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In the Matter of: Application for Certification for the PUENTE POWER PROJECT	Docket No. 15-AFC-01 APPLICANT'S REBUTTAL TESTIMONY – NON-SUBSTANTIVE CORRECTIONS TO EXPERT DECLARATION OF PHILLIP MINEART

In the final production and docketing of Applicant's Rebuttal Testimony (TN #215553), formatting errors occurred in the references to certain figures contained in the EXPERT DECLARATION OF PHILLIP MINEART IN RESPONSE TO REPORT OF DR. REVELL. In addition, Attachment B to this same declaration was inadvertently omitted. Applicant hereby submits a revised version of Mr. Mineart's declaration with the figure references corrected and Attachment B included. No substantive changes were made to Mr. Mineart's declaration. Note that Attachment B to the Mineart declaration was previously docketed as an attachment to correspondence between the Applicant and the California Coastal Commission (TN #213625), which was identified in Mr. Mineart's Opening Testimony declaration as Applicant's Exhibit 1087.

DATED: January 24, 2017

Respectfully submitted,

/s/ Michael J. Carroll

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In the Matter of: Application for Certification for the PUENTE POWER PROJECT	Docket No. 15-AFC-01 EXPERT DECLARATION OF PHILLIP MINEART IN RESPONSE TO REPORT OF DR. REVELL

I, Phillip Mineart PE, declare as follows:

1. I am employed by AECOM, which has been retained by the Applicant to conduct certain analyses associated with the proposed Puente Power Project (Project) and am duly authorized to make this declaration.

2. I earned a Bachelor of Science degree in Environmental Engineering from Humboldt State University in 1979 and a Master of Science degree in Civil Engineering from Cornell University in 1983. I have over 30 years of experience in the fields of hydrologic, hydraulic and hydrodynamic analysis, coastal engineering, erosion and sediment transport modeling, environmental restoration, risk assessments, climate change and sea level rise. A copy of my current curriculum vitae is attached to this declaration as Attachment A. Based on my education, training and experience, I am qualified to provide expert testimony as to the matters addressed herein.

3. I prepared or participated in preparing, and am knowledgeable of the contents of, the following Applicant's Exhibits:

- Applicant's Exhibit No. 1010: Application for Certification, 4.4 Geological Hazards and Resources (Tsunami) (CEC TN #204219-11);
- Applicant's Exhibit No. 1021: Application for Certification (AFC) Section 4.15, Water Resources (CEC TN #204219-22);
- Applicant's Exhibit No. 1042: AFC Appendix N, Water Resources (N-2) (CEC TN #204220-14);
- Applicant's Exhibit No. 1043: Applicant's Responses to CEC Data Requests Set 1 (DR 41) (CEC TN #205765);
- Applicant's Exhibit No. 1059: Applicant's Responses to City of Oxnard Data Requests Set 2 (DR 47 – 65, 67) (CEC TN #206310);
- Applicant's Exhibit No. 1061: Applicant's Responses to City of Oxnard Data Requests Set 2, 30-Day Extension (59, 60, and 62) (CEC TN #206533);
- Applicant's Exhibit No. 1070: Applicant's Responses to City of Oxnard Data Requests Set 4 (DR 83 – 90, 92 - 94) (CEC TN #207179);
- Applicant's Exhibit No. 1077: Applicant's Responses to City of Oxnard Data Requests Set 5 (DR 95 – 99) (CEC TN #210971);
- Applicant's Exhibit No. 1086: Response to Recommended Specific Provisions in August 26, 2016 Proposed Report (CEC TN # 213624);
- Applicant's Exhibit No. 1087: Comments on California Coastal Commission Report to California Energy Commission on AFC 15-AFC-01 - NRG Puente Power Project (CEC TN # 213625);
- Applicant's Exhibit No. 1088: Final NRG Comment Letter to California Coastal Commission re Agenda Item F10a; Sept. 9, 2016 (CEC TN # 213626);
- Applicant's Exhibit No. 1089: Applicant's Comments on the Preliminary Staff Assessment (CEC Log No. TN #213683);
- Applicant's Exhibit No. 1090: Puente Power Project (P3), Project Enhancement – Outfall Removal and Beach Restoration (Section 3.2) (CEC TN #213802); and

- Applicant's Exhibit No. 1093: Applicant's Responses to City of Oxnard Data Requests Set 6 (DR 104 - 108) (CEC TN #214330).

4. I have reviewed and am knowledgeable of the contents of the following documents:

- California Energy Commission (CEC) Staff Final Staff Assessment (FSA), Part 1, Section 4.11, Soil and Water Resources (portions pertaining to coastal and riverine flooding) (CEC TN #214712);
- CEC FSA, Part 1, Appendix SW-1, Soil and Water Resources, Effects of Climate Change and Coastal Flooding on Puente (CEC TN #214712);
- CEC FSA, Part 1, Appendix SW-3, Soil and Water Resources, Estimating Flushing Times (CEC TN #214712); and
- FSA, Part 2, Section 5.2, Geology and Paleontology (portions pertaining to flooding and tsunami) (CEC TN #214713).

5. I have reviewed the Report prepared by Dr. David Revell PhD and filed by intervener City of Oxnard on January 18, 2017 (CEC TN #215427), and various supporting documents filed concurrently therewith (CEC TN #215428-1 through #215428-7) ("Revell Report").

6. Except where stated on information and belief, the facts set forth hereinare true of my own personal knowledge, and the opinions set forth herein are true and correct articulations of my opinions. If called as a witness, I could and would testify competently to the facts and opinions set forth herein.

7. Intervenors in their submitted testimony have claimed that the proposed Project has a high risk of flooding due to coastal hazards and that the dunes fronting the Mandalay Generating Station (MGS) property, which includes the Project site, could be subject to significant erosion during large storm events and, therefore, cannot be relied upon to provide protection against flooding. I have reviewed data related to coastal hazards and flood protection and believe that the intervenors have overstated the risk of flooding and potential damage to the Project, and understated the stability of the dunes and therefore the protection they can provide.

Following is a summary of my analysis, which provides a more accurate assessment of the coastal hazards and dune stability. I have also provided specific rebuttals to the analysis provided in the Revell Report (CEC TN #215427).

Flood, Sea Level Rise and Tsunami Hazards

8. Intervenors oppose the location of the Project site because of the perceived vulnerability of the Project site to flood, sea level rise ("SLR") and tsunami hazards. For the reasons set forth below, I believe the testimony of the intervenors overstates these potential risks. In addition to extensive analysis of these issues in the CEC proceedings, as reflected in the FSA, these issues were the subject of expert testimony and briefing before the California Public Utilities Commission ("CPUC") in connection with the CPUC's consideration and approval of the resource adequacy purchase agreement between NRG and Southern California Edison for the Project. Expert testimony presented in the CPUC proceedings, and relevant to the issues raised in the Revell Report, is summarized in the Reply Brief of NRG Energy Center Oxnard LLC and NRG California South LP ("CPUC Reply Brief') attached hereto as Attachment B and incorporated herein by reference.

Flooding Risk

9. The MGS property, of which the Project site is a part, is located at an elevation of between 12 and 14 feet (NAVD88). Relative to the local tidal datums, the MGS property is approximately 7-9 feet above Mean Higher High Water (MHHW) and 11-13 feet above Mean Lower Low Water (MLLW). The Project site is on the higher portion of the MGS property (~14 feet) and is, therefore, approximately 9 feet above MHHW. Compared to the local active tide gages (Santa Barbara and Santa Monica), the Project site is over 5 feet higher than the highest observed water level (8.31 feet in November 1982)[1].

[1] MHHW is 5.31 ft NAVD88 and the highest observed water level is 7.54 ft NAVD88 at Tide Station #9411340, Santa Barbara. MHHW is 5.24 ft NAVD88 and the highest observed water level is 8.31 ft NAVD88 at Tide Station #9410840, Santa Monica. See https://tidesandcurrents.noaa.gov/map/ for data.

10. Potential sources of flooding risk for the proposed Project site are the Santa Clara River (riverine flooding) if it overtops its banks, or coastal flooding if a large storm in the Pacific Ocean overwhelmed the beach and dunes fronting the site. The entire MGS property, including the proposed Project site, is outside the FEMA 100-year floodplain from either of these potential sources, riverine or coastal flooding.

11. The Project site is located about 1.5-2.0 miles south of the mouth of the Santa Clara River and over 2.5 miles from the Victoria Avenue Bridge over the Santa Clara River. If the Santa Clara River were to overtop its banks, flood waters would need to flow overland before reaching the MGS property, and would be expected to be shallow. As shown on FEMA's Flood Insurance Rate Map (FIRM) Community Panel Numbers, No. 06111C0885E and 06111C0905E (Effective Date of January 20, 2010), a portion of the MGS property, including a very small portion of the Project site on which nothing is planned for development, is shown in the FEMA "Zone X- Other Flood Areas" (areas protected by levees from 1 percent annual chance flood, areas of 0.2 percent annual chance flood; areas of 1 percent chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile). For the MGS property, including the Project site, this flood hazard zone would be best described as an area of 0.2 percent annual chance flood, which corresponds to the 500-year floodplain, or an area of 1 percent chance flood (i.e., 100-year flood event) with average depths of less than 1 foot. More detailed analysis of the 500-year floodplain is contained in Attachment C to this declaration and incorporated herein by reference.

12. The FEMA maps show flooding near the Project site from the Santa Clara River where it breaks out of its banks near its mouth. On the FEMA maps, the base flood elevation is 10-12 feet, which is below the elevation of the flood protection berm along the north MGS property line (which is at an elevation of 17-18 ft NAVD88). Furthermore, the Edison Canal would act as a drain limiting the amount of water that could flood the site from an upland source.

13. Coastal flooding is shown on the 2010 effective FEMA maps at the MGS property as a VE zone. VE zones are defined as "areas subject to inundation by the 1-percent-

annual-chance flood event with additional hazards due to storm-induced velocity wave action." Unlike the more common AE zones, which show the depth or elevation of flood water, VE zones show the elevation of wave run-up. The effective FIRM shows a VE zone with a value of 13 feet.

14. FEMA is in the process of updating FIRMs of Ventura County. FEMA's Draft Work Map, which was included in the FSA as Soil and Water Resources Figure 7, and is the precursor to preliminary maps, shows the VE zone has increased to 20 feet. This wave run-up level at 20 feet represents the ocean still water level (water level excluding waves) of approximately 8 feet in elevation plus the level of wave run-up on the beach, not the level of flooding. If FEMA determined that a dune would be overtopped by wave run-up (e.g., dune was lower in elevation than the VE zone), FEMA would include an estimate of the depth of flooding on the back side of the dune due to the water that overtopped the dune, typically shallow flooding of a few feet (not the elevation of the VE zone). The dunes directly in front of the Project site are over 100 feet in width, and thus any future overtopping of shallow water, if it were to occur, would have to travel a significant distance prior to reaching the Project site.

Coastal Erosion

15. I disagree with the contention of the intervenors that the dunes are at high risk of failure due to erosion and, therefore, do not provide the level of protection they historically have provided.

16. I agree with the CEC Staff conclusion that the sediment discharged from the Santa Clara River comprises the majority of the shoreline sediment supply in the Project vicinity, with sand bypassing from Ventura Harbor a secondary source. I also agree with the CEC Staff conclusion in the FSA that the lack of dredging at Ventura Harbor, assuming the Santa Clara River watershed remains unchanged, would not significantly reduce the volume of sand needed to maintain the beach width at the Project site. A more detailed analysis of this issue is provided below.

17. In fact, the FSA significantly understates the extent of historic beach accretion and protection it provides. Since 1947, the beach fronting the MGS property has increased in width by more than 300 feet (see AFC Figure 4.15-7, which shows the growth in

width based on aerial photos) (Applicant's Exhibit No. 1021; CEC TN #204219-22). This estimate of width is the distance from the outfall headwall to the water line at the time of each photo. The estimate is approximate because the water level changes with the tides and season; however, all the photos, taken at different times over the decades, are consistent in showing the continual increase in beach width. In the 1950s and 1960s, a paved road ran along the beach just above the outfall headwall. The road is currently buried about 3 to 4 feet beneath the sand (based on an exploratory excavation done in 2014). As can be seen by comparing historic photos provided in Applicant's Responses to City of Oxnard Data Requests Set 2 (DR 64) (Applicant's Exhibit No. 1059; CEC TN #206310), the dunes have expanded farther towards the beach and ocean, and the old beach road is now partially covered by new dunes, indicating an increase in beach volume as well as width. The dunes' growth would appear to have been limited primarily by the outflow from the MGS outfall, rather than by erosion caused by extreme water levels or storms. This is indicated by the larger width in the dune field farther north and south from the outfall, where the outfall discharge impacts the beach less.

Specific Responses to Revell Report

18. The Revell Report (CEC TN #215427) provides information that I believe overstates the risk the proposed Project site faces from coastal hazards. I have provided my rebuttals below in the order presented in the Report.

Beach Changes Between 2009 and End of 2016 (Revell Report, p. 5)

19. The Revell Report makes several statements about the use of the 2009 LiDAR data that was used in the analysis presented in the FSA, claiming it was from a period when the beach was exceptionally wide. The 2009 data were collected in November 2009, a time when the beach may have been wider than the narrowest beaches observed in the winter (sandy beaches on the coast of California tend to be wider in the summer and narrower in the winter). To test this, the City of Oxnard collected topographic data of the beach on December 20, 2016. These data were compared to the 2009 LiDAR data and several, I believe erroneous, conclusions were drawn from the comparison. **Figure 1** below is an artistic rendering of Mandalay Beach after the existing outfall is removed. The original figure is from the FSA,

which was taken from Applicant's Project Enhancement – Outfall Removal and Beach Restoration (Applicant's Exhibit No. 1090; CEC TN #213802) but the version provided in **Figure 1** below is from the Revell Report.

20. The black and green arrows in the figure purport to show areas of recent or substantial erosion. As discussed below, both arrows point to "crescent" shaped areas that are formed by the discharge from MGS. The accumulation of sand on the beach during periods when the MGS is not operating causes the discharge from the outfall to veer to the south and occasionally north and landward. These "crescent" shaped areas can be impacted by storms, but the topography within these areas changes regularly due to the different flow paths followed by the discharge each time the MGS is in operation. They are easily identified in the field and aerial photographs. The landward edge of the "crescents" tends to be scarped due to the MGS discharge creating a channel within the crescent area. These "crescent" shaped areas can be identified in **Figure 2**. The horizontal line in **Figure 2** follows the edge of the dunes/vegetation. It can be seen from following the line that the edge of the dunes follows a fairly straight line along the beach except where disturbed by the outfall. Once the outfall is removed, it is expected that the portion of the beach impacted by the outfall will take on the appearance of the areas to the north and south. The blue arrow in **Figure 1** appears to be misplaced, as it points to the existing location of the outfall, sand shown there is the artist's rendering of the beach after outfall removal.

Claims of Changes in Topography Due to Large Storm Events (Revell Report, p. 5).

21. The Revell Report claims changes in topography due to large storm events. The following is a quote from the testimony

> "*The most notable changes in topography occur at the dunes directly in front of the proposed location. These dunes were heavily impacted by recent storms--most likely during the energetic El Niño of 2015/2016 and possibly during the December 11, 2015 storm event, which destroyed portions of the Ventura pier and caused extensive flood damages around Ventura and Oxnard. The area of maximum dune erosion resulted in the vertical erosion of 12 feet of sand and reduced the buffering capacity of the dunes fronting the proposed site. The beach*

during the more recent time periods (2009 and 2016) shows substantial erosion of the dunes at the back of the beach (Upper transect) in the area fronting the proposed site."

22. Plant personnel at the MGS make daily inspections of the beach and dunes in front of the facility. Furthermore, areas of substantial erosion, especially an area with 12 feet of vertical erosion, which is over twice the height of the average person), would have taken a long time to heal, possibly years. None of the claims of erosion in the above quote were observed during any inspections (*See*, Applicant's Exhibit No. 1121, Declaration of Thomas Di Ciolli).

Figure 2. Photo from FSA showing view of Puente site with an artistic rendering to show a potential post-construction removal of the existing outfall structure. The black arrow indicates recent dune erosion and the blue arrow shows area of recent wave overtopping to the access road. The green arrow shows part of the area of substantial dune erosion depictedin Figure 3.

Figure 1: From Revell Report (CEC TN #215427, Figure 2) showing Puente site with artistic rendering to potential post-construction removal of the existing outfall structure. Explanation of the arrows is provided in the text.

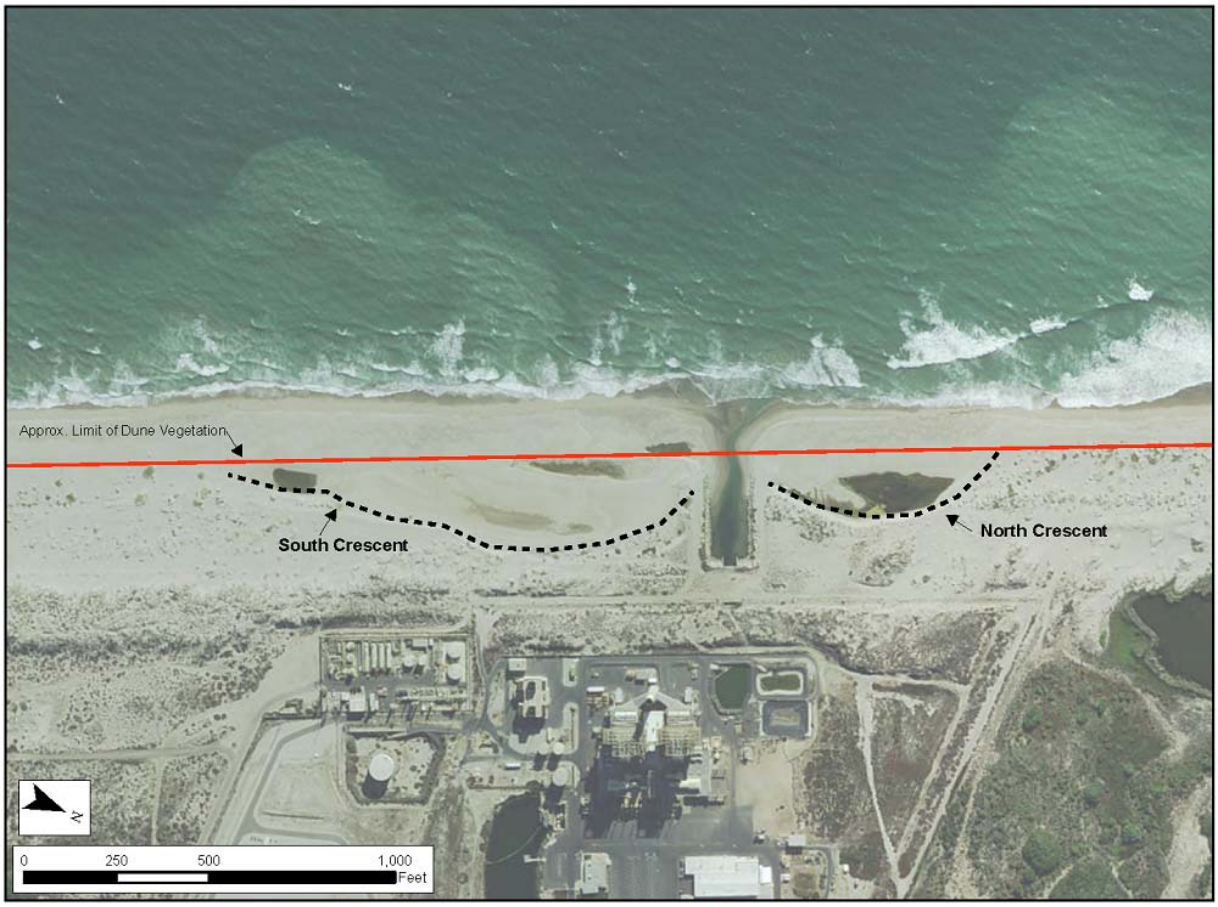

Figure 2: Aerial Photograph of Mandalay Beach Showing Edge of dune vegetation and Crescent Shaped areas Caused by MGS Discharge. North is to the right. The "Crescent" shaped areas due to the discharge are indicated by the arrows.

23. Figure 3 from the Revell Report compares the 2016 LiDAR collected by the City of Oxnard to the 2009 LiDAR used in the FSA. According to the Revell Report, *"Figure 3 in which the topographic surfaces were subtracted from each other (2016 – 2009). Areas in hot colors indicate erosion and areas of cool colors indicate accretion (Figure 3)."* It must be assumed the yellow represents areas of no change since areas inland and on the plant site are yellow and are not expected to change elevation. The major take-a-way from the comparison is that the beach fronting Mandalay between 2009 and 2016 either stayed the same (yellow color) or accreted (blue color). There is a small area on the edge of the northern crescent that shows erosion, likely due to failure of the scarp created by the MGS outflow or possibly

undercut by wave runup. Scarps on sandy beaches tend to be unstable, so it is not surprising to see some changes along them.

24. The conclusion in the Revell Report that the present beach condition is much less protective of the dunes fronting the proposed Project site than assumed in the 2009 data and relied upon for hazard modeling in the FSA is unsupported by the data presented in the Revell Report and observations of the dunes made on a regular basis by MGS plant personnel.

Historic Beach Variability (Revell Report, p. 8)

25. I agree that beach widths can be variable over seasons and years. Beacon Line 32 provided as Figure 5 in the Revell Report is located just south of the mouth of the Santa Clara River where the largest variability is expected given that it is closest to the sediment sources (Santa Clara River and Ventura Harbor). Beacon Line 33 appears to be located at McGrath Lake near the proposed Project site, and lines 34, 35 and 36 are located on Oxnard Shores beach. Results for Beacon Line 33 are similar to the results at Beacon Line 32 as described in the Revell Report in that the change between years is not continuously positive or negative and there are large changes between some years. This profile is likely influenced by McGrath Lake. However, lines 34-36, which are located on a sandy beach similar to Mandalay Beach, show an almost continuous increase in beach width from 1987 to 2007 (though not uniform in magnitude between measurements) of between 250 feet at line 34 (closest to Mandalay Beach) and 100 feet at lines 35 and 36. The locations of the Beacon Lines were estimated from Figure 3.1 in Barnard (2009)[2] and the shape of the profiles from figures in Appendix A of the same report.

26. The Revell Report states at page 8 that sand had been largely trapped on the beaches in front of the site due to the lack of dredging at the Channel Islands Harbor. Dredging records provided in Applicant's Responses to City of Oxnard Data Request Set 2 (DR 56) (Applicant's Exhibit No. 1059; CEC TN #206310), Applicant's Responses to City of Oxnard

[2] Barnard et al 2009., Coastal processes study of Santa Barbara and Ventura Counties, CA: U.S. Geological Survey Open-File Report 2009-1029, http://pubs.usgs.gov/of/2009/1029/

Data Request Set 4 (DR 83) (Applicant's Exhibit No. 1070; CEC TN #207179 and Applicant's Responses to City of Oxnard Data Request Set 5 (DR 95) (Applicant's Exhibit No. 1077; CEC TN #210971) show that Channel Islands Harbor was dredged 12 times between 1987 and 2007, or about every other year. The amount dredged was about equal to the long-term average rate of dredging. The contention that the beach growth was partially due to lack of dredging at Channel Islands Harbor is unsubstantiated by the data.

Topographic Variations in front of MGS and Project Site (Revell Report, p. 9)

27. The Revell Report developed three beach cross-sections from topographic data collected in 1997, 1998, 2009 and 2016 and compared them to each other to estimate beach erosion. The upper section is located near the northern boundary of the MGS property, the middle section along the northern edge of the outfall structure, and the lower section through the middle of the southern crescent described above (see **Figure 2** for location of crescent).

28. Table 1 in the Revell Report provides a geomorphic summary of the beach profiles. The analysis shows that the beach grew from about 350 to 390 feet wide in 1997 to about 550 to 585 feet wide in 2009 at the upper and middle sections (about 200 feet increase in width). There was a small decrease of 25 to 50 feet between 2009 and 2016. This decrease is about 10% of the beach width. This is likely within measurement and analysis error though it is also possible that that the beach has narrowed slightly. Even on an accreting beach there will be years or seasons where the beach narrows. For the lower section, the Revell Report shows that the beach narrowed from 415 feet wide in 1997 to 200 feet wide in 2009 and 2016, a decrease of 200 feet. The results indicate that north of the outfall the beach is presently over 300 feet wider than it is south of the outfall. A review of aerial photographs or a visit to the site will show that the beach is fairly uniform in width along the entire length of the MGS property (see **Figure 2**). The 200 feet width calculated for 2009 and 2016 for the lower section is likely due to locating the section in the "crescent" area formed by the MGS discharge. When the outfall is removed, the "crescent" should fill in with sediment.

29. Table 1 in the Revell Report also lists beach slopes for each beach profile. For the upper and lower sections the slopes generally got shallower over time due to the growth

of the beach. The lower section got steeper with a predicted slope of 18% in 2016, which is very steep for a sandy beach. As with the width, the large slope calculated for the lower section is likely due to placing the section in the crescent area created by the MGS discharge, an area unrepresentative of beach morphology. The upper and middle sections may be more representative, and both indicate an accreting beach with shallow slopes.

30. Lastly, the Revell Report compares the outfall structure to the groin field at Pierpoint Bay (p. 11) and claims that the outfall acts as a groin capturing sediment in front of the MGS property. If this was true, removal of the outfall structure would result in the structure no longer retaining sediment, and the beach could narrow and the likelihood of dune erosion could increase. A groin is a structure placed perpendicular to a beach designed to intercept the long shore transport of sediment. It is often used to prevent the movement of sand down the beach to widen or prevent narrowing of a beach. To be effective, a groin needs to be placed in the surf zone and portions of the beach regularly exposed to wave run-up (i.e., wetted area of beach). This is where most of the longshore sediment transport occurs. A look at the Pierpont groin field on Google Earth will show that the groins are low on the beach (below MHHW and within the area subject to the tides). The MGS outfall is out of the surf zone and rarely subject to wave run-up and, therefore, too high up on the beach to act as an effective groin (the outfall is above MHHW). I disagree with the Revell Report that removal the outfall would have a significant negative effect on the movement of sand along the beach.

Sediment Supply

31. The Revell Report contends that the FSA overestimates the sediment contribution of the Santa Clara River, and underestimates the importance of dredging Ventura and Channel islands Harbors. The Revell Report also disagrees with the FSA assessment regarding the particle size of sediment that should be included in the analysis. Regarding the selection of correct particle size for calculating sediment load that can remain on the beach, it is clear from the fact that Mandalay Beach has increased in size over the decades that the supply of sediment is more than sufficient to maintain the beach irrespective of which particle size is

responsible. In general I agree with the staff assessment of sediment supply; however, I would like to point out the following additional information.

32. The Revell Report appears to acknowledge the history of beach accretion fronting the MGS property, and I agree that sand bypassing from the Ventura Harbor contributes to such accretion, however, I believe the Report gives undue weight to concerns regarding possible future variability of dredging and sand bypassing. If Ventura Harbor dredging ceased, a bypass bar would likely form and sand transport past the harbor would eventually return to near pre-harbor construction conditions. The sand trap updrift of Ventura Harbor usually fills within a year or two, after which sand bypasses the trap and deposits in the channel and harbor requiring annual dredging to keep the harbor open (if the sand didn't bypass the trap, the channel would not need to be dredged). Last year (2015-2016) resulted in a large amount of sediment bypassing the sand trap updrift of the Ventura Harbor and depositing into the Ventura Harbor inlet. The January 21, 2016 Ventura County Star newspaper reported that about 900,000 cubic yards of material was deposited at Ventura Harbor, filling the sand trap and overflowing into the inlet channel to the harbor. The newspaper reported that the harbor entrance normally has a depth of 40 feet but was down to 14 feet last year, and that the harbor entrance normally has a navigable area about 300 feet wide but was down to about 40 feet last winter. The harbor was dredged last winter, but if dredging did not occur, the harbor would likely become completely blocked within a few years. After that, most of the sediment that normally collected in the harbor and was dredged and bypassed to the down drift beaches would naturally bypass the harbor and continue south as it did before harbor construction. Thus, if dredging was completely and permanently discontinued at Ventura Harbor, which is unlikely, there would be only a short-term impact on the transport of sand down drift. Implicit in Revell's assumption on the importance of dredging Ventura Harbor is that if the Harbor is not dredged the sand disappears from the system and is not available to the down drift beaches. I disagree with this implicit assumption for the reasons discussed above. Whether the harbor is dredged or not, eventually most of the sand transported towards Ventura Harbor would be transport towards Mandalay Beach either naturally or by dredging. In addition, though the Corps of Engineers' budget for dredging commercial harbors

in the future is unknown, the implied assumption that Ventura City and County would abandon Ventura Harbor, and all its economic activity and hundreds of million dollar plus homes, is a remote possibility and I disagree that it needs to be considered as a reasonable possibility as implied by the Revell Report.

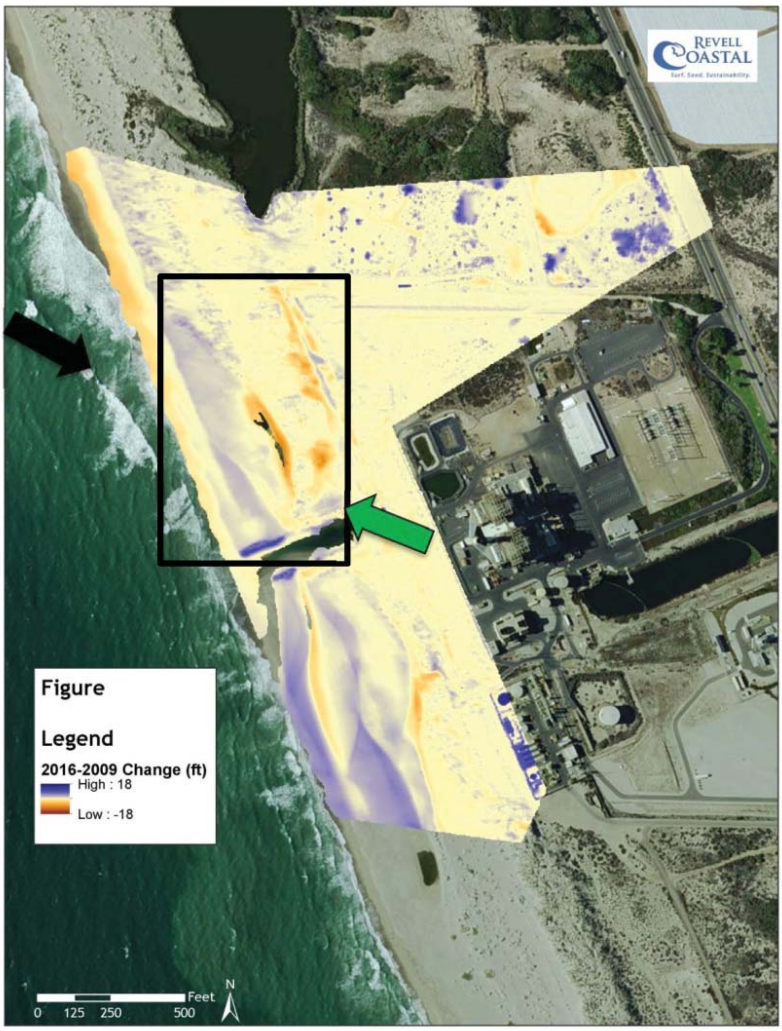

Figure 3. Topographic changes between 2016 and the 2009 LIDAR. The hot colors indicate erosion and the cool colors indicate accretion. The black arrow is the approximate view angle for the FSA cover image and the black box highlights the area of greatest change in front of the proposed Puente project. The green arrow approximates the dune identified with the same arrow in Figure 2.

Figure 3: Comparison between 2009 LiDAR used in the FSA and the 2016 LiDAR collected by the City of Oxnard. The hot colors indicate erosion and the cool colors indicate accretion. Significance of the arrows and box are provided in the Revell Report. (Figure is Figure 3 from Revell Report).

33. The Revell Report states that the FSA was deficient in not discussing the dredging at Channel Island Harbor. It claims that the observed beach widening is at least partially explained by the "substantially less frequent dredging at Channel Island Harbor in the last decade". Channel Island Harbor was dredged every other year since 1974 except for 1997-1999, during which three years in a row were dredged (See Applicant's Responses to City of Oxnard Data Request Set 2 (DR 56) (TN #206310), Applicant's Responses to City of Oxnard Data Request Set 4 (DR 83) (Applicant's Exhibit No. 1070; CEC TN #207179) and Applicant's Responses to City of Oxnard Data Request Set 5 (DR 95) (Applicant's Exhibit No. 1077; CEC TN #210971)). Except for 2013, dredging over the last decade at Channel Island Harbor has not been very different from historic dredging rates. In fact 2015 and 2009 were two of the highest rates of dredging since 1972.

34. The Revell Report claims that rising seas and increased coastal hazards will cause the dunes to migrate inland onto the Project site (p. 13). The dunes fronting the MGS property are vegetated and not as mobile as "sand" dunes which migrate due to wind blowing sand off the dune in the inland direction. Vegetation tends to stabilize dunes and prevent their migration. As long as the dunes remain vegetated they should remain stable and not migrate.

Implications of Topographic Changes on FEMA Preliminary Coastal Flood Maps

35. The Revell Report claims that the preliminary FEMA flood maps underestimate the coastal hazards at the MGS property. Table 2 in the Revell Report, provides alternative calculations for wave run-up elevations that he claims are representative of the VE zone fronting MGS. The FEMA value shown on the preliminary map is 20 feet. The calculation of wave run-up is very sensitive to the beach slope used in the calculation. FEMA used a value of 5%. Based on the 2009 Lidar data, slopes of 3% to 5% were measured and provided in Applicant's Responses to City of Oxnard Data Request Set 4 (DR 87) (Applicant's Exhibit No. 1070; CEC TN #207179). These are consistent with FEMA's analysis and typical for sandy beaches. The Revell Report presents results for slopes up to18%. He observed the 18%slope on his lower section from his 2016 data. As discussed above under *Beach Changes between 2009*

and End of 2016 this section was placed in the area that receives discharge from MGS and so has channels cut into the beach from the discharge and is not representative of beach slopes. The beach slopes measured at the other two sections are 5% to 6% more similar to what I measured from the 2009 LiDAR and what was used by FEMA. In this same section, he reports that substantive dune erosion occurred during the January 1983 event (the largest event on record) based on his review of a 1984 aerial photograph (Figure 7 in his report). The aerial photograph is low resolution and does not contain sufficient detail to identify areas of dune erosion. It appears from his statement that he may have interpreted the white areas on the dune face as areas of erosion rather than areas of no vegetation or vegetation too sparse to show up on the photograph.

FEMA and Sea Level Rise

36. The Revell Report calculated the transgression[3] of the beach and dune profile based on different levels of SLR from present to the year 2100. Although he did not specify his method it appears from the results that he used the "Bruun" rule for calculating shoreline retreat. The Bruun rule is a simple method for calculating shoreline retreat. According to the Bruun rule the amount of shoreline retreat is simply the amount of sea level rise divided by the beach slope. For example if SLR was 1 foot and the beach slope was 1% (1/100) the shoreline is predicted to retreat 100 feet. Note that the amount of shoreline retreat is completely dependent upon the selected slope of the beach. In the above example, if the beach slope was 10%, instead of 1%, the shoreline would be predicted to retreat only 10 feet. In Table 3 of the Revell Report, Dr. Revell provides estimates of the amount of transgression assuming a beach slope of 1/75 or 1.33%. With 2 feet of SLR this results in a transgression of 150 feet. Note that in Table 1 of the Revell Report the smallest slope he reports for Mandalay beach is 4% and the highest 18%. With 2 feet of SLR and a 4% slope the transgression of the profile would be 50 ft not 150 ft, as he reports in his Table 3, and using 18% , the highest value in Revell

[3] The transgression of the dune is the migration of the dune inland, usually in the direction of the prevailing wind, that buries the existing topography with sand. It is driven by aeolian sand transport. Beach transgression is the movement of the beach profile inland.

Report Table 1, the transgression would only be 18 feet. The slope Dr Revell uses in his calculations for transgression do not represent the slopes on Mandalay Beach even according to the data in his Report (See his Table 1).

37. The Bruun rule has been used for decades to estimate shoreline retreat due to SLR. However, it suffers from several deficiencies that make it unreliable as a method for shoreline retreat (see Copper and Pilkey 2004 for example)[4]. Three important assumptions required to use the Bruun Rule that invalidate its use on Mandalay Beach are:

- **No net longshore transport** – Mandalay Beach has grown by several hundred feet in the last few decades. In Table 1 in the Revell Report, he shows a growth of 300 feet in beach width between 1997 and 2009 on two of his transects, and then a small decrease in width by 2016. This indicates a system that has a significant amount of net longshore transport. The Bruun rule only allows cross-shore transport since it makes the simple assumpion that sand on the upper part of the beach is transported to the lower part keeping the same profile.
- **SLR can only cause shoreline retreat** – Using the Bruun rule, shorelines can only retreat. This is obviously not true on Mandalay Beach, which has grown in size since construction of the MGS.
- **Implied by the rule - the slope and characteristics of the upland area or back shore doesn't affect the retreat –** Whether the dunes exist or not, are vegetated or not, the Bruun rule gives the same amount of shoreline retreat.

38. For these reasons, and others, using the Bruun rule for shoreline retreat at Mandalay Beach is incorrect. Figure 9 in the Revell Report shows that the VE zone for the MGS facility will be located at the eastern edge of the detention basins with 2 feet of SLR, yet 2 feet of SLR does not even bring MHHW near the toe of the dunes and barely brings it to the edge of the outfall structure.

[4] Cooper, J, Andres and Orrin H. Pilkey. 2004. Sea-level rise and shoreline retreat: time to abandon the Bruun Rule. Global and Planetary Change. Vol. 43. PP 157-171.

Coastal Hazard and Sea Level Rise Modeling

39. The Revell Report provided comments on the use of the USGS COSMOS 3.0 model for hazards analysis (starting on page 22). He objected to the use of the USGS model and described why he believes The Nature Conservancy Model is preferable. In general, I agree with the CEC Staff's discussion in the FSA, but have some additional comments.

40. The Coastal Resilience Ventura Coastal Hazard Mapping report (The Nature Conservancy Model or TNC model) is a planning level analysis. From the reports introduction "The Nature Conservancy is leading Coastal Resilience Ventura – a partnership to provide science and decision-support tools to aid conservation and planning projects and policymaking to address conditions brought about by climate change. The primary goals of Coastal Resilience Ventura are assessing the vulnerabilities of human and natural resources, and identifying solutions that help nature help people." The report is a planning level document. Though the report uses reasonable scientific methods to derive its estimates of coastal hazards its mapping isn't detailed enough for site studies and its scenario selection is designed to identify areas that could be impacted by climate change coastal hazards not areas that are necessarily impacted. In fact on page 8 of the document states: "This information is intended to be used for planning purposes only. Site-specific evaluations may be needed to confirm/verify information presented in these data."

41. The model is inaccurate and flawed as applied to the Project site. The model predicted that an El Nino-type storm event, such as the one that occurred in January 1983, would flood the entire Project site under current conditions, but that prediction is contrary to what actually happened. The January 1983 El Nino storm and other large storm events have occurred in the past, and the resulting waves and storm surges have had no impact on the MGS site- there was no flooding and no impact to MGS operations. Since the 1983 event, the beach fronting the MGS property has accreted and is now wider than it was in 1983. In addition, foredunes have formed and stabilized farther out towards the ocean. Thus, under "current conditions," the Project site is not more vulnerable to coastal hazards than it was in 1983, but is actually less vulnerable. Under current conditions, the Project site is protected by a beach that is

300 feet wide, with dunes that are 20 to 30 feet high. If the same event occurred today, the waves would break onto a wider beach and would need to erode the newly formed foredunes before impacting the main dunes protecting the Project site. Given that no damage occurred in 1983, it is unlikely that any damage would occur under current conditions. (See, CPUC Reply Brief, pp. 10-13). In regard to SLR, for historical perspective, during the period of 1947-2016, SLR has been 0.004 foot per year (1.34 millimeters per year (mm/yr)), as measured at the Santa Monica gage. This amounts to about 3 inches since construction of the original MGS power plant approximately 60 years ago. Although the historical rate of SLR is less than the predicted future rate, the fact that the beach has grown in width notwithstanding SLR indicates a very stable beach. The 2013 Coastal Resilience Study (specifically, Figure 16 in that report) shows that the sediment yield from the Santa Clara and Ventura Rivers should remain about the same as the historical yield until about 2050. Thus, the existing data indicate that loss of beach is unlikely to occur over the life of the Project, and even under the most conservatives analysis, the width of the beach fronting the MGS property would continue to be over 200 feet wide.

Tsunami Flooding on the MGS Beach

42. Studies of distant earthquakes (teletsunamis) indicate that the Project site is unlikely to be in the inundation zone for any reasonable return period event. Studies of tsunamis generated by local earthquakes indicate that the site is unlikely to be in an inundation zone for "frequent" events (events with return periods of 1,000 to 1,500 years or less). Studies that used conservative assumptions indicate that the Project site might be in an inundation zone for less frequent events, e.g., 2,500-year return period; however, the predicted water level is lower than the top of the dunes. Analysis of return periods for various tsunami sources indicate return periods of between 800 and 10,000 years. In all cases, the maximum projected wave height is well below the top of the existing dunes that protect the Project site.

Regarding the Goleta Landslide Scenario (p. 25 in Revell Report)

43. With recurrence times that are at least an order of magnitude longer (30,000-50,000 yr vs. 2500 yr) than those used in performance based engineering, the probability for Goleta landslides is well beyond the probability levels used in engineering practice (including

seismic hazard assessments), and it would therefore be wholly inconsistent to use these numbers for planning/design purposes. This scenario was included in the CGS tsunami inundation maps, but these are only used for evacuation planning purposes, and not for building purposes: “These maps were prepared to assist cities and counties in identifying their tsunami hazard. They are intended for local jurisdictional, coastal evacuation planning uses only (CGS)”

44. In addition, using worst-case sea-level variations on top of what is already a very low probability scenario only leads to an unacceptable compounding of conservatism.

Regarding Earthquake Activity on the Ventura Pitas-Point Fault(p 26 in Revell Report)

45. This fault is included in the standard seismic model for California (UCERF3) and the shaking hazard is presumably considered in the appropriate section, albeit at smaller maximum magnitudes than proposed in the Ryan paper. For seismic shaking purposes, that increase in magnitude may not be as significant since ground motions tend to saturate at higher magnitude levels.

46. In any case, the activity rate of the Ventura Pitas-Point is very much a subject of scientific discussion, and Ryan et al's model is currently not consistent with the seismic hazard models in current use by the USGS or the State of California.

47. Their tsunami models are not meant for quantitative hazard analysis, as stated in their conclusions. Also, the Ryan distribution of amplitudes along the Oxnard coasts are strongly governed by local bathymetric circumstances, and at the site they only reach 14ft. They write: "The more unexpected large amplitudes to the east result from two main effects: strong eastward refraction of the south- ward directed tsunami wavetrain as the waves encounter deeper water to the south in the Santa Barbara Channel (Ryan Figure 1), and focusing of the waves guided by bathymetry (e.g., intersection of slower nearshore waves with faster deepwater waves in the channel).”

48. This means that observed amplitude patterns are not random, but determined by local bathymetry. It is therefore not correct to use the maximum amplitudes along the entire Oxnard coastline as a representative measure of the tsunami amplitudes at the site. The

largest amplitudes that the Revell Report is referring to occur located more than 5 km to the south of the site.

49. I hereby sponsor this declaration into evidence in these proceedings as Applicant's Exhibit No. 1128.

Executed on January 25, 2017, at Oakland, CA.

I declare under penalty of perjury of the laws of the State of California that the foregoing is true and correct.

Phillip Mineart

ATTACHMENT A

AECOM

Phillip Mineart, P.E.
Hydrology, Hydraulics, Environmental Restoration and Water Quality

Areas of Expertise

Water Resources
Mathematical Modeling
Hydrology and Hydraulics

Education

MS/Civil Engineering/1983/Cornell University
BS/Environmental Resources Engineering/1979/Humboldt State University, Arcata, CA

Licenses/Registrations

Professional Engineer/CA/ #C44087/6/30/2017

Years of Experience

With AECOM (Formerly URS) 32
With Other Firms 2

Professional Associations

American Geophysical Union
American Society of Civil Engineers
American Water Resources Association

Mr. Mineart is a registered Professional Engineer in California. He has over 30 years of experience in the fields of hydrologic, hydraulic and hydrodynamic analysis, erosion and sediment transport modeling, environmental restoration, risk assessments, climate change and sea level rise. Below is a summary of his experience.

Experience

Coastal and Hydrodynamics

Technical Lead, Puente Power Project Application for Certification, NRG Oxnard Energy Center LLC. Managed the data collection and preparation of the Water Resources section of the Application for Certification (CEQA-equivalent document) for the proposed 262 megawatt natural gas-fired generation facility in Oxnard, California. Responsibilities included analyzing impacts of flooding due to sea level rise, tsunamis, and riverine sources. Analysis also included coastal hazards such as impacts from beach and dune erosion and/or accretion.

Sediment Transport and Tidal Flow Study for Facility Improvements to the Ammunition Pier and Turning Basin, Project Manager, Seal Beach Ca., 2016. The study purpose was to determine if proposed improvements at the Seal Beach Naval Weapons Station could alter the hydrodynamic regime and sediment dynamics as changes in the tidal currents, waves, or sedimentation patterns and impact coastal resources and/or the Seal Beach National Wildlife Refuge (SBNWR). Hydrodynamic models for tidal flow and sediment transport were developed. In addition, a wave model was developed to determine potential Surfside and Sunset Beach impacts. This study is intended to support the Environmental Assessment currently underway.

Port of San Francisco, Sea Level Rise Study, Coastal Engineer, San Francisco, CA, 2011. Determined the 100-year design water levels (Still Water Level and Wave Runup) along the Port of San Francisco shoreline, under various scenarios of Sea Level Rise. The DHI-MIKE21 Nearshore Wave model was used for wind-wave generation, and the Delft SWAN wave model was used for breakwater analysis. The DHI-MIKE21 hydrodynamics model was used for still water level analysis. Flood inundation maps of the estimated 100-year flood at present day, in year 2050, and year 2100 were developed. The maps were used to identify locations along the shoreline that could be subject to flooding or wave damage under future sea levels. Boundary conditions were obtained from NOAA tidal gauges and wave buoys, NWS wind data, and DWR Delta outflow data.

Port of Oakland, Oakland Airport Perimeter Dike Wave and Water Level Analysis in San Francisco Bay, Hydrodynamic Task Leader, Oakland, California, 2008. This Project involved modeling with DHI-MIKE21 Near-Shore Waves model, data analysis of water level and wave runup return frequency, and analysis of levees for sufficient crest height and riprap armor

stability. Analysis was conducted for existing conditions and projected future conditions including sea level rise.

State Coastal Conservancy, South Bay Salt Ponds Restoration Project – Phase II, Senior Hydraulic Engineer, Southern San Francisco Bay, CA, 2012 – Ongoing. Responsible for hydrodynamic and sediment transport analysis for development of conceptual (10%) designs for restoration of former Cargill salt ponds in three pond complexes around southern San Francisco Bay. One and 2-dimentsional hydrodynamic modeling was conducted to develop optimal breach and channel sizes. Preliminary sediment transport analysis was conducted to aid in the decision on whether to use dredge material raise the level of subsided ponds or if natural sedimentation would be able to raise the level of the ponds in the presence of sea level rise.

Chevron, Kitmat LNG Project, Senior Hydraulic Engineer, 2014. URS developed a 3-dimensional hydrodynamic and sediment transport model of Clio Bay in British Columbia, Canada. In additional to the numerical modeling the project also included field data collection and laboratory analysis. The modeling and data were used to predict the behavior of soils excavated from the Kitimat LNG site, if the excavated materials were released from split-hull barges into Clio Bay with the objective of benthic habitat restoration. The computer modeling was used to predict the behavior of material single and multiple releases from barges and bottom mounding (STFATE and MDFATE models) and the dispersion of the suspended portion throughout Clio Bay (EFDC model).

San Francisco Public Utilities Commission (SFPUC), Tidal Power Feasibility Study, Technical Lead, San Francisco, CA, 2007. Technical lead for the hydrodynamic modeling of the San Francisco Bay to determine total extractable energy and percent of energy that can be extracted from tidal currents without adverse impacts to the Bay's tidal prism and overall ecosystem. The MIKE 21 model was used for two-dimensional modeling; the TRIM model was used for three-dimensional modeling.

Chevron, Castro Cove Sediment Remediation Project, Hydrodynamic Modeling Lead Engineer, Richmond, CA, 2012. Castro Cove is a small cove along the northern shore of San Francisco Bay. URS developed a remediation design for a contaminated mud flat. The mud flat was isolated from the tides during construction by a sheet pile wall. After remediation was complete URS developed a two-dimensional hydrodynamic model of Castro Cove including the sheet pile wall to determine the best approach to remove the sheet pile to minimize erosion of the remedial cap as each sheet pile was removed. The suggested approach was used in the removal of the sheet pile and remedial cap remained intact as the tide was gradually allowed to return to the construction site.

Knik Arm Bridge and Toll Authority, Knik Arm Crossing Hydrodynamic Study for EIS, Technical Leader, Anchorage, AK, 2005 – 2008. Developed two-dimensional hydrodynamic and sediment transport models for Knik Arm near Anchorage, Alaska. Knik Arm experiences 30-foot tides and has extremely large sediment inputs making modeling challenging. Model was calibrated to both historic and data collected specifically for this project. State-of –the-art sediment shear stress data were collected to aid in calibration. Modeling was conducted using the MIKE21 model.

Federal Aviation Administration (FAA), San Francisco Airport Reconfiguration EIR/EIS, Technical Leader, San Francisco, CA, 1999 – 2003. Technical leader for the hydrodynamic and sediment transport analysis for the San Francisco Airport Reconfiguration EIR/EIS. Two-and three-dimensional hydrodynamic models were developed using MIKE21 and TRIM. The models were calibrated/validated to over 30 current stations with a least 29 days of record, 7 suspended sediment stations with 5 months or longer records and 18 tide stations. The model study was used to predict changes to currents, sediment transport and morphology of the Bay due to the project. Mr. Mineart provided technical review for the concurrent water quality analysis of PCBs, Mercury, and trace metals. PCBs and Mercury were modeled using the MIKE two-dimensional sediment transport model, trace metals were simulated using the MIKE21 heavy metals model.

U.S. Department of the Interior (DOI), Bureau of Reclamation (USBR), San Joaquin River Restoration Program Reach 2B and Mendota Pool Bypass Project, Task Leader Water Resources and Climate Change Sections, Fresno and Madera Counties, CA, 2009 – Est. 2015. This project primarily involves developing project alternatives, preparing an Environmental Impact Statement/Environmental Impact Report (EIS/EIR), and providing permitting support for the project. Components of the project include increasing channel capacity, incorporating riparian habitat, and providing fish passage through the reach via the modification of existing structures, installing fish screens and diversions, and constructing a new channel. Mr. Mineart is responsible for the completion of the water resources section of the EIR/S (hydrology, geomorphology and water quality) and the climate change sections.

Elkhorn Slough Foundation, Parsons Slough Sill Project, Senior Hydraulic Engineer, Monterey County, CA, 2009– 2010. Provided senior technical review and over site for hydraulic modeling and scour analysis of Elkhorn Slough and Parsons Slough near Monterey CA. The analysis was used to aid in the design of an adjustable sill structure at the mouth of Parsons Slough to limit erosive tidal energy in Parsons Slough while allowing for sufficient flushing to maintain water quality. Results from the HEC-RAS model were analyzed to evaluate whether design alternatives would meet specified design criteria. The scour analysis was conducted to determine if the project would result in increased erosion at the proposed structure or at a nearby by railroad bridge.

Bremerton Naval Complex Erosion Protection Study, Technical Lead, Bremerton, WA, 2009 – 2012. A riprapped embankment was replaced with a soft bank sloped beach covered with approximately a 3-foot layer of a sand-gravel mix. Subsequent to the action, erosion was observed and a 3-foot layer of the sand-gravel mix was mostly gone. The objectives of the project are to provide an engineering study, develop alternatives and a construction design, specification, and cost estimate that will provide long-term protection of the area. A field program was conducted to collect wave, current and tidal data. A beach erosion model was developed to predict erosion of the beach under historic conditions and to model alternative solutions.

US Navy, Site 10 Shoreline Erosion Study and Five-Year Review, Lead Coastal Engineer, Indian Island, WA, 2009– 2010. The objective of this study was to develop and evaluate alternatives for preventing future shoreline erosion at the remediated and capped Northend landfill on Indian

Island on Port Townsend Bay, WA. Previous methods used on the "high energy" portion of the beach had failed. The technical approach for meeting the objectives included performing a records and literature review to obtain data, performing field reconnaissance of the site, developing shoreline erosion protection alternatives, and performing a comparative analysis of the alternatives. A conceptual design and cost estimate for the recommended alternative was developed.

ARCO, Army Creek Marsh Remediation Project, Senior Hydraulic Engineer, New Castle, DE, 2009– 2010. Oversaw the development of a two-dimensional hydrodynamic model of a muted tidal wetland located on Army Creek, near Delaware Bay, in Delaware. Water levels in Army Creek Marsh were simulated using the two-dimensional MIKE 21 flow model. The digital terrain input consisted of a flexible mesh. Existing conditions were modeled with a tide gate structure that only allowed flow out of the marsh. Water levels computed for existing conditions were used to evaluate the proposed restoration plan, which consists of the excavation of contaminated material and re-grading as necessary to allow for a range of marsh habitat. Potential future water levels at the restoration site were also evaluated with the tide gate operating to allow tidal flows into the marsh.

California Department of Fish & Game, Napa Plant Site Saltpond Restoration Project, Senior Technical Reviewer for Hydraulics and Hydrology, Napa County, CA, 2005-2010. Provided technical review and oversite for hydrodynamic and salinity modeling and sediment transport studies for approximately 1,400 acre restoration of former saltwater evaporation ponds along the Napa River, near Napa, CA. The project area contained three separate units. Models were developed for each unit. Salinity modeling was conducted as part of permit compliance to insure that there would be no adverse impacts to the surround water bodies after breaching the former salt ponds.

Mt. View Sanitary District and Shell Oil Spill Litigation Trustees, Peyton Slough Studies, Task Leader, Martinez, CA, 1986-87 and 1994-95, 2008. Directed hydraulic and hydrologic study of Peyton Slough and surrounding wetlands, which receives wastewater wetland effluent. Modeled hydrologic scenarios to predict plant community response and evaluate restoration options. Developed MIKE11 model to analyze hydraulic capacity of the channels and develop specifications for hydraulic control facilities.

U.S. Steel, U.S. Steel Shearwater Remediation Project, Technical Lead, South San Francisco, CA, 1999 – 2002. Analyzed potential for erosion at the U.S. Steel Shearwater Remediation Project site at Oyster Cove in the San Francisco Bay. Determined hydraulic parameters used to calculate erosion of remediation cap in the sub-tidal zone from RMA2, a two-dimensional finite element hydrodynamic model. Evaluated potential for erosion in the intertidal zone based on the stability of the sandy slope.

Public Service Enterprise Group (PSEG), Dennis Township Wetland Restoration Project, Hydrodynamic Modeler, Delmont, NJ, 1994-95. Developed two-dimensional RMA2 model for abandoned hay farm along Delaware Bay. The model was used to analyze and design new channels and levee breaches that would optimize chances for successful restoration.

Public Service Enterprise Group (PSEG), Thompson's Beach – Maurice River Township Wetland Restoration Project, Hydrodynamic Modeler, Delmont, NJ, 1995-96. Developed two-dimensional RMA2 model for

abandoned and flooded hay farm along Delaware Bay. The existing levees has breached in several locations resulting in a severely muted tidal condition. The model was used to analyze and design new channels and levee breaches that would optimize chances for successful restoration.

Hayward Area Recreation and Park District, Hydraulic Analysis, Oliver Brothers Wetland Enhancement Project, Task Leader, Hayward, CA, 1996-2003. Evaluated existing hydrologic conditions and developed hydraulic design (e.g., culverts, channels) for adjacent wetlands. Plan integrated endangered species habitat enhancement with protection and interpretation of cultural resource values and public access.

Flooding and Hydrodynamics

State Coastal Conservancy, Bay Area Extreme Storm, Project Manager, 2014. AECOM developed a definition for an extreme storm event for the Bay Area. Hydrologic and hydraulic models were developed for major streams in the Bay Area including most streams in Santa Clara County; Lower Walnut Creek in Contra Costa County, San Francisquito Creek in San Mateo County, San Anselmo Creek in Marin County and San Francisco Bay. Results from these analyses were supplemented with a review a FEMA and local hydrologic flood studies to develop inundation depths and durations for major urban areas around the Bay Area. These were used by economists to estimate the potential damage from an extreme storm event.

Santa Clara Valley Water District, Almaden-Calero Canal Hydrology Study. Ongoing. The Almaden-Calero Canal is used to transport water from Almaden Reservoir to Calero Reservoir. Both reservoirs are used for water supply. A continuous simulation HEC-HMS model is being developed to estimate the inflow into the canal from storm water runoff. A long period of rainfall will be simulated and then used to generate a frequency curve for runoff into the canal.

State Coastal Conservancy and California American Water, Carmel River Reroute and San Clemente Dam Removal Project, Senior Review, Monterey County, California, 2008 – present. This project includes design and geotechnical exploration services for the San Clemente Dam Removal Project. The project will meet the steelhead passage and dam seismic safety goals through the removal of the dam, relocation of accumulated sediment in San Clemente Creek, and restoration of San Clemente Creek to pre-dam conditions. A portion of Carmel River will be permanently bypassed by cutting a 450-foot-long channel between Carmel River and San Clemente Creek, approximately 2,500 feet upstream from the dam. Mr. Mineart provided senior oversight for the hydraulic, flood inundation and sediment transport analyses. The sediment transport analysis included estimating the changes in morphology of the Carmel River with and without the project and how those changes could affect flooding. Analysis included the implementation of the HEC-HMS, HEC-RAS and SRH-1D models.

City of Daly City, Mussel Rock Landfill Stormwater Evaluation, Task Leader, 2015. Mussel Rock Landfill is a closed landfill located on the Pacific Ocean coastline in Daly City. The goal of the project was to evaluate the adequacy of the existing storm drain system under existing and future climate change conditions, recommend upgrades if needed and evaluate the adequacy of the adjacent seawall with sea level rise. An XPSWMM model was developed for the drainage system based on as-built drawings

and a field inspection. A range of design storms were simulated from a 2-year event to a 100-year event for existing climate conditions and accounting for climate change to the year 2050. Wave runup calculations were conducted for the seawall with and without sea level rise.

California Coastal Conservancy, Santa Clara River Restoration, Project Manager, Ventura County CA, 2003-2005. Technical Leader for hydrology and hydraulic analysis of the restoration of the Santa Clara River in Ventura County. He developed a water balance model for the river to identify all major sources and sinks of flow into and out of the river. A HEC-RAS hydraulic model of about 20 miles of the river was developed. A continuous simulation HEC-HMS hydrology model for the 1000+ square mile watershed was also developed.

Bay Area Rapid Transit (BART). Letter of Map Revision (LOMR). Alameda County. Hydraulic engineer responsible for completing and submitting LOMR application to FEMA. LOMR application was submitted as part of the Warm Springs Extension Project. A section of the project passed through a FEMA mapped floodplain that had been modified by previous projects, completed by others, but never remapped. LOMR was accepted by FEMA and the BART project area was removed from the floodplain.

City of San Jose. CLOMR and LOMR Application. San Jose, CA. A Conditional Letter of Map Revision (CLOMR) was submitted to and accepted by FEMA for a project undertaken by the City at a location adjacent to Coyote Creek in San Jose. After construction of the project was complete a Letter of Map Revision application was submitted to FEMA for review. The LOMR is still under review by FEMA.

Pacific Gas and Electric Company (PG&E), L400/402 Cache Creek Erosion Study, Project Manager, Yolo County, CA. Since the original installation of natural gas pipelines in the 1960s Cache Creek has incised almost 20 feet endangering the safety of the pipelines. URS conducted an assessment of the geomorphology, geologic and geotechnical conditions in the vicinity of the gas pipeline crossings. The study included an evaluation of the channel dynamics, stream hydraulics and erosion and sediment transport potential in the vicinity of the pipeline crossing. The study was updated in 2014 prior to repair of the pipeline crossing.

Pacific Gas and Electric Company (PG&E), Hydrologic Services Pipelines Crossing L400/401, L-400 MP 141.7, Project Manager, Tehama County, CA, 2014. In 2012 during an inspection of its natural gas pipelines the clearing crew discovered that about 50 feet of the pipeline was exposed in Salt Creek. The purpose of the project was to evaluate the causes of the exposed pipeline and determine possible repairs to protect the exposed pipeline. A field inspection with a hydrologist and geomorphologist was conducted; historic data including aerial photographs and historic surveys were analyzed; and hydrology and hydraulic modeling and sediment transport capacity was calculated. Based on the analysis possible protection measures were provided.

Rhodia, Inc., Rhodia-Peyton Slough Remediation and Restoration, Technical Leader, Martinez, CA, 2000 – ongoing. Technical lead for the design and analysis of a tidal channel, tide gates, groundwater water balance, and wetland design as part of a large remediation project in Martinez, CA. The tidal channel feeds over 100 acres of wetlands and ponds. Unsteady HEC-RAS, RMA2 and MIKE21 models were used in the

analysis of the channels, ponds and wetland. For the water balance analysis three double ring infiltrometers were installed to estimate infiltration rates. Two underwater seepage meters were installed to estimate seepage to groundwater from pond bottoms. Conducted screening level fate and transport groundwater modeling and participated in the review of higher level fate and transport modeling. Since construction was completed adaptive management activities have been conducted include shoreline repairs, data collection and erosion control.

Department of Water Resources (DWR), Delta Risk Management Strategy (DRMS), Hydrologic Engineer, Sacramento – San Joaquin Delta, CA, 2005 – 2009. This project was a comprehensive risk analysis of the Sacramento-San Joaquin Delta and Suisan March including the development of risk management strategies. The hazards included earthquakes, flooding, subsidence, normal operating conditions "sunny weather", and climate changes. The consequences of levee failures in the Delta include impacts to: the levee integrity, the water quality, the water reliability for export, the ecosystem, and the direct and indirect economic impacts. As a participant on the flood hazards working group Mr. Mineart helped develop innovative methods based on probabilistic models to identify flood risks to levees from storms and waves. The study assessed the risk due to the above stressing events for 50-year, 100-year and 200-year time horizons. Since the hydraulics in the Delta is strongly influenced by tidal conditions, sea level rise was incorporated into the future predictions of tides in the Delta. For stormwater runoff into the Delta, estimates from global climate models for future rainfall volumes and patterns were used to adjust flood frequency curves to account for changes that may occur by the year 2050 and 2100.

Kinder-Morgan, Inc., Rodeo Creek Stream Restoration, Project Leader, Contra Costa County, CA, 2003-2004. Project leader for stream restoration project on Rodeo Creek in Contra Costa County, CA. Rodeo Creek is deeply incised and URS developed environmentally friendly restoration techniques. Mr. Mineart directed the HEC-RAS and HEC6 analysis to estimate the long term erosion of the channel with and without mitigation. He conducted rainfall frequency analysis and HEC-HMS analysis. He analyzed the sediment transport capacity of the creek for major rainfall events in last 15 years. He oversaw development of alternative restoration measures.

Granite Rock, Wilson Quarry Inundation Study, Senior Engineer, Aromas, CA, 2011. Provided senior review of flood inundation study for the Pajaro River in San Benito County, Ca. GIS was used to develop cross-sections for a HEC-RAS model. A flood frequency analysis was performed using peak flows measured at a near-by USGS gage to obtain peak flow rates associated with the 100-year, 500-year, and 1,000-year floods.

U.S. Army Corps of Engineers (USACE), Natomas Levee Risk Assessment Methodology, Hydraulic Engineer, Nationwide, 2007 – 2008. As part of the USACE’s efforts to inventory and evaluate flood protection systems throughout the United States, URS developed probabilistic based tools to assess risk of failure due to wave or river erosion of levees. Mr. Mineart was Technical Leader for developing the methods to incorporate into the model for current and wave erosion rates.

City of Santa Barbara, Santa Barbara Airport Runway Safety Project, Task Leader, Santa Barbara, CA, 2003-2008. The Santa Barbara Airport is in the floodplain of five creeks and is immediately adjacent to extensive wetlands. Mr. Mineart developed sediment transport and hydrodynamic models of the streams and wetlands around Santa Barbara Airport to analyze alternative options for lengthening the safety area of the airport's main runway. A storm drain model using SWMM was developed to produce a storm drainage master plan for the airport property. A HEC-RAS model was developed to estimate flooding of the airport property and to complete a CLOMR and LOMR process for FEMA.

Calpine Energy, Flood Inundation Study for Pastoria Energy Facility, Task Leader, Grapevine CA, 1998 – 2000. Task leader for water resources section of the Pastoria Energy Facility AFC. Mr. Mineart's responsibilities included hydrology, flood analysis, water quality and development of mitigation measures. The hydrology and flood study included analysis of existing rainfall and flow data, development of design storm hydrographs, and implementation of the HEC-RAS model for flood plain delineation. Mitigation measures were developed to reduce the potential for flooding at the proposed facility site.

Roseville Energy LLP, Roseville Energy Facility AFC, Water Resources Task Lead, Roseville, CA, 2000 – 2002. Evaluated the potential for impacts as a result of construction and operation of the Roseville Energy Facility to assist in preparation of the Application for Certification. Proposed mitigation measures to minimize impacts to receiving waters from stormwater runoff. Measures included the implementation of Best Management Practices to control erosion, sediment, and other pollutants, as specified for compliance with the Stormwater Pollution Prevention Plan.

Sunrise Power Company, Sunrise II Power Project, Water Resources Task Lead, Bakersfield, CA, 2001 – 2004. Completed the Water Resources section of the Application for Certification of the Sunrise II Power Project. Compiled application for Underground Injection Control Program permit for deep well injection of wastewater.

City of Albany, Curtis-Neilson Storm Drain Analysis Project, Project Manager, Albany, CA, 2006 – 2007. Oversaw the development of an XPSWMM model for portion of the City of Albany's storm drain system. The model was used to identify local bottlenecks and to aid in the design of a 1,300-foot-long storm drain pipe to reduce local flooding. The proposed design replaced existing storm drains under private property with minimal disruption to the neighborhood.

U.S. Department of Energy (DOE), Yucca Mountain Nuclear Repository Flood Study, Task Leader, Yucca Mountain, NV, 1999 – 2003, 2007 – 2008. Managed hydraulic/hydrology study for the Yucca Mountain Nuclear Repository in Nevada. The project involved a flood risk assessment and preliminary design for mitigation measures. The analysis involved predicting rainfall and flood inundation in an alluvial fan with uncertain flow paths and high sediment transport. Channel geometry and substrate were used to predict water surface elevations, velocities, and bed shear stress. The effects of sediment transport on flow resistance were assessed. Directed HEC-1 and HEC-RAS analysis.

Dam Design and Analysis

San Francisco Public Utilities Commission (SFPUC), San Andreas Dam Inundation Mapping, Project Manager, San Mateo County, CA, 2015. Project Manager and engineer responsible for the analysis of the dam breach of the San Andreas Dam. Estimated breach characteristics and routed flood wave downstream to San Francisco Bay and mapped resulting inundated area. Project also included the analysis and mapping of the inundation area due to emergency releases from the dam. Inundation was primarily in urban areas. Analysis used the MIKE21 two-dimensional hydrodynamic model.

Contra Costa Water District (CCWD), CALFED Los Vaqueros Reservoir Expansion Studies, Hydraulic Engineer, Contra Costa County, CA, 2001 – 2007, 2011 – 2012. Responsible for the analysis of the dam breach and flood inundation modeling of Los Vaqueros Dam. Mr. Mineart modeled the failure of the earthen embankment dam using the BREACH model and routed the resulting flood wave downstream into the Sacramento-San Joaquin River Delta using the FLDWAV model. Mr. Mineart conducted the breach analysis and provided technical review for the flood routing and inundation mapping of the expansion of Los Vaqueros Reservoir. The flood routing was conducted using the MIKE21 two dimensional model.

San Francisco Public Utilities Commission (SFPUC), Lower Crystal Springs Dam Inundation Mapping, Independent Technical Review, San Mateo County, CA, 2010 – 2011. Provided technical review for dam breach and flood inundation mapping for the Lower Crystal Springs Reservoir and floodplain maps on San Mateo Creek. Analysis was conducted using the two-dimensional MIKE21 model. Inundation maps were developed in ArcGIS.

Empire Land, Pelona Vista Detention Basin Preliminary Design, Hydraulic Engineer, City of Palmdale, CA, 2004 – 2005. This 1000 acre-feet stormwater detention basin reduces the Los Angeles County 50-year flood event runoff from a maximum discharge of 6,400 cfs to 750 cfs to prevent downstream flooding. Mr. Mineart conducted hydrologic studies for various return period storm events including PMP as part of spillway design.

California American Water Company, San Clemente Dam, Hydraulic Engineer, Monterey County, CA, 1997 – 1999. San Clemente Dam is a concrete arch dam on the Carmel River that is almost completely full of sediment. Mr. Mineart conducted a dam breach and inundation study using the NWS DAMBRK model.

Outfall/Dilution/Intake Studies

City of Benicia, Benicia WWTP Effluent Initial Dilution at Long-Term Average, Design, and Peak Daily Flow Rates, Project Manager, San Francisco Bay, CA, 2012-2013. The City of Benicia operates a diffuser that discharges 500 feet offshore of its WWTP into the Carquinez Straits. The City's NPDES permit required the City to perform a dilution modeling study to justify the continued use of dilution credits for the determination of water quality based effluent limits. A dilution analysis was conducted using different effluent flow rates, seasonal conditions, and a year of current speed, direction and depth data to capture variability in dilution due to tidal conditions. The results of the dilution modeling confirmed that the original design and installation of the diffuser results in an initial dilution

considerably greater than 10:1 in the receiving water under a variety of conditions and under critical ambient conditions

Crockett Cogeneration, Dye Study and Near-Field Dilution Modeling for Crockett Cogeneration and C&H Sugar Outfall, Project Manager, San Francisco Bay, CA, 2010-2011. Crockett Cogeneration and C&H Sugar share an industrial discharge to San Francisco Bay. The dilution study was necessary to determine the initial dilution that can be obtained in the Carquinez Strait near slack tide. Dye studies were conducted on two days to determine the effluent dilution during periods with low current speeds and to validate the dilution model. The dilution modeling study was used to evaluate the expected dilution at slack tide for periods with average and maximum effluent flow rates. The US EPA's Visual Plumes model (Frick et. al, 2003) was used to simulate the dilution of the discharge.

Chevron, Plume Modeling of Hydrotest Water Discharge, MTOE Pipeline Project, Task Leader, Angola, 2008. An analysis of a proposed discharge of hydrotest water into coastal waters off the coast of Angola was conducted in response to a request from Chevron. The purpose of the analysis was to estimate the near-field dilution of hydrotest water with the surrounding ocean water. Data on ambient conditions were obtained from the National Oceanographic Data Center for the area offshore of Angola. Based on the modeling and toxicity data for Bactron B1150, the biocide used in the test, the extent of impact to fish and plankton was estimated.

EBMUD, Near-Field Dilution Study for East Bay Municipal Utility District (EBMUD) Outfall, Project Manager, San Francisco Bay, CA, 2008. East Bay Municipal Utility District (EBMUD) provides treatment of wastewater for several communities East of San Francisco Bay. The treated wastewater is discharged to the San Francisco Bay through an outfall diffuser. EBMUD retained URS Corporation to model the expected near-field dilution of the effluent and determine the ammonia concentration at the edge of the zone of initial dilution. The Monte Carlo method was used to generate a distribution of dilution values. The use of a probabilistic analysis provides a better understanding of the water quality impacts of a discharge then the more traditional "worst case" and sensitivity analysis.

New York, Dye Study and Modeling of Wastewater Outfall, SI Group, Project Engineer, Schenectady, 2009. Project engineer responsible for dilution study on the Mohawk River in New York for permit compliance. A winter and summer dye study was conducted to validate dilution model. The near-field and far-field dilution of a wastewater plume discharged into the Mohawk River was calculated using the Visual Plumes model and in-house analysis methods.

Larry Walker Associates, EBDA Anti-Degradation Analysis, Project Manager, San Francisco Bay, CA, 2004 – 2005. The MIKE 21 hydrodynamic model of the San Francisco Bay developed by URS was used to analyze the potential for changes in copper and nickel concentrations in San Francisco Bay due to increased discharge from the East Bay Dischargers Authority outfall offshore from Alameda, CA. Impacts to Bay water quality were analyzed for a large portion of the Bay. Discharges under current and projected future conditions (including numerous other discharges) were analyzed.

City West Water, Technical Oversight, Altoona Wastewater Treatment Plant Outfall Dilution Modeling Study, Peer Review, Altoona, Australia,

2008. City West Water is considering using a Recycled Water plant to purify and reuse Altona Treatment Plant (ATP) effluent for industrial and irrigation use. CWW hired URS to conduct a modelling study of the outfall under both existing conditions and future conditions (with the recycled water plant concentrate). To conduct the modelling study, URS utilized the Visual Plumes (VP) model. As input to the model, URS collected a full range of ambient and effluent data, so that a total of 17,472 independent cases were evaluated. Concentrations of Ammonia, BOD, TDS, E Coli, TN, TP, and TSS at the edge of the mixing zone were analyzed, and statistics were generated.

Marin Municipal Water District (MMWD), EIR for Desalinization Plant, Task Leader, Marin County, CA, 1991, 2003 – 2004. In 1991 Conducted diffuser dilution analysis for the Marin Municipal Water District (MMWD) as part environmental study of planned desalination plant for water supply. MMWD planned to use an underutilized existing wastewater treatment plant diffuser for disposal of desalination reject water. Because of the daily variation in the flow rates of the wastewater treatment plant, the discharge density fluctuated between positive and negative buoyancy. Used EPA's CORMIX II model to estimate dilution and mixing zone size. To verify model a dye study was undertaken to estimate dilution under existing operating conditions. In 2003-2004 conducted probabilistic study of the proposed discharge using EPA's Visual Plumes model. Calculated the probability that NPDES permit conditions would be violated under varying flow and ambient conditions. Determined that adding brine to wastewater discharge would result in an extremely small probably of exceeding NPDES permit conditions.

Potlatch Corp., Outfall Dilution Study, Project Manager, Clearwater, ID, 1998. Conducted mixing zone analysis, using EPA's Plumes model, of industrial discharge in the Snake River in Idaho. Mixing zone was calculated for temperature and water quality parameters. Detailed in-situ temperature and conductivity measurements were made to validate the model and estimate model error. A statistical event tree analysis was conducted to determine the uncertainty in model results based on variability in ambient conditions.

Dow Chemical Company, Brazos River Dilution Study, Modeling Lead, Freeport, TX, 2000. Based on a recommendation from the TNRCC, developed a quasi-three dimensional WASP5 model of the Brazos River. The model was used to calculate the transport of pollutants discharging into the Brazos River from groundwater. Three dimensional velocity and salinity data were collected to aid in model setup. Typical dilution factors were calculated for ebb and flood tides.

Kvaerner Metals, Outfall Dilution Study, Task Leader, Philippines, 1998. Conducted probabilistic modeling for negatively buoyant discharge from mining operation. Use a lattin-hyper cube technique to efficiently generate probably distribution of dilution from outfall. The results were used to determine uncertainty in model results to aid in design and permit compliance.

DuPont De Nemours & Company, NPDES Permit Renewal, Outfall Dilution Study, Project Manager, 1993. Conducted thermal discharge studies in the Niagara River in New York for chemical plant discharge. Surface discharge was modeled using empirical relationships since EPA

models were not capable of modeling buoyant surface discharge in a cross flow. Observed temperature data was used to calibrate empirical model.

Outfall Dilution Studies, Task Leader, Various Locations and Clients. Designed outfall diffusers for use in disposing of desalination reject water in San Diego Bay and off Santa Barbara, California. Used EPA PLUMES models for dilution estimation and in-house hydraulic model for diffuser design.

Echo Bay Mines, Near-field and Far-field Dilution Study, Task Leader, Juneau, AK, 1993. Conducted both near and far field dilution study and diffuser design study for tailings pond discharge into Gastineau Channel in Alaska. Two models were developed for the study, a dilution model to estimate near-field dilution and because of the low flushing rates in Gastineau Channel a far field pollutant build-up model. Estimated long- term build- up of pollutants in Channel due to long term continuous discharge.

Intake Studies, Task Leader, Various Locations and Clients. Developed and implemented two-dimensional hydrodynamic model of the lower end of Klamath Lake to determine the impacts to lake circulation of an industrial discharge and intake. Developed a two-dimensional CE-QUAL-W2 model for Lake Travis near Austin, Texas to simulate the transport of contaminants in the lake including the effects of the intake configuration. Analyzed different intake configurations for hydro-power intake on Lake Almanor in Northern California to determine how to best manage cold water resource. Analyzed potential recirculation between intake and outfall for proposed desalination project in San Francisco Bay.

Water Quality Studies

U.S. Bureau of Reclamation (USBR), Delta-Mendota Canal Recirculation Feasibility Study, Hydraulic and Water Quality Engineer, Sacramento, CA, 2006 – 2011. Worked on water quality and sediment portion of U.S. Bureau of Reclamation (USBR) study to determine the feasibility of re-circulation of Delta water to the San Joaquin River to meet water quality and flow standards. Reviewed and analyzed TSS and erosion data collected to aid in determining impacts of increased flow releases on water quality in the San Joaquin River. Reviewed DSM2 modeling results to determine impacts to salinity levels in the Delta from modified operations.

City of San Jose, South Bay Copper Nickel TMDL Source Identification Project, San Jose, CA, 1997 – 1999. Assisted in the development of watershed and sediment loads to the South Bay for the South Bay Copper and Nickel TMDL. Developed data and analysis methodologies for estimating the contribution of in-bay sediment to the total Bay load. Identified data gaps and methods for improving estimates.

Bay Area Stormwater Management Agencies Association, BASMAA Long-Term Data Analysis Project, Oakland, CA, 1995 – 1996. Developed land use based water quality load estimates for Bay Area Association of Stormwater Management Agencies. Compiled data from three counties in San Francisco Bay Area. Developed multiple linear regression model between measured concentrations, land use and runoff coefficients.

Lower Colorado River Authority, MTBE Pipeline Spill, TX. Developed CE-QUAL-W2 model for Lake Travis near Austin, Texas. The model was used to simulate a MTBE and benzene spill into the Lake. Model results

were used to determine the maximum spill that would not exceed water quality criteria at different intake points in the Lake. Volatilization was estimated by calibrating separate volatilization model to lake model results.

Alameda County Public Works Agency, Storm Inlet cleaning BMP Study, Task Leader, Alameda Countywide Clean Water Program, Hayward, CA. Conducted storm inlet cleaning study in Alameda County. The study involved the cleaning of 60 storm inlets at annual, semi-annual, quarterly and monthly frequencies to determine optimal cleaning frequency. Both the mass and volume of sediment removed were measured as well as the chemical quality of sediments to determine pollutant load removal.

City of San Jose, Street Sweep Effectiveness Study, Project Manager, CA. Conducted comparative study of the effectiveness of five different street sweepers for San Jose, California. A statistical model of the study was developed prior to initiation of the study to determine the minimum number of samples necessary to arrive at a statistically valid result. The volume and mass of sediment from the five sweepers were measured from eight randomly selected sweeping routes. For each sweeper and route the chemical quality of the sediment collected was analyzed. An ANOVA analysis was conducted on the results to determine which sweeper(s) was most effective at picking up selected pollutants.

Groundwater

U.S. Environmental Protection Agency (USEPA), Development of EPA MULTIMED Model, Model Developer, Nationwide. Participated in the development of the EPA's Multimed and EPACML groundwater/surface water contaminant transport models. Mr. Mineart's responsibilities included linking an unsaturated zone flow and transport model with a saturated zone transport model, designing and implementing a Monte Carlo pre- and post-processor for the linked model and conducting testing of model.

East Bay Municipal Utility District (EBMUD), Camanche Hills Hunting Preserve, Project Manager, Land Applications Data Report, 2006. Developed a water balance model to estimate maximum loading rate for land application of wastewater that was protective of groundwater for EBMUD’s Camanche Hills Hunting Preserve. Calculated maximum hydraulic and nutrient loading rates and amount of land required to prevent degradation.

American Petroleum Institute, SESOIL Development for API Risk Assessment Decision Support System, Model Developer, 1992. Modified the SESOIL unsaturated zone transport model for inclusion into decision support system. Modifications included simplifications to data input files and the addition of new volatile emissions routine. The new addition included the volatilization routine described in EPA’s Superfund Exposure Assessment Manual.

Western Farms Services, Contaminate Fate and Transport Modeling, Technical Lead, 1992 – 1994. Implemented SESOIL groundwater transport model to determine clean up levels for several pesticide/fertilizer distribution centers. The model was used to back calculate the allowable mass/concentrations of contaminants that could be left in the soil and meet water quality criteria at property boundaries.

Granite Rock Company, Geotechnical and Hydrological Study of Overburden Embankment Expansion, Hydraulic Engineer, San Benito County CA, 2000 – 2005. Engineer responsible for hydrological studies of proposed overburden placement from long term operation of large gravel mine. Hydrologic studies consisted of infiltration studies, rainfall-runoff analysis and preliminary design of several retention and infiltration basins to limit volume and rate of runoff to pre-project conditions.

EIR/EIS Experience

Sonoma County Permit and Resource Management Department, Sutter Medical Center of Santa Rosa/Luther Burbank Center for the Arts Joint Master Plan Initial Study and Environmental Impact Report, Hydrology and Water Quality Task Leader, Santa Rosa, CA, 2006 – 2010. Sutter proposed to build new hospital facilities on a 79 acre parcel to replace two medical facility campuses which were not in compliance with the Hospital Seismic Safety Act (SB1953). The project scope includes preparing a CEQA Initial Study and Environmental Impact Report (EIR). Major issues addressed included water supply and storm water runoff from the site. Water supply issues were addressed through mitigation measures that reduced off-site water use. Storm water runoff issuers were addressed through Best Management Practices (BMPs) that included detention ponds incorporated into site design.

Federal Rail Administration, (FRA), California High-Speed Rail Authority, (CHSRA), California High Speed Rail Environmental Impact Analysis – Fresno and Palmdale, CA Sections, Hydrology and Water Quality Task Leader, 2008 – Present. Responsible for completing the hydrology and water quality sections of the EIR and EIS for the Fresno to Bakersfield and the Bakersfield to Palmdale sections of the CA high speed train project. Analysis included the impacts to floodplains, local drainage and storm water runoff. Streams on the 303(d) list or with active or proposed TMDLs were identified and potential impacts estimated.

San Luis and Delta-Mendota Water Authority in cooperation with U.S. Department of the Interior, Bureau of Reclamation (USBR), NEPA/CEQA Compliance for Grassland Bypass Project, Water Resources Task Leader, Los Banos, CA, 1999- 2001. Task leader for the water resources section of the EIR/EIS on use of a portion of the federal San Luis Drain to convey agricultural drainage water around wetland habitat areas for the Grasslands Bypass Project. Developed a water balance model for the approximately 100,000-acre Grassland drainage area used to estimate impacts.

San Joaquin River Exchange Contractors Water Authority, San Joaquin River Water Transfers, Task Leader, San Joaquin Valley, CA, 1999 – 2000. Task leader for water resources section for NEPA/CEQA Compliance for Water Transfers and Conveyance for San Joaquin River Exchange Contractors Water Authority. Participated in preparation of EA/IS on water transfer and conveyance project for wetland habitat enhancement and for agricultural use on the westside of the San Joaquin Valley. Developed water balance model that included infiltration, evaporation, crop use and deep percolation.

San Joaquin River Group Authority, Water Acquisition Supplemental EIS/EIR, Task Leader, San Joaquin Valley, CA, 2000 – 2001. Task leader for water resource section for Supplemental EIS/EIR on acquisition of up to

47,000 acre-feet of additional water (above the 110,000 acre-feet already approved) to provide additional stream flows for anadomous fish in the San Joaquin River for a 31-day spring pulse flow. The project was conducted for the San Joaquin River Group Authority in cooperation with U.S. Department of the Interior, Bureau of Reclamation

Publications

Thermal behavior of a multi-reservoir hydroelectric system (with R. Cross, K. Voos, and W. Lifton). Paper presented at ASCE/Waterpower '87 International Conference on Hydropower, August 19-21, 1987. Portland, Oregon.

Feasibility of cold water releases from Lake Britton (with R. Cross, W. Lifton, and D. Gilbert). Paper presented at 14th Annual Conference on Water Resources Planning and Management Modeling, Monitoring, and Managing Water Resources Systems, March 16-18, 1987. Kansas City, Missouri

Observations of upwelling near breakwaters (with P. Mangarella and J. Colonell). AWRA 1988 Symposium on Coastal Water Resources, May 1988. Wilmington, North Carolina.

A subsurface contaminant transport model for exposure assessment from landfills (with A. Salhotra). Proceedings of 12th Annual Madison Waste Conference at University of Wisconsin at Madison, September 20-21, 1989

Natural and Anthropogenic Sources of Specific Metals and PAH Pollutants in Storm Water (with C.-C. Lee and T.D. Cooke). Poster presented at the 66th Annual Conference of the Water Environment Federation, October 3-7, 1993, Anaheim, CA.

Sensitivity Analysis of Non-Point Source Loads Assessment Using Monte Carlo Simulation (with Marco Lobascio). Paper presented at the 1993 Runoff Quantity and Quality Model Group Conference. November 8-9, 1993, Reno, Nevada.

Two Options for Disposal of Desalination Reject Water (with Louis Armstrong and Ralph Cross). Paper presented at the 1993 National Conference on Hydraulic Engineering. ASCE.

Developing and Implementing Municipal Stormwater Monitoring Plans to Meet Multiple Objectives (with T.D. Cooke and C-C. Lee). Paper presented at WEFTEC'94, the 67th Annual Conference of the Water Environment Federation. October 15-19, 1994, Chicago, Illinois.

The Value of More Frequent Cleanout of Storm Drain Inlets (with Sujatha Singh). In Watershed Protection Techniques. Vol. 1, No. 3. 1994. Ellicott City. MD.

Hydraulic and Water Quality Modeling for Saigon South Project (with Stephane Asselin and Thomas McDonald). Paper in The Built Environment Volume 10. Transactions of the Wessex Institute. 1995.

Watershed Based Source Screening Model An Analytical Tool for Watershed Management in Urban Environments (with Terrance Cooke, Sujatha Singh and Jim Scanlin). Paper presented at the Watershed '96 Conference. MOVING AHEAD TOGETHER. Technical Conference and Exposition. June 8 - 12, 1996. Baltimore, Maryland (US EPA).

Hydraulic Studies for a Large Wetland (with Stephane Asselin and Pierre-Yves Saugy). In proceeding of ASCE North American Water and Environment Congress 1996. Anaheim, California, June 22-28, 1996

Parameters for Dam Breach Analyses (with Ken Susilo and Thomas C. MacDonald). 1997, "Considerations When Selecting Parameters for Dam Breach Analysis," Dam Safety '97, Proceedings of the 1997 ASDSO Conference (CD-ROM), Pittsburgh, Pennsylvania, September 7-10, 1997.

Integrated Hydrodynamic, Sediment Transport and Water Quality Modeling of San Francisco Bay (with Vivian Lee). Presentation at 8th International Conference on Estuarine Modeling. Monterey California. November 2003.

Sediment Transport Modeling for San Francisco Bay under a Range of Hydrologic Conditions (with Vivian Lee). Paper presented at 8th International Conference on Estuarine Modeling. Monterey California. November 2003.

Peyton Slough Remediation Removes it from the Bay Area list of Toxic Hot Spots (with Francesca Demgen and Lois Autie). Poster presented at the 7th Biennial State of San Francisco Estuary Conference, Oakland,CA. October 2005.

A Kinetic Model Of Copper Cycling In San Francisco Bay. (with Brad Bessinger, Terry Cooke, Barton Forman, Vivian Lee and Louis Armstrong) In San Francisco Estuary and Watershed Science. In press.

Sensitivity And Spin Up Times Of Cohesive Sediment Transport Models Used To Simulate Bathymetric Change (with David H. Schoellhamer, Neil K. Ganju, and Megan A.Lionberger). Proceedings The 8th International Conference on Cohesive Sediment Transport. Institute of Lowland Technology, Saga University, Saga, Japan. September 2005.

Hydrodynamic Effects of Proposed Knik Arm Crossing (with J. Colonell, PE, PhD., F.ASCE, and J. Gambino, PE). Hydrologic Analysis Used in the Delta Risk Management Strategy.

Mineart, P. and Thomas MacDonald

Salt Pond Restoration: North San Francisco Bay Salt Pond Project – Salt Removal (with Seth Gentzler, PE) Presented at 2012 Headwaters to Oceans (H2O) Conference to be held May 29-31, 2012 at the Catamaran Resort Hotel, San Diego, CA.

Probabilistic Analysis of Delta Hydrology and Water Levels (with Thomas Macdonald, PhD, PE, Ram Kulkarni, PhD). Poster presented at California Water and Environmental Modeling Forum, February 23-25, 2009 Asilomar Conference Grounds, Carmel,, CA.

ATTACHMENT B

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Southern California Edison Company (U338E) for Approval of the Results of Its 2013 Local Capacity Requirements Request for Offers for the Moorpark Sub-Area.	Application 14-11-016 (Filed November 26, 2014)

REPLY BRIEF OF NRG ENERGY CENTER OXNARD LLC AND NRG CALIFORNIA SOUTH LP

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REPLY BRIEF OF NRG ENERGY CENTER OXNARD LLC AND NRG CALIFORNIA SOUTH LP

NRG Energy Center Oxnard LLC ("NECO") and NRG California South LP ("NRG South") (together, "NRG") submit their reply brief pursuant to Rule 13.11 of the Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), and the schedule in the Assigned Commissioner's Scoping Memo and Ruling dated March 13, 2015. This reply brief responds to the opening briefs filed by the Office of Ratepayer Advocates ("ORA"), the City of Oxnard ("City"), Sierra Club, California Environmental Justice Alliance ("CEJA"), Center for Biological Diversity ("CBD") and World Business Academy ("WBA").

I. INTRODUCTION

ORA, Sierra Club and WBA oppose approval of the tolling agreement with NRG South for the existing 54 megawatt ("MW") Ellwood Generating Station ("Ellwood"), which will be refurbished (without any change in size or capacity) to achieve a remaining 30-year design life ("Ellwood Refurbishment Contract"). The Ellwood Refurbishment Contract was selected as a mutually inclusive offer with a tolling agreement for a new 0.5 MW energy storage facility to be built at the Ellwood site ("Ellwood Storage Contract"). As explained below, procurement of the bundled Ellwood Refurbishment Contract and Ellwood Storage Contract is consistent with the Commission's procurement rules and the procurement authority of Southern California Edison Company ("SCE"). Approval of these contracts adds energy storage (which will be incremental

capacity) at the Ellwood site, and lengthens Ellwood's useful life and enhances its operations, all as allowed under the Commission's procurement rules. Selection of the Ellwood Refurbishment Contract is also consistent with the Commission's prior decision approving an application by Pacific Gas and Electric Company ("PG&E") for approval of the results of its new generation request for offers ("RFO"), which procured contracts for new, incremental capacity and contracts for existing capacity that did not count toward PG&E's new generation procurement authorization.

The City, Sierra Club, CEJA, CBD and WBA oppose approval of the resource adequacy purchase agreement with NECO for the 262 MW simple cycle peaking facility known as the Puente Power Project ("Puente") (the "Puente Contract"). Puente will be built on a portion of the site of the existing Mandalay Generating Station ("Mandalay") in Oxnard, which is a plant that uses once-through cooling ("OTC") technology and is scheduled to retire. The City and Sierra Club rely on a modeling exercise prepared by the City's retained consultant, Dr. Revell, to assert that locating Puente at the Mandalay site will be "unreliable." As explained below, the modeling results have been discredited in the record and shown to be unreliable. The assertions of the City and Sierra Club do not support a finding regarding Puente's future reliability. The City also attempts to discredit the testimony of NECO's expert witness, Mr. Mineart, but the City's arguments misrepresent the record and are not credible.

The City also wrongly argues that procurement of the Puente Contract does not ensure reliability in the Moorpark sub-area because Puente is not in Goleta. The City fails to understand that Decision 13-02-015 authorized procurement for the Moorpark sub-area to address reliability issues arising largely due to the retirement of almost 2,000 MW of OTC capacity. All of this existing OTC capacity is located in Oxnard. The Puente Contract provides the opportunity to replace the almost 2,000 MW of aging OTC capacity with 262 MW of new fast-start peaking

capacity that repurposes and reuses existing gas and transmission infrastructure at the Mandalay site. This is an ideal local reliability solution.

The City and Sierra Club urge the Commission to delay approval of the Puente Contract until after the California Energy Commission ("CEC") renders its licensing decision for the Puente Application for Certification ("AFC"), but they have not shown how the CEC's decision would help "illuminate" issues,,"assist" review, or allow the Commission to "better evaluate" the Puente Contract. The Puente Contract is final and has been executed by SCE and NECO. Delay serves no valid purpose. In the Puente Contract, NECO agreed to assume the risk of an unfavorable CEC licensing decision. The Commission should approve the Puente Contract without delay, and thereby allow NECO to undertake its obligation to obtain CEC approval for Puente in accordance with its contractual commitment. This result would be consistent with the Commission's prior decisions approving contracts for new generation.

The City wrongly asserts that Commission approval of the Puente Contract will prejudice the CEC's ability to consider a full range of alternatives and potential mitigation for Puente. This is not true. The City's relies entirely on the "Alternatives" section of the AFC for Puente, which was prepared by NECO's permitting team and submitted to the CEC. Regardless of what is written in the AFC, it is obvious that an applicant cannot dictate what the CEC will consider or require as part of its review of the Puente AFC. The City's argument is contrary to all reason and common sense. NECO's statements in the AFC are also consistent with CEQA, which does not require consideration of alternatives that cannot achieve a project's fundamental purpose.

The City further errs in asserting that Commission approval of the fixed price in the Puente Contract somehow limits the CEC's authority to require changes in the Puente project that might substantially increase its costs. This is wrong. The Puente Contract specifies a fixed resource adequacy payment with no mechanism for increasing that price during the contract term. Under the Puente Contract, NECO will be responsible for paying for and implementing

any mitigation required by the CEC. Commission approval of the Puente Contract does not, and could not, limit the CEC's authority to consider and require mitigation that is shown to be necessary to mitigate significant environmental impacts or ensure reliability.

The City also wrongly argues that the Commission must act as the lead agency under the California Environmental Quality Act ("CEQA") and conduct an environmental review of Puente. It is well established that Commission approval of a utility power purchase agreement is not a "project" for purposes of CEQA and does not trigger a requirement for environmental review under CEQA.

In a new twist on an old, wrong argument, the City alleges that the Commission must act as the lead agency under CEQA for Puente because approval of the Puente Contract would foreclose alternatives or mitigation measures that would ordinarily be part of CEQA review of Puente. This is also wrong. The City again distorts the statements in the Alternatives section of the Puente AFC. NECO does not have the power to dictate or constrain the CEC's authority to consider project alternatives or require mitigation. The City also misrepresents the testimony of NECO's witness, Ms. Gleiter, by alleging that Ms. Gleiter testified that Commission approval of the Puente Contract "makes it far more likely that the CEC will approve" the Puente AFC. In actuality, when Ms. Gleiter was asked to confirm this during cross-examination, she replied: "No, that is definitely not true."[1] Contrary to the City's arguments, Commission approval of the Puente Contract does not, and could not, commit the CEC to approve the Puente AFC or limit the scope of the CEC's environmental review of Puente.

The City also alleges that Puente provides more capacity than needed, but the City's position is contrary to the record. The CAISO's testimony shows that the selected contracts actually are only a portion of the resources needed to meet reliability needs in the Moorpark

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[1] Reporter's Transcript, Volume 2 (NRG/Gleiter), p. 340 lines 16-21.

sub-area. SCE's testimony also explains that the Puente Contract was necessary to meet the minimum procurement level of 215 MW that the Commission required in Decision 13-02-015.

CEJA argues that SCE's evaluation of offers in the RFO failed to comply with Commission decisions requiring consideration of environmental justice impacts, but its argument misinterprets the Commission's guidance on the use of qualitative considerations in an RFO. In directing utilities to consider certain qualitative bid evaluation metrics, the Commission did not specify that utilities must give disproportionate consideration to environmental justice factors over other qualitative considerations such as the preference for using brownfield sites rather than greenfield sites. The Commission also did not specify that qualitative considerations would override the utilities' quantitative analysis of which resources are the lowest cost and best fit for the utility's need. SCE has shown that the Puente Contact was the most cost-effective gas-fired offer, and it also satisfies the Commission's preference for locating new capacity at brownfield sites instead of greenfield sites. Siting Puente at the existing Mandalay site also provides environmental benefits because it provides the opportunity to replace almost 2,000 MW of aging OTC capacity with 262 MW of new fast-start peaking capacity. Construction of Puente thus would result in a net environmental benefit to the local community.

CEJA also incorrectly argues that SCE's selections of the Puente Contract and the Puente Refurbishment Contract were inappropriately based on a "qualitative" assessment regarding the risk of resource shortages due to the possible retirement of existing non-OTC units owned by NRG South. This claim is contrary to the record, which shows that SCE selected the winning contracts for the Moorpark sub-area based primarily on its quantitative analysis of net market value. Additional qualitative factors may have supported its selection, but the Puente Contract won due to its net market value. SCE's testimony also shows that the Ellwood Refurbishment Contract offered a low cost solution to improve reliability in the Goleta service area. The Independent Evaluator performed an independent, parallel evaluation of the offers and confirmed

that the contracts' economics and their general terms and conditions represented the best resources available from a competitive solicitation.

Sierra Club, the City and WBA unreasonably urge the Commission to reject the RFO results, and to require SCE to start over and conduct another RFO to procure a greater quantity of preferred resources. SCE explained that it selected every preferred resources offer for the Moorpark sub-area other than energy storage, and still had to select a large gas-fired generation offer to meet the minimum procurement authorization of 215 MW. Given that SCE has just completed an exhaustive RFO process, it is not reasonable to expect that the results of a second RFO would produce materially greater amounts of preferred resources. WBA's witness also confirmed that the resources advocated by WBA were not bid into the RFO and are "speculative numbers." It would not be prudent to risk local reliability based on speculation about alternative resources.

II. DISCUSSION

A. The Ellwood Refurbishment Contract Does Not Violate Commission Rules Or SCE's Procurement Authority.

ORA and Sierra Club oppose approval of the Ellwood Refurbishment Contract based on their view that SCE lacks authority to procure capacity from a refurbished existing plant in the LCR RFO.[2] Sierra Club argues that SCE violated procurement rules adopted on page 28 of Decision 14-02-040, but review of that decision shows that SCE's procurement of the bundled Ellwood Refurbishment Contract and Ellwood Storage Contract is consistent with the Commission's procurement rules. In Decision 14-02-040, the Commission stated:

> While current rules do not specifically prohibit the combination of RFOs for existing or new facilities, we hereby clarify that upgraded and repowered plants are allowed to bid in new generation RFOs. We clarify the rules so as to oversee the

[2] ORA Opening Brief, pp. 5-7; Sierra Club Opening Brief, pp. 5-7.

administration of RFOs that fill defined reliability needs in the most cost effective way.

Allowing for the incremental capacity of existing plants or repowered plants to participate in long-term RFOs appropriately acknowledges the varied technological capabilities and improvements possible with today's generation stock, and may alleviate some need to build additional capacity. **In addition, it may be possible for an existing power plant to add capabilities (e.g., energy storage, more optimal ramp rate, or start up times) that would enhance the operation of the plant and increase its value to the system.**

In discussing this issue, first we need to define the term "incremental capacity." We will take SCE's recommendation that the definition should be "capacity incremental to what was assumed in the underlying needs assessment." In other words, these are net additions. **We agree with SDG&E that an existing facility may provide value to IOU ratepayers if it has a useful life extending beyond its current contract or is able to lengthen its useful life by upgrading or repowering various facility components.** The following terms are defined herein:

- Upgraded plants: Upgrades are defined as expanding the generation capacity at, **or enhancing the operation of, a generation facility**, so long as such incremental MW and/or enhanced operating characteristics can provide the necessary attributes that the Commission has authorized the utility to procure. **An upgraded plant** or a plant with incremental capacity additions **would be a plant where the main generating equipment is retained and continues to operate.**

- Repowered plants: Repowers are defined as capital investments that extend the useful life of a generation facility, after the planned retirement date. A repowered facility is a facility where the main generating equipment (such as the turbine) is changed out for new equipment.[3]

Procurement of the bundled Ellwood Refurbishment Contract and Ellwood Storage Contract is consistent with these rules. First, as quoted above, the Commission recognized that the rules do not "prohibit the combination of RFOs for existing or new facilities." Sierra Club

[3] Decision 14-02-040, pp. 28-29 (emphasis added).

tries to read such a prohibition into the rules, but none actually exists. Second, the combination of the Ellwood Refurbishment Contract and the Ellwood Storage Contract adds energy storage, which will be incremental capacity and a "net addition" at the existing Ellwood site. This is specifically allowed under the rules cited above. Third, refurbishing the Ellwood plant will "lengthen its useful life" and "enhances the operation of" the existing Ellwood plant, and provides the necessary attributes that SCE is authorized to procure. This is specifically allowed under the definition of an upgraded plant.

Sierra Club also misses the point that when a plant is repowered or upgraded to add incremental capacity, the utility would be expected to contract for all of the plant's available capacity, not just the portion that is incremental. Thus, while only the incremental capacity or "net addition" counts toward the amount of capacity that the utility is authorized to procure from new generation, it is reasonable to expect the utility to contract for all of the available capacity in order to meet reliability needs and obtain the best value from the upgrade. Certainly it would make no sense to buy only incremental capacity without also taking advantage of the existing capacity that was assumed to continue operating in the underlying need determination. To continue operating, an expanded plant also would need to have an off-taker for all of the plant's capacity, not just the portion that is incremental.

The Commission has previously approved contracts with existing plants that were procured through a utility's long-term RFO for new generation. In Decision 10-07-045, the Commission approved three contracts procured by PG&E through its 2008 long-term RFO. Of the three approved contracts, only one was for a new generating facility. The other two approved contracts were (1) a tolling agreement for the existing 674 MW Contra Costa Generating Station, and (2) a power purchase agreement for the existing 129 MW Midway Sunset Project. The Commission approved both contracts as part of its approval of PG&E's RFO results, and neither

contract involved upgrades or incremental capacity.[4] This precedent supports approval of the Ellwood Refurbishment Contract in this proceeding. As stated above, in Decision 14-02-040 the Commission noted that current rules do not prohibit the combination of RFOs for existing or new facilities, and did not adopt such a prohibition.

This precedent also shows that ORA's arguments are unfounded. ORA argues that the Ellwood Refurbishment Contract exceeds SCE's procurement authority and "subverts" the long-term procurement process.[5] As explained above, the procurement rules do not prohibit SCE from entering into agreements that accomplish the dual purpose of adding incremental storage capacity at Ellwood and lengthening its useful life. The Commission also previously approved the results of PG&E's long-term RFO process, which included two contracts for existing generation. ORA also acknowledges that SCE could contract with Ellwood through "bilateral contracts."[6] If SCE had executed the Ellwood Refurbishment Contract through a bilateral negotiation, SCE would file an application to obtain Commission approval. ORA has not shown why a separate bilateral negotiation and application process for the Ellwood Refurbishment Contract would be preferable to considering it here. It was logical and prudent to procure the Ellwood Refurbishment Contract in the RFO for the Moorpark sub-area, and it is most efficient to consider the Ellwood Refurbishment Contract in this proceeding given its role in addressing unique reliability concerns in a portion of the Moorpark sub-area.

ORA also mistakenly suggests that the Ellwood Refurbishment Contract has a "premium capacity price" similar to new capacity.[7] This is not true. SCE has explained that the Ellwood Refurbishment Contract offers a low cost option for enhancing long-term reliability in the Goleta

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4 Decision 10-07-045, pp. 36-40.

5 ORA Opening Brief, pp. 6-9.

6 ORA Opening Brief, p. 8.

7 ORA Opening Brief, p. 8.

service area.[8] The Independent Evaluator also performed an independent, parallel evaluation of the offers and concluded that all of the selected contracts, which include the Ellwood Refurbishment Project, merit Commission approval "because the contracts' economics and their general terms and conditions represented the best resources available from a competitive solicitation."[9]

Finally, ORA's argument that the 54 MW Ellwood Refurbishment Contract must count toward the 215 to 290 MW of incremental procurement authorized in Decision 13-02-015 makes no sense.[10] The 54 MW is existing, not incremental, capacity and SCE has been very clear on that point. The CAISO's studies also assumed that Ellwood would continue operating. Treating Ellwood as incremental capacity would falsely inflate the amount of incremental capacity to be added to the system.

B. The City Has Not Shown That Puente Will Be "Unreliable."

The City relies solely on the modeling exercise presented by its retained consultant, Dr. Revell, to allege that locating Puente at the Mandalay site would be "unreliable."[11] NRG's opening brief explained that the predictions of Dr. Revell's model have been shown to be inaccurate and flawed as applied to the Puente site. The model predicted that an El Nino-type storm event such as the one that occurred in January 1983 would flood the entire Puente site under current conditions, but that prediction is contrary to what actually happened. The January 1983 El Nino storm and other large storm events have occurred in the past, and the resulting waves and storm surges have had no impact to the Puente site – there was no flooding

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8 Exhibit SCE-7 (Cushnie), p. 6 lines 15-17.

9 Exhibit SCE-2, Appendix D (Independent Evaluator Report), p. 39.

10 ORA Opening Brief, p. 6.

11 City of Oxnard Opening Brief, pp. 6-7 and Exhibit A. Sierra Club makes the same assertions, but relies solely on the reports provided by the City's consultants. Sierra Club Opening Brief, pp. 2-4.

and no impact to Mandalay's operations.[12] Since the 1983 event, the beach fronting the Puente site has accreted and is now wider than it was in 1983.[13] In addition, as can be seen in the historic photos included with Mr. Mineart's testimony, foredunes have formed and stabilized farther out towards the ocean.[14] Thus, under "current conditions," the Puente site is not more vulnerable to coastal hazards than it was in 1983, but is actually less vulnerable. Under current conditions, the Puente site is protected by a big sandy beach that is 300 feet wide, with dunes that are 20 to 30 feet high.[15] If the same event occurred today, the waves would break onto a wider beach and would need to erode the newly formed foredunes before impacting the main dunes protecting the Puente site. Given that no damage occurred in 1983, it is unlikely that any damage would occur under current conditions.

Under cross-examination, Dr. Revell admitted that he did not consider what actually happened (or did not happen) at Mandalay during the 1983 storm event that he modeled.[16] Dr. Revell also admitted that he did not validate his model to actual events at the Mandalay site (which would have shown him that the model's predictions are wrong), and he did not try to calibrate the model with data regarding historical events to improve its accuracy.[17] Dr. Revell also stated that he does not intend to re-evaluate the model's accuracy now that he has the benefit of knowing Mandalay's site experience.[18] Dr. Revell also admitted that he is aware that the

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12 Exhibit NRG-2 (Mineart), Appendix B, p. 2; Reporter's Transcript (NRG/Mineart), Vol. 2, p. 382 line 24 through p. 383 line 3.

13 Exhibit NRG-2 (Mineart), Appendix B, p. 5 and Attachment 1.

14 Exhibit NRG-2 (Mineart), Appendix B, Attachment 1.

15 Exhibit NRG-2 (Mineart), Appendix B, p. 4; Reporter's Transcript (NRG/Mineart), Vol. 2, p. 386 lines 22-24.

16 Reporter's Transcript, Vol. 3 (City of Oxnard/Revell), p. 515 lines 20-25 and p. 517 lines 17-21.

17 Reporter's Transcript, Vol. 3 (City of Oxnard/Revell), p. 527 line 12 through p. 528 line 1.

18 Reporter's Transcript, Vol. 3 (City of Oxnard/Revell), p. 616 lines 11-25 ("And so it's possible, but I'm not currently – you know, it's not currently in the works.").

beach has grown.[19] Despite these flaws in Dr. Revell's analysis, the City repeats its alarmist predictions and sticks to its story that Puente "faces significant coastal hazards."[20] As shown above, the City's assertions are not credible and do not support a finding regarding Puente's future reliability.

The City also misleadingly suggests that by 2060 sea level rise will overtake the coast and flood "the majority of the Puente site" "under the lowest sea level rise projections."[21] The City fails to note that this dire prediction also relies on Dr. Revell's modeling of an extreme storm event similar to the January 1983 storm, but occurring in 2060 in combination with projected sea level rise. As explained above, the model's inaccuracy in predicting impacts from a storm that actually occurred in 1983 with no impact to the Puente site shows that the model cannot be trusted to predict what could happen from a recurrence of the same storm in 2060. Dr. Revell's modeled results also assumed that coastal erosion would occur due to wave impacts and sea level rise, but this contradicts evidence showing that the beach has not eroded and instead has grown steadily.[22] As Mr. Mineart explained, the likelihood of damage to the Puente site due to wave run up and storm surge flooding during an extreme storm event in 2050 "is remote," because for this to occur the beach would need to erode most of the way back to the dunes, a distance of over 300 feet.[23] Thus, for the City's prediction to be accurate, not only would the beach need to stop growing, it also would need to shrink substantially – by over 300 feet – to

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19 Reporter's Transcript, Vol. 3 (City of Oxnard/Revell), p. 595 lines 17-21.

20 City of Oxnard Opening Brief, pp. 6-7 and Exhibit A.

21 City of Oxnard Opening Brief, p. 7.

22 Exhibit NRG-2 (Mineart), Appendix B, p. 5 (showing that the beach has widened by approximately 200 feet since 1947 and is currently approximately 300 feet wide); Reporter's Transcript, Volume 2 (NRG/Minear), p. 408 lines 22-25 ("You could see from the photos it has grown from '47 up to 2012 where our photos cover you can see that the beach has grown fairly regularly.").

23 Exhibit NRG-2 (Mineart), Appendix B, p.4.

reduce the level of protection historically provided by the beach. The City has not shown that this is probable.

The City also relies on Dr. Revell's theory, which has been discredited, that sediment supply to the beach fronting the Puente site is likely to decrease and leave the Puente site more exposed to coastal hazards and the impacts of sea level rise in the future.[24] Recognizing that Dr. Revell admitted that the beach has grown,[25] the City now warns that the beach "can't grow much wider," and insists that the "long-term trend for beach conditions indicates diminished sediment supply and more erosion."[26] Dr. Revell's statement that the beach "can't grow much wider" is unsupported – he made this assertion by looking at a photograph of the current beach without any explanation.[27] As explained above, the record shows that the beach in front of the Puente site has grown steadily over time. There is no evidence demonstrating that the beach "can't grow much wider." Dr. Revell's theory that sediment supply will diminish and lead to more erosion is also contrary to evidence showing that sediment supply is not likely to decrease significantly during Puente's operating life. Sediment yield from the Santa Clara River is a significant source of sediment for the beach fronting the Puente site, and is not predicted to decline significantly during Puente's useful life.[28] Dr. Revell's unsupported statements to the contrary are unreliable.

The City attempts to discredit the testimony of NECO's expert witness, Mr. Mineart, but the City's arguments misrepresent the record and are not credible. First, NECO did not present

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24 City of Oxnard Opening Brief, p. 7.

25 Reporter's Transcript, Volume 3 (City of Oxnard/Revell), p. 595 lines 17-21.

26 City of Oxnard Opening Brief, p. 7.

27 Reporter's Transcript, Volume 3 (City of Oxnard/Revell), p. 601 lines 4-27.

28 Reporter's Transcript, Volume 2 (NRG/Mineart), p. 409 line 17 through p. 410 line 10; Exhibit CO-4 ("Coastal Resilience Ventura: Technical Report of Coastal Hazards Mapping"), Figure 16 (fourth to last page of document) (showing substantial increases in sediment yield from the Santa Clara River, with decreases below historic levels not occurring until after almost 2050, the end of Puente's useful life).

expert testimony in order "to cast doubt" on long-term threats to Puente as the City alleges.[29] The City falsely suggests that NECO is trying to hide risks. In fact, NECO undertook an analysis of coastal hazards to inform its own investment decision. NECO made a contractual commitment to spend hundreds of millions of dollars to build a new plant at the Mandalay site, and bears the full risk under the Puente Contract if the plant cannot operate reliably due to coastal hazards.[30] The results of NECO's analysis show that coastal hazards do not prevent Puente from providing a reliable source of resource adequacy capacity.[31] NECO has millions of dollars on the line if its analysis is wrong. As the only party bearing that investment risk, NECO has zero incentive "to cast doubt" on threats to the plant.

Second, the City wrongly asserts that Mr. Mineart's analysis is "unreliable," and attacks his experience and credentials.[32] Mr. Mineart is a registered professional engineer with more than 30 years of experience in the fields of hydrologic, hydraulic and hydrodynamic analysis, erosion and sediment transport modeling, risks assessments, climate change and sea level rise, and surface and groundwater fate and transport modeling.[33] His resume describes his extensive experience assessing risks to infrastructure projects from wave impacts and flooding hazards, including due to projected sea level rise.[34] Compared to Dr. Revell's resume, Mr. Mineart has far greater experience conducting project-specific and site-specific risk assessments for infrastructure projects. Dr. Revell also admitted that he did not factor site-specific

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29 City of Oxnard Opening Brief, p. 7.

30 Exhibit NRG-1 (Gleiter), pp. 8-9.

31 Exhibit NRG-2 (Mineart), Appendix B, p. 6 ("The combined effects of [sea level rise ("SLR")], potential erosion of the berm, wave events, and storm surge run-up that could occur during the life of the project through planning horizon 2050 are not expected to adversely impact the project. The potential anticipated elevation of SLR, in combination with any of these natural phenomena or weather-induced events, would be well below the beach dunes in proximity to the west boundary of the project site.").

32 City of Oxnard Opening Brief, p.

33 Exhibit NRG-2 (Mineart), Appendix A.

34 Exhibit NRG-2 (Mineart), Appendix A.

considerations such as the operating experience at Mandalay into his analysis. Mr. Mineart's site-specific analysis is more appropriate to assess potential risks to Puente than the general Ventura County coastline analyses commissioned by the City.

Third, the City argues that Mr. Mineart's analysis was "improperly truncated," but Mr. Mineart correctly considered potential impacts during Puente's planned operating life, which is expected to last approximately 30 years between 2020 and 2050.[35] The City states that a 30-year useful life is contrary to the Coastal Commission's guidance recommending that sea level rise planning use a 100-year lifespan for critical infrastructure, including "power plants and energy transmission infrastructure."[36] The CEC disagrees with the Coastal Commission's blanket characterization of power plants as "critical infrastructure," and the resulting recommendation that all power plants "warrant special considerations such as applying a 500-year event design standard, assuming the highest sea-level rise projections, and protection from the worst-case future impacts."[37] The CEC explained that CEC staff analyzes information specific to each proposed project and site location, and expressed concern that "the public and intervening parties may believe that the Guidance recommends special considerations to all power plants without question."[38] The CEC therefore asked the Coastal Commission to remove "power plants" from the critical infrastructure category "to avoid a default assumption that all power plants are critical."[39] Applying these comments, the Coastal Commission modified the final recommended policy guidance so that "critical infrastructure" now only includes "**some** power plants and

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35 NRG-2 (Mineart), Appendix B, p. 3.

36 City of Oxnard Opening Brief, p. 8.

37 CEC Comments on Public Review Draft, California Coastal Commission Sea-Level Rise Policy Guidance, July 20, 2015, attached to this reply brief as Appendix A.

38 *Id.*

39 *Id.*

energy transmission infrastructure."[40] Given that the CEC has exclusive jurisdiction to evaluate the threat to Puente's reliability from coastal hazards and sea level rise, the CEC will decide the applicable considerations to apply to Puente in light of its useful life and site-specific conditions.

Fourth, the City falsely asserts that Mr. Mineart "simply assumed that beach accretion would keep up with sea level rise."[41] This misrepresents Mr. Mineart's analysis. Mr. Mineart's analysis assumed that beach accretion *would not* keep up with sea level rise. Despite the fact that accretion "has been occurring along the stretch of beach adjacent to the project site," Mr. Mineart applied a worst-case assumption that the beach would not keep up with sea level rise and would erode "about 130 feet from its current location by year 2060."[42] However, even applying this "worst-case scenario and assuming that historical accretion will not continue, the beach would be approximately the same width in 2050 as it was in 1947."[43] Thus, even if beach accretion does not keep up with sea level rise, the existing accreted beach is wide enough to accommodate the worst-case erosion scenario without jeopardizing the Puente site.

Fifth, the City faults Mr. Mineart for assuming 130 feet of *beach* erosion rather than 130 feet of *dune* erosion, citing the Coastal Resilience Ventura report, but the City has not shown how 130 feet of *dune* erosion in front of the Puente site is plausible given that the existing dunes are fronted by a 300-foot wide beach. Mr. Mineart explained during hearings that "they have such a huge protective beach right now," and "[t]he beach is 300-feet wide."[44] He also explained that "the beach is big enough that the dunes are not going to take a constant full force of wave

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40 California Coastal Commission Sea Level Rise Policy Guidance, Recommended Final Draft – July 31, 2015, p. 80 (insert to draft shown in bold underlined text), available at: http://documents.coastal.ca.gov/assets/slr/guidance/July2015_Full_RecFinal.pdf.

41 City of Oxnard Opening Brief, p. 9.

42 Exhibit NRG-2 (Mineart), Appendix B, p. 5.

43 Exhibit NRG-2 (Mineart), Appendix B, p. 5.

44 Reporter's Transcript, Volume 2 (NRG/Mineart), p. 386, lines 22-24.

action."[45] Mr. Mineart also explained that "we know the dunes have been stable," and "[t]here's no evidence of erosion," and "[t]here's no evidence that waves have ever impacted the dunes historically."[46] Mr. Mineart's site-specific analysis of the beach in front of the Puente site shows that the dune erosion predicted in the Coastal Resilience Ventura report is not accurate as applied to this particular site.

Sixth, the City incorrectly asserts that the 1984 aerial photograph attached to Mr. Mineart's testimony "shows significant erosion of the dune in front of the Mandalay site from just one large storm event from over 30 years ago."[47] Dr. Revell's "observation" from the 1984 photograph is contrary to Mr. Mineart's testimony as cited above, and also contradicts reports from the Mandalay plant staff, who confirmed that the 1983 storm event had no impact to the Mandalay site.[48] Significant dune erosion in front of the Mandalay site would have been reported by staff, and likely would have taken years to repair itself.

Dr. Revell's assertion that the 1984 photograph shows substantial erosion is not substantiated. Dr. Revell said that "vegetation has been substantially denuded or eroded in front of the site" in the 1984 photograph, but this is not evidence of dune erosion. The amount of visible vegetation varies in the aerial photographs. The most credible explanation for these differences is the relative resolution of the photographs. Scattered vegetation on the dunes cannot be seen as easily in the low resolution photographs as in the high resolution photographs. The 1984 photograph has a low resolution compared with, for example, the photograph from 1959, which more clearly shows vegetation and the road that used to be visible between the

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45 Reporter's Transcript, Volume 2 (NRG/Mineart), p. 387, lines 25-28.

46 Reporter's Transcript, Volume 2 (NRG/Mineart), p. 381, lines 17-21.

47 City of Oxnard Opening Brief, p. 10.

48 Exhibit NRG-2 (Mineart), Appendix B, p. 2 ("A review of large storm events that have caused damage at Oxnard Shores (1960, '63, '65, '71, '78, '83, '88, '95 and '97-98) indicated no impact to the project site with the exception of the need to repair rip-rap at the MGS outfall in 1983).

Puente site and the beach. As shown in the photographs from 1977, 1994, 2005, 2009, 2010 and 2012, that road has been covered with accumulated sand,[49] and the accumulated sand also could explain why vegetation is sometimes less visible in the photographs. Dr. Revell's willingness to testify to "significant erosion of the dune" based solely on the low resolution 1984 aerial photograph is not credible.

Finally, the City asserts that the Puente site is exposed to flooding from a tsunami triggered by an underwater landslide known as the "Goleta 2 Landslide," even under current conditions.[50] The City's analysis is based on modeling assumptions and mapping that assumed hydraulic connections between the tsunami wave and the Puente site.[51] The City's analysis for current conditions is contrary to the Tsunami Inundation Map for Emergency Planning developed by the California Emergency Management Agency, which shows that the Puente site is not currently in the tsunami inundation zone, including for a tsunami triggered by a Goleta 2 Landslide.[52] As Mr. Mineart testified, accretion of the beach in front of the Puente site so far has kept up with sea level rise.[53] Thus, the evidence does not suggest that the tsunami inundation map is wrong today. The City's claim to the contrary again casts doubt on the City's modeling prediction for future years.

In addition, NRG's opening brief explained that the Goleta 2 Landslide has an expected return rate of once every 15,000 years, which means it has a 0.2 percent chance of occurring during Puente's useful life.[54] Given this extremely low probability of occurrence, it is not

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49 Exhibit NRG-2 (Mineart), Appendix B, Attachment 2.

50 City of Oxnard Opening Brief, p. 11.

51 Exhibit CO-2 (Cannon), Attachment 2, pp. 5-6.

52 Exhibit NRG-2 (Mineart), Appendix B, Attachment 2; Exhibit NRG-4 ("Tsunami Inundation Map for Emergency Planning), Table 1: Tsunami sources modeled for Ventura County coastline (showing Goleta Landslide #1 and Goleta Landslide #2 in the list of Local Sources).

53 Reporter's Transcript, Volume 2 (NRG/Mineart), p. 376 line 28 through p. 377 line 4 (explaining that the beach "has been growing even though the sea has been rising").

54 NRG Opening Brief, p. 28.

reasonable to reject the Puente project based on a Goleta 2 Landslide. Even the City's witness Mr. Cannon acknowledged that "it's going to be up to the coastal engineer and the client that he's working for"[55] to decide how to plan for a Goleta 2 Landslide.

C. Contrary To The City's Arguments, Puente Is Ideally Located To Meet Local Reliability Needs In The Moorpark Sub-Area.

The City argues that procurement of the Puente Contract does not ensure reliability in the Moorpark sub-area because Puente is not in Goleta.[56] The City's argument is wrong. Puente is ideally located at the site of one of the existing OTC plants. The Commission previously found that replacing the OTC units with new generation at the same site would be "certain" to meet reliability needs. In Decision 13-02-015, the Commission found that: "Gas-fired resources at the current OTC sites are certain to meet the ISO's criteria for meeting LCR needs"; and "Other resources can also meet or reduce LCR needs, but may not be effective in doing so."[57] The Commission also found that "[t]he most likely locations for to meet LCR needs in the Moorpark sub-are are the sites of the current OTC plants."[58] The CAISO's testimony confirms that procurement of the Puente Contract meets local reliability needs and enhances the safe and reliable operation of SCE's electrical system.[59]

The City also misconstrues the reliability issue identified for the Goleta service area. Reliability in Goleta was not the only driver for LCR procurement for the Moorpark sub-area. As confirmed in Decision 13-02-015, the Commission authorized procurement for the Moorpark sub-area to address reliability issues arising largely due to the assumed retirement of almost 2,000 MW of OTC capacity. All of the relevant OTC capacity is currently located in Oxnard, at

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55 Reporter's Transcript, Volume 3 (City of Oxnard/Cannon), p. 634 lines 10-17.

56 City of Oxnard Opening Brief, p. 13.

57 Decision 13-02-015, Finding of Fact 26.

58 *Id.*, Finding of Fact 39.

59 Exhibit CAISO-1 (Sparks), p. 4 lines 8-13; Exhibit CAISO-3 (Millar), pp. 4-5.

Mandalay and the Ormond Beach Generating Station. The Puente Contract offers an opportunity to replace almost 2,000 MW of aging OTC capacity with 262 MW of new fast-start peaking capacity that repurposes and reuses existing gas and transmission infrastructure. This is an ideal local reliability solution for the Moorpark sub-area.

D. Parties Have Not Shown That CEC Approval Is Necessary For The Commission's Evaluation Of The Puente Contract.

The City and Sierra Club argue that the Commission should delay approval of the Puente Contract until after the CEC approves the Puente AFC, based on assertions that CEC approval somehow would "illuminate" issues, "assist" review, and allow the Commission to "better evaluate" the Puente Contract.[60] These vague arguments do not explain how delay would help the Commission evaluate the reasonableness of the Puente Contract. The Puente Contract is final and has been executed by SCE and NECO. Delay would not change the terms of the Puente Contract. In reality, the only result of delay would be to delay the full effectiveness of the Puente Contract, and miss the deadline for Commission approval that is specified therein. This would expose NECO to the risk of termination, which likely is what the City and Sierra Club are attempting to achieve with their push for delay.

Even if the termination trigger in the Puente Contract were extended until after the CEC process is complete, delay still serves no valid purpose. As one scenario, assume the CEC approves construction of Puente as proposed in the AFC. If this occurs, there would be nothing further for the Commission to consider, and no reason for additional review of the Puente Contract. There would be no valid basis for revisiting the CEC's approval of construction at the Puente site, given the CEC's exclusive authority to make that decision.

As a second scenario, assume the CEC rejects the Puente AFC. If the Commission approves the Puente Contract now to make it fully effective, then the CEC's rejection of the AFC

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[60] City of Oxnard Opening Brief, pp. 13-14; Sierra Club Opening Brief, p. 5.

would result in termination of the Puente Contract and NECO would owe a termination payment to SCE equal to its development security.[61] If Commission approval were delayed, however, NECO would not owe a termination payment because the Puente Contract would not have become fully effective when CEC rejection occurs.[62] This shows that delay in Commission approval actually would be to ratepayers' detriment, because it would delay achievement of the condition that causes the Puente Contract to become fully effective and binding on the parties. In either case, however, if the CEC rejects the AFC, there would be nothing further for the Commission to consider, and no reason for additional review of the Puente Contract.

As a third scenario, assume the CEC approves construction of Puente but requires additional mitigation not proposed in the AFC, such as potential requirements for monitoring the dunes. Under the Puente Contract, NECO bears all responsibility and costs associated with constructing, operating and maintaining Puente to supply resource adequacy capacity in accordance with the Puente Contract. NECO therefore will be responsible for paying for and implementing any mitigation required by the CEC. The City is very confused in this regard, because it seems to believe that the fixed price in the Puente Contract somehow limits the CEC's authority.[63] This is not correct. The Puente Contract specifies a fixed resource adequacy payment with no mechanism for increasing that price during the contract term. In the third scenario, NECO would pay for any increased costs associated with required mitigation and ratepayers would be insulated from those additional costs. Thus, in the third scenario, there would be nothing further for the Commission to consider, and no reason for additional review of the Puente Contract.

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61 Exhibit NRG-1 (Gleiter), p. 8 lines 14-19.

62 Exhibit NRG-1 (Gleiter), p. 8 lines 5-10.

63 City of Oxnard Opening Brief, pp. 16-17.

As a fourth scenario, assume the CEC approves construction of Puente, but finds that another site is environmentally superior. Parties who oppose Puente make much of this possibility, but consideration of the factors supporting reuse of a brownfield site and an existing power plant site with gas and transmission infrastructure already in place shows that this is not a likely outcome of the alternatives analysis. The CEC has explained the purpose of its alternatives analysis as follows:

> The California Environmental Quality Act (CEQA) Guidelines and the Energy Commission's regulations require an evaluation of the comparative merits of a range of feasible site and facility alternatives that achieve the basic objectives of the proposed project but would avoid or substantially lessen potentially significant environmental impacts. (Cal. Code Regs., tit. 14, §§ 15126.6(c) and (e); see also, tit. 20, § 1765.)
>
> The range of alternatives, including the "No Project" alternative, is governed by the "rule of reason" and need not include those alternatives whose effects cannot be reasonably ascertained and whose implementation is remote and speculative. (Cal. Code Regs., tit. 14, § 15126.6(f).) Rather, the analysis is necessarily limited to alternatives that the "lead agency determines could feasibly attain most of the basic objectives of the project." (Id.)[64]

Under these tests, the CEC considers the "comparative merits" of a reasonable range of feasible alternative sites and technologies that would achieve the basic objectives of the project, but would "avoid or substantially less potentially significant environmental impacts." Puente avoids many impacts that would occur if the plant were built at a greenfield site or a site that lacks existing gas and electric transmission infrastructure. The CEC will conduct the required alternatives analysis, but it seems unlikely that other sites would be environmentally preferable given that the Puente site has been used continuously for power generation since the 1950s.

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[64] California Energy Commission Final Decision on the Carlsbad Energy Center Project, June 2012, CEC-800-2011-004-CMF, p. 3-1.

Nevertheless, even if the CEC were to find that the Puente site cannot be approved due to the existence of feasible environmentally superior alternative sites that would avoid or substantially lessen potentially significant environmental impacts and also achieve the project's objectives, this outcome would not necessarily lead to further consideration of the Puente Contact in the form presented in this proceeding. If NECO does not have the ability to acquire and use the alternative site, then the fourth scenario would lead to termination of the Puente Contract just like a CEC decision rejecting the AFC. On the other hand, if NECO could obtain site control, it would be necessary to make changes to existing transmission interconnection arrangements for Puente and the Puente Contract in order to move Puente to the other site. In that situation, additional Commission review of the Puente Contract in its current form would not be relevant, and a modified contract would be submitted for review if agreed to by the parties. Thus, even under the improbable scenario in which an alternative site were shown to be environmentally superior to the Puente site, there would be no reason for additional review of the executed Puente Contract.

NECO urges the Commission to see through the rhetoric of parties who pretend to want additional "illumination" from the CEC process. In the Puente Contract, NECO agreed to assume the risk of an unfavorable CEC licensing decision. The Commission should approve the Puente Contract without delay, and allow NECO to undertake its obligation to obtain CEC approval for Puente in accordance with its contractual commitment. This outcome would be consistent with the Commission's prior decisions approving contracts for new generation.

E. Approval Of the Puente Contract Will Not Impair The CEC's Environmental Review Or Constrain The CEC's Authority To Evaluate Alternatives.

The City argues that Commission approval of the Puente Contract will "prejudice the CEC's ability to consider a full range of alternatives and potential mitigation for the Puente

Project."[65] This is not true. The City's relies entirely on the "Alternatives" section of the AFC for Puente, which was prepared by NECO's permitting team and submitted to the CEC. Regardless of what is written in the AFC, it is obvious that an applicant does not have the ability to dictate what the CEC can and cannot consider or require as part of its review of the Puente AFC. The City's argument is contrary to all reason and common sense.

The City also misrepresents NECO's statements in the Puente AFC. The language quoted by the City reflects NECO's position regarding the relative importance of the stated project objectives for Puente. The Alternatives section of the AFC describes a range of reasonable alternatives to Puente as proposed, including: the "No Project" alternative required by CEQA; alternative generation technologies and configurations; alternative sources of water supply; alternative waste handling systems; and alternative emission control technologies.[66] The Alternatives section lists the project objectives, which include the objective to fulfill NECO's obligations under the Puente Contract, along with seven other project objectives.[67] The Alternatives section then recites the applicable CEQA requirements for considering a reasonable range of alternatives, noting that "there is no ironclad rule governing the nature or scope of alternatives to be discussed other than the rule of reason."[68] In the next paragraph, which is the one the City cites, NECO presents its view that the project objective of meeting NECO's obligations under the Puente Contract is particularly important. That paragraph explains that the objective of meeting NECO's contractual commitment to build Puente with the technology and at the location specified in the Puente Contract "must be kept in mind when determining what

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65 City of Oxnard Opening Brief, p. 15. CEJA makes a similar argument. CEJA Opening Brief, pp. 22-25.

66 Exhibit CO-3, p. 5-1.

67 Exhibit CO-3, p. 5-1.

68 Exhibit CO-3, p. 5-2.

constitutes a range of reasonable alternatives, as well as which alternatives might be considered feasible."[69]

NECO's statements in the Puente Alternatives discussion are entirely consistent with CEQA's requirements for consideration of alternatives. Under CEQA, alternatives must be able to attain most of the basic objectives of the project.[70] CEQA does not require consideration of alternatives that "cannot achieve the project's underlying fundamental purpose."[71] An agency therefore may structure its alternatives analysis based on a reasonable definition of the project's underlying purpose, and need not study alternatives that cannot achieve that fundamental goal.[72] There is no rule requiring a CEQA analysis to explore offsite project alternatives in every case.[73] An agency may determine that no feasible locations exist either because basic project objectives cannot be achieved at another site, or because there are no sites meeting the criteria for feasible alternative site.[74] NECO's position is also consistent with California Public Resources Code Section 25540.6(b), which specifies that an evaluation of alternative sites is not required when a natural gas-fired thermal power plant is proposed for development at an existing industrial site such as Mandalay.

Ultimately, CEC Staff and the CEC AFC Committee for Puente will determine what constitutes a range of reasonable alternatives, and which alternatives should be considered in light of the project objectives. It is a legal certainty that NECO does not have the power to dictate or limit the scope of that review. The City's arguments to the contrary are without merit.

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69 Exhibit CO-3, p. 5-2.

70 Title 14, California Code of Regulations, Section 15126.6(a).

71 *In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings,* 43 Cal.4th 1143, 1165 (2008).

72 *Id.,* p. 1166.

73 *California Native Plant Society v. City of Santa Cruz,* 177 Cal. App. 4th 957, 991 (2009).

74 *See City of Long Beach v. Los Angeles Unified School District,* 176 Cal. App. 4th 889, 921 (2009).

The City further errs in asserting that Commission approval of the fixed price in the Puente Contract somehow limits the CEC's authority "to require changes in the Puente project that might substantially increase its costs."[75] This assertion is wrong. As explained above, NECO will be responsible for paying for and implementing any mitigation required by the CEC. Commission approval of the Puente Contract does not, and could not, limit the CEC's authority to consider and require mitigation that is shown to be necessary to mitigate significant environmental impacts or ensure reliability.

F. The City's Argument That The Commission Must Conduct A CEQA Review Of Puente Misrepresents NECO's Testimony And CEQA.

The City argues that the Commission must act as the lead agency under CEQA and conduct an environmental review of Puente.[76] CBD also argues that CEQA requires environmental review in this proceeding,[77] and CEJA argues that the Commission is a "responsible agency" and must wait for the CEQA lead agency to complete its environmental review before approving the Puente Contract.[78] This is wrong. It is well established that Commission approval of a utility power purchase agreement is not a "project" for purposes of CEQA and does not trigger a requirement for environmental review under CEQA. In its recent decision approving a power purchase agreement executed by San Diego Gas and Electric Company for a new gas-fired power plant, the Commission rejected CBD's argument that CEQA review was required, and explained:

> To the contrary, CEQA Guidelines, long-standing case law, and Commission precedent all make clear that Commission review of purchase power contracts does not trigger CEQA. A contract for purchase power by a regulated entity is not a "project" pursuant to CEQA. CEQA defines a "project" as "[a]ctivities involving the

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75 City of Oxnard Opening Brief, pp. 16-17.

76 City of Oxnard Opening Brief, p. 17.

77 CBD Opening Brief, pp. 16-17.

78 CEJA Opening Brief, p. 22.

> issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies." (Public Resources Code § 21065.) Commission approval of a purchase power contract does not confer a lease, permit, license, certificate, or any other entitlement on the seller. Rather, it is an assurance that the utility will recover through its rates the costs that it incurs under the contract. It is well-settled that "[s]uch a ratemaking order is not 'project' under CEQA. All Commission orders concluding that CEQA does not apply to a ratemaking proceeding have been upheld. (E.g., Samuel C. Palmer, III v. Public Utilities Commission SF# 23980, writ denied 5/10/79.)" (D.86-10-044 at 16-17, 1986 Cal. PUC LEXIS 642, 16-17 (Cal. PUC 1986).)
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> Likewise, the Commission is not a "responsible agency" under CEQA when it approves purchase power contracts. A "responsible agency" is defined as a public agency other than the lead agency which has discretionary approval power over the project. (Public Resources Code § 21069.) While the Commission has considerable discretion over whether to approve a purchase power contract, it does not have power to approve or deny the underlying generation project. The project underlying the purchase power contract could proceed regardless of the Commission's decision. (Id. at 16-18.)[79]

In a new twist on an old, wrong argument, the City alleges that the Commission must act as the lead agency under CEQA for Puente because approval of the Puente Contract would foreclose alternatives or mitigation measures that would ordinarily be part of CEQA review of Puente.[80] This is not true. As explained above, the City distorts the statements in the Alternatives section of the Puente AFC. NECO does not have the power to dictate or constrain the CEC's authority to consider project alternatives or require mitigation.

The City also asserts that NECO's witness, Ms. Gleiter, testified that "contract approval will provide significant financial momentum to the Puente project," and "makes it far more likely that the CEC will approve its project."[81] The City misrepresents Ms. Gleiter's testimony. When asked to confirm that "NRG has determined that PUC approval here makes it more likely

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79 Decision 15-05-051, pp. 29-30 (footnotes omitted).

80 City of Oxnard Opening Brief, pp. 17-18.

81 City of Oxnard Opening Brief, p. 18.

that it will receive approval of this project from the CEC", Ms. Gleiter responded: "No, that is definitely not true."[82]

Instead, Ms. Gleiter testified that Commission approval of the Puente Contract allows NECO to "scale expenses at risk."[83] As has been made clear in this proceeding, NECO is assuming substantial risk by agreeing to permit and build Puente to supply resource adequacy capacity pursuant to the Puente Contract. Numerous milestones in the project development process must be achieved successfully in order for NECO to meet this contractual commitment. Commission approval of the Puente Contract is one significant milestone because, as Ms. Gleiter explained, the Puente Contract provides the revenue stream that supports the investment. CEC approval of the Puente AFC is another obvious key milestone. Mr. Gleiter's testimony explained how a project developer views these milestones together. As long as both milestones remain unmet, the total risk of success or failure is heightened, making the significant project development and permitting expenditures more "at risk." Meeting one key milestone such as approval of the Puente Contract makes a developer more comfortable about continuing to spend millions of dollars to meet the next key milestone of obtaining CEC approval. There are other milestones in this risk assessment, including project financing and construction hurdles. But the risk assessment described by Ms. Gleiter is a purely internal risk assessment by NECO and its parent company. NECO's assessment of its own financial risk does not, and indeed could not, limit the CEC's authority to decide whether or not to approve the Puente AFC, or constrain the CEC's independent review of the Puente AFC. The City's argument to the contrary is wrong.

In addition, the CEQA case law cited by the City does not apply here. In *Save Tara v. City of West Hollywood,* the Court addressed "the question of whether and under what circumstances an agency's agreement allowing private development, conditioned on future

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82 Reporter's Transcript, Volume 2 (NRG/Gleiter), p. 340 lines 16-21.

83 Exhibit NRG-1 (Gleiter), p. 7 lines 23-25.

compliance with CEQA, constitutes approval of the project within the meaning of sections 21100 and 21151" of CEQA.[84] That case involved an agreement entered into by the City of West Hollywood conveying to a developer an option to purchase certain city-owned real estate for use to construct a housing development, with an additional commitment by the city (not conditioned on CEQA compliance) to contribute toward development costs. The city's obligation to convey the property was conditioned on all applicable requirements of CEQA having been satisfied. The petitioners sought a decision holding that the city was required to prepare an environmental impact report for the housing development project *before* it agreed to convey the property to the developer. The Court held that: "A CEQA compliance condition can be a legitimate ingredient in a preliminary public-private agreement for exploration of a proposed project, but if the agreement, viewed in light of all the surrounding circumstances, commits the public agency as a practical matter to the project, the simple insertion of a CEQA compliance condition will not save the agreement from being considered an approval requiring prior environmental review."[85]

The holding in *Save Tara* does not apply in this proceeding. The Commission is not conveying any property to NECO, or agreeing to explore or move forward with a public-private partnership with NECO. The Commission also is not granting approval for construction of Puente to proceed. Commission approval of the Puente Contract also does not, and could not, commit the CEC to approve the Puente AFC or limit the scope of the CEC's environmental review of the Puente project. Although the City and other parties have insisted on using this proceeding to object to Puente on environmental grounds, the only action that the applicant has requested with respect to Puente is for the Commission to approve the Puente Contract as reasonable and authorize rate recovery. Consistent with the Commission's long-standing and recently affirmed precedent on utility power purchase agreements, approval of the Puente

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84 *Save Tara v. City of West Hollywood,* 45 Cal. 4th 116, 121 (2008).

85 *Id.*, p. 132.

Contract is not a "project" for purposes of CEQA. NECO's testimony about how it views its financial risks does not change this well settled legal conclusion.

Finally, even if the Commission's approval of the Puente Contract were technically a "project," which it is not for the reasons discussed above, CEQA provides an exemption for actions undertaken by public agencies relating to any thermal power plant that will be licensed by the CEC. Pursuant to California Public Resources Code Section 21080(b)(6), CEQA does not apply to:

> Actions undertaken by a public agency relating to any thermal powerplant site or facility, including the expenditure, obligation, or encumbrance of funds by a public agency for planning, engineering, or design purposes, or for the conditional sale or purchase of equipment, fuel, water (except groundwater), steam, or power for a thermal powerplant, if the powerplant site and related facility will be the subject of an environmental impact report, negative declaration, or other document, prepared pursuant to a regulatory program certified pursuant to Section 21080.5, which will be prepared by the State Energy Resources Conservation and Development Commission, by the Public Utilities Commission, or by the city or county in which the powerplant and related facility would be located if the environmental impact report, negative declaration, or document includes the environmental impact, if any, of the action described in this paragraph.[86]

The CEC is the "State Energy Resources Conservation and Development Commission" referenced in the statute, and its thermal power plant siting and environmental review process is a certified regulatory program pursuant to California Public Resources Code Section 21080.5. The CEC's certified regulatory program entails a full environmental review of potential project impacts and imposes requirements necessary to ensure that all potential environmental impacts are mitigated to below significant levels. This further demonstrates that the City's CEQA argument is baseless.

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[86] *See also* CEQA Guidelines, 14 Cal. Code Regs. Section 15271.

G. The City's Challenge To Puente's Size Is Contrary To The Record.

The City argues that the size of the Puente Contract is "unjustifiable" based on the City's interpretation of the CAISO's studies.[87] The City's argument is contrary to the testimony of the CAISO's witness, who cautioned that the resources for which SCE seeks approval in this proceeding "are only a portion of those necessary to meet reliability needs in the Moorpark sub-area."[88] SCE's testimony also explains that in order to meet the minimum procurement level of 215 MW that the Commission required in Decision 13-02-015, it was necessary to select a large gas-fired project, and Puente was the most cost effective gas-fired generation offer.[89]

H. CEJA Misinterprets The Commission's Guidance On Qualitative Considerations In An RFO.

CEJA argues that SCE's evaluation of offers in the RFO failed to comply with Commission decisions requiring consideration of environmental justice impacts.[90] CEJA's argument misinterprets the Commission's guidance on the use of qualitative considerations in an RFO. CEJA relies on Decision 07-12-052, where the Commission stated that "[t]he evaluation criteria used in competitive solicitations must be clear, transparent, and available to potential bidders early enough in the procurement process to permit potential bidders to tailor their projects to fit the utility's actual needs."[91] The Commission then stated that: "We discuss below certain bid evaluation metrics that we urge the utilities, in conjunction with Independent Evaluators, Procurement Review Groups and Energy Division, to consider when developing the RFO bid documents and process."[92] The Commission found that utilities should consider

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87 City of Oxnard Opening Brief, pp. 20-21.

88 Exhibit CAISO-1 (Sparks), p. 3 line 22 through p. 4 line 1.

89 Exhibit SCE-7 (Cushnie), p. 1 line 12 through p. 2 line 1; Exhibit SCE-1 (Singh), p. 45 line 18 through p. 46 lines 2, 9-10.

90 CEJA Opening Brief, pp. 5-10.

91 Decision 07-12-052, p. 155.

92 *Id.*

capacity and energy benefits, resource diversity, portfolio fit, local reliability/resource adequacy, congestion costs, credit and collateral, debt equivalence, potential treatment under financial accounting rules, and transmission costs/savings, as well as "disproportionate resource sitings in low income and minority communities, and environmental impacts/benefits (including Greenfield vs. Brownfield development)."[93]

In suggesting that utilities should consider these bid evaluation metrics, the Commission did not specify that utilities must give disproportionate consideration to environmental justice factors over other qualitative considerations such as the preference for using brownfield sites rather than greenfield sites. The Commission also did not specify that qualitative considerations would override the utilities' quantitative analysis of which resources are the lowest cost and best fit for the utility's need. Utilities have flexibility to apply relevant qualitative considerations in their RFO resource evaluations, as long as they demonstrate how resource selections were made and justify their selected contracts.

SCE complied with those requirements in this proceeding. SCE's testimony and the Independent Evaluator's report show that SCE selected the winning contracts for the Moorpark sub-area based primarily on its quantitative analysis of net market value – namely, the valuate of a resource's energy, ancillary services, and capacity benefits, minus fixed and variable offer-related costs.[94] SCE also assessed non-quantifiable characteristics of each offer. SCE's selection process revealed that the Puente Contact was the most cost-effective gas-fired offer, and it also satisfies the Commission's preference for locating new capacity at brownfield sites instead of greenfield sites.

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93 *Id.*, pp. 156-157.

94 Exhibit SCE-1 (Singh), pp. 30-49; Exhibit SCE-2, Appendix D (Independent Evaluator Report), p. 5.

Siting Puente at the existing Mandalay site also provides environmental benefits because it accommodates the potential retirement of almost 2,000 MW of aging OTC capacity with 262 MW of new fast-start peaking capacity. The OTC units in Oxnard require between 12 and 18 hours to start up, which means that they have emissions during the entire lengthy start up period, in addition to the time they operate to meet electricity needs.[95] In addition to being significantly smaller than the existing OTC capacity, Puente will be able to start and be at its full capacity in only 10 minutes, avoiding the significant start up emissions of the existing OTC units.[96] Moreover, unlike the existing OTC units, Puente will be able to be shut down at night and restarted the next day, further reducing emissions compared to the existing OTC units. Construction of Puente thus will result in a net environmental benefit to the local community.

CEJA also argues that SCE failed to favor renewable energy projects in environmental justice communities,[97] but the record shows that SCE selected every renewable offer available in the RFO for the Moorpark sub-area.[98]

I. CEJA Misinterprets The Record, Which Shows That SCE Selected Contracts Based On Its Least Cost Best Fit Quantitative Analysis.

CEJA argues that SCE's selections of the Puente Contract and the Puente Refurbishment Contract were inappropriately based on "qualitative" assessments regarding the risk of resource shortages due to the possible retirement of existing non-OTC peaking resources owned by NRG South.[99] This claim is contrary to the record. As stated above, SCE's testimony and the Independent Evaluator's report show that SCE selected the winning contracts for the Moorpark sub-area based primarily on its quantitative analysis of net market value – namely, the value of a

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95 Reporter's Transcript, Volume 2 (NRG/Gleiter), p. 351 lines 3-12.

96 Exhibit NRG-1 (Gleiter), p. 2 lines 24-28.

97 CEJA Opening Brief, p. 10.

98 Exhibit SCE-7 (Bryson), p. 14 lines 2-3.

99 CEJA Opening Brief, pp. 11-20.

resource's energy, ancillary services, and capacity benefits, minus fixed and variable offer-related costs.[100] SCE's selection process revealed that the Puente Contact was the most cost-effective gas-fired offer, and it also satisfies the Commission's preference for locating new capacity at brownfield sites instead of greenfield sites. Additional qualitative factors may have supported this selection, but the Puente Contract won due to its net market value.

SCE's testimony also shows that the Ellwood Refurbishment Contract offered a low cost solution to improve reliability in the Goleta service area, and SCE added the 0.5 MW Ellwood Storage Contract and a 1 MW rooftop solar project in Goleta to help address unique reliability concerns in Goleta. SCE's testimony explains that the set of selected contracts were "the best combination of offers" and "allowed SCE to select cost-competitive Preferred Resources offers."[101] The Independent Evaluator performed an independent, parallel evaluation of the offers and concluded that all of the selected contracts merit Commission approval "because the contracts' economics and their general terms and conditions represented the best resources available from a competitive solicitation."[102]

J. Parties Have Not Shown That Another RFO Would Produce Materially Greater Amounts Of Preferred Resources.

Sierra Club, the City and WBA unreasonably urge the Commission to reject the RFO results and require SCE to start over by conducting another RFO for preferred resources.[103] SCE explained that it selected every preferred resources final offer for the Moorpark sub-area other than energy storage, and had to select a large gas-fired generation offer to meet the minimum

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100 Exhibit SCE-1 (Singh), pp. 30-49; Exhibit SCE-2, Appendix D (Independent Evaluator Report), p. 5.

101 Exhibit SCE-1 (Singh), p. 46 lines 7-9.

102 Exhibit SCE-2, Appendix D (Independent Evaluator Report), p. 39.

103 Sierra Club Opening Brief, p. 5; City of Oxnard Opening Brief, pp. 25-26; WBA Opening Brief, p. 3.

procurement authorization of 215 MW.[104] Given that SCE just completed an exhaustive RFO process, it is not reasonable to expect that the results of a second RFO would produce materially greater amounts of preferred resources. Parties have not shown that a second RFO would yield a materially different result that the RFO that SCE just completed.

WBA argues that SCE should select alternative resources to meet local reliability needs in the Moorpark sub-area, but the resources described in WBA's testimony were not even bid into the RFO.[105] WBA's witness also admitted that the resources identified in WBA's testimony are "speculative numbers."[106] It would not be prudent to risk local reliability based on speculation about alternative resources.

III. CONCLUSION

For the reasons explained in NRG's opening brief and reinforced above, the Commission should approve all 11 contracts selected and executed by SCE for the Moorpark sub-area, including the Puente Contract, the Ellwood Refurbishment Contract, and the Ellwood Storage Contract. The Commission should approve all of these contracts without delay or condition.

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Respectfully submitted,

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104 Exhibit SCE-7 (Cushnie), p. 1 line 20 through p. 2 line 1.

105 Reporter's Transcript, Volume 1 (WBA/Perry), p. 161 line 18 through p. 163 line 5 and p. 165 lines 16-20.

106 Reporter's Transcript, Volume 1 (WBA/Perry), p. 166 line 9.

ATTACHMENT C

ATTACHMENT C

500-year Flood Analysis

The P3 project site (site) is located within the existing Mandalay Generating Station (MGS) property west of Harbor Blvd and north of Mandalay County Park in Oxnard, CA (see **Figure 1-1**). The site is located near the upstream end of the Edison Canal, which drains south to Channel Islands Harbor. The site is approximately 9,000 feet south-southeast of the mouth of the Santa Clara River and 1,000 feet south of the overflow to the Pacific Ocean of the Santa Clara River breakout (the southern end of McGrath Lake). A small levee separates the site from the McGrath Lake area, dunes separate the site from the ocean, and no levee separates the site from Edison Canal.

Current FEMA Flood Insurance Rate Maps (FIRMs) show that a portion of the site is within a shaded Zone X. This study is being performed, in part, to support a request for a Letter of Map Revision (LOMR) from FEMA based on correcting the existing map. No changes are being proposed to the existing hydrology or hydraulic models. Hydraulic modeling described in this study was only performed to provide information on the extent of 500-year flooding from potential sources in the vicinity of the P3 project site.

1.1 Existing Topography of the Site

Topographic data covering the MGS property were obtained from a survey performed in March 2011 (Saddleback Surveys, 2011). Topographic data covering areas beyond the limits of the MGS property were obtained from the California Coastal Conservancy Coastal LiDAR Project: Hydro-flattened Bare Earth DEM[5]. This LiDAR, with 1 meter grid spacing, is a survey of coastal California extending approximately 3 miles inland in the vicinity of the site, and the survey data was collected between October 2009 and August 2011. Elevations from the LiDAR were spot-checked in the vicinity of the MGS property and were found to be in agreement within a few tenths of a foot of survey data obtained for the site (Saddleback Surveys, 2011).

[5] Available at: https://coast.noaa.gov/dataviewer

Typical elevations within the P3 site are approximately 14.8 feet. Elevations within the overall MGS property range from approximately 11.5 to 13.5 feet (excluding the P3 site, ponds, and berms). The berm along the northern MGS property boundary, which protects the site from flooding around McGrath Lake, ranges from approximately 17.5 to 18.7 feet. The dune along the western boundary, which protects the site from coastal flooding and wave run-up, ranges from approximately 22.3 to 33.5 feet. Elevations along the top of bank of Edison Canal range from approximately 11.5 to 13.0 feet, similar to the elevations of the MGS property.

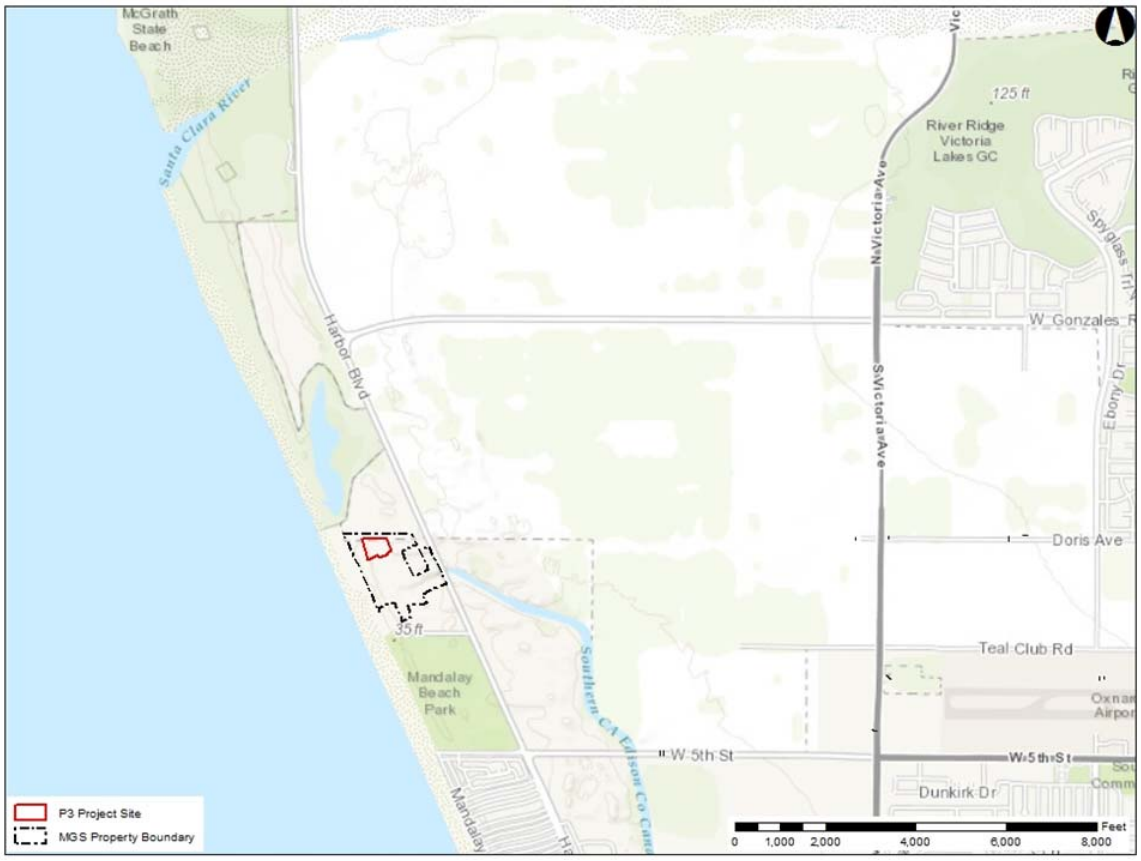

Figure 1-1: Vicinity Map

1.2 Existing FEMA Models and Studies

The current Flood Insurance Study (FIS) prepared by FEMA for Ventura County was revised January 7, 2015. The current FEMA FIRMs covering the site are dated January 20, 2010.

The 36-acre MGS property is situated in both the shaded and unshaded "Zone X" areas, as shown on FIRM Community Panel Numbers, No. 06111C0885E and 06111C0905E (Effective Date of January 20, 2010). The southern portions of both the MGS property and the

site are in “Zone X – Other Flood Areas” (shaded; areas protected by levees from 1 percent annual chance flood, areas of 0.2 percent annual chance flood; areas of 1 percent chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile). The remaining portions of the MGS property and the site are in “Zone X - Other Areas” (unshaded; areas determined to be outside the 0.2 percent annual chance floodplain) (FEMA, 2010). GIS layers of the zones shown on the 2010 effective FIRMs were obtained from FEMA. See **Figure 1-2**.

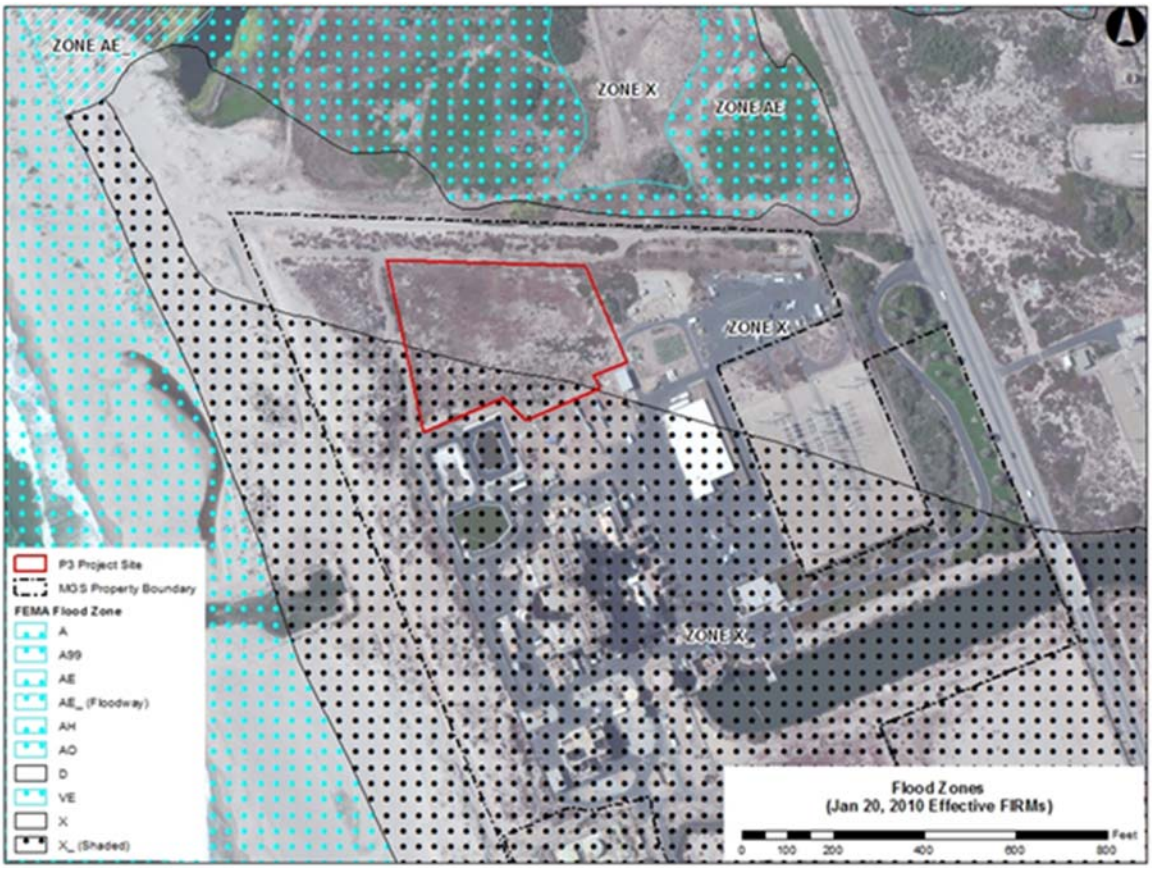

Figure 1-2: FEMA Flood Zones

The available FEMA documentation for the mapping shown on the two FEMA panels was reviewed; however, detailed information to support the mapping is not available. The floodplain boundaries were compared to 2011 LiDAR, a USGS topographic map from the 1970s and the topography from 1956, pre-project construction. The floodplain boundary does not correspond to any contours on any of the maps, i.e., the floodplain boundaries do not correspond to existing or possibly historic topography. After reviewing the floodplain topography, it is not

clear from the FEMA map why the flood zones are shown as they are. The Zone X (shaded) area appears to start upgradient in a residential area of Oxnard and extends southwest to the Edison Canal; it then continues along portions of the Edison Canal, including at the MGS property, with no obvious source of the flooding.

Potential sources could include the Santa Clara River overflowing its banks and flowing south to the MGS site via the Santa Clara River Breakout, but that is not what the FEMA map appears to show. If the mapped 0.2% annual chance (500-year) flooding was coming from the Santa Clara River Breakout, it would have to flow south and then east past the dune system, which does not seem likely due to the high elevations of the dunes. Other potential sources could include the Edison Canal backwatering in the upstream direction onto the MGS property due to flood flows entering downstream or from coastal flooding. However, still water flood levels in the coastal study are not high enough to overtop the banks of the Edison Canal. Inflows to the Edison Canal in the vicinity include the Doris Avenue Drain and West 5th Street Drain. The FEMA FIS states that the Doris Avenue Drain has sufficient capacity for the 1%-annual-chance flood but is subject to shallow flooding during a 0.2%-annual-chance flood. It seems likely that the shaded Zone X is mapped at the project site based on shallow 500-year flooding from the drains. The drain flows were analyzed to determine if they were possible sources of the flooding (see Section 2).

1.2.1 Older FEMA Work Maps

After submitting a data request to FEMA, AECOM obtained PDF files containing scans of various FIRM Work Maps relating to the FEMA floodplains for the City of Oxnard, CA. They were undated. These are the maps presumably used to develop the prior FEMA floodplain maps.

The existing FIRM panels generally follow the floodplain designations found on the older Work Maps with some slight variations. On the older Work Maps, the entire P3 site is identified

as being in Zone C[6], an area outside of the 500-year floodplain. **Figure 1-3** shows an old FIRM Work Map (with the P3 site in Zone C) and **Figure 1-4** shows the old Work Map for the Flood Boundary and Floodway Map (FBFM) compared with the effective FEMA flood zones. The old FBFM has the 500-year floodplain boundaries labeled, which implies that the current shaded Zone X is for 500-year flooding. The zone boundaries have been modified on the newer maps putting the southern part of the P3 site into Zone X (shaded), which is a slight extension of the neighboring Zone B found on the older map. It appears that the area was revised to include the end of the Edison Canal with the boundary extending to the north of the end of the canal. It is possible that the flood-carrying capacity of the Edison Canal was not included since the maps show flooding going over the canal from east to west to connect the floodplain to the ocean.

The old FEMA maps indicate that the flooding is likely from the Oxnard West Drain and the Doris Avenue Drain. The extent to which these drains would still cause the same flooding is unknown. The Doris Avenue Drain is the closest to the MGS property. It empties into the Edison Canal about 3,500 feet downstream of the MGS property.

[6] Note on FEMA floodplain designations: FEMA has simplified its floodplain designations over the decades. On the existing maps FEMA uses an "A" designation to show areas that are within a 100-year floodplain. There are various types of "A" zones. V zones are areas of coastal flooding. X zones are areas of low hazard flooding. Shaded X zones are areas between the 100-year and 500-year floodplains, and unshaded areas are outside the 500-year floodplain. On older maps, B zones and C zones are also shown. B zones are similar to shaded X zones and C zones are similar to unshaded X zones, generally outside the 500-year floodplain but may have ponding or local drainage issues.

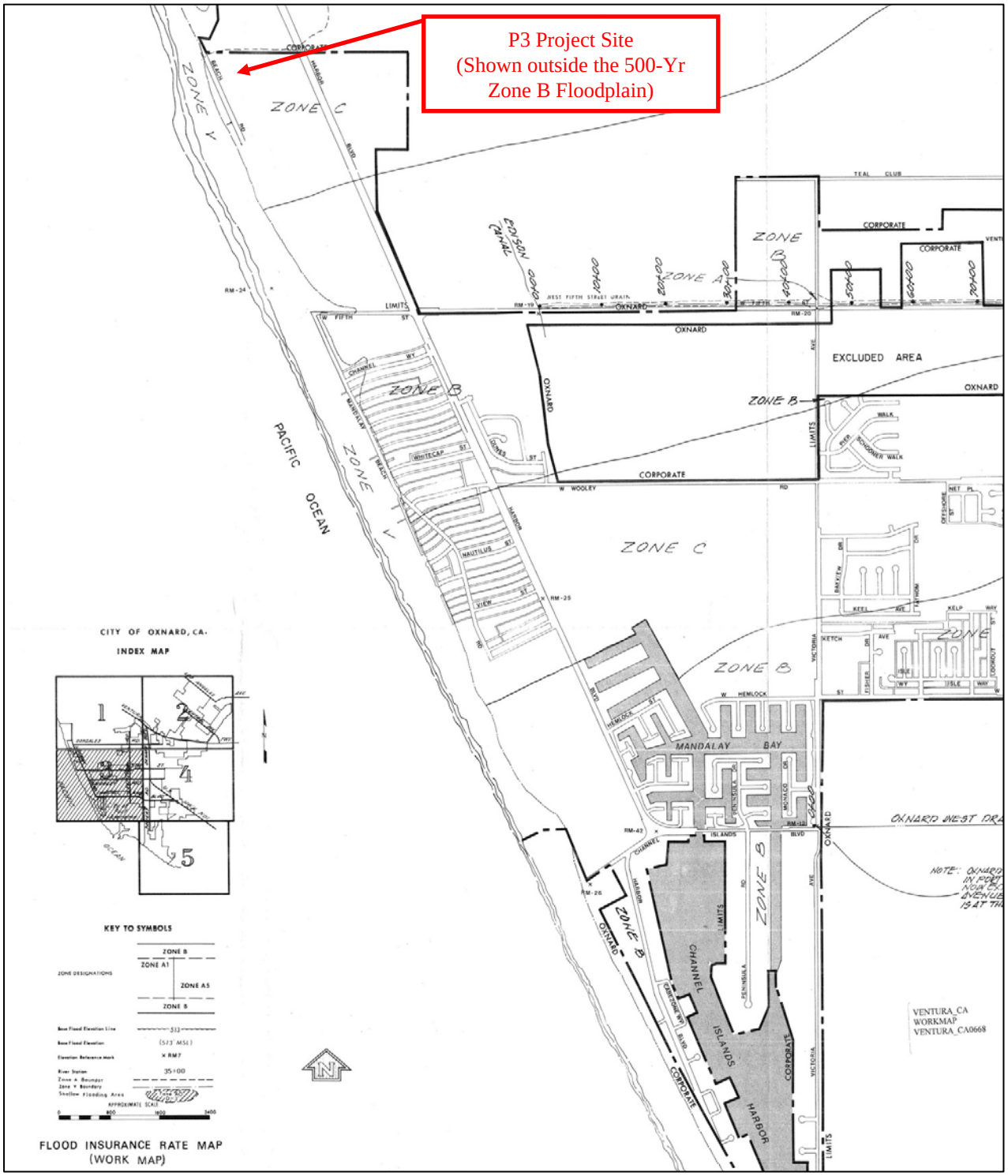

Figure 1-3: Old FIRM Work Map (provided by FEMA, undated)

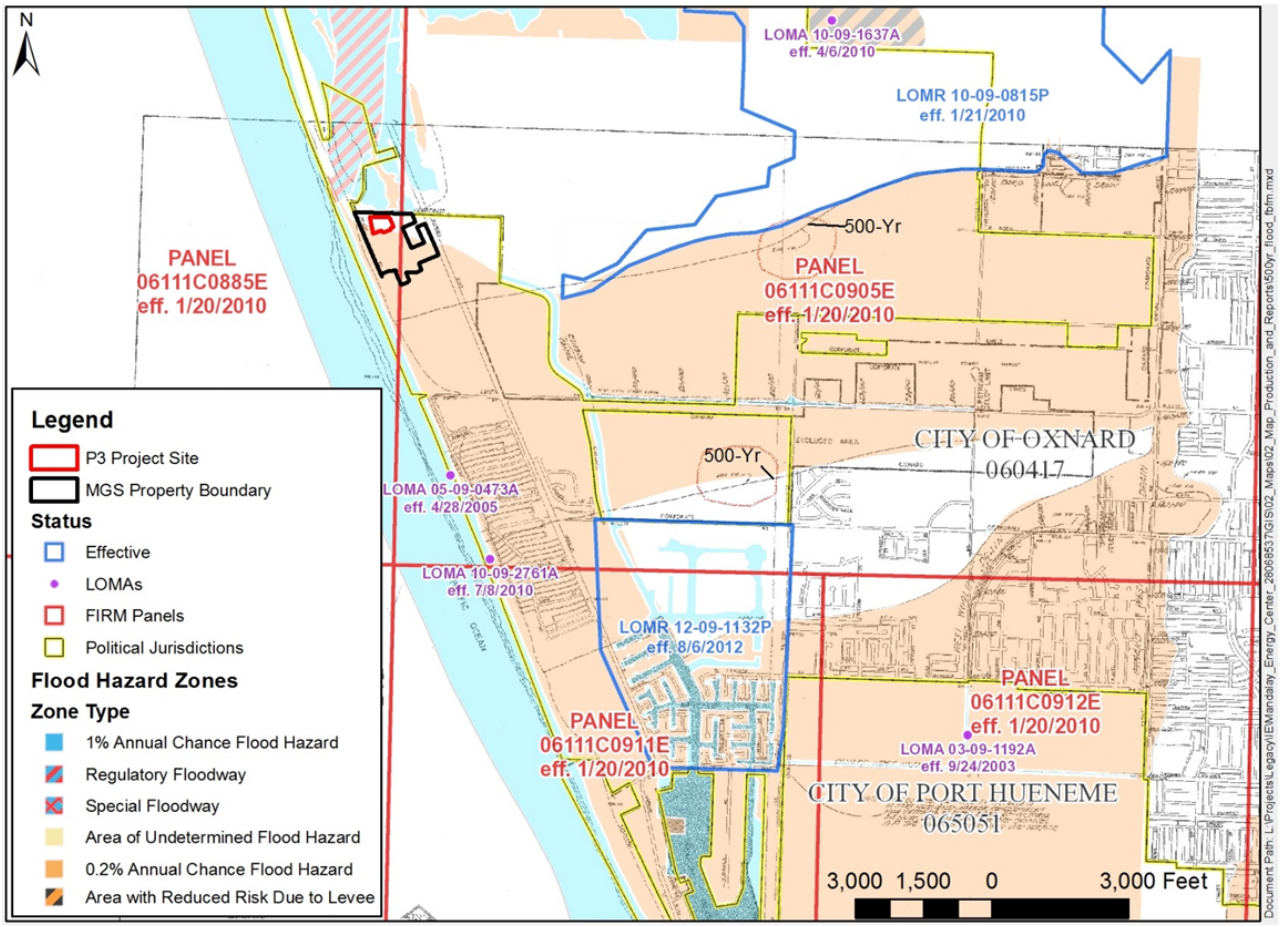

Figure 1-4: Old FBFM Work Map with Current FEMA Flood Zones Shown

2. Hydrodynamic Modeling of 500-Year Flood

To further understand the potential flooding on the P3 site caused by the 0.2% chance annual flood, a two-dimensional (2D) hydrodynamic model of the site and surrounding drainages was developed in HEC-RAS (version 5.0.3).

2.1 Model Study Area and Setup

Since flooding at the site could potentially be caused by one or more sources, the model study area was set up to capture the drainages in the surrounding vicinity of the site. The model extends from north of right bank of the Santa Clara River to south of the mouth of Channel Islands Harbor, west to the dune line along the coast, and inland approximately 2-3 miles (see **Figure 2-1**). This area captures the lower Santa Clara River, Edison Canal, Doris Avenue Drain, West 5th Street Drain, and lower Oxnard West Drain. The effective FIRM and the preliminary maps show that the site is not within a coastal flood zone.

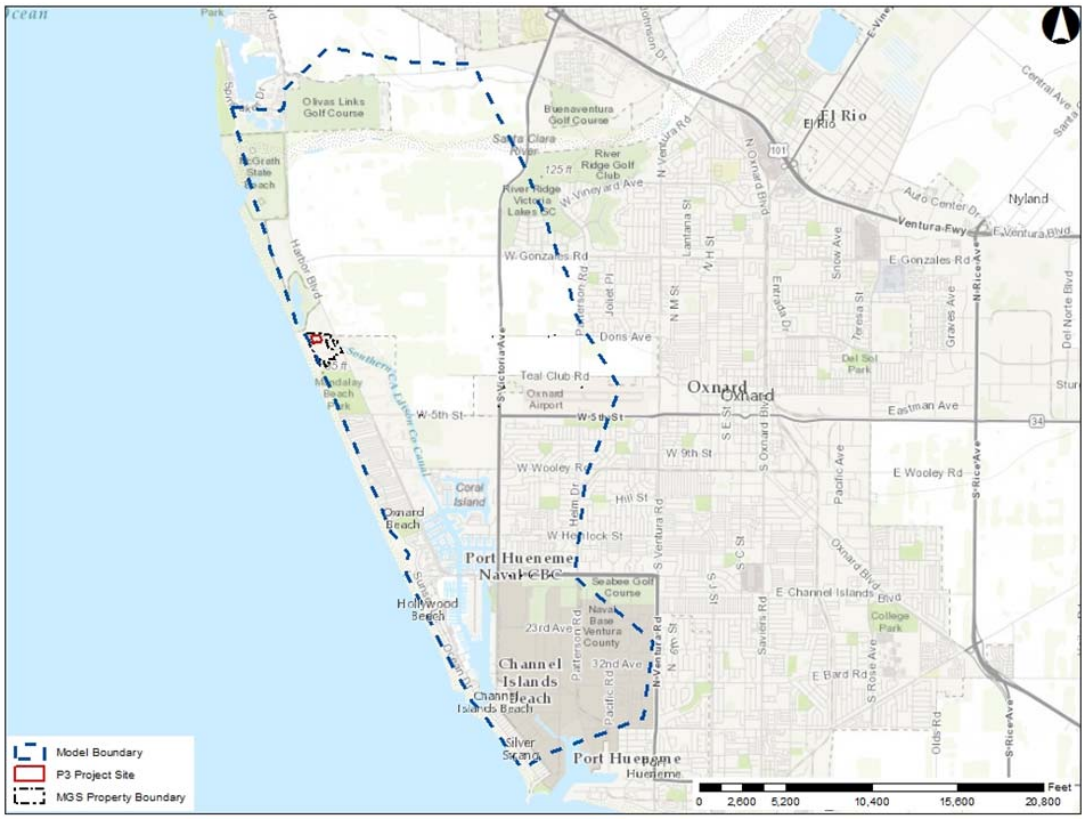

Figure 2-1: Model Study Area

Using the NOAA Coastal LiDAR merged with bathymetry data for the Edison Canal and Channel Islands Harbor, a model mesh was generated for the study area on a 30-meter spacing. Grid faces were enforced along breaklines such as canal inverts and tops of bank. Cell sizes were adjusted to 10-meter spacing along breaklines. Additional grid cells were added on a manual basis for specific areas of interest.

Road crossings over the three drains that showed in the LiDAR data were edited out using canal cross-sections upstream and downstream of the crossings to provide a continuous flow path in the modeling surface. Numerous other road crossings exist in the LiDAR data over tributary ditches to the three drains. These other crossings were not edited out of the model.

2.2 Hydrology and Boundary Conditions

Boundary conditions for the model describe the flows that drain into the study area and the controls that govern how they are released from the study area. Upstream boundary conditions are represented by flow hydrographs, and downstream boundary conditions are represented by the tailwater conditions, or stage hydrographs.

2.2.1 Upstream Boundary Conditions

Flows in the lower Santa Clara River, Doris Avenue Drain, West 5th Street Drain, and lower Oxnard West Drain were input to the model as hydrographs as upstream boundary conditions (see **Table 2-1**). The flows for the Santa Clara River are the flows used in the FIS for "Santa Clara R at Mouth."

The FIS provides flows for the Doris Avenue Drain and the Oxnard West Drain. Flows in the drains are based on flows used in the FIS for "Doris Avenue Drain." The flows in the drains were calculated based on watershed area and the runoff density calculated using the information in the FIS. In the FIS, Doris Avenue Drain has a 500-year flow of 750 cfs and a drainage area of 0.4 square miles; this equates to a runoff density of approximately 3 cfs/acre. The 500-year flow in the FIS for the Oxnard West Drain at the Edison Canal is 5,850 cfs for a corresponding drainage area of 4.9 square miles, which equates to approximately 2 cfs/acre. The runoff density is approximately the same for upstream locations on the Oxnard West Drain. Since the runoff density for the Doris Avenue Drain was higher than the Oxnard West Drain, it

was applied to all areas draining to the Edison Canal. Watersheds for the drains were delineated in GIS based on topography and the locations of ditches and drains.

The watershed size for the entire Doris Avenue Drain is approximately 3.3 square-miles. Presumably, the 750 cfs flow is entering the very upstream end of Doris Drain because it only corresponds to a 0.4 square-mile drainage. The land use in the upper watershed of Doris Avenue Drain is mostly Developed, Medium Density according to the National Land Cover Database 2011. This level of development is consistent with the upper watershed of West 5th Street Drain and the entire Oxnard West Drain watershed. Large areas of the lower Doris Avenue Drain and lower West 5th Street Drain watersheds are agricultural land uses. However, aerial photography shows that almost all of the agricultural areas have been used for strawberry production with plastic covering much of the area. It is assumed, therefore, that the runoff density for the upper Doris Avenue Drain watershed is applicable to the entire watersheds for all the drains. This should provide an upper bound on the flow rates.

Since HEC-RAS only allows hydrograph flows to enter the model area at the boundary, the entire watershed for each drain extending to the confluence with the Edison Canal was used for calculating input flows at the boundary. In addition, there is direct runoff contributing to the Edison Canal that does not flow through one of the three drains. To understand all the flows that could contribute to flooding along the Edison Canal, the direct runoff was divided based on the location of the drain confluences and added to the flows for each canal. For example, the flow entering the upstream end of Doris Avenue Drain in the model includes the runoff for the entire Doris Avenue Drain Watershed and the direct runoff to Edison Canal for the portion of the canal upstream of Doris Avenue Drain.

The flows thus calculated were used as the peak flow in the hydrographs. To simplify the shape of the hydrograph, peak flow was reached linearly over 24 hours and then held steady for 24 hours in the model.

Table 2-1: 500-year Flows for Model Upstream Boundary Conditions

Model Upstream Boundary Location	FIS Location	FIS Flow	Watershed Area (mi^2)	Model Flow
Santa Clara River	Santa Clara R at Mouth	270,000 cfs	na	270,000 cfs 7,646 cms
Doris Avenue Drain	Doris Avenue Drain	750 cfs for 0.4 mi^2	3.6	6,912 cfs 196 cms
West 5th Street Drain	Doris Avenue Drain		2.4	4,588 cfs 130 cms
Oxnard West Drain	Doris Avenue Drain		7.9	15,181 cfs 430 cms

2.2.2 Downstream Boundary Conditions

A stage hydrograph was used as the downstream boundary condition at the mouths of the Santa Clara River and Channel Islands Harbor and for the overflow of the Santa Clara River Breakout. The stage used was a constant elevation of mean higher high water (MHHW) or 5.27 feet for the entire model run time.

2.3 Other Model Input Data

Other model input includes the Manning's n to describe the roughness of each grid cell. A uniform Manning's n of 0.024 was applied to the entire study area. A computational time step of 3 seconds was used.

3. Results Discussion

Results of the 500-year 2D hydrodynamic model show that there is no flooding of the P3 site or the MGS property from the lower Santa Clara River, Santa Clara River Breakout, Edison Canal, Doris Avenue Drain, West 5th Street Drain, or Oxnard West Drain. The only ponding within the MGS property is in the Edison Canal and north of the berm along the northern property boundary. No ponding occurs on the P3 site. **Figure 3-1**shows the maximum ponding depth resulting from 500-year flows for the model study area, **Figure 3-2** shows the maximum ponding depths zoomed to the MGS property, and **Figure 3-3** provides a comparison of the model results and the FIRM flood zones.

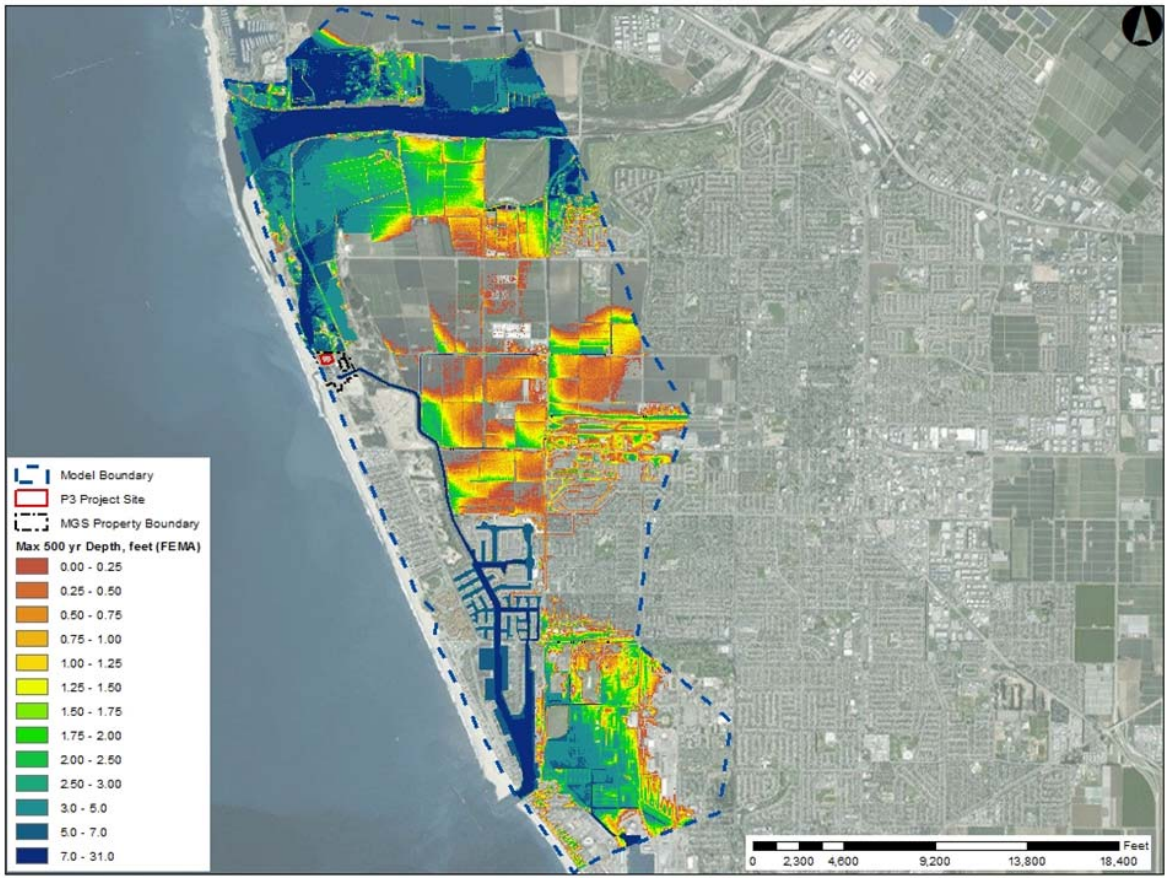

Figure 3-1: 500-year Maximum Flood Depth for Model Study Area

The results shown in **Figure 3-1** are fairly consistent with the FEMA FIRM (see **Figure 1-4**) and indicate that the drains appear to be the source of the 500-year flooding shown on the effective FIRM at the P3 site, rather than the Santa Clara River. Since the Edison Canal can contain the 0.2% annual chance flow within its banks, flooding from the drains would not reach the P3 site.

Based on the 500-year inundation area determined from the 2D model, it is apparent that the P3 site should not be included in the area of shaded Zone X. **Figure 3-4** shows the proposed alteration of the shaded Zone X so that the 500-year floodplain is extended around the end of the Edison Canal and would not include the P3 site.

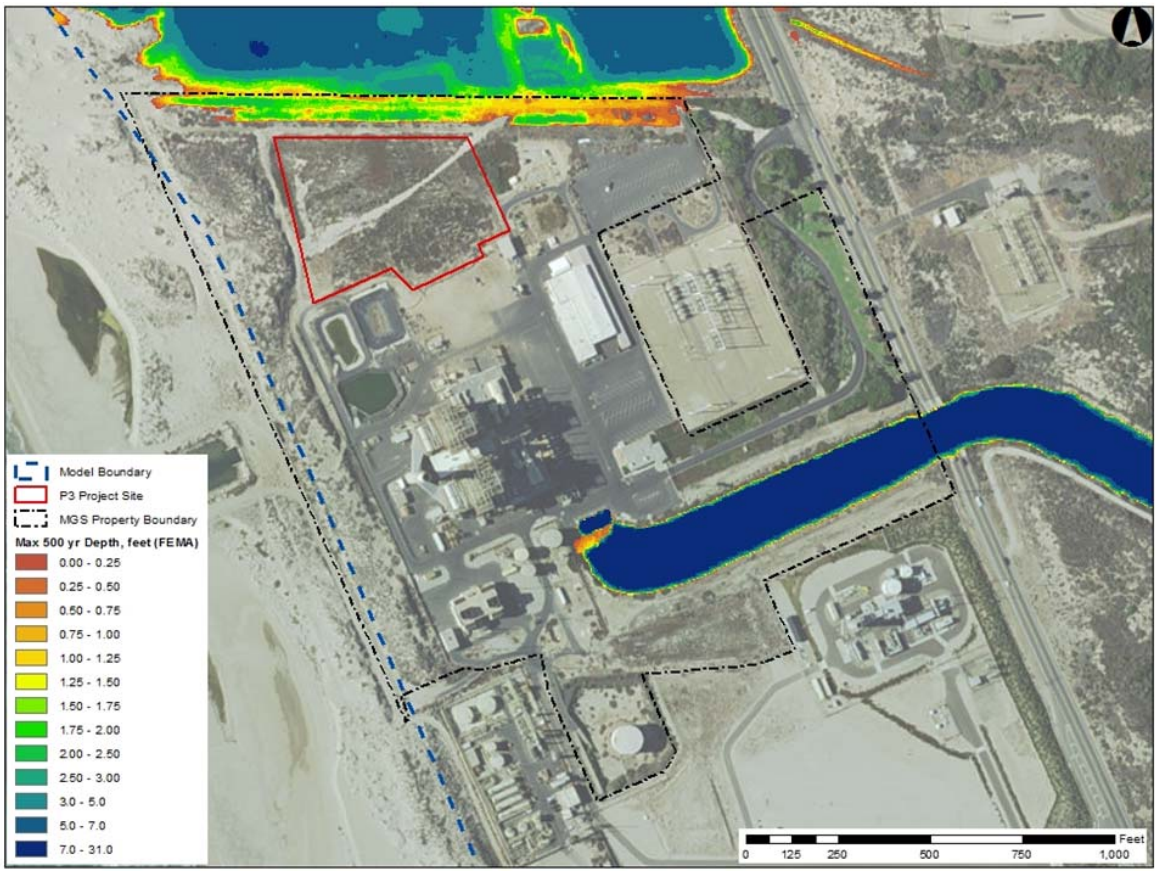

Figure 3-2: 500-year Maximum Flood Depth for MGS Property

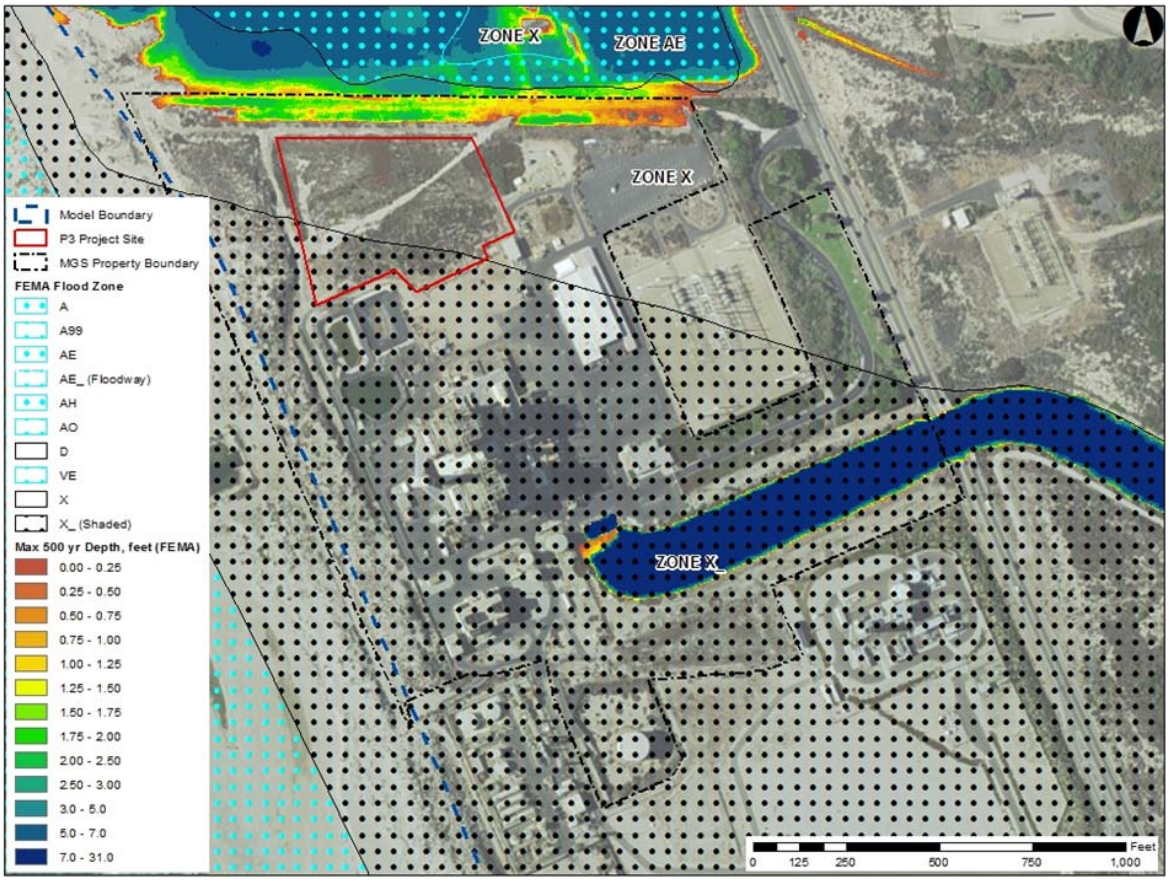

Figure 3-3: 500-year Maximum Flood Depth for MGS Property with Current FIRM Flood Zones

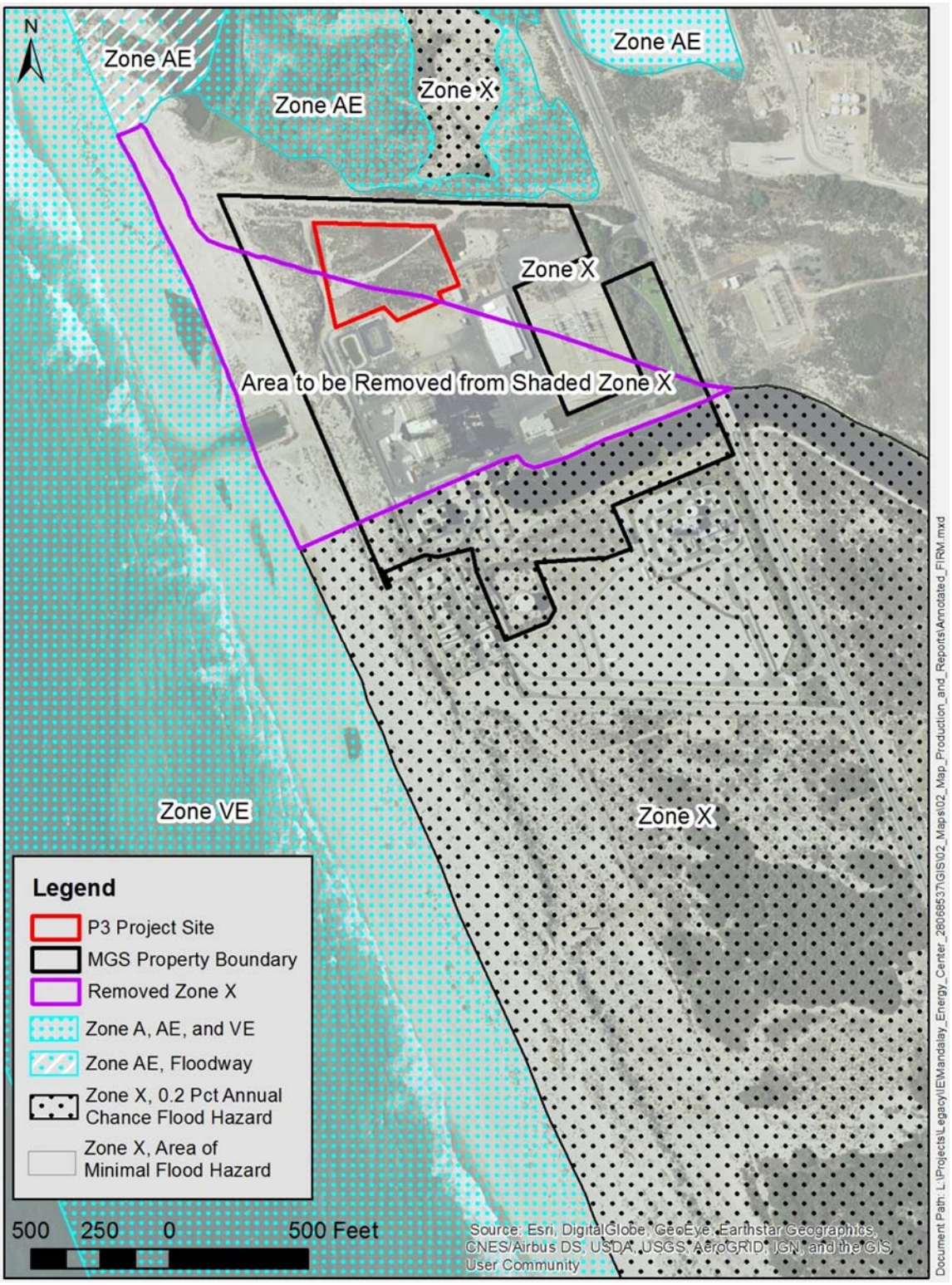

Figure 3-4: Annotated FIRM

4. References

FEMA Undated. Flood Insurance Rate Map (Work Map), City of Oxnard, CA. Maps 1 and 3. Undated.

FEMA 2010. Flood Insurance Rate Map, Ventura County, California and Incorporated Areas. Panels 885 and 905. Map Numbers 06111C0885E and 06111C0905E. Effective January 20, 2010.

FEMA 2015. Flood Insurance Study, Ventura County, California. Volumes 1, 2, and 3. Flood Insurance Study Number 06111CV001C. Revised January 7, 2015.

NOAA 2011. 2009 - 2011 CA Coastal Conservancy Coastal Lidar Project: Hydro-flattened Bare Earth DEM. Downloaded November 7, 2016. https://coast.noaa.gov/dataviewer

Saddleback Surveys, Inc. 2011. Topographic Survey Being a Control and Topographic Survey for Mandalay Generating Station.