C	-183	79	-216	87			87	87	0
9	33X 10	502BB	20140318	C	-190	82	-215	64			82	80	2
10	33XY	502BL	20131105	C	-195	62	-210	65			65	68	-3
11	33YZ	502AB	20131106	C	-195	61	-210	61			61	64	-3
12	34D' 6	502BF	20140402	C	-125	11,400					11,400	12,600	-1,200
13	34DG	502X	20131107	C	-190	64	-205	61			64	75	-11
14	34F 5	502BU	20131107	C	-191	63	-201	63	-211	62	63	65	2
15	34F 10	502AP	20140421	C	-211	70					70	75	-5
16	34JL	503AR	20140423	C	-161	200					200	80	120
17	34L' 1	503N	20140422	C	-162	75					75	108	-33
18	34L 10	502AK	20140310	C	-166	72					72	108	-36
19	34LS	503BF	20140424	C	-133	53	-151	73	-163	81	81	97	-16
20	34T0.1	503AB	20140422	C	-134	447					447	457	-10
21	34U 8	513D	20140428	C	-150	80	-165	79			80	80	0
22	34X40	513R	20140429	C	-85	84	-101	115			115	37	78
23	35F 20	513L	20140501	C	-70	195	-78	273	-85	415	415	353	62
24	35K1	523D	20140519	C	-88	365		392			392	419	-27
25	33Q1						DP1				50	50	n/a
26	33U3						DP2				50	50	n/a
27	33W						DP3				50	50	n/a
28	33X						DP4				50	50	n/a
29	33Y						DP5				50	50	n/a
30	33Z						DP6				50	50	n/a
31	34D						DP7				50	50	n/a
32	34E						DP8				50	50	n/a
33	34G2						DP9				50	50	n/a
34	34L						DP10				50	50	n/a
35	34S						DP11				50	50	n/a
36	34V						DP12				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.

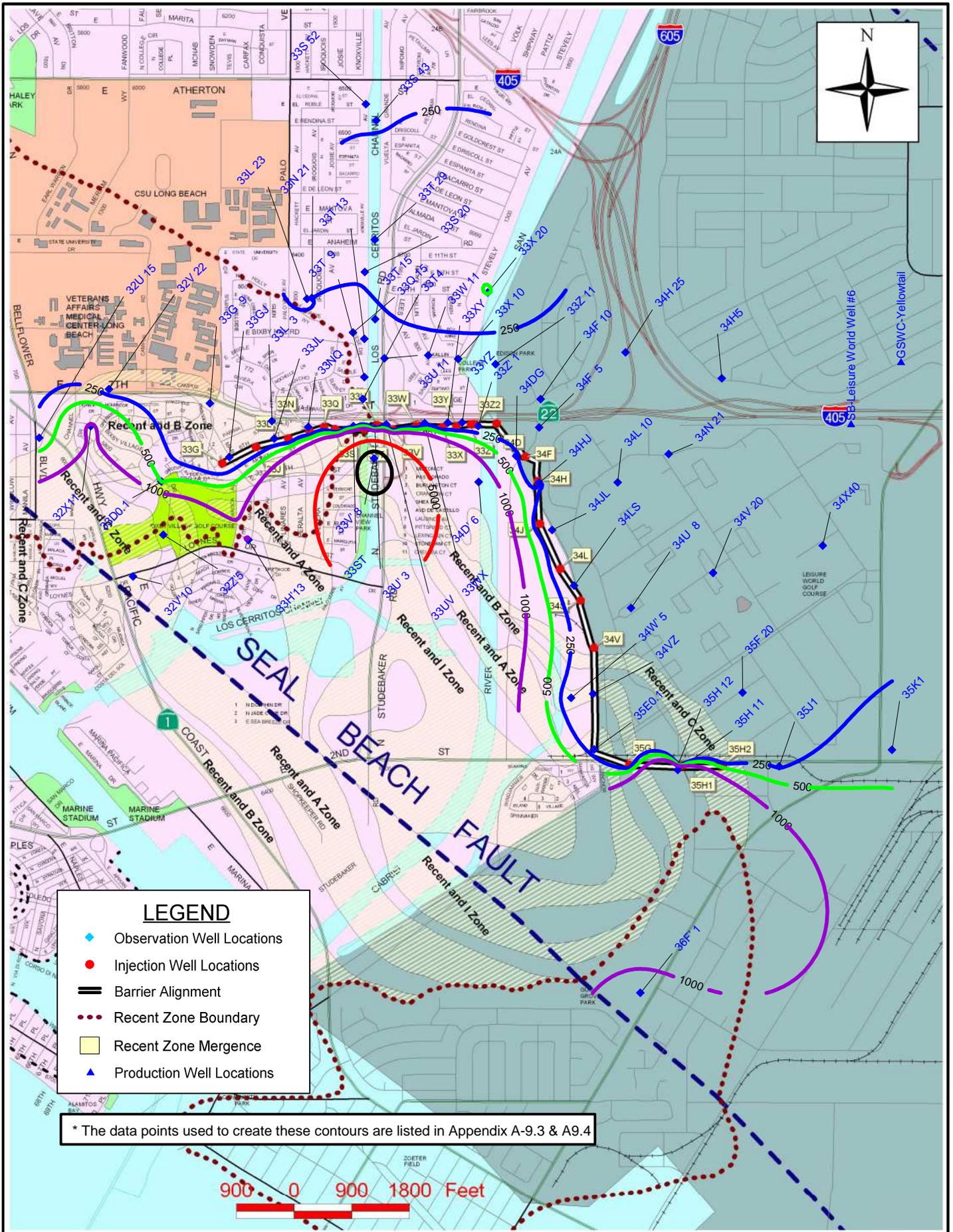


Alamitos Barrier Project
 B Zone: Change in Chloride Concentration, Spring 2013 to Spring 2014

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. 13-14	12-13	(FY13-14 - FY12-13)
1	32V10	483G	20140626	B	-62	4,580					4,580		n/a
2	32Z5	482W	20140626	B,A	-20	1,080	-30	3,010			3,010		n/a
3	33JL	492BQ	20140421	B	3		-7	62			62	80	18
4	33NQ	492BN	20140417	B	-3	108	-14	82			108		n/a
5	33Q 9	492CM	20140319	B	-85	104	-95	63	-105	133	133	321	-188
6	33Q 15	492AN	20140320	B	-263	3,230					3,230	2,930	300
7	33ST	492BK	20140409	C,B	-25	108					108	1,050	-942
8	33T 3	492CL	20140325	B	-41	107	-58	90	-76	92	107	4,010	-3,903
9	33T 4	492CS	20140630	B	-91	101					101		n/a
10	33T 9	492YY	20140408	B	-165	233					233	168	65
11	33T 13	492AB	20140408	B	-254	187					187	171	16
12	33U 11	492AK	20140410	B	-260	161					161	187	-26
13	33W 11	502S	20140410	B	-241	132	-269	151			151	202	-51
14	33X 10	502BC	20140318	B	-275	74					74	71	3
15	33X 20	502K	20140414	B	-266	69					69	66	3
16	33XY	502BM	20131105	B	-245	71					71	58	13
17	33YZ	502AC	20131106	B	-214	67	-263	67			67	65	2
18	34D' 6	502BG	20140402	B	-180	75	-194	4			75	249	-174
19	34DG	502Y	20131107	B	-232	57	-257	49			57	81	-24
20	34F 5	502BS	20131107	B	-231	55	-260				55	88	-33
21	34F 10	502AQ	20140421	B	-269	64					64	77	-13
22	34JL	503AQ	20140423	B	-196	1,040	-211	923			1,040	1,210	-170
23	34L 10	502AL	20140310	B	-224	88	-249	130			130	79	51
24	34LS	503BE	20140424	B	-188	78					78	84	-6
25	34T0.1	503AC	20131112	B	-174	65	-207	66	-239	63	66	68	2
26	34U 8	513E	20140428	B	-225	2,050					2,050	77	1,973
27	34X40	513Q	20140429	B	-137	101					101	20	81
28	35F 20	513K	20140501	B	-115	357					357	299	58
29	35J1	514M	20140430	B	-128	742	-143	827	-148	871	871	456	415
30	35K1	523A	20140519	B	-127	147	-142	153	-157	157	157	122	35
31	33Q1						DP1				50	50	n/a
32	33U3						DP2				50	50	n/a
33	33W						DP3				50	50	n/a
34	33X						DP4				50	50	n/a
35	33Y						DP5				50	50	n/a
36	33Z						DP6				50	50	n/a
37	34D						DP7				50	50	n/a
38	34E						DP8				50	50	n/a
39	34G2						DP9				50	50	n/a
40	34L						DP10				50	50	n/a
41	34S						DP11				50	50	n/a
42	34V						DP12				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.

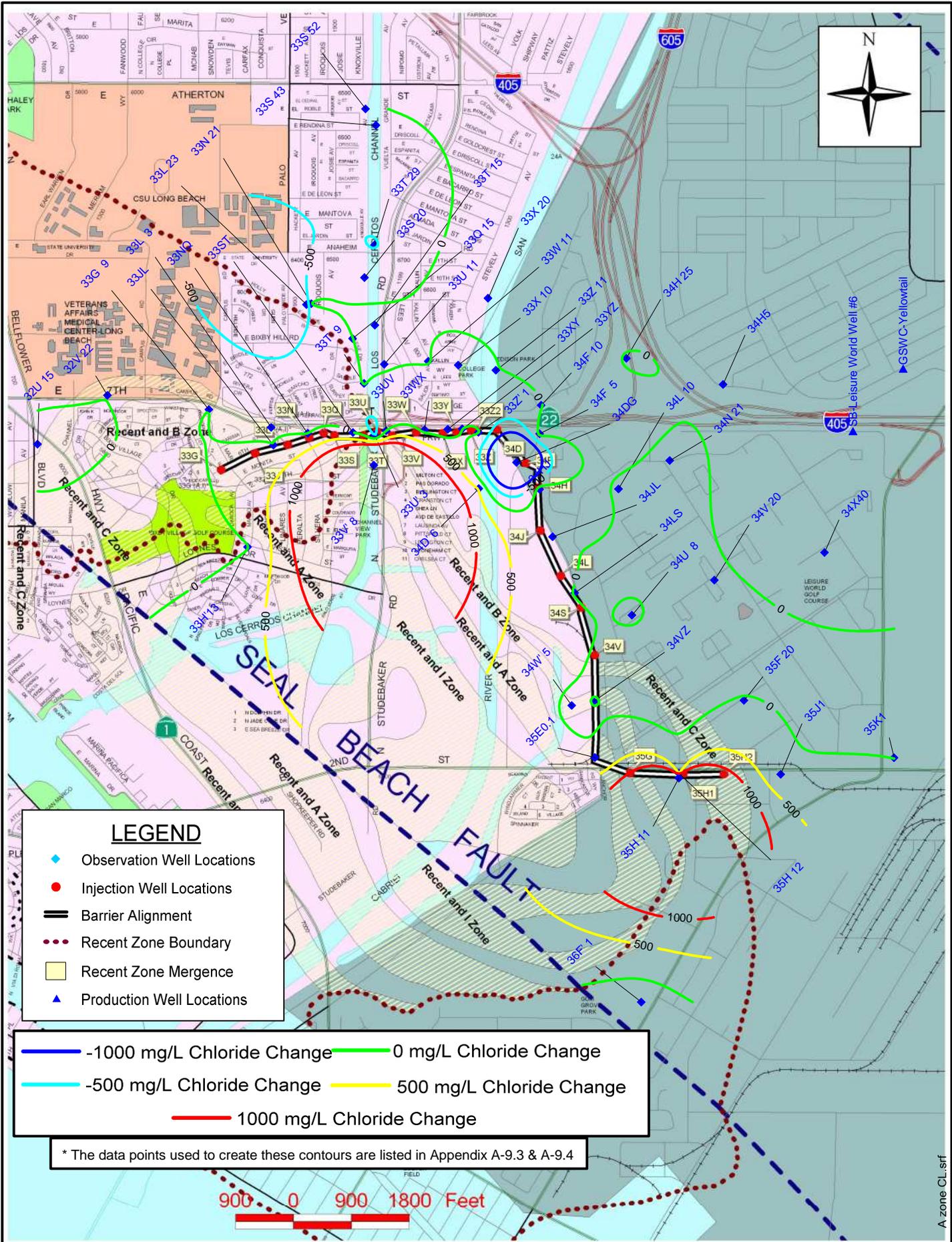


LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- Barrier Alignment
- ⋯ Recent Zone Boundary
- Recent Zone Mergence
- ▲ Production Well Locations

* The data points used to create these contours are listed in Appendix A-9.3 & A9.4





LEGEND

- ◆ Observation Well Locations
- Injection Well Locations
- Barrier Alignment
- ⋯ Recent Zone Boundary
- ▭ Recent Zone Mergence
- ▲ Production Well Locations

- -1000 mg/L Chloride Change
- -500 mg/L Chloride Change
- 0 mg/L Chloride Change
- 500 mg/L Chloride Change
- 1000 mg/L Chloride Change

* The data points used to create these contours are listed in Appendix A-9.3 & A-9.4



Alamitos Barrier Project
A Zone: Change in Chloride Concentration, Spring 2013 to Spring 2014

A zone CL.srf

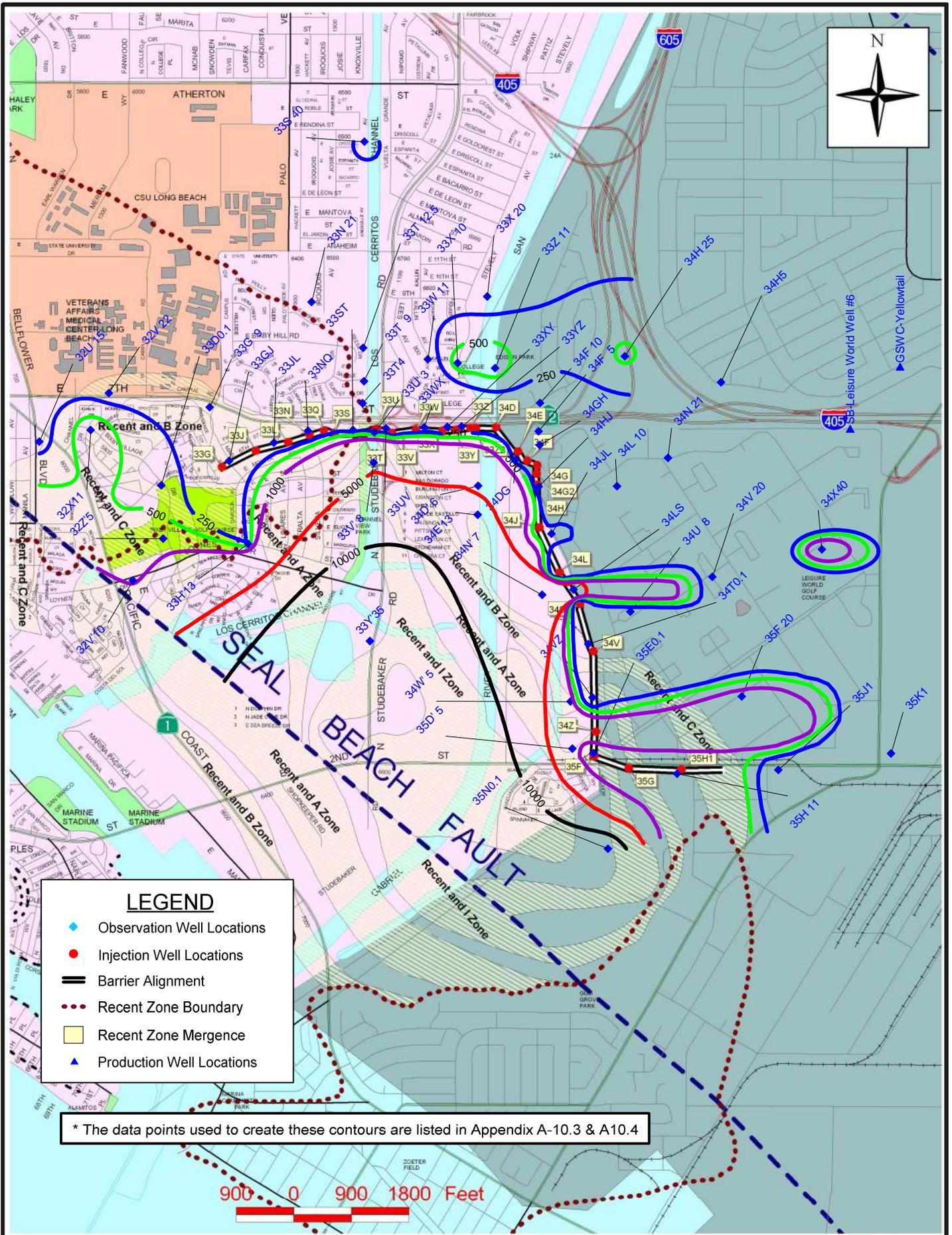
ALAMITOS BARRIER PROJECT
A-ZONE CHLORIDE CONCENTRATIONS
 Chloride Data Used for Contours and Cross-Section

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. 13-14	12-13	(FY13-14 - FY12-13)
1	32U 15	482M	20140319	A	-17	249					249	213	36
2	32V 22	482P	20140319	A	-11	130					130	133	-3
3	32V'10	483F	20140626	A	-90	3,030	-105	3,110			3,110		n/a
4	32X11	482S	20140626	A	-9		-24	1,070			1,070		n/a
5	32Z'5	482W	20140626	B,A	-20	1,080	-30			3,010	3,010		n/a
6	33D0.1	482U	20140626	A,I	-24		-49	333		482	482		n/a
7	33G 9	482F	20140318	A	-3		-23	111		111	110		1
8	33GJ	482X	20140630	A	-35	62					62		n/a
9	33H'13	493YY	20140320	R,A	-18	395	-38	716	-58	972	972	993	-21
10	33JL	492BW	20140407	A,I	-41	85	-79	72	-116	78	85	77	8
11	33L 3	492	20140403	A	-60	56					56	76	-20
12	33L 23	492RR	20140319	A	-344	390					390	1,380	-990
13	33N 21	492BU	20140313	A	-305	216	-330	216	-346	248	248	195	53
14	33NQ	492BP	20140407	A,I	-48	72	-92	71	-136	70	72	82	-10
15	33Q 15	492AM	20140320	A	-337	126					126	129	-3
16	33S 20	492BR	20140317	A	-317	139	-336	240	-355	268	268	449	-181
17	33S 43	491E	20140317	A	-333	223	-344	215			223	259	-36
18	33S 52	491H	20140317	A	-284	200	-289	239			239	256	-17
19	33ST	492BL	20140409	A	-65	89	-86	84	-100	97	97	112	-15
20	33T 4	492CR	20140630	A	-146		-166	117	-186	124	124		n/a
21	33T 9	492TT	20140408	A	-263	89					89	71	18
22	33T 13	492ZZ	20140417	A	-128	96					96		n/a
23	33T 15	492SS	20140325	A	-334	211					211	126	85
24	33T 29	491C	20140312	A	-350	467					467	1,000	-533
25	33U 11	492AJ	20140421	A	-348	202					202	149	53
26	33U' 3	492WW	20140326	A	-89	163					163	734	-571
27	33UV	492BH	20140409	A	-106	79	-131	83	-155	94	94	76	18
28	33V' 8	492BY	20140326	R,A	-24	13,800	-48	6,640			13,800	9,280	4,520
29	33W 11	502T	20140410	A	-321	59	-349	61	-376	119	119	84	35
30	33WX	502AF	20140409	A	-258	68	-281	69	-297	170	170	291	-121
31	33X 10	502BD	20140318	A	-320	81	-340	65	-356	62	81	544	-463
32	33X 20	502J	20140414	A	-353	512					512	99	413
33	33XY	502BN	20140409	A	-279	72	-296	78	-311	74	78	312	-234
34	33YZ	502AD	20140410	A	-296	75	-327	72			75	69	6
35	33Z' 1	502G	20131113	A	-320	82					82	47	35
36	33Z 11	502V	20140415	A	-321	62	-346	66			66	85	-19
37	34D 6	502BH	20140402	A	-270	1,620	-303	1,200	-335	604	1,620	1,140	480
38	34DG	502Z	20140415	A	-292	281	-324	289			289	3,830	-3,541
39	34F 5	502BR	20140414	A	-297	77	-322	212	-347	225	225	114	111
40	34F 10	502AR	20140416	A	-311	82	-326	81			82	98	16

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

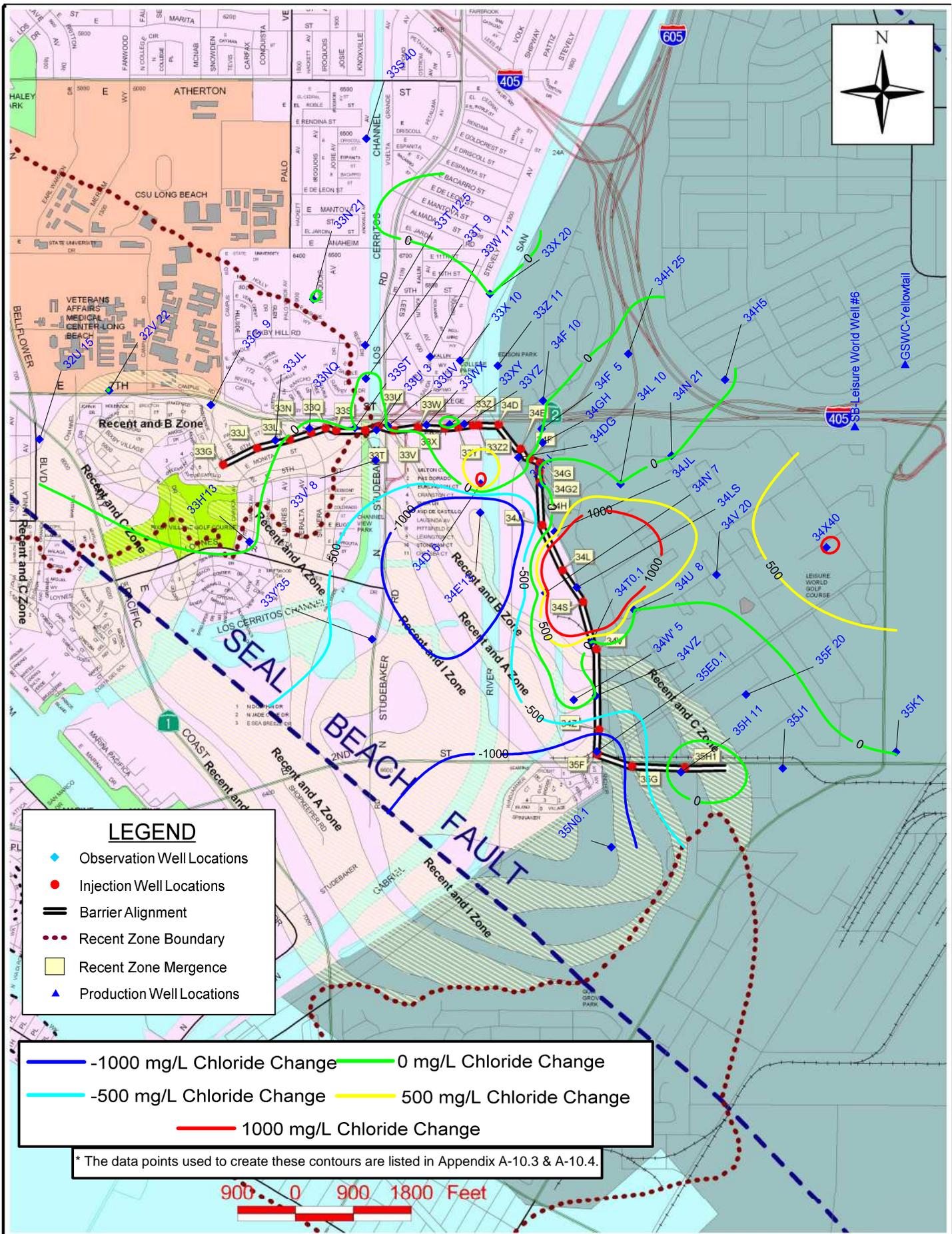
No.	PROJ	FCD	DATE	AQUIFER	For Cross-Section (Internodal Wells in Bold)						For Contours	MAX CHLORIDE	Change in Chloride
					ELEV 1 (ft)	CHL 1 (mg/L)	ELEV 2 (ft)	CHL 2 (mg/L)	ELEV 3 (ft)	CHL 3 (mg/L)	MAX CHL. 13-14	12-13	(FY13-14 - FY12-13)
41	34H 5	512E	20140522	A	-297	78	-312	77	-327	88	88	75	13
42	34H 25	502AH	20131118	A	-297	80	-312	86	-331	65	86	101	-15
43	34HJ	502BX	20140422	A	-310	69	-321	68	-331	293	293	72	221
44	34JL	503AP	20131119	A	-263	62	-288	64	-308	53	64	57	7
45	34L 10	502AM	20140310	A	-310	55	-330	52	-354	49	55	75	-20
46	34LS	503BD	20131120	A	-238	57	-283	56			57	68	-11
47	34N 21	512B	20140320	A	-328	70	-354	65			70	87	-17
48	34U 8	513F	20140428	A	-280	70	-310	98			98	75	23
49	34V 20	513B	20140428	A	-234	82	-265	73	-292	96	96	112	-16
50	34VZ	503BH	20140424	A	-146	69	-156	61			69	57	12
51	34W' 5	503AJ	20140327	A	-81	75	-101	73	-119	75	75	137	-62
52	34X40	513P	20140429	A	-202	172	-232	130			172	39	133
53	35E0.1	503BK	20140424	A	-74	156					156	89	67
54	35F 20	513J	20140501	A	-129	91	-158	104			104	88	16
55	35H 11	514G	20140430	A	-123	1,110	-146	4,690			4,690	836	3,854
56	35H 12	514D	20140430	A	-137	440					440	93	347
57	35J1	514L	20140430	A	-193	88	-208	158	-228	223	223	113	110
58	35K1	523B	20140519	A	-197	20	-212	333	-227	409	409	410	-1
59	36F' 1	505D	20140402	A	-99	736					736	1,070	-334
60	33G						DP1				50	50	n/a
61	33J						DP2				50	50	n/a
62	33L						DP3				50	50	n/a
63	33N						DP4				50	50	n/a
64	33Q						DP5				50	50	n/a
65	33S						DP6				50	50	n/a
66	33T						DP7				50	50	n/a
67	33U						DP8				50	50	n/a
68	33V						DP9				50	50	n/a
69	33W						DP10				50	50	n/a
70	33X						DP11				50	50	n/a
71	33Y						DP12				50	50	n/a
72	33Z						DP13				50	50	n/a
73	33Z2						DP14				50	50	n/a
74	34D						DP15				50	50	n/a
75	34F						DP16				50	50	n/a
76	34H						DP17				50	50	n/a
77	34J						DP18				50	50	n/a
78	34L						DP19				50	50	n/a
79	34S						DP20				50	50	n/a
80	34V						DP21				50	50	n/a
81	35G						DP22				50	50	n/a
82	35H1						DP23				50	50	n/a
83	35H2						DP24				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.



* The data points used to create these contours are listed in Appendix A-10.3 & A10.4





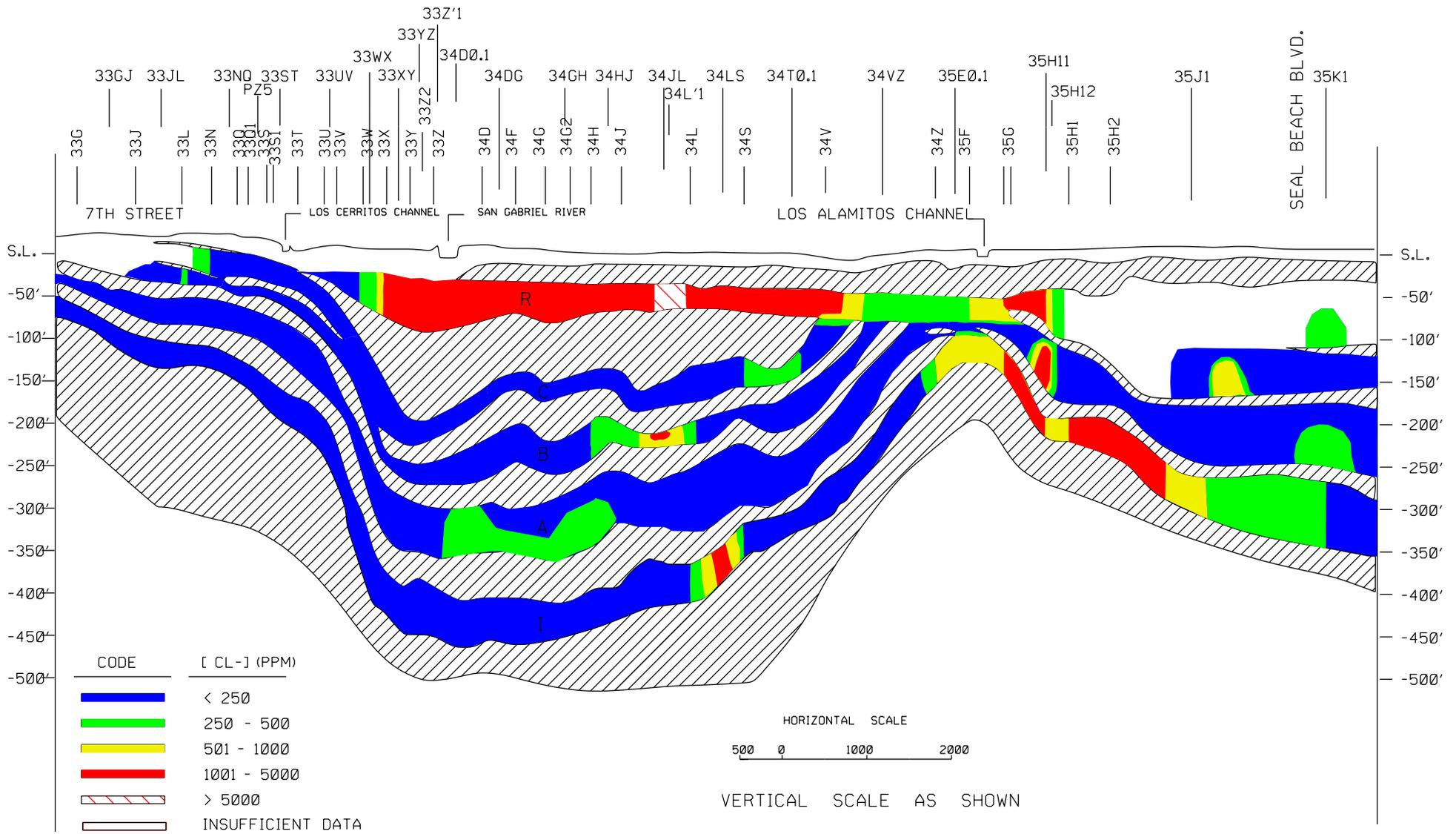
ALAMITOS BARRIER PROJECT
I-ZONE CHLORIDE CONCENTRATIONS
 Chloride Data Used for Contours and Cross-Section

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. 13-14	12-13	(FY13-14 - FY12-13)
1	32U 15	482L	20140319	I	-74	134					134	104	30
2	32V 22	482N	20140319	I	-51	111					111	112	-1
3	32V'10	483E	20140626	I	-140	726	-152			828	828		n/a
4	32X11	482R	20140626	I	-51	350	-61	725			725		n/a
5	32Z'5	482V	20140626	I	-68	456	-83			787	787		n/a
6	33D0.1	482U	20140626	A,I	-24		-49	333		482	482		n/a
7	33G 9	482G	20140318	I	-34	182	-68	78	-78	77	182	79	103
8	33GJ	482Y	20140630	I	-75	59	-95	79			79		n/a
9	33H'13	493XX	20140320	I	-89	280					280	249	31
10	33JL	492BW	20140407	A,I	-41	85	-79	72	-116	78	85	77	8
11	33N 21	492BV	20140313	I	-457	67	-468	66			67	68	-1
12	33NQ	492BP	20140407	A,I	-48	72	-92	71	-136	70	72	82	-10
13	33S 40	491F	20140317	I	-470	296					296	287	9
14	33ST	492BM	20140409	I	-130	79	-148	75	-163	88	88	86	2
15	33T 4	492CQ	20140630	I	-277	96	-292	109			109		n/a
16	33T 9	492XX	20140408	I	-365	80					80	85	-5
17	33T 12.5	492BT	20140325	I	-423	113	-438	125	-443	127	127	103	24
18	33U' 3	492QQ	20140326	I	-147	192					192	317	-125
19	33UV	492BJ	20140409	I	-209	83	-228	77	-246	81	83	62	21
20	33V' 8	492BX	20140326	I	-109	4,580	-130	4,610			4,610	4,650	-40
21	33W 11	502U	20140410	I	-423	75	-446	69	-468	68	75	63	12
22	33WX	502AG	20140409	I	-374	46	-391	53	-405	61	61	51	10
23	33X 10	502BE	20140318	I	-420	634	-440	213	-460		634	186	448
24	33X 20	502H	20140414	I	-442	76					76	80	-4
25	33XY	502BP	20140409	I	-404	68	-417	70	-431	65	70	92	-22
26	33Y'35	493ZZ	20140401	I	-67	21,800					21,800	22,400	-600
27	33YZ	502AE	20140410	I	-402	63	-433	67			67	63	4
28	33Z 11	502W	20140415	I	-417	398	-437	404	-457	661	661	319	342
29	34D' 6	502BI	20140402	I	-400	1,690	-410	4,760	-418	4,810	4,810	3,560	1,250
30	34DG	502AA	20140416	I	-402	78	-432	77			78	58	20
31	34E'13	503AT	20140310	I	-289	911	-308	6,130			6,130	9,380	-3,250
32	34F 5	502BQ	20140415	I	-411	66	-426	65	-441	66	66	64	2
33	34F 10	502AS	20140416	I	-416	62	-442	62			62	51	11
34	34GH	502BV	20140416	I	-412	70	-427	70	-437	69	70	83	-13
35	34H 5	512D	20140522	I	-407	196	-422	233	-442	176	233	279	-46
36	34H 25	502AJ	20140423	I	-407	521	-427	561	-446	548	561	573	-12
37	34HJ	502BW	20140421	I	-407	58	-417	58	-427	63	63	61	2

ALAMITOS BARRIER PROJECT
I-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. 13-14	12-13	(FY13-14 - FY12-13)
38	34JL	503AN	20140423	I	-383	61	-403	284			284	47	237
39	34L 10	502AN	20140310	I	-404	32	-426	36			36	34	2
40	34LS	503BC	20140424	I	-338	4,320	-368	8,650			8,650	448	8,202
41	34N 21	512C	20140320	I	-423	76	-448				76	85	-9
42	34N 7	503AG	20140327	I	-221	79	-254	519	-274	472	519	155	364
43	34T0.1	503AD	20131112	I	-289	89	-312	80	-334	101	101	192	-91
44	34U 8	513G	20140428	I	-360	112	-375	127			127	139	-12
45	34V 20	513C	20140428	I	-386	246					246	30	216
46	34VZ	503BG	20131114	I	-214	63	-224	59			63	72	-9
47	34W 5	503AK	20140327	I	-156	4,860					4,860	4,580	280
48	34X40	513N	20140429	I	-331	1,020	-346	2,050			2,050	1,000	1,050
49	35D 5	503AM	20140327	I	-89	4,330					4,330		n/a
51	35E0.1	503BJ	20140424	I	-114	602					602	2,220	-1,618
52	35F 20	513H	20140429	I	-235	3,210	-245	3,160			3,210	3,560	-350
53	35H 11	514H	20140430	I	-203	860					860	511	349
54	35J1	513M	20140430	I	-261	218	-271	208	96	119	218	283	-65
55	35K1	523C	20140519	I	-363	30	-373	25			30	26	4
56	35N0.1	504N	20140331	I	-71	11,800					11,800	13,100	-1,300
57	33G						DP1				50	50	n/a
58	33J						DP2				50	50	n/a
59	33L						DP3				50	50	n/a
60	33N						DP4				50	50	n/a
61	33Q						DP5				50	50	n/a
62	33U						DP6				50	50	n/a
63	33V						DP7				50	50	n/a
64	33W						DP8				50	50	n/a
65	33X						DP9				50	50	n/a
66	33Y						DP10				50	50	n/a
67	33Z						DP11				50	50	n/a
68	33Z2						DP12				50	50	n/a
69	34D						DP13				50	50	n/a
70	34E						DP14				50	50	n/a
71	34F						DP15				50	50	n/a
72	34G2						DP16				50	50	n/a
73	34H						DP17				50	50	n/a
74	34J						DP18				50	50	n/a
75	34L						DP19				50	50	n/a
76	34S						DP20				50	50	n/a
77	34V						DP21				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.



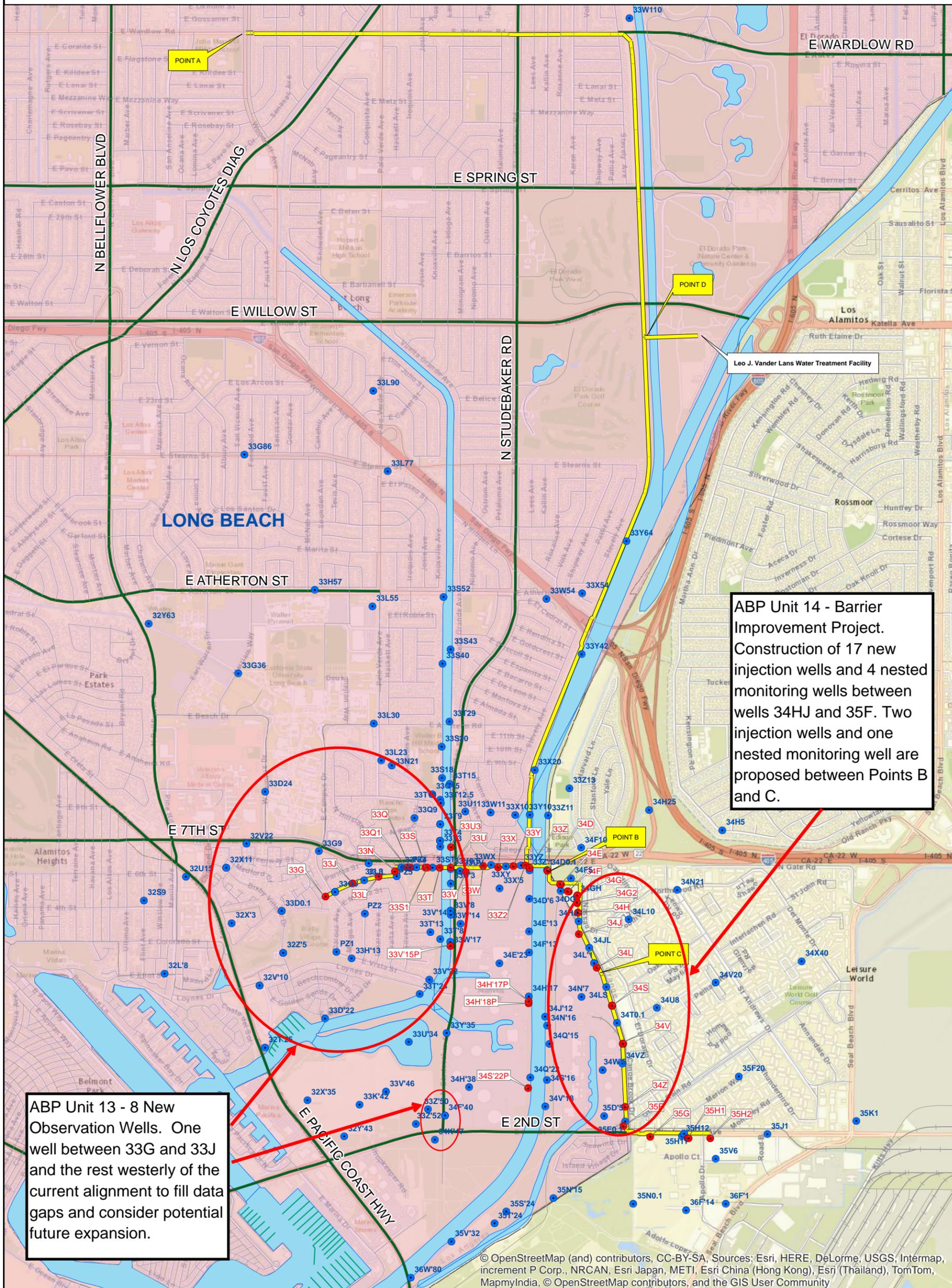
CHLORIDE SECTION ALONG THE BARRIER

Spring 2014

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



ABP Unit 14 - Barrier Improvement Project. Construction of 17 new injection wells and 4 nested monitoring wells between wells 34HJ and 35F. Two injection wells and one nested monitoring well are proposed between Points B and C.

ABP Unit 13 - 8 New Observation Wells. One well between 33G and 33J and the rest westerly of the current alignment to fill data gaps and consider potential future expansion.

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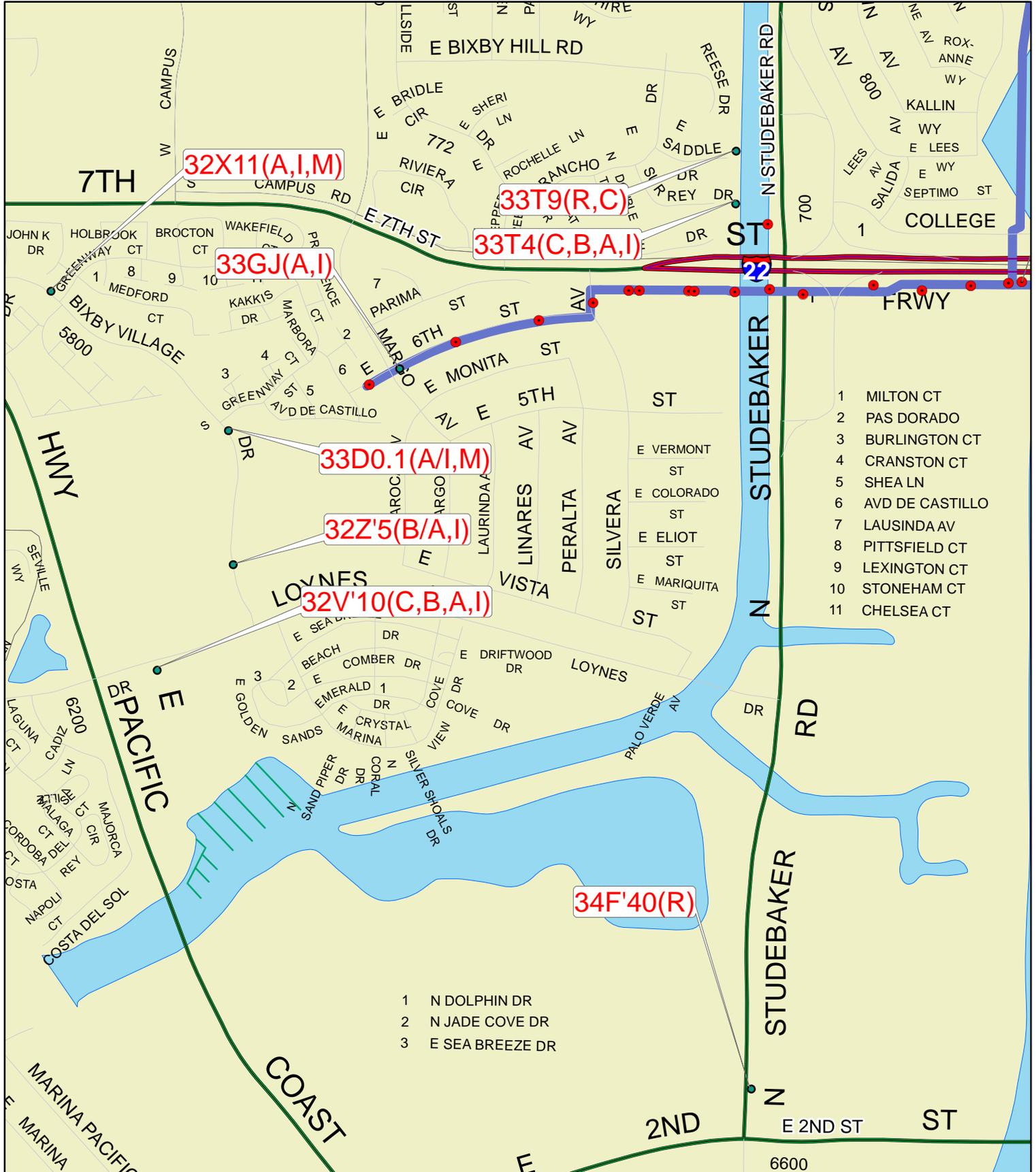
Legend

- Alamos Injection Well
- Observation Well
- ABP Water Supply Line



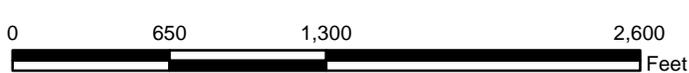
ALAMITOS BARRIER PROJECT

Unit 13 Observation Well Overview Map



- 1 MILTON CT
- 2 PAS DORADO
- 3 BURLINGTON CT
- 4 CRANSTON CT
- 5 SHEA LN
- 6 AVD DE CASTILLO
- 7 LAUSINDA AV
- 8 PITTSFIELD CT
- 9 LEXINGTON CT
- 10 STONEHAM CT
- 11 CHELSEA CT

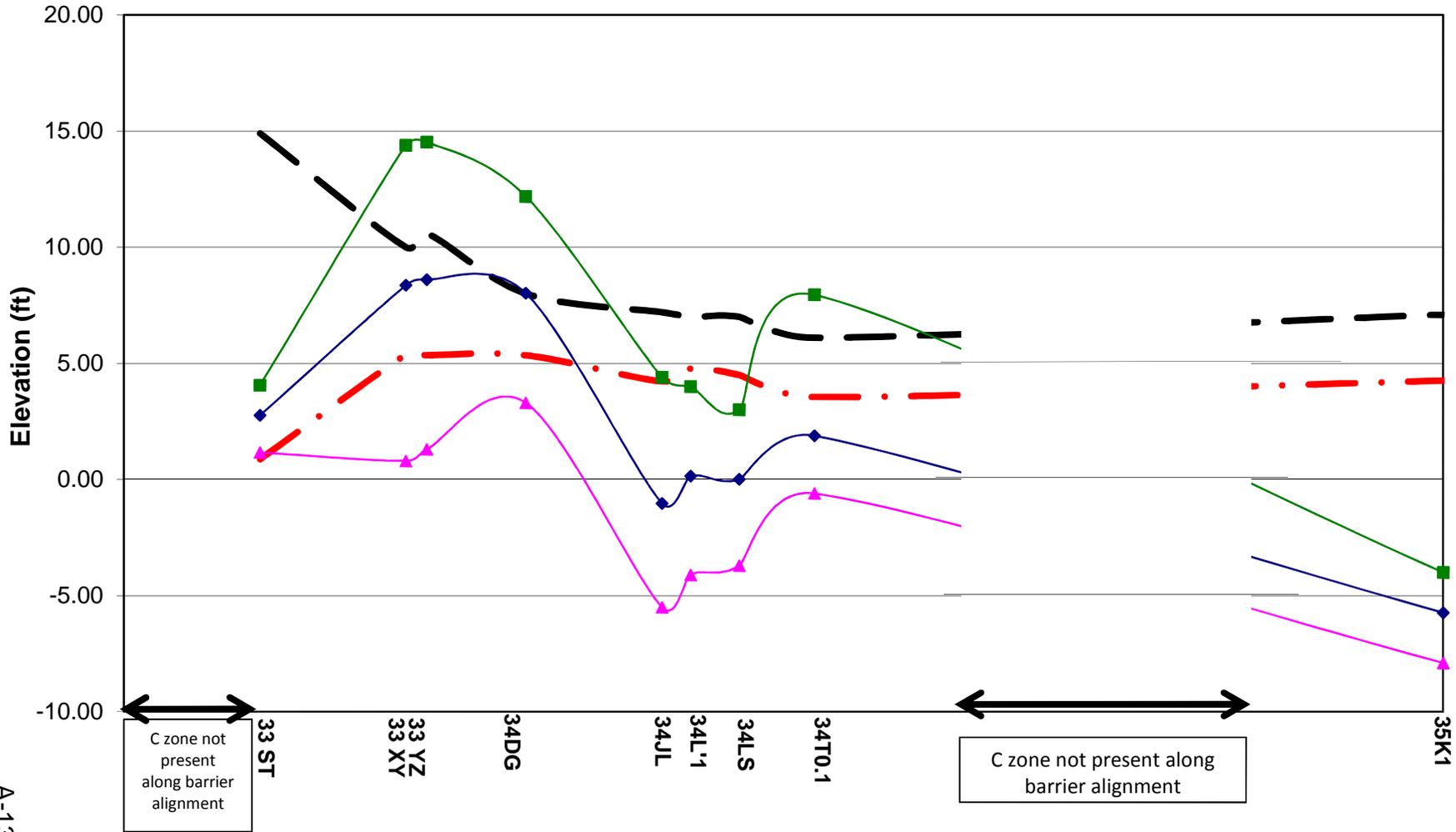
- 1 N DOLPHIN DR
- 2 N JADE COVE DR
- 3 E SEA BREEZE DR



●	Unit 13 Alamitos Observation Wells
●	Alamitos Injection Wells
—	Barrier Alignment

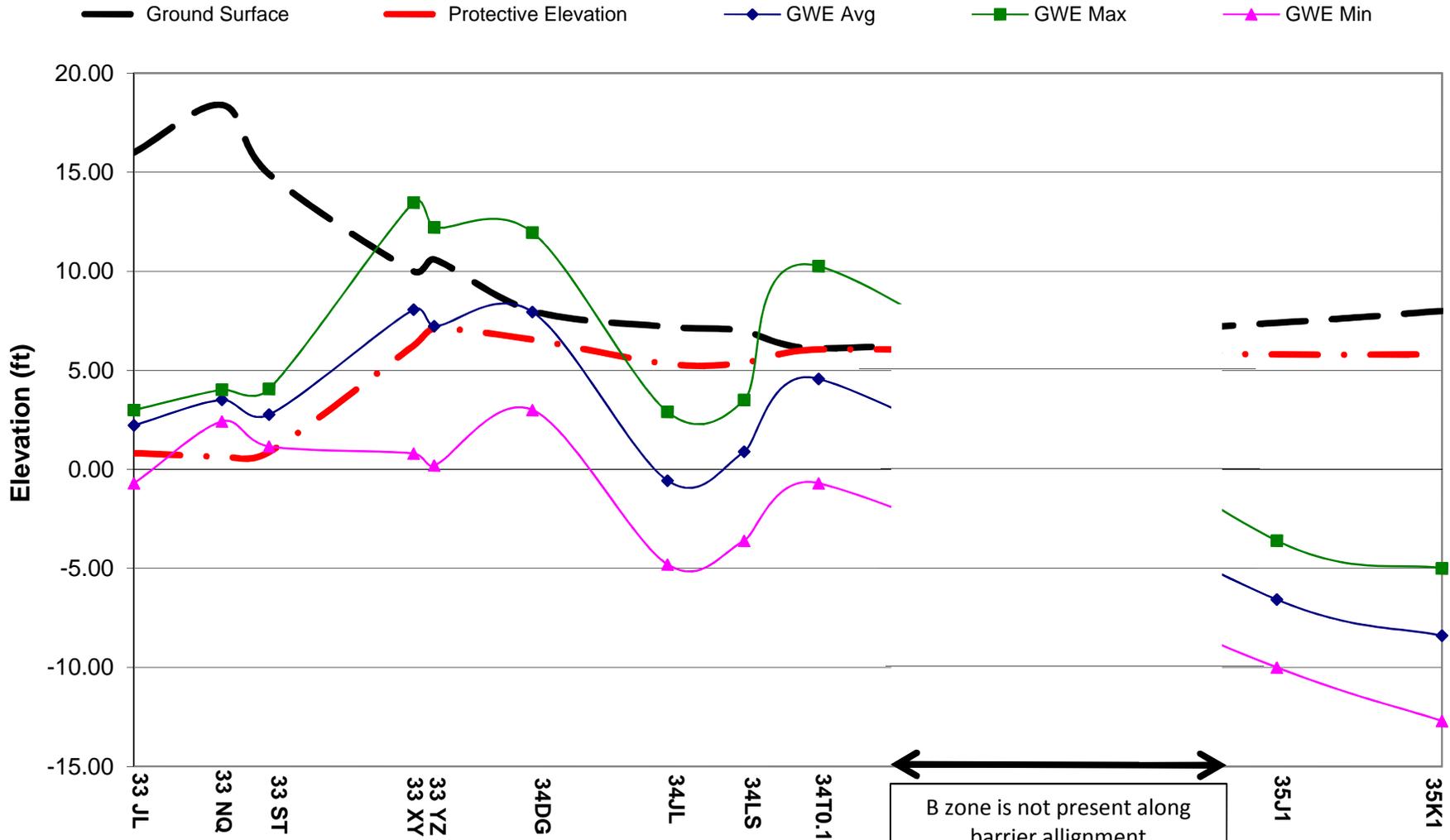
C Zone - Groundwater Elevation (GWE) Along the ABP FY 2013-14

—◆— Ground Surface
 - - - Protective Elevation
 —◆— GWE Avg
 —■— GWE Max
 —▲— GWE Min

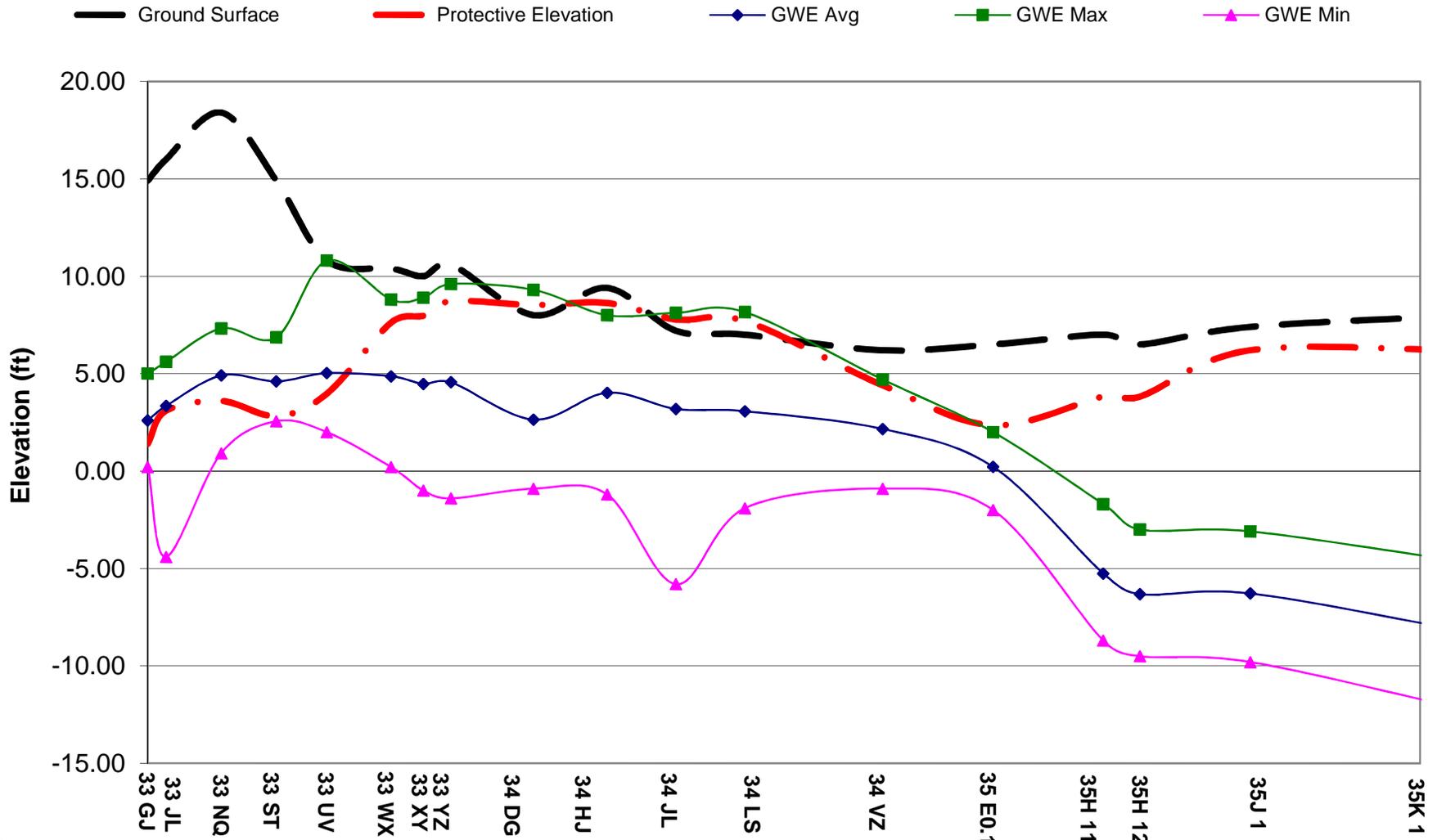


A-13

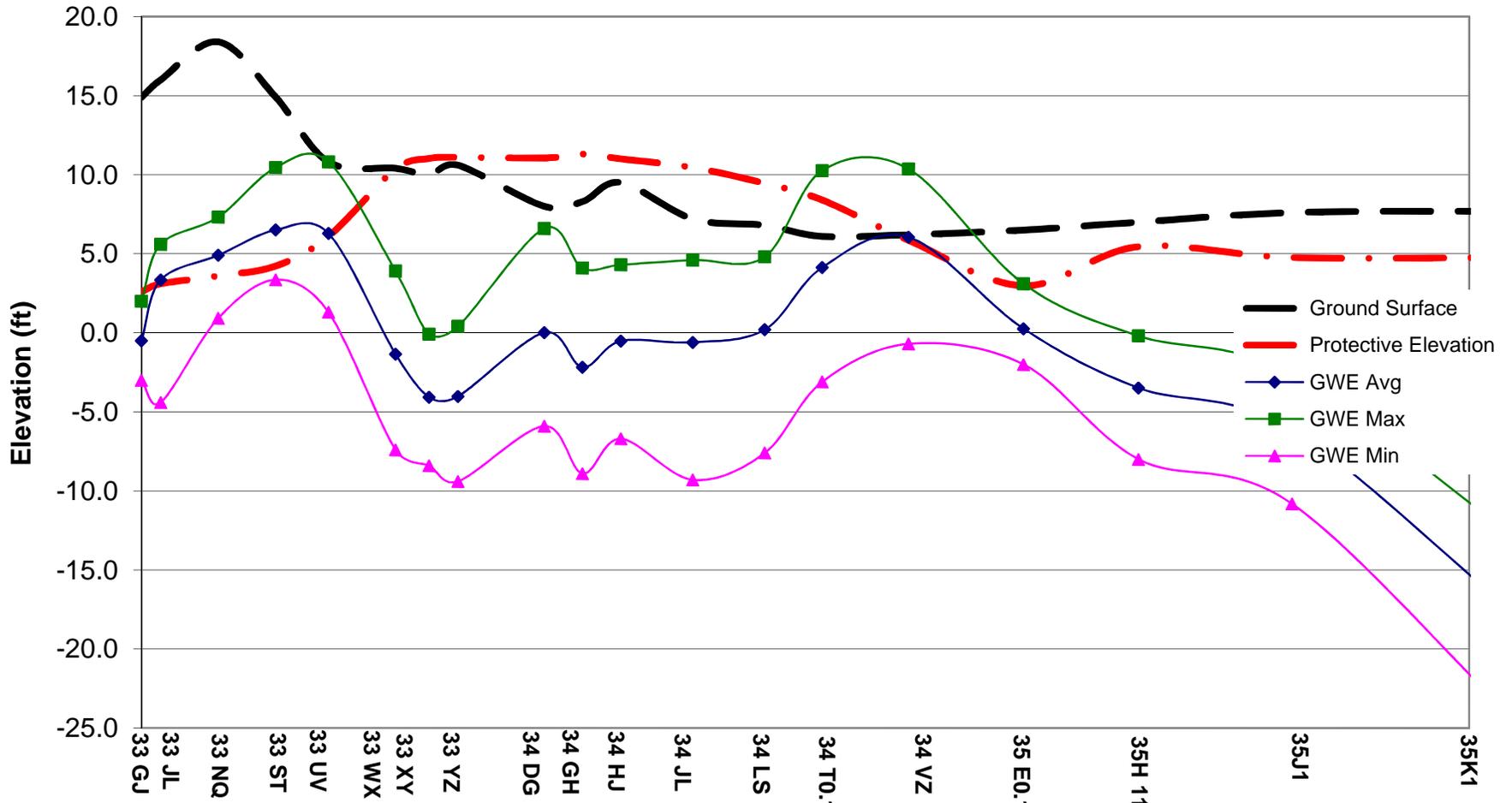
B Zone - Groundwater Elevation (GWE) Along the ABP FY 2013-14



A Zone - Groundwater Elevation (GWE) Along the ABP FY 2013-14



I Zone - Groundwater Elevation (GWE) Along the ABP FY 2013-14



Current Capital Improvement Projects and Contracts (July 2013 through June 2014)

Board Award Date	Project Title	Description	Contractor	Final Contract Amount	Field Acceptance
08/14/2012	ABP Unit 13 - Observation Wells	Construction of 8 new observation wells (21 casings total) near west end of the ABP	Bakersfield Well and Pump	\$1,256,101 (\$300,000 from WRD)	November 2013
Anticipated early 2015 by OCWD	ABP Unit 14 - Injection and Observation Wells	Construction of 17 new clustered injection wells (8 locations), 4 nested observation wells, and 2 shallow piezometers	TBD	\$14,752,000 total \$2,506,000 for LACFCD facilities [Estimated]	Fall 2017 [Estimated]

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

Summary of the Alamitos Barrier Project Shutdowns (July 2013 through June 2014)

Shutdown	Startup	Duration (days)	Impacted Portion of ABP	Reason	Addressed By	Means of Repair/Remediation
02/15/2013	10/16/2014	608	Well 34G	Return of Surface Leakage	LACDPW	Injecting with limited flowrate. Geotechnical investigation to start in Fall 2014 to determine best method of preventing surface leakage.
10/13/2013	10/16/2014	368	Well 33W	Surface leakage	LACDPW	Verified the surface leakage and resumed injection with limited flowrate.
05/15/2014	N/A	N/A	Well 34H(A)	Overpressure, will not take water.	LACDPW	Will investigate starting Fall 2014

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.

Alamitos Barrier Project Cost for FY2013-14

ITEM NO.	DESCRIPTION	JOB NO.	DESCRIPTION	SERVICES AND SUPPLIES	FY 2013-14 BUDGET	% BUDGET FY 13-14	OCWD SHARE	OCWD BUDGET FY 13-14	% OCWD BUDGET FY 13-14	LADWP SHARE	LADWP BUDGET FY 13-14	% LADWP BUDGET FY 13-14		
1.	Analysis and direction of injection operations	H0321551 H0321550	ABP ANALY&DIR OF INJECTION O BARRIER PROJECT OPERATION-GEN		15,839.18 50,220.49		36%							
			Subtotal #1		68,059.67	80,000	85.1	24,471.70	28,000	87.4	43,587.96	52,000	83.8	
2.	Maintenance and repair of injection wells	F6004011 F0064011 H0321911 F6980080F HF01512000 HF01511000	MAINT INJECTION WELLS - ABP INJECT WELLS-MAINT/IN ALAMITOS Alamitos Barrier Proj-Telemetry Maint MAINT ENGR - BARRIER PROJ DGBP and ABP Maintenance/Repair DGBP Automated System		168,203.61 37,552.34 24,970.52 3,797.07 122.05 19,957.00									
			Subtotal #2		254,602.59	300,000	84.9	91,545.54	105,000	87.2	163,057.05	195,000	83.6	
3.	Operation of injection	F6004000	RECHARGE OPER U/S - ABP		23,294.88									
			Subtotal #3		23,294.88	40,000	58.2	8,375.96	14,000	59.8	14,918.92	26,000	57.4	
4.	Analysis and direction of extraction operations (No cost to OCWD)	H0321555	ABP ANALY&DIR OF EXTRACT OPE		727.90									
			Subtotal #4		727.90	0	N/A	0.00	0	0.0	727.90	-	-	
5.	Maintenance, and repair of extraction wells (No cost to OCWD)				0.00									
			Subtotal #5		0.00	5,000	N/A	0.00	0	0.0	-	5,000	0.0	
6.	Operation of extraction wells (No cost to OCWD)	F6000900	NON-LABOR EXP BARRIER (ALMT)		5,583.78									
			Subtotal #6		5,583.78	5,200	107.4	0.00	0	0.0	5,583.78	5,200	107.4	
7.	Maintenance and repair of distribution system	H0321569 F6004010 F6001907 F6004012 N2420007 F6004014F F6004022 H0321016	ALAMITOS BARRIER PROJECT MAINT AIR/VAC-BLWOLF U/S - ABP INSPECT CRANE PRES REDUCE - ABP MAINT PRES - ABP MISC. SUPPLIES SEAWATER INTRUS ABP Locate & Mark Barrier Proj. U/gw WATER SAMPLING Seawater Barriers Administrative Sup		138,239.38 2,761.63 928.96 33,644.99 1,766.15 11,297.73 664.24 91,569.20									
			Subtotal #7		280,872.28	250,000	112.3	100,991.13	87,500	115.4	179,881.15	162,500	110.7	
8.	Maintenance of observation wells	F5064044 F6005273	OBSERV. WELLS-CLEANOUT(ALAMITO) POST EMERGENT WEED CONTROL		336,039.08 345.75									
			Subtotal #8		336,384.83	150,000	224.3	120,951.37	52,500	230.4	215,433.47	97,500	221.0	
9.	Collection of groundwater data	H0321552 BP14-781 BP14-181	ABP COLL OF GR WTR DATA FOR TB-002BP-14-781 (F015NRFA) 13-445BS-14-181 (H0321550)		72.50 1,172.00									
			Subtotal #9		1,244.50	100,000	148.2	53,305.05	35,000	152.3	94,944.71	65,000	146.1	
10.	Yard Maintenance (Flat Fee from OCWD)	FFM34107 F6001904 F6001920 F6003124	Facility Maintenance Alamitos Yd #19 CONDUCT QUARTERLY INSPECTION CONDUCT QUARTERLY INSPECTION BUILDING MAINTENANCE-NONRESI		88,734.01 457.64 438.64 3,983.91									
			Subtotal #10		93,614.20	45,000	208.0	375.00	375	100.0	93,239.20	44,625	208.9	
11.	Well redevelopment	H0321565 H0321554 F54900977 F54900993 F54918128 F54929601 F54929725 F54939467 F54941934 F54942077 F54956006 F54969552 F54971561 F54971564 F54992223 F54992225 F55053479 F55053481 F55064597 F55064598 F55079904 F55079906 F55087048 F55087051 F55092505 F55101025 F55110019 F6009118 F5064022 F4046508 F5009760F	ABP NPDES MONI & REPORT INJ WE ABP WELL REDEVELOPMENT PROGRAM REDEVELOP INJ. WELL, 34G2 - A.B.P. REDEVELOP INJ. WELL, 34G2 BC ZONE - REDEVELOP INJ. WELL, 35H2 (A ZONE) REDEVELOP INJ. WELL, 35H1 (I ZONE) REDEVELOP INJ. WELL, 35H1 (A ZONE) REDEVELOP INJ. WELL, 34G 34L - A.B. REDEVELOP INJ. WELL, 34G - A.B.P. REDEVELOP INJ. WELL, 34J - A.B.P. REDEVELOP INJ. WELL, 33Z - A.B.P. REDEVELOP INJ. WELL 33Y - A.B.P. REDEVELOP INJ. WELL, 33Z2- A.B.P. REDEVELOP INJ. WELL, 33K - A.B.P. REDEVELOP INJ. WELL, 33W - A.B.P. REDEVELOP INJ. WELL, 33V - A.B.P. REDEVELOP INJ. WELL, 33U - A.B.P. REDEVELOP INJ. WELL, 33U3 - A.B.P. REDEVELOP INJ. WELL, 33T - A.B.P. REDEVELOP INJ. WELL, 33S1 33S - A.B. REDEVELOP INJ. WELL, 33S1 - A.B.P. REDEVELOP INJ. WELL, 33Q1 - A.B.P. REDEVELOP INJ. WELL, 33Q - A.B.P. REDEVELOP INJ. WELL, 33J - A.B.P. REDEVELOP INJ. WELL, 33L - A.B.P. REDEVELOP INJ. WELL, 33G - A.B.P. REDEVELOP INJ. WELL, 33N - A.B.P. Disassemble/Reassemble of Wells ABP Redevelop injections wells - ABP Safety, fabricate hndrails (redevelop) DRILL EQPT-MAINT&TEST - Eaton Yard		377,522.75 145,609.11 8,956.22 16,610.82 16,917.17 14,715.99 4,362.09 25,013.18 19,420.29 13,880.68 38,107.00 32,370.54 34,889.39 28,373.62 39,325.21 25,825.63 26,200.03 16,008.02 19,647.99 11,725.22 10,566.08 6,299.96 13,925.04 8,637.93 14,431.43 9,828.00 15,747.27 12,426.54 46,010.58 48,548.34 48,285.46									
			Subtotal #11		809,997.62	500,000	162.0	291,244.75	175,000	166.4	518,752.86	325,000	159.6	
12.	Processing of data and preparation of reports	H0321553	ABP DATA PRO & PRE OF REPORT		39,348.31									
			Subtotal #12		39,348.31	70,000	56.2	14,148.18	24,500	57.7	25,200.13	45,500	55.4	
13.	Special Programs (No cost to OCWD unless pre-arranged)	H0321591 RF02610112	ALAMITOS BARRIER PROJ-PLANNING Alamitos Barrier Project Unit 13 Obs		21,189.37 1,206,056.67									
			Subtotal #13		1,227,246.04	50,000	2,454.5	0.00	0	0.0	1,227,246.04	50,000	2454.5	
14.	Reclaim Water Program	H0321556	ABP RECLAIMED WATER SUPPLY		8,968.11									
			Subtotal #14		8,968.11	12,000	74.7	3,224.60	4,200	76.8	5,743.51	7,800	73.6	
15.	Projects & Studies (Reimbursable amounts include labor expenses, plus approved contract expenses that are not addressed under a separate agreement).				0.00									
			Subtotal #15		0.00	72,000	0.0	0.00	25,200	0.0	-	46,800	0.0	
16.	ABP Liability Insurance Premiums paid separately by OCWD	N/A	ABP Liability Insurance		35,667.96									
			Subtotal #16		35,667.96	0	0.0	17,833.98	0	0.0	17,834	-	0.0	
17. ³	Pipeline R/W (U/S of T) (Costs are reimbursable per 1864 Agreement consistent with pipeline ownership, i.e. 5/23 OCWD, 18/23 LACFCB)	EF18212152 H0321899	Alamitos Barrier Project-Parcels (R) R/W Mitigation for Existing ABP Facil		337,000.00 3,706.12									
			Subtotal #16		340,706.12	0	0.0	74,066.55	0	0.0	266,639.57	0.0		
			TOTAL		3,673,324.05	1,679,200	218.8	782,699.83	551,275	142.0	2,872,790	1,127,925	254.7	

NOTES:

¹ OCWD share represents 36% of the total costs in all items except for 4, 5, 6, 10, 13, and 16. The percentage is based on amount of overall barrier injection water provided to Orange County portion of the ABP during this fiscal year.

² Per Agreement No. 8458 between the LACFCB and the OCWD, all costs included in Items 4, 5, 6 and 13 are not reimbursable with respect to OCWD and the OCWD cost for Item 10 is fixed at \$375,000.

³ Per Agreement No. 8458 between the LACFCB and the OCWD, all costs included in Item 16 are reimbursable at the same ratio as ownership of the pipeline upstream of the T-vault (18/23 LACFCB, 5/23 OCWD).

TOTAL OPERATION AND MAINTENANCE COST	\$ 3,673,324.05
ORANGE COUNTY'S SHARE OF THE OPERATION AND MAINTENANCE COST	\$ 782,699.83
Less: Los Angeles County's Share of the FY13-14 Liability Insurance	\$ (17,833.99)
Less: Credit for overpayment of FY2008-09 O&M (26% of \$49,554.20)	\$ (12,884.09)
Less: Credit for overpayment of FY2010-11 O&M (33% of \$56,713.28)	\$ (18,715.38)
Less: Advance Deposit Paid by OCWD (50% of the OCWD FY13-14 budget)	\$ (275,638.00)
BALANCE DUE FROM ORANGE COUNTY WATER DISTRICT	\$ 457,628.37

* AS OF FY09-10, SHOWING CAPITAL IMPROVEMENT PROJECTS AS THEIR OWN CATEGORY AND ALSO SPLITTING UP LABOR EXPENSES FROM CONTRACT EXPENSES FOR APPLICABLE PROJECTS (WHERE SEPARATE COST-SHARING AGREEMENTS ARE IN PLACE FOR CONTRACT AMOUNTS)

2015-16 OPERATION AND MAINTENANCE BUDGET

JMC No.	Fiscal Year	LACFCO		OCWD		WRD		TOTAL	
		Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual
1.		Analysis and direction of injection operation (\$)							
	2011-12	65,000	52,575	35,000	19,711			100,000	72,286
	2012-13	59,590	10,819	31,500	4,941			90,000	15,760
	2013-14	52,000	43,588	28,000	24,472			80,000	68,060
	2014-15	48,750		26,250				75,000	
	2015-16	48,750		26,250				75,000	
2.		Maintenance and repair of injection wells (\$)							
	2011-12	117,000	284,218	63,000	106,558			180,000	390,775
	2012-13	162,500	285,933	87,500	130,604			250,000	416,538
	2013-14	195,000	163,057	105,000	91,546			300,000	254,603
	2014-15	260,000		140,000				400,000	
	2015-16	260,000		140,000				400,000	
3.		Operations of Injection Well Facilities (\$)							
	2011-12	130,000	25,116	70,000	9,416			200,000	34,532
	2012-13	32,500	15,616	17,500	7,133			50,000	22,749
	2013-14	26,000	14,919	14,000	8,376			40,000	23,295
	2014-15	22,750		12,250				35,000	
	2015-16	19,500		10,500				30,000	
4.		Analysis and direction of extraction operation (\$)							
	2011-12	0	0					0	0
	2012-13	0	133					0	133
	2013-14	0	728					0	728
	2014-15	0						0	
	2015-16	0		0				0	
5.		Redevelopment, maintenance, and repair of extraction wells (\$)							
	2011-12	5,000	0					5,000	0
	2012-13	5,000	65,068					5,000	65,068
	2013-14	5,000						5,000	
	2014-15	200,000						200,000	
	2015-16	15,000		0				15,000	
6.		Operations of Extraction Wells (\$)							
	2011-12	5,200	6,219					5,200	6,219
	2012-13	5,200	5,194					5,200	5,194
	2013-14	5,200	5,584					5,200	5,584
	2014-15	5,200						5,200	
	2015-16	6,000		0				6,000	
7.		Maintenance and repair of ABP (\$)							
	2011-12	227,500	231,004	122,500	86,607			350,000	317,612
	2012-13	130,000	315,946	70,000	144,313			200,000	460,259
	2013-14	162,500	179,881	87,500	100,991			250,000	280,872
	2014-15	195,000		105,000				300,000	
	2015-16	195,000		105,000				300,000	
8.		Maintenance of Observation Wells (\$)							
	2011-12	65,000	138,409	35,000	51,892			100,000	190,300
	2012-13	32,500	3,535	17,500	1,615			50,000	5,150
	2013-14	97,500	215,433	52,500	120,951			150,000	336,385
	2014-15	32,500		17,500				50,000	
	2015-16	195,000		105,000				300,000	
9.		Collection of groundwater data (\$)							
	2011-12	58,500	105,834	31,500	39,679			90,000	145,513
	2012-13	65,000	114,373	35,000	52,241			100,000	166,614
	2013-14	65,000	94,945	35,000	53,305			100,000	148,250
	2014-15	97,500		52,500				150,000	
	2015-16	110,500		59,500				170,000	
10.		Yard Maintenance (\$)							
	2011-12	39,625	70,455	375	375			40,000	70,830
	2012-13	39,625	66,119	375	375			40,000	66,494
	2013-14	44,625	93,239	375	375			45,000	93,614
	2014-15	53,500		6,500				60,000	
	2015-16	75,380		4,620				80,000	
11.		Injection Well Redevelopment (\$)							
	2011-12	260,000	517,953	140,000	194,189			400,000	712,143
	2012-13	292,500	362,626	157,500	165,635			450,000	528,260
	2013-14	325,000	518,753	175,000	291,245			500,000	809,998
	2014-15	325,000		175,000				500,000	
	2015-16	520,000		280,000				800,000	
12.		Processing of data and preparation of reports (\$)							
	2011-12	39,000	59,464	21,000	22,294			60,000	81,758
	2012-13	45,500	37,626	24,500	17,186			70,000	54,812
	2013-14	45,500	25,200	24,500	14,148			70,000	39,348
	2014-15	45,500		24,500				70,000	
	2015-16	45,500		24,500				70,000	
13.		Special Programs (\$)							
	2011-12	95,000	141,683	70,000		70,000		235,000	141,683
	2012-13	2,100,000	722,862		0			2,100,000	722,862
	2013-14	50,000	1,227,246	0		300,000	300,000	50,000	1,227,246
	2014-15	1,000,000		0				1,000,000	
	2015-16	350,000		0				350,000	
14.		Oversight of Reclaim Water Program (\$)							
	2011-12	6,500	19,418	3,500	7,280			10,000	26,698
	2012-13	5,200	7,171	2,800	3,275			8,000	10,446
	2013-14	7,800	5,744	4,200	3,225			12,000	8,968
	2014-15	7,800		4,200				12,000	
	2015-16	9,750		5,250				15,000	
15.		Projects and Studies (\$)							
	2011-12	39,000	134,297	21,000	50,350			60,000	184,647
	2012-13	78,000	706	42,000	323			120,000	1,032
	2013-14	45,800	0	25,200	0			72,000	0
	2014-15	45,500		24,500				70,000	
	2015-16	45,500		24,500				70,000	
16.		ABP Liability Insurance (\$)							
	2011-12	0	0	0	0			0	0
	2012-13	0	0	0	0			0	0
	2013-14	0	17,834	0	17,834			0	35,668
	2014-15	37,500		37,500				75,000	
	2015-16	37,500		37,500				75,000	
17.		Joint Pipeline ROW (\$)							
	2011-12	0	0	0	0			0	0
	2012-13	0	5,028	0	1,397			0	6,424
	2013-14	0	266,640	0	74,067			0	340,706
	2014-15	0		0				0	
	2015-16	0		0				0	
18.		Total ABP Expenditure (\$)							
	2011-12	1,152,325	1,786,645	612,875	588,352	70,000		1,835,200	2,374,997
	2012-13	3,052,025	2,018,757	486,175	529,039			3,538,200	2,547,796
	2013-14	1,127,925	2,872,790	551,275	800,534	300,000		1,679,200	3,673,324
	2014-15	2,376,500		625,700				3,002,200	
	2015-16	1,933,380		822,620				2,756,000	
		Total ABP Operations and Maintenance (\$) [Item 18-Item 13-Item 16]							
	2011-12	1,057,325	1,644,962	542,875	588,352	0	0	1,600,200	2,233,314
	2012-13	952,025	1,295,894	486,175	529,039			1,438,200	1,824,933
	2013-14	1,077,965	1,645,544	551,275	800,534	0		1,629,200	2,446,078
	2014-15	1,376,500		625,700				2,002,200	
	2015-16	1,545,880		785,120				2,331,000	
		Volume of Water (ac-ft)							
	2011-12			2,400	1,182	3,600	3,153	6,000	4,335
	2012-13			2,400	1,722	3,600	3,769	6,000	5,490
	2013-14			2,100	2,406	3,900	4,286	6,000	6,692
	2014-15			2,275		4,225		6,500	
	2015-16			2,275		4,225		6,500	