HOPKINS GROUNDWATER CONSULTANTS, INC.
THE WATER RESOURCE SPECIALISTS

March 29, 2017
Project No. 15-004-01

Marina Coast Water District
11 Reservation Road
Marina, California 93933

Attention: Mr. Keith Van Der Maaten
General Manager

Subject: CalAm Monterey Peninsula Water Supply Project, Draft Environmental Impact Report/Environmental Impact Statement, Prepared for California Public Utilities Commission and Monterey Bay National Marine Sanctuary, January 2017.

Dear Mr. Keith Van Der Maaten:

As requested, Hopkins Groundwater Consultants, Inc. (HGC) has reviewed the hydrogeology-related and alternatives portions of the Cal-Am Monterey Peninsula Water Supply Project (MPWSP or the "project") Draft Environmental Impact Report/ Environmental Impact Statement (DEIR/EIS) prepared for the California Public Utilities Commission, dated January 2017, and is providing these comments for Marina Coast Water District's (MCWD) consideration and use. In preparing these comments, we have reviewed the relevant portions of: (1) the DEIR/EIS; (2) the DEIR/EIS appendices; (3) references cited in the DEIR/EIS and DEIR/EIS appendices; (4) the calibrated model developed for the MPWSP and the application of the superposition model scenario constructed to evaluate the project; (5) the documents provided to HGC in response to MCWD's data and public records act requests that were made available before March 27, 2017; and (6) publicly available information referenced at the end of our comments.[1]

<u>Preliminary Statement on DEIR/EIS's Analysis of MPWSP's Hydrogeological Analysis.</u>

The DEIR/EIS frames the MPWSP and the project area hydrogeology in a manner that would lead anyone to believe the MPWSP can cause no harm and will ultimately be of benefit to the entire Salinas Valley Groundwater Basin (SVGB) as well as all groundwater users in the project area. In painting this picture, however, the DEIR/EIS mischaracterizes the project and the complex hydrogeological conditions in the project area by incorrectly suggesting, without any supporting evidence in many cases, that:

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[1] / As you are aware, our review of the DEIR/EIS was hampered by the extensive delays in receiving requested information relied on in the DEIR/EIS's groundwater analysis and modeling. In addition, we still have not received some of the information we requested through MCWD's data and public records act requests that would further inform our comments and analysis.

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1. The intake system will induce seawater flow vertically through the ocean floor by using facilities that extend beyond the coastline at sufficiently shallow depths to virtually eliminate the production of groundwater from the overdrafted SVGB, and in particular the Marina Subarea[2]. As explained in Comment Nos. 2, 6, 9, 11, 14, 22, and 23 below, this assertion is not accurate.
2. The shallow aquifers along the coastline around the CEMEX site are fully intruded by seawater and the groundwater in the project area of SVGB consists almost entirely of highly saline seawater that extends up to 8 miles inland. As explained in Comment Nos. 3, 7, 9, 15, 16, 17, 19, 20, 21, 22, 24, 29, 33, 36, and 37 below, this characterization ignores contrary information, is a gross misrepresentation of the aquifers in the Marina Subarea, and is simply not accurate.
3. The groundwater gradient (flow) in all aquifer zones produced by the project is onshore (inland or away from the coast) in the entire area that is potentially impacted by the MPWSP and efforts to abate seawater intrusion (prohibition of groundwater production in coastal areas of SVGB Pressure Area, etc.) have had little to no effect on restoring coastal conditions and are not expected to over the entire life of the project. As explained in Comment Nos. 2, 3, 6, 11, 15, 16, 19, 23, 26, and 37 below, this is also not accurate.
4. Historical studies are sufficiently complete and comprehensive in nature to document conditions in the vicinity of the project using existing wells (or without wells) and that baseline conditions inland of the project area, within the area the model shows will become completely intruded by seawater, do not need to be investigated prior to designing the project and modeling its impacts. As explained in Comment Nos. 3, 7, 9, 15, 16, 17, 18, 19, 20, 22, 24, 26, 27, 28, 29, 30, 33, 34, 36, 37, 38, 39, 42, and 43 below, this is not accurate.

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[2] / The "Marina Subarea" is used in these comments to refer to the combination of (1) that portion of the 180/400 Foot Aquifer Subbasin of the SVGB located south of the Salinas River plus (2) the northwest portion of the Monterey Subbasin that would be impacted by the proposed slant well pumping on the CEMEX property. While the Marina Subarea is not a formally DWR-recognized subarea, it contains highly complex hydrogeological conditions that are very different from the portion of the 180/400 Foot Aquifer Subbasin north of the Salinas River as explained herein. The Marina Subarea is the coastal subarea of the overdrafted SVGB and is the area that would be directly impacted by the proposed project feed water pumping of 27,000 AFY. The Monterey County Water Resources Agency has defined the "Pressure Area" as a combination of the DWR-designated 180/400 Foot Aquifer Subbasin and the former Seaside Area and Corral De Tierra Subbasins (now the new Seaside and Monterey Subbasins). The Pressure Area is not a formally DWR-recognized subarea either, but that term is used throughout the DEIR/EIS.

5. The limited exploration and testing to date sufficiently validates the assumptions in the DEIR/EIS's groundwater model(s) used to simulate impacts of the proposed project and additional modeling based on actual conditions identified through recent fieldwork and laboratory testing is not necessary to disclosure of the project's potential groundwater impacts or evaluate of project alternatives. As explained in Comment Nos. 2, 4, 5, 6, 15, 18, 25, 26, 27, 28, 29, 31, 32, 33, 38, and 39 below, this is not accurate.
6. The DEIR/EIS's superposition model is reliable and demonstrates that the project's potential impacts on groundwater levels and groundwater quality in the Marina Subarea will be less than significant. As explained in Comment Nos. 4, 5, 8, 15, 25, 26, 27, 28, 30, 31, 32, 35, 37, and 39 below, this is not accurate.
7. Mitigation of the project's impacts can be accomplished through multiple methods and means. As explained in Comment Nos. 1, 4, 6, 8, 9, 10, 11, 12, 13, 21, 22, 23, 24, 25, 29, 30, 34, 35, 36, and 40 below, this is not accurate.

With these factors and hydrogeological conditions in mind, HGC has reviewed pertinent sections of the DEIR/EIS, calibrated model and superposition model numerical files that were made publicly available, numerous historical reports, and the baseline hydrogeological data that have been generated prior to February 2017 near the CEMEX site and south of the Salinas River (and is still being generated at the time of this review), and we offer the following comments for your consideration. Following our detailed comments on the DEIR/EIS, we also provide a summary of our conclusions and recommendations at end of the document.

Prior to turning to our specific comments, we note that our review of the documentation of the groundwater models that were constructed to simulate surface water and groundwater in the SVGB indicates there is a fundamental problem with the modeling utilized for the DEIR/EIS. Namely, the calibrated North Marina Groundwater Model ($NMGWM^{2016}$) was abandoned and replaced with the inferior superposition model because of technical problems. While not explained in the DEIR/EIS, based on our review, the problems appear to originate with the Salinas Valley Integrated Ground and Surface Water Model (SVIGSM) where all wells used to calibrate the model are located north of the Salinas River outside of the Marina Subarea/project area (LSCE, 2015).[3] The problems, however, carry over to the $NMGWM^{2016}$ and CEMEX Model (CM), which were used to create the DEIR/EIS's superposition model as explained below.

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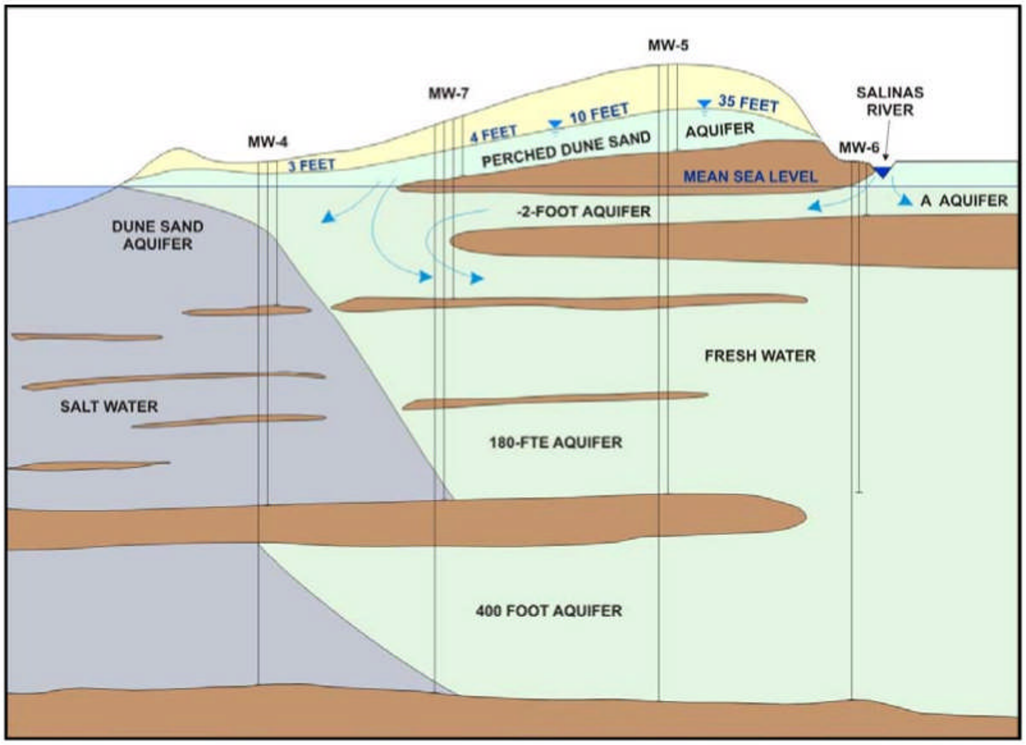
[3] / The Marina Subarea/project area as defined by available studies (KJC, 2004, Geoscience, 2014) as being separated from the main portion of the Pressure Area north of the Salinas River by a geologic facies change (the depositional environment) creating differences in the strata that formed as the 180-Foot Aquifer and 180-Foot Equivalent Aquifer (180-FTE), and the shallower Dune Sand and A-Aquifer zones.

The NMGWM^{2016} domain covers the coastal area northwest of Salinas and uses input from the SVIGSM for its simulations. The NMGWM^{2016}, however, largely uses wells north of the Salinas River as target wells for model calibration while incorporating only a few wells from the Fort Ord area south of the river along with abbreviated data sets from the TSW monitoring wells. The results of the NMGWM^{2016} simulations were used as input to the CM, which has a domain that covers a smaller area centered around the CEMEX active mining area and was used to simulate effects of production proposed for the TSW project. The NMGWM^{2016} was then initially used to evaluate the effects of the proposed MPWSP, but later abandoned because of the inability to complete satisfactory model calibration in the Dune Sand and 180-FTE Aquifers south of the river.

It appears the NMGWM^{2016} modeling was abandoned due to the difficulty with model calibration in the modelers attempts to add hydrogeologic information that was not included in the SVIGSM. This additional information generated by the pre-project studies indicates a semi-perched groundwater condition within the Dune Sand Aquifer that is also documented by other studies. This condition is of particular importance because it has resulted in Dune Sand Aquifer groundwater elevations in the Fort Ord area of 70 to 90 feet above mean sea level (amsl) (Ahtna, 2015), which decline to approximately 35 feet amsl at MW-5S. The presence and effects of this perched layer of fresh water was attempted to be incorporated in the NMGWM^{2016}, but was unsuccessful. The wells located south of the Salinas River in the project area that were used for calibration to compare simulated results with observed groundwater level elevations produced model error in the Dune Sand Aquifer (model layer 2) on the order of 30%. Consequently, there was not a high level of confidence in the accuracy of model predictions in the project area. Nonetheless, the hydraulic conductivity values used unsuccessfully in the NMGWM^{2016} were subsequently used to create the superposition model. As a result, the superposition model uses all the aquifer parameters of the poorly calibrated NMGWM^{2016} and assigns new boundary conditions and starting heads of zero. This maneuver, however, does not fix or improve the problems with the DEIR/EIS's modeling or its reliability. In fact, instead of improving on the poorly calibrated model, the maneuver removes all other stresses and recharge conditions in the basin and fails to address the project's impacts on the beneficial groundwater conditions that have developed in the Marina Subarea. Not only does this make the DEIR/EIS's assessment of groundwater even more unreliable, as a result the DEIR/EIS is incapable and therefore fails to evaluate the project's impacts on semi-perched groundwater conditions within the Dune Sand Aquifer and the semi-confined -2-Foot Dune Sand Aquifer conditions. This failure is fatal to the DEIR/EIS's ability to reliably analyze the project's potential groundwater impacts.

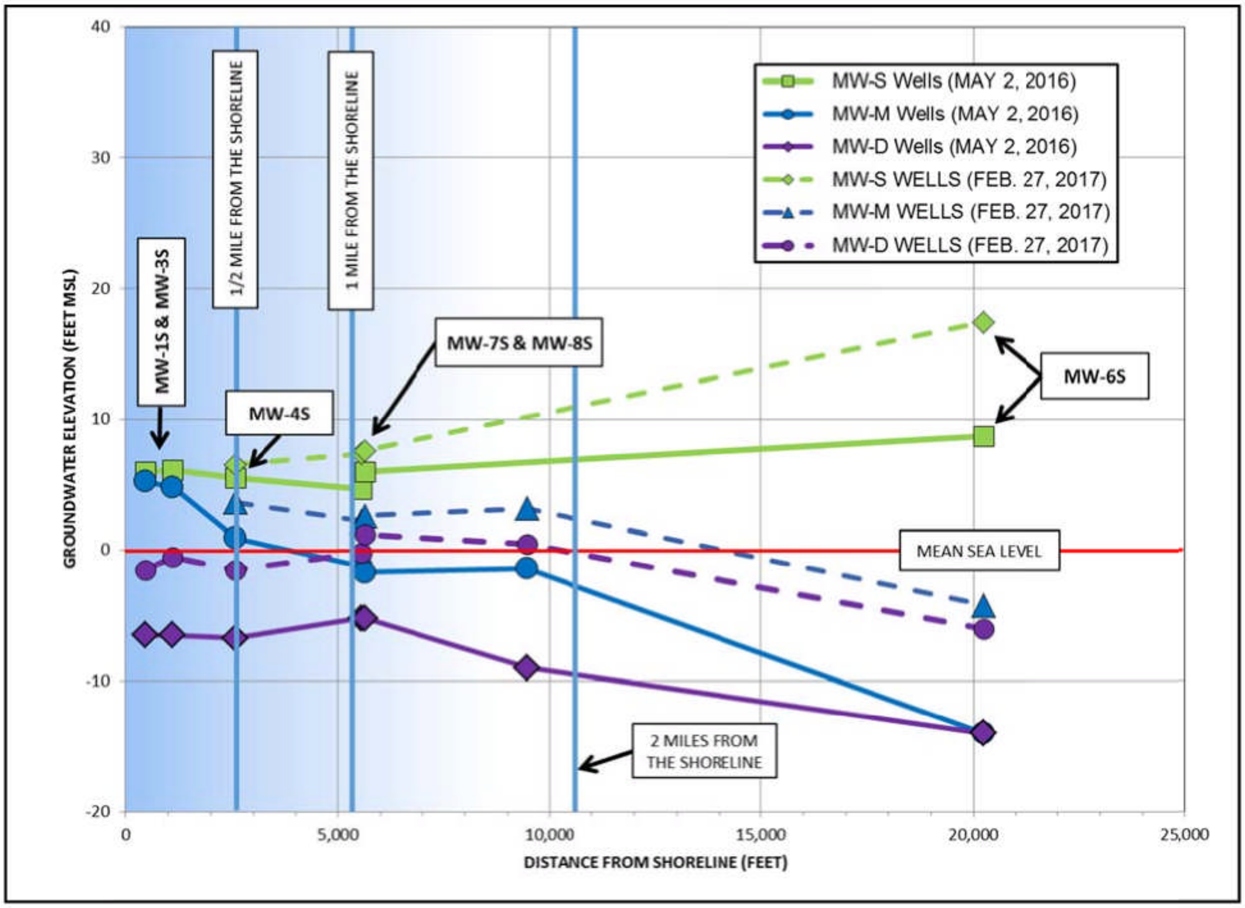
As discussed in detail below, the pre-project studies indicate that MW-1S, MW-3S, MW-4S, and MW-7S likely are connected to the Dune Sand Aquifer zone recognized as the -2-Foot Aquifer that is identified beneath the County landfill site (Geoscience, 2016). The elevation and thickness of this zone indicates it likely has a hydraulic continuity to the A-Aquifer zone in the main portion of the SVGB located north of the river. The concept demonstrated by these data is further illustrated on Diagram 1 – Conceptual Hydrogeology of Marina Subarea along with the perched Dune Sand Aquifer condition.

Diagram 1 – Conceptual Hydrogeology of Marina Subarea



Also discussed below, recent data obtained regarding the gradient beneath the landfill (near MW-5) shows recharge from the river that creates a groundwater gradient toward the coastline. Importantly, this is consistent with the elevated heads in MW-6S where it also receives recharge from the river. Diagram 2 – Water Level Elevation and Shoreline Proximity compares available data that were collected just prior to restarting the long term pumping test on May 2, 2016, and the high water level conditions observed on February 27, 2017. This diagram shows the wells that are constructed in the Dune Sand Aquifer zone that is equivalent to the -2-Foot Aquifer zone along with MW-6S, which is in the A Aquifer zone (Geoscience, 2016). As shown by these data, there is a groundwater gradient that moves water from the river area of recharge toward the coastline in the Marina Subarea of the SVGB. Monitoring Well MW-5S data with water levels in excess of 35 feet amsl were not included in Diagram 2 because it is now recognized to be screened in a semi-perched dune sand layer on top of the aquitard layer identified as the Fort Ord Salinas Valley Aquitard (FO-SVA). The FO-SVA layer overlies the -2-Foot Aquifer/Dune Sand Aquifer, which is reportedly 30 to 40 feet thick and rests on the Salinas Valley Aquitard near the river in the Marina Subarea northeast of the project site (Geoscience, 2016).

Diagram 2 – Water Level Elevation and Shoreline Proximity



The significance of this condition south of the Salinas River is illustrated by Diagram 3 – Particle Tracking With No Background Gradient, and Diagram 4 – Particle Tracking With 8-Foot Gradient Across Model Domain. The DEIR/EIS, however, does not recognize this condition due to the poor model calibration.

Turning back to the modeling used in the DEIR/EIS, the $NMGWM^{2016}$ was constructed with a landward gradient in the 180-Foot Aquifer and does not simulate the -2-Foot-Aquifer beneath the confining layer that underlies the perched portion of the Dune Sand Aquifer. Initial head conditions create a constant landward flow of seawater beneath the perched layer. The particle tracking results during operation of wells for the MPWSP were not presented for either the calibrated $NMGWM^{2016}$ or the superposition model, however particle movement would be similar to Diagram 3, which has a flat gradient prior to pumping, like the superposition model. As shown in Diagram 4, an 8-foot gradient across the entire model toward the coastline results in a different flow pattern and the capture of groundwater that is flowing toward the shoreline like the groundwater in the semi-perched Dune Sand Aquifer above the confining layer and groundwater in the -2-Foot Dune Sand Aquifer below the confining layer (see Diagram 2).

Diagram 3 – Particle Tracking With No Background Gradient

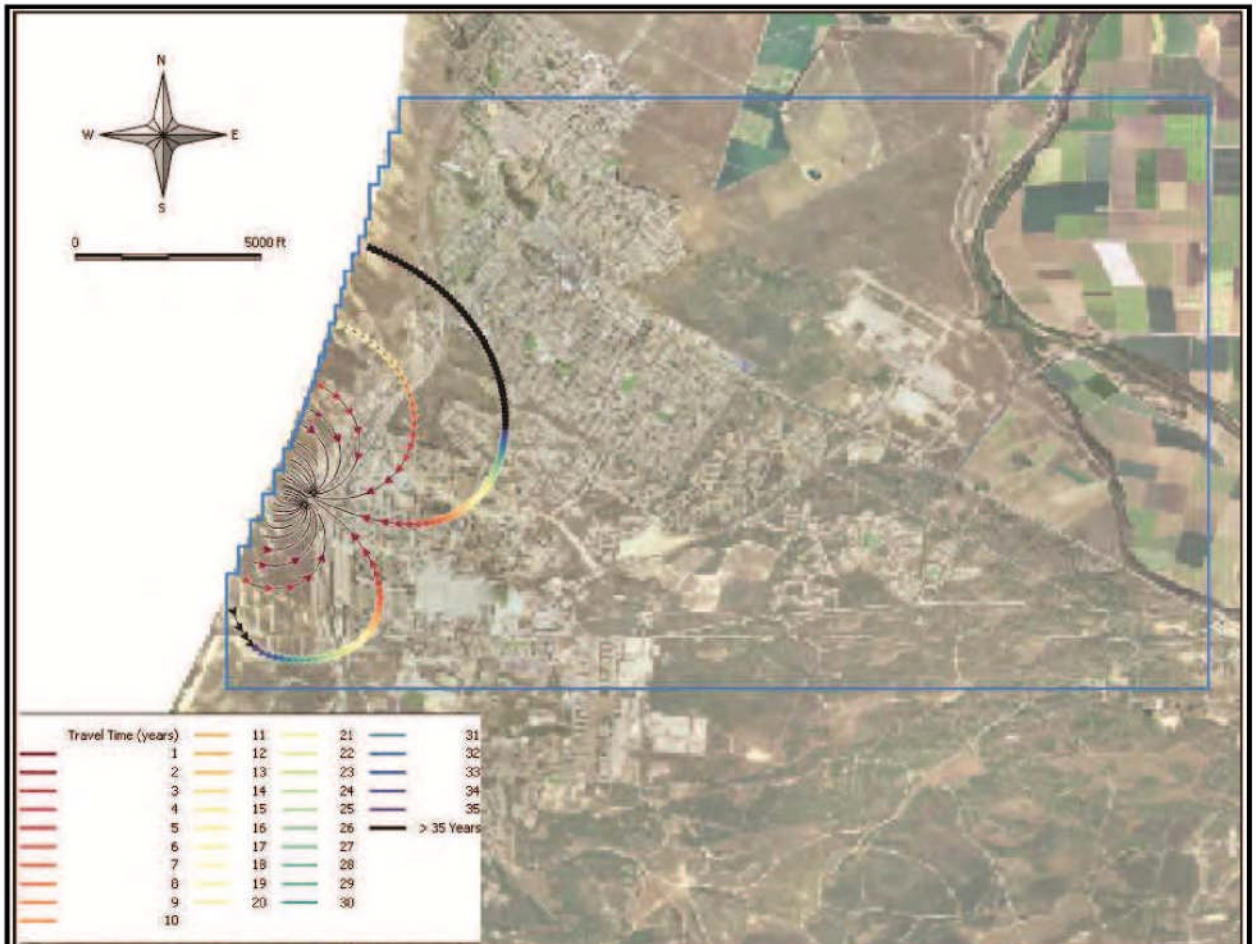


Figure 7: Simulated Capture Zone – No Background Gradient

FROM (HYDROMETRICS, 2006)

Again, this failure is fatal to the DEIR/EIS's ability to reliably analyze the project's potential groundwater impacts. Given the potential magnitude of the increased groundwater production, the impacts to the SVGB, in particular the Marina Subarea, the project's potential impact on the Marina Subarea are very likely grossly understated by the superposition model. Therefore, a well calibrated model is needed to quantify the project's potential impacts with a reasonable scientific basis. Specifically, a model that utilizes all the recharge and discharge components included in the older SVIGSM, and constructed with a level of detail reflecting our present understanding and knowledge of the hydrogeological system in the Marina Subarea is needed. Moreover, because seawater is an issue, a dual density model should be used to allow calculation of the head differences between the ocean water offshore and onshore, and freshwater in the aquifer zones inland and to allow prediction of water quality changes and the concentrations of feedwater that would be produced by the proposed project.

**Diagram 4 - Particle Tracking With
8-Foot Gradient Across Model Domain**

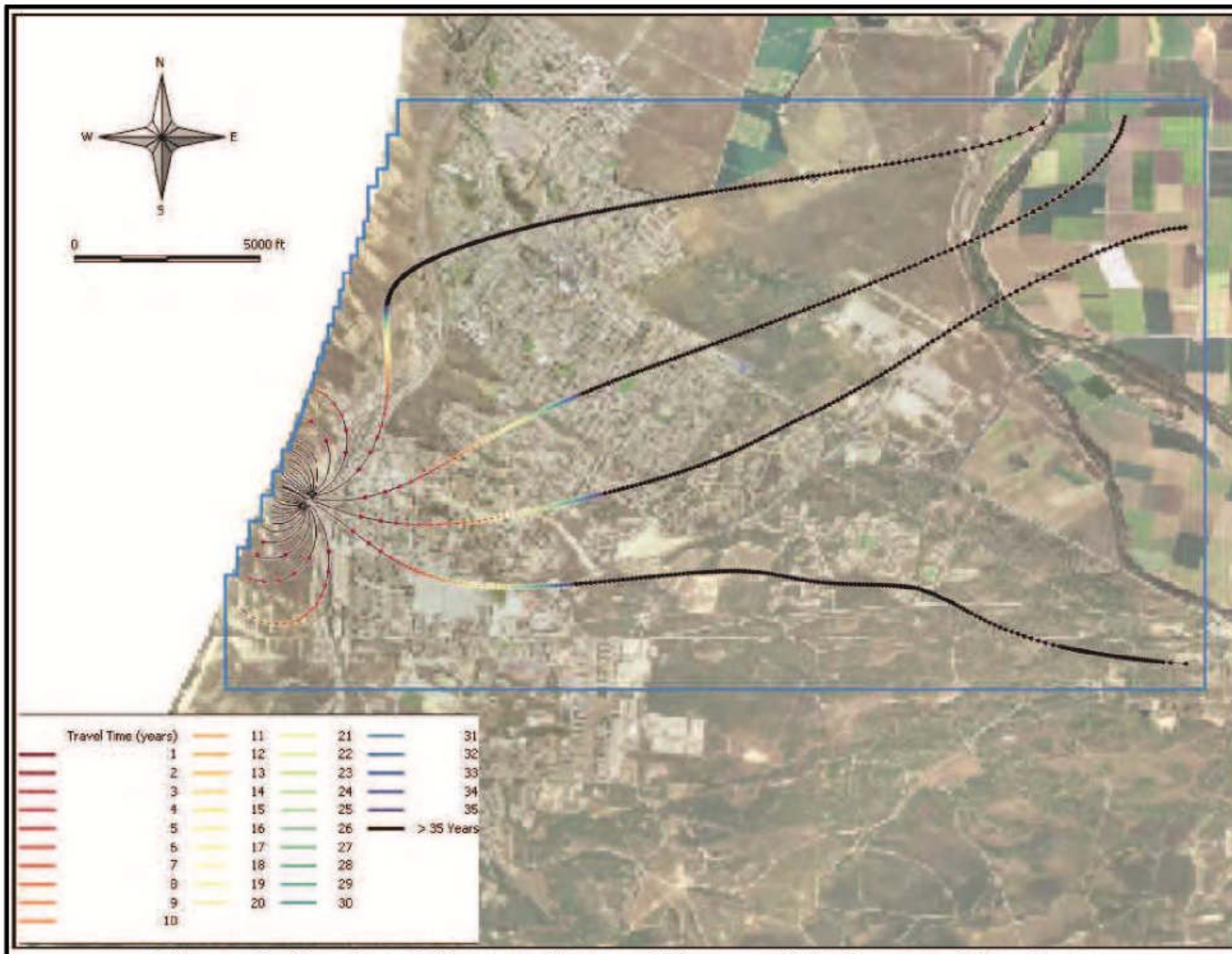


Figure 8: Simulated Capture Zone – Westward Background Gradient

FROM (HYDROMETRICS, 2006)

With this understanding of perched groundwater conditions within the Dune Sand Aquifer in the Marina Subarea and with the fundamental flaws in the DEIR/EIS's modeling, we offer the following specific comments on the DER/EIS. To simplify the presentation of our comments and assist your review of these pertinent issues, we have excerpted or summarized the sections of the DEIR/EIS that we address and subsequently provide our comments or concerns of the hydrogeological issues that are crucial to understanding the potential project impacts. Please note that while we have selected certain sections of the DEIR/EIS to comment upon, our comments apply to similar statements that are repeated in other sections of the DEIR/EIS.

Comments on DEIR/EIS Chapter 2 (Water Demand, Supplies, and Water Rights).

DEIR/EIS's water rights discussion fails to estimate the amount of return water required for the project and may have insufficient supply to meet all return water requirements:

On **Page 2-22 of the DEIR/EIS** states:

> MPWSP source water would include some brackish groundwater from the SVGB. As part of the proposed project, CalAm would return to the SVGB a volume of desalinated product water equal to the amount of SVGB groundwater included in the source water. While CalAm's SVGB return water obligation will be based on the amount of fresh water in the source water, in order to consider the effect of the return water for this EIR/EIS, groundwater modeling simulated scenarios with return water obligations representing 0, 3, 6, and 12 percent of the source water (see Section 4.4, Groundwater Resources). The amount of SVGB groundwater included in the source water is expected to decrease over time (CalAm et al., 2016b).

Then on **Page 2-35 of the DEIR/EIS** states:

> CalAm proposes as part of the MPWSP to return to the Basin (in the manner further described below) the fresh water portion of the brackish source water. In other words, although the groundwater modeling indicates that the Basin water that could be withdrawn by the supply wells would be brackish and thus not fresh, potable water, the MPWSP would return to the Basin desalinated product water in the amount of the fresh water molecules that make up the withdrawn brackish Basin water. In that the quantity of such fresh water component of the supply water is not currently known, the modeling and the EIR/EIS analysis assess a range of return water between 0 and 12 percent of the source water.

HGC Comment No. 1:

The DEIR/EIS fails to disclose the amount of return water that would be necessary to replace the groundwater drawn from the SVGB as proposed in the Project Description.[4] Nor does the DEIR/EIS provide any discussion or information to support bracketing the return water percentage between 0% to 12%. In fact, it is likely that the return water obligation would be more than 12%, especially in the initial years of operation. Even the NMGWM^{2016} calibrated model, which likely underestimates the slant wells production of groundwater as discussed in

[4] / As discussed below and in Comment No. 4 below, the return water proposal in the DEIR/EIS does not address the amount return water that is needed to mitigate the project's cumulative impacts on groundwater quality that would be required to comply with the SWRCB's report, the SGMA, and CEQA.

Comment No. 5 below, predicts up to 22% of groundwater will be produced from the Dune Sand Aquifer and another 3.5% of groundwater will be produced from the 180-FTE Aquifer during the initial time step.[5]

While it is not stated exactly how the range of 0 to 12 percent estimates were determined in the DEIR/EIS, an analysis of the salinity of the feedwater using ocean water with a total dissolved solids (TDS) concentration of 33,500 milligrams per liter (mg/l) and groundwater with an average TDS concentration of 440 mg/l can yield an estimate. Using these values and the laboratory test results obtained during the MPWSP's Test Slant Well (TSW) production period and included in the water quality report to the Hydrogeologic Working Group (HWG) (Geoscience, 2015p, Table 2), the TSW produced water with an average TDS concentration of 25,033 mg/l and was comprised of 25.6 percent groundwater and 74.4 percent ocean water.

Over the initial period of the long-term pumping test, the TDS concentration had reached approximately 29,100 mg/l prior to cessation of the test in early June 2015. Subsequent laboratory test results indicate that on December 12, 2016, and January 19, 2017 the TDS concentration had reached approximately 30,200 mg/l and 31,700 mg/l, respectively. Using these values along with the average February 2017 value of 29,900 mg/l, we can estimate a range of return water quantities by considering the groundwater component produced if a groundwater TDS concentration of 1,000 mg/l (State Drinking Water secondary standard) or 3,000 mg/l (Regional Water Quality Control Board [RWQCB] Water Quality Control Plan (WQCP) for the Central Coast Basin, water quality defined for beneficial uses) were used compared to the reported 440 mg/l average groundwater TDS concentration. Table 1 – Feedwater Composition Based on TDS Concentrations shows a comparison of the results using these values.

As shown, approximately 13.3 to 14.4 percent of the feedwater was groundwater when pumping was initiated. While higher salinity feedwater was produced by the TSW in December 2016 and January 2017, the concentration declined by February 2017 where approximately 11 to 12 percent of the groundwater produced would need to be returned. As explained below (see Comment No. 33), the water quality bias of the TSW to be more saline than other comparable

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[5] / Modeling summarized in Appendix E1 of the **April 30, 2015 MPWSP Draft EIR** (Geoscience, 2014a, Figure 20) indicates that the initial groundwater production would be much greater during the initial production period (50 to 40 percent during the first year) and would decrease over a 4-year period to an estimated 4 percent after 4 years of production. Our review of the NMGWM^{2016} calibrated model results indicates that initially over 25 percent of the production will come from groundwater and that after 5 years, the component predicted to come from the SVGB is approximately 10 percent. The NMGWM^{2016} calibrated model, like the prior modeling, likely underestimates the slant wells production of groundwater (See Comment Nos. 3 and 9 below) and should not be considered to represent maximum amount of groundwater that may need to be returned to comply with the Agency Act.

wells located away from the CEMEX operations is a result of the dredge pond location and the salt water discharges that occur inland of the TSW location.

Notably, if a greater percentage of groundwater is produced than presently estimated by the DEIR/EIS, which is likely, or if usable groundwater salinity increases, the annual amount of return water to the SVGB would increase accordingly. The higher return water volumes required during the initial production period when a greater component of groundwater is pumped is not addressed in the DEIR/EIS. Please note that our comment here should not be interpreted to suggest the return of all groundwater to the SVGB as proposed MPWSP's return water proposal would mitigate the project's impacts to the Marina Subarea. The inadequacy of the DEIR/EIS's analysis of the MPWSP's return water proposal and DEIR/EIS's failure to mitigate the project's cumulative impacts on groundwater is discussed in HGC Comment No. 4.

Table 1 – Feedwater Composition Based on TDS Concentrations

OCEAN WATER SALINITY (MG/L)	GROUNDWATER SALINITY (MG/L)	FEEDWATER SALINITY (MG/L)	GROUNDWATER PERCENTAGE	OCEAN WATER PERCENTAGE
33,500	440	29,085	13.3	86.7
33,500	1,000	29,085	13.5	86.5
33,500	3,000	29,085	14.4	85.6
33,500	440	30,200	10.0	90.0
33,500	1,000	30,200	10.2	89.8
33,500	3,000	30,200	10.8	89.2
33,500	440	31,700	5.4	94.6
33,500	1,000	31,700	5.5	94.5
33,500	3,000	31,700	5.9	94.1
33,500	440	29,900	10.9	89.1
33,500	1,000	29,900	11.1	88.9
33,500	3,000	29,900	11.8	88.2

Finally, the DEIR/EIS cites to the settlement agreement regarding return water as support for the assumption that the amount of SVGB groundwater included in the source water is expected to decrease over time. This assumption appears to be based on the belief that the project's cumulative impacts will make the entire Marina Subarea hypersaline and therefore less groundwater will be available to pump. Under the proposed return water agreement and project description, the greater the project's cumulative impacts to the Marina Subarea water quality, the less mitigation Cal-Am is required to provide. Not only is this inconsistent mitigation requirements under the California Environmental Quality Act (CEQA), it ignores the Sustainable Groundwater Management Act's (SGMA) mandates as discussed below. As shown in Diagram 4, when efforts under SGMA increase inland groundwater levels to further abate seawater intrusion, a greater amount of groundwater will be captured by the slant well intake system.

<u>DEIR/EIS's water rights discussion presents misleading picture of where slant wells will draw water:</u>

One such example is on **Page 2-30,** where the DEIR/EIS states, "The proposed project (MPSWP) and Alternative 5a are designed to take supply water from the ocean via underground slant wells that draw water from the earth underneath the ocean … b***ecause the project supply wells could draw some water from the Basin***, concerns have been expressed as to whether CalAm does or will hold legal rights to use the water that would be taken by the slant wells, treated at the desalination plant and supplied to CalAm customers located outside the Basin." (emphasis added)

<u>HGC Comment No. 2</u>:

The above statements are likely to mislead the public and the Commissioners. While it may be accurate to state that the proposed slant wells will pump most of the water from underneath the ocean, to state that the project supply wells "could draw some water from the Basin," using the term "could" inaccurately suggests there is some doubt that groundwater would be drawn from the SVGB.

While the amount of groundwater that would be drawn from the SVGB cannot be accurately determined based on available information or DEIR/EIS modeling to date, there is no question a substantial amount of groundwater will be drawn from the SVGB – and based on currently available information, a much greater quantity than indicated in the DEIR/EIS as discussed in Comment No. 1 and explained later in these comments.

<u>DEIR/EIS's water rights discussion inaccurately suggests the MPWSP will create "developed water" because all the aquifers in the Marina Subarea of the SVGB are contaminated by seawater and will not support beneficial uses; this conflicts with available data from the TSW's monitoring wells:</u>

Specifically, **Pages 2-32 and 33** of the DEIR/EIS state:

> Essentially, if the extraction of otherwise unusable Basin groundwater will not harm lawful water users and any fresh water extracted can be returned to the Basin without injury to existing legal water users, then CalAm would have rights to the portion of feedwater that comes from the Basin because the MPWSP product water that contains such Basin water would be "developed water."

> Developed water is water that was not previously available to other legal users and that is added to the supply by the developer through artificial means as a new water source. "The key principle of developed water is if no lawful water user is injured, the effort of an individual to capture water that would otherwise be unused should be legally recognized." Report at 37. Due to long-term seawater intrusion (where the seawater has moved inland) in the Basin, large areas of the Basin groundwater are impaired as to drinking and agricultural uses. The geographic areas from which the project supply wells could draw water inland of the sea are indeed intruded by seawater. (See Section 4.4, Groundwater Resources) "Since this groundwater is reportedly impaired, it is unlikely that this water is, or will be put to beneficial use." Report at 15. In fact, in response to concerns over seawater intrusion and historic overdraft in the Basin, the County adopted Ordinance No. 3709, which precludes the installation of new groundwater wells and prohibits groundwater pumping between mean sea level and 250 feet below mean sea level in certain areas.

HGC Comment No. 3:

Contrary to the DEIR/EIS suggestion, "developed water" is not being created by the MPWSP, but is already there because of the restriction on pumping from Monterey County adopted Ordinance No. 3709 (and conservation efforts in the area) and it would otherwise be available to existing overliers and appropriators if it were not for the Ordinance restrictions. As shown in Table 2 – Groundwater Composition Based on TDS Concentrations – the salinity of groundwater in the Marina Subarea affected by the project is not largely intruded by seawater as claimed in the DEIR/EIS. Using the TDS concentration of 33,500 mg/l for ocean water and the TDS concentration of native groundwater 440 mg/l,[6] we analyzed the composition of the local groundwater in the aquifer zones that will be produced by the MPWSP slant wells by using the following equation:

$$OWP = (GS-IS) / (OWS - IS) \times 100.$$

OWP = Ocean Water Percentage, (%)
GS = Groundwater Salinity, (mg/l)
IS = Inland Water Salinity (TDS = 440 mg/l)
OWS = Ocean Water Salinity (TDS = 33,500 mg/l)

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[6] / Our use of 440 mg/l here is based upon the TDS concentration provided by Geoscience as the SVGB average concentration. It should not be used to infer that groundwater that exceeds 440 mg/l has no beneficial uses. As discussed in Comment No. 21, the DEIR/EIS assumption that groundwater that exceeds 500 mg/l has no beneficial uses is wrong and inconsistent with the Basin Plan.

The analysis of available data shows that the percentage of ocean water decreases significantly within a short distance from the coastline. It also shows that within the area affected by the project, the groundwater is not the salinity of seawater as claimed in above passage – or intruded for up to 8 miles inland as stated in the DEIR/EIS on page 4.4-31. A visual presentation of these data is shown in Diagram 5 – Percent Groundwater and Ocean Water with Distance from the Shoreline.

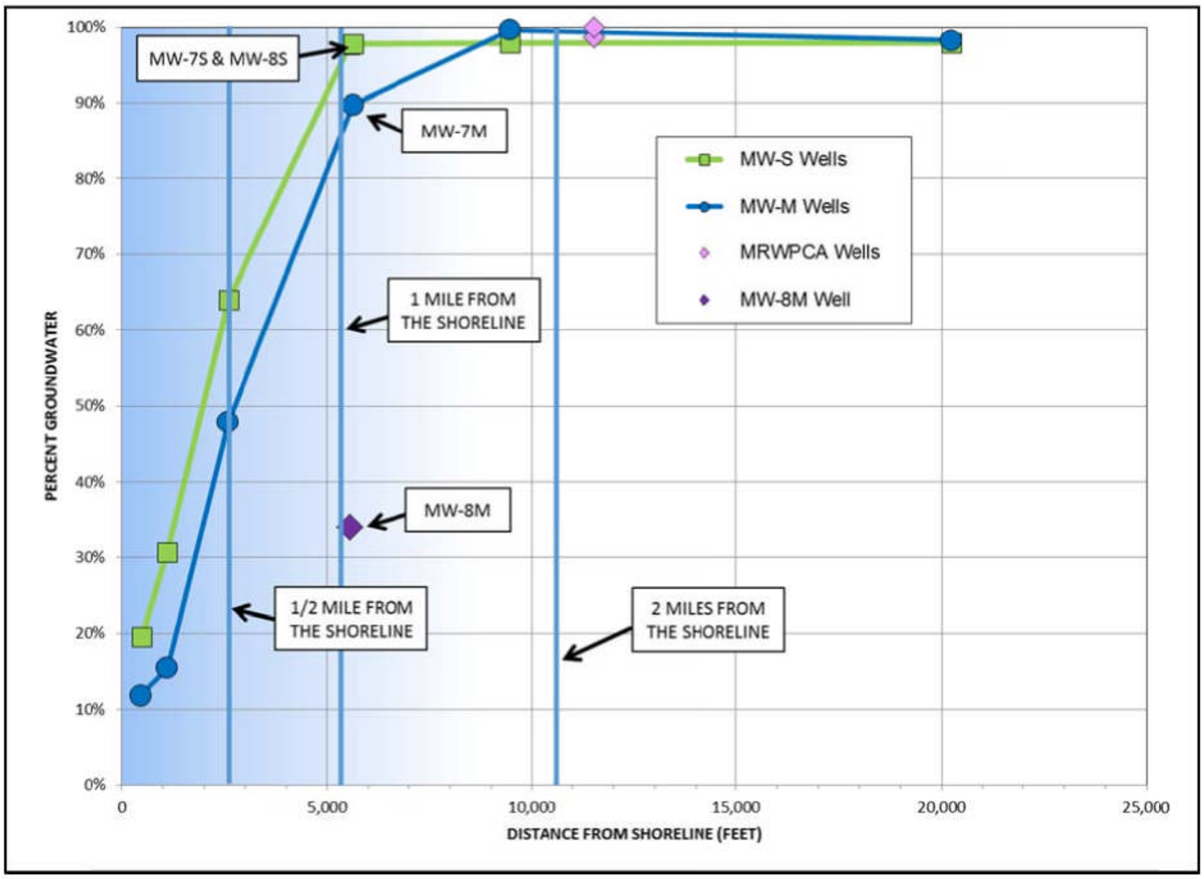
Table 2 – Groundwater Composition Based on TDS Concentrations

GROUND-WATER SAMPLE LOCATION	OCEAN WATER SALINITY/TDS (MG/L)	GROUND-WATER SALINITY/TDS (MG/L)[1]	GROUND-WATER SAMPLE SALINITY/TDS (MG/L)	PERCENT GROUND-WATER	PERCENT OCEAN WATER	DISTANCE FROM THE COASTLINE (FEET)
DUNE SAND AQUIFER OR A-AQUIFER						
MW-1S	33,500	440	27,050[2]	19.5 %	80.5 %	480
MW-3S	33,500	440	23,350[2]	30.7 %	69.3 %	1,100
MW-4S	33,500	440	12,350[2]	64.0 %	36.0 %	2,590
MW-5S	33,500	440	1,141[2]	97.9 %	2.1 %	9,450
MW-6S	33,500	440	608	99.5 %	0.5 %	20,240
180-FOOT AQUIFER						
MW-1M	33,500	440	29,600[2]	11.8 %	88.2 %	465
MW-3M	33,500	440	28,400[2]	15.4 %	84.6 %	1,102
MW-4M	33,500	440	17,700[2]	47.8 %	52.2 %	2,580
MW-5M	33,500	440	558[2]	99.6 %	0.4 %	9,462
MW-6M	33,500	440	966	98.4 %	1.6 %	20,240
400-FOOT AQUIFER						
MRWPCA NO. 1	33,500	440	890[3]	98.6 %	1.4 %	11,530
MRWPCA NO. 2	33,500	440	350[4]	100.3 %	-0.3[4]	11,530

1 – AVERAGE INLAND WATER SALINITY FROM (GEOSCIENCE, 2015a)
2 – AVERAGED FROM DATA IN (GEOSCIENCE, 2015p) TABLE 2
3 – DATA FROM (GEOSCIENCE, 2015p) FIGURE 3-5
4 – WATER QUALITY BETTER THAN INLAND WATER SALINITY

Figure 1 – Average Chloride Concentrations, Dune Sand and 180-Foot Aquifer (attached to these comments) shows the location of the wells being monitored for the TSW project. As shown, the chloride concentrations in the 180-Foot Aquifer decrease from 9,664 mg/l in MW-4M to 105 mg/l in MW-5M, which is in the middle of the reported zone of seawater intrusion that is defined by a chloride concentration of 500 mg/l (B&C, 2015). Figure 2 – Average Total Dissolved Solids Concentrations, Dune Sand and 180-Foot Aquifer (attached to these comments) shows this same trend in the average TDS values obtained from available laboratory data (Geoscience, 2015p) and unpublished data provided by the CPUC in response to an MCWD data request, which we understand MCWD will include with its comments.

Diagram 5 – Percent Groundwater and Ocean Water with Distance from the Shoreline



The Monterey Regional Water Pollution Control Agency (MRWPCA) well locations are indicated on Figures 1, and 2, for reference, however, available data are provided on Figure 3 – MRWPCA Wells in 400-Foot Aquifer (attached to these comments), which shows the delineation of the seawater intrusion front(s) estimated by previous study (B&C, 2015) for water quality in the 400-Foot Aquifer at the MRWPCA site. As shown on Figure 3, the MRWPCA Wells are within the seawater intruded portion of the SVGB but have a fresh water quality.

To assist in reviewing the chemical character of the fresh water contained in the 180-FTE and Dune Sand Aquifers Figures 4 - and 5 – Stiff Diagrams Dune Sand and A Aquifer, and 180-Foot Aquifer (attached to these comments), respectively, visually show the dominant cations and anions for available groundwater data. As shown in Figure 4, monitoring wells MW-5S, MW-6S, MW-7S, and MW-8S have a distinctly different chemistry than the cluster of wells located at the CEMEX site. First, there are a number of overlying land uses in that area including agricultural, waste disposal, composting, and sewage treatment that commonly contribute salts and nutrients to groundwater. For instance, MW-5S has a water surface of approximately 35 feet above sea level. It is not possible for seawater intrusion to flow uphill to this location. The chemical character of MW-5S groundwater is a calcium chloride with a nitrate concentration of approximately 235 mg/l (nitrate as NO_3). Seawater does not have a high concentration of nitrate, which clearly shows this freshwater source has received about 25% of its existing dissolved mineralogy as a nutrient from overlying land uses. Both MW-7S and MW-8S have high nitrate concentrations of 198 mg/l and 123 mg/l, respectively, which appear to be flowing from the semi-perched water source at MW-5S and dilute on its way westward. Both MW-7S and MW-7M have a calcium chloride chemical character consistent with recharge from the semi-perched layer and not seawater with a sodium chloride chemical character.

These data appear to indicate that cessation of pumping along the coast in combination with natural recharge mechanisms, only now being discussed, has resulted in favorable groundwater conditions that appear to be protecting the shallow aquifers in an area of the SVGB located inland of the project and south (or in the vicinity) of the Salinas River. The DEIR/EIS does not acknowledge these water quality data as significant and insists that the groundwater is impaired to an extent that it is unlikely that this water is suitable for, or can be put to beneficial use. Available data do not support the DEIR/EIS's conclusion and in fact indicate additional study of existing conditions should be conducted to further understand sources of groundwater recharge and its movement within the aquifers of the Marina Subarea of the SVGB Pressure Area.

<u>DEIR/EIS's water rights discussion incorrectly assumes that the proposed return water agreement or other alternatives will mitigate the project's groundwater impacts in the Marina Subarea as required by the State Water Resources Control Board's (SWRCB's) advisory opinion and CEQA:</u>

On **Page 2-34 and 35**, the DEIR/EIS quotes the SWRCB report stating:

> Cal-Am could use one of several possible options to replace any fresh water it extracts from the Basin. Cal-Am could return the water to the aquifer through injection wells, percolation basins, or through the CSIP. Cal-Am would need to determine which of these methods would be the most feasible, and would in fact, ensure no

> harm to existing legal users. The feasibility analysis would depend on site-specific geologic conditions at reinjection well locations and at the percolation areas. These studies need to be described and supported in detail before Cal-Am can claim an appropriative right to export surplus developed water from the Basin.

Report at 39. The Report emphasizes more than once that any injection wells or percolation basins for the purpose of returning fresh water to the Basin would need to be located where the underlying aquifer does not contain degraded water so as to avoid a waste of beneficial water.

> In summary, to appropriate groundwater from the Basin, the burden is on Cal-Am to show no injury to other users. Key factors will be the following: (1) how much fresh water Cal-Am is extracting as a proportion of the total pumped amount and how much desalinated water is thus available for export as developed water; (2) whether pumping affects the water table level in existing users' wells and whether Cal-Am can avoid injury that would otherwise result from any lowering of water levels through monetary compensation or paying for upgraded wells; (3) whether pumping affects water quality to users' wells within the capture zone and whether Cal-Am can avoid or compensate for water quality impacts; (4) how Cal-Am should return any fresh water it extracts to the Basin to prevent injury to others; and (5) how groundwater rights might be affected in the future if the proportion of fresh and seawater changes, both in the larger Basin area and the immediate area around Cal-Am's wells.

Report at 46. The Report concluded that further data were needed in order to apply the facts and evidence to the criteria set forth in the Report for determining CalAm's water rights. The Report noted that information was needed pertaining to the depth of the project supply slant wells, the hydrogeologic conditions of the site and the area, updated modeling to evaluate the impacts of the project, aquifer testing, and studies to help determine how extracted fresh water would be replaced. Most of these studies and activities have been undertaken and the results are described and reflected in Section 4.4, Groundwater Resources. CalAm has supplied details about its proposed supply wells and return water proposal. Test borings have helped to characterize the hydrogeologic framework within which the project would operate. Groundwater modeling has been conducted. CalAm also obtained approval to construct a test well on the CEMEX site. That well is in place (and core samples taken during the drilling of the well confirmed the assumptions about hydrogeologic conditions) and test pumping is occurring. Test slant well pumping and monitoring data was used to refine the aquifer properties

> represented in the revised version of the groundwater model to test the model's reliability for simulating drawdown from slant well pumping. Once the test well results are complete, the modeling will be verified and will be re-run as warranted. Thus, the full panoply of evidence concerning the project's relationship to groundwater (and thus water rights) may continue to evolve and be refined throughout the CPUC proceeding. This preliminary analysis of water rights is based upon detailed and extensive groundwater aquifer characterization and groundwater modeling that has been undertaken by the EIR/EIS preparers to assess the effects of the project on Basin groundwater users.

HGC Comment No. 4:

The DEIR/EIS incorrectly assumes the "Settlement Agreement on MPWSP Desalination Plant Return Water," will mitigate all the project's groundwater impacts. The proposal, however, would return groundwater to the SVGB and provide benefit to well operators located north of the Salinas River, which is outside of the area that will experience the greatest impact from the project (i.e. Marina Subarea) which is located south of the river. See HGC Comments 9 and 10 for further discussion.

Regional data available for model construction south of the Salinas River in the vicinity of the CEMEX site are limited. The initial field work and aquifer testing conducted for the TSW project has provided hydrogeological data indicating conditions that were not anticipated during construction of the model (i.e., 180-FTE Aquifer semi-confinement, mounded water in the Dune Sand Aquifer, a portion of the Dune Sand Aquifer being confined along the river, freshwater present in the 180-FTE Aquifer at MW-5, etc.). The Lawrence Berkeley National Laboratories Peer Review contained in DEIR/EIS as Appendix E1 reviewed the hydrogeologic conditions incorporated and omitted from NMGWM^{2015} and indicated on page 26 that,

> "In this case, the input of areal recharge to the 180-FTE at the edge of the FO-SVA will not increase in response to extractions, and so the area of capture zone in the 180-FTE aquifer will increase. Consequently the distribution of water level drawdowns due to the proposed extraction will be different than those predicted by the model. The portion of the total volume of water extracted that is from beneath the onshore is also likely to be different."

To proceed with any level of confidence with the water rights analysis and the amount of return water that will be required of the project, it is imperative that aquifer test results from the TSW and monitoring well information be used along with historical data available from Fort Ord Wells and the landfill monitoring wells to update and calibrate the NMGWM^{2016} in order to simulate MPWSP impacts. Incorporation of these data will require successful model modification and recalibration of the area south of the river to an acceptable standard. The failure to achieve successful modification and calibration is reportedly why the calibrated model (NMGWM^{2016}) was abandoned and the superposition model approach adopted. Without successful model revision and recalibration based on the newly acquired data, it will be impossible for experts, much less the public, to understand the potential impacts of the TSW and the MPWSP production as explained in our comments.

<u>DEIR/EIS's water rights discussion of potential harm fails to provide any estimate of groundwater pumped from slant wells and thus cannot assess the feasibility of the project or potential impacts to the groundwater basin or potential harm to users:</u>

On **Page 2-35**, the DEIR/EIS states:

> The extensive groundwater modeling conducted for this EIR/EIS and discussed in detail in the Groundwater Resources section and in Appendix E2 is different from that conducted for the 2015 Draft EIR on the MPWSP. As explained in Chapter 4.4, Groundwater Resources, the modeling is specifically targeted to isolating the change in groundwater levels that would be generated by the MPWSP. **This modeling, however, cannot project the amount of Basin water that is expected to be drawn into the supply wells** [emphasis added]. Due to decades of seawater intrusion in the area, any Basin water extracted by the supply wells would be brackish water, which is a combination of ocean water and water that originated from the inland aquifers of the Basin. CalAm proposes as part of the MPWSP to return to the Basin (in the manner further described below) the fresh water portion of the brackish source water. In other words, although the groundwater modeling indicates that the **Basin water that could be withdrawn by the supply wells would be brackish and thus not fresh, potable water** [emphasis added], the MPWSP would return to the Basin desalinated product water in the amount of the fresh water molecules that make up the withdrawn brackish Basin water. In that the quantity of such fresh water component of the supply water is not currently known, the modeling and the EIR/EIS analysis assess a range of return water between 0 and 12 percent of the source water.
>
> The concept of significant effect under CEQA is not necessarily synonymous with harm or injury to water rights holders. In other words, physical change caused by the project might not rise to the level of a significant environmental impact under CEQA, but could still cause some harm or injury to a Basin water user (for instance, if the cost to a Basin water rights holder of withdrawing water were to rise even though the environment would not suffer significant impacts). Here, though, the Groundwater Resources section of this EIR/EIS strives to and does in fact effectively and meaningfully analyze two of the three precise concepts of "harm" or "injury" set forth in the Report. **These two criteria are reduction in the availability of fresh water and reduction of water quality** [emphasis added]. In addition, the analysis in the Groundwater Resources section (based upon the groundwater modeling) provides an answer to the third concept of injury

> set forth in the Report, that of a reduction in groundwater levels that requires users to spend additional funds to extract water.

HGC Comment No. 5:

This section appropriately states that "This modeling, however, cannot project the amount of Basin water that is expected to be drawn into the supply wells." Then it concludes "Due to decades of seawater intrusion in the area, any Basin water extracted by the supply wells would be brackish water." This statement is contradicted by the freshwater quality observed in wells constructed and/or sampled for the observation of test slant well pumping. The blanket statement of seawater intrusion in the area ignores the conditions that have protected this specific section of coastline in the Marina Subarea and result in fresh water located in both the Dune Sand and 180-FTE Aquifers. When fresh quality groundwater is drawn from these inland areas and mixed with seawater produced by the MPWSP, a brackish source water at the project intake facilities will be the result.

Groundwater modeling conducted using the $NMGWM^{2016}$ or the superposition model does not indicate that the "Basin water that could be withdrawn by the supply wells would be brackish and thus not fresh, potable water…". Neither of these models are a dual density model that can track and predict water quality changes. The MPWSP brackish source water is a result of mixing seawater and fresh potable groundwater drawn into the slant well facilities from the SVGB. It is only a matter of inference to conclude that the contamination of the freshwater with seawater will result in a brackish water supply, even without the modeling capabilities.

The analysis conducted for the DEIR/EIS cannot and does not effectively or meaningfully analyze the reduction in the availability of fresh water or reduction of water quality as stated in the above passage. Rather, because the models constructed for the DEIR/EIS are not capable of this analysis, the DEIR/EIS's discussion of these issues amounts to pure speculation. Importantly, the DEIR/EIS conclusions are not consistent with the limited data that is available, which indicate a substantial area of fresh water that is contained in the 180-FTE and Dune Sand Aquifers directly inland of the CEMEX site. As this groundwater is removed by the project and replaced with seawater, the project will effectively reduce fresh water in the Marina Subarea for the duration of the project and the induced concentrated flow of seawater will reduce the water quality and render the area unsuitable for freshwater projects for the foreseeable future.

DEIR/EIS's water rights discussion conclusion that the MPWSP will not significantly impact groundwater resources is not supported by the MPWSP modeling to date or other evidence:

On **Page 2-36**, the DEIR/EIS after addressing the significance thresholds further goes on to state:

> Applying the thresholds stated above, the analysis concludes that the MPWSP would not result in a significant impact to groundwater resources. It would not reduce, or affect at all, the availability of fresh water (only brackish water from the Basin is projected to be drawn into the MPWSP supply); would not lower groundwater levels in the Basin so as to affect the water supply of any

groundwater users or substantially deplete aquifer volume; and would not alter or reduce groundwater quality.

HGC Comment No. 6:

The DEIR/EIS's conclusions are not supported by the information presented in the DEIR/EIS or any other evidence and must be revised.

First, the suggestion that the project "would not affect at all" the availability of fresh water because only brackish water is projected to be drawn into the MPWSP supply is misleading and conflicts with other sections of the DEIR/EIS. As discussed in Comment No. 5 above, the DEIR/EIS's speculation that only brackish water would be extracted by the project's slant wells is not supported by the models used to analyze the project impacts. It would appear beyond dispute that the project will replace freshwater and slightly brackish water with highly saline seawater and, therefore, alter and reduce the groundwater quality. Nor is this impact limited to the upper aquifers in the Marina area, the water budget obtained from our independent operation of the calibrated NMGWM^{2016} shows that the project will effectively cause up to 235 acre-feet per year to seep upward out of the 900 Foot-Deep Aquifer. This quantity could be significant on a cumulative basis and could adversely affect the main source of groundwater presently used by the MCWD - the deep aquifer. Therefore, the DEIR/EIS must be revised based on reliable modeling to disclose that the project will reduce the availability of fresh water in the Marina Subarea, including the Deep 900-Foot Aquifer.

Second, the DEIR/EIS's statement that the project would not lower groundwater levels in the SVGM so as to affect the water supply of any groundwater users or substantially deplete aquifer volume is similarly unsupportable. The DEIR/EIS incorrectly assumes that unless the project is directly/solely responsible for causing water levels in an existing well to drop below the wells' screened intervals, the project would not substantially deplete aquifer volume. Despite the fact that it is undisputed that the project will deplete aquifer volumes, the DEIR/EIS fails to consider what amount of depletion would constitute a substantial impact. As explained further below, assuming that lowering groundwater levels in the Marina Subarea would not substantially deplete aquifer volume unless an existing well goes dry is not a meaningful analysis, especially in this portion of the SVGB where pumping is restricted to support basin water level recovery.

Third, the DEIR/EIS's statement that the project would not alter or reduce groundwater quality is demonstrably false. The project, by design, will significantly reduce groundwater quality within the Marina Subarea. Moreover, this statement fails to consider how dropping groundwater heads along the coast has the potential to significantly induce greater seawater intrusion and interfere with future Sustainable Groundwater Management Agency activities.

DEIR/EIS's water rights discussion conclusion that the SVGB and Basin users will not be harmed fails to consider the project's water quality impacts on the Marina Subarea:

On **Page 2-36 and 37**, the DEIR/EIS states:

> Due to the long-degraded condition of water in the Basin within the radius of influence (the area within which the project could affect groundwater levels), there are few active wells that could potentially be affected by the project. As discussed in detail in the Section 4.4, Groundwater Resources, there are only three active supply wells with well screens across the Dune Sand Aquifer or 180-Foot Equivalent Aquifer within the area where the project may cause groundwater levels to decrease by more than 1 foot but no more than 5 feet.3 These three wells are located at the Monterey Peninsula Landfill and are used for dust control. Given that the well pumps and the screens are set at least tens of feet below the existing groundwater level, a decrease in the levels of less than 5 feet would not cause injury to this overlying user. There are four active wells with well screens in the 400-Foot Aquifer. These include the South Well on the CEMEX property, a well on land owned by Ag Land Trust that is used to supply water for dust control, and two private wells with unknown owners. Due to the brackish to saline quality of the groundwater within the 400-Foot Aquifer, these wells would not be expected to supply drinking water. The Groundwater Resources section concludes as to all active wells that a water level decline between 1 and 5 feet would not expose well screens, cause damage, or reduce yield in the groundwater supply wells that could be influenced by the MPWSP. All in all, the project was determined not to result in a significant impact in terms of groundwater supplies either quantitatively or qualitatively. Thus, it appears reasonable to conclude that the MPWSP would not result in harm or injury to the water rights of legal users of water in the Basin in terms of fresh water supply or water quality, two of the Report's three injury criteria relative to the development of legal water rights.

HGC Comment No. 7:

As noted above, this is not a meaningful analysis of the project's potential to substantially deplete aquifer volumes or impact current water users within the Marina Subarea. More importantly, it does not assess or analyze the project's potential cumulative water quality impacts on existing users, in and outside the potential drawdown area, or reasonably foreseeable groundwater projects that may be conducted under the SGMA. These projects include, but are not limited to, the use of the MCWD's Armstrong Ranch property for storage and recovery of river diversions.

DEIR/EIS's water rights discussion conclusion that the SVGB and Basin users will not be harmed fails to consider the project's water quality impacts on the Marina Subarea water rights holders:

On **Page 2-37**, the DEIR/EIS states:

> Turning to the third of the three injury criteria set forth in the Report – increased pumping costs – as noted above, the water levels in seven potentially active wells could drop by somewhere between 1 and 5 feet, thus requiring marginally more

energy to extract the water from those wells. As a physical solution to ensure that those well owners continue to enjoy the same measure of water rights as they do prior to MPWSP implementation and thus are not injured, CalAm could compensate the well owners for any increased pumping costs causally tied to the MPWSP. Assuming that CalAm were to compensate the owner of these wells for any increased pumping costs sustained due to the MPWSP, the slant wells' operation would not cause injury under the Report's third injury criteria.

Furthermore, CalAm has proposed a mitigation measure (set forth in Section 4.4, Groundwater Resources as Mitigation Measure 4.4-3) to further ensure that Basin groundwater users are not injured. Working with the Monterey County Water Resources Agency, CalAm would fund the installation of monitoring wells to expand the County's network of groundwater monitoring wells so as to be better able to monitor on an on-going basis the effect of the project slant wells on groundwater within the radius of influence. If the monitoring efforts were to demonstrate that the project were affecting any existing neighboring active wells, CalAm would coordinate with the affected well owner and take both interim and long-term steps to avoid harm (possibly including improving well efficiency, providing a replacement water supply and/or compensating the well owner for increased costs).

In light of the foregoing, it seems reasonable to conclude that the MPWSP would not cause harm or injury to Basin water rights holders such that CalAm would possess the right to withdraw water from the Basin to produce "developed water" for beneficial use and under the physical solution doctrine.

HGC Comment No. 8:

Groundwater Resources Mitigation Measure 4.4-3, which is voluntary and appears unenforceable, fails to ensure the project will not result in significant groundwater impacts to the Marina Subarea or its groundwater users. Given the DEIR/EIS's use of the superposition model, which fails to evaluate potential future cumulative conditions, it would be impossible for anyone to assess whether impacts to a well are directly tied to the MPWSP. As well, the use of this model cannot determine the impact of the project on future basin management efforts planned to improve the groundwater conditions in the SVGB.

Again, the DEIR/EIS does not assess or analyze the project's potential water quality impacts on existing users, in and outside the potential drawdown area, or with any reasonably foreseeable groundwater projects under the SGMA.

DEIR/EIS's water rights discussion estimates regarding feedwater composition are not supported by evidence and conflict with the SWRCB RWQCB WQCP:

On **Pages 2-37 and 38**, the DEIR/EIS states:

> The entirety of the geographical area of the Basin that would be affected by the project contains brackish water rather than fresh water. Based on the groundwater modeling and as discussed in the Groundwater Resources section, while the project may actually improve the Basin's seawater intrusion issue by slowing the seawater interface line from advancing more inland, the project is not forecasted to draw any fresh water through the MPWSP source water supply wells over the life of the project. If indeed no fresh water is withdrawn by the project, then no physical solution in the form of return to the Basin of fresh water (or other off-setting mechanism to alleviate the harm) would be required in order for CalAm to secure and maintain water rights for the project feedwater. If the water in the Basin were to become fresher in the future such that the MPWSP supply wells were drawing fresh water from the Basin, then a physical solution (such as the proposed return component of the project, discussed below) would be needed in order for CalAm to maintain rights to the Basin water for the project.
>
> In any event, the proposed project does include a return water component. CalAm proposes to return to the Basin the percentage of supply water that is determined to have originated from the inland aquifers of the Basin, i.e., the fresh water component of the water that is extracted by the slant wells as if the brackish water could be segregated between its ocean (seawater) and inland (fresh water) elements. Not only would this plan further ensure that there is no injury to Basin groundwater users, but the Basin and its groundwater users could be benefitted by the return of fresh water to the seawater-intruded Basin.

HGC Comment No. 9:

First, data developed for the TSW project indicate that the blanket statement "The entirety of the geographical area of the Basin that would be affected by the project contains brackish water rather than fresh water" is false as discussed above. Wells MW-5, MW-6, MW-7, and MW-8 shallow and middle wells are located within the geographical area that would be affected by the project and the measured TDS concentrations for samples from the Dune Sand Aquifer wells ranges from approximately 608 to 1,237 mg/l and is considered fresh water under the Basin Plan. Table 3 – Dune Sand and 180-FTE Aquifers Water Quality Data summarizes the existing freshwater quality in these 4 shallow wells. Moreover, salts impacting these wells are derived from overlying land uses and not seawater intrusion. See HGC Comment No. 3. As well, the 180-FTE Aquifer zone was found to be saline at MW-8M, but brackish at MW-7M and fresh at MW-5M and MW-6M. These new data indicate the statement that the project "may actually improve the Basin's seawater intrusion issue" is not accurate for this area of the SVGB.

Other than the more coastal wells MW-7M and MW-8M, these wells do not contain chloride concentrations above the 500 mg/l indicator of seawater intrusion (see Table 3).

Table 3 – Dune Sand and 180-FTE Aquifers
Water Quality Data

WATER QUALITY SOURCE	SAMPLE DATES[1]	TDS (MG/L)	CHLORIDE (MG/L)	NITRATE-NO3 (MG/L)[3]
MW-5S	3/10/15 4/02/15	1,142	272	235
MW-5M	3/03/15 4/02/15	559	105	67
MW-6S	4/05/15	608	57	ND
MW-6M	4/04/15	966	167	ND
MW-7S	8/03/15	1,200	387	198
MW-7M	8/02/15	3,832	1,739	15
MW-8S	5/28/15 6/23/15	1,237	256	119
MW-8M	5/27/15 6/23/15	22,250	11,463	6

1 – IF MORE THAN ONE SAMPLE DATE IS SHOWN SAMPLE RESULTS WERE AVERAGED

Second, the determination method for calculating brackish groundwater produced is not clearly identified in the DEIR/EIS. Brackish groundwater proximate to the CEMEX site has been identified through initial water quality testing of monitoring well samples for the TSW project. The results of a feedwater blend using these brackish groundwater data for comparison are presented in Table 4 – Feedwater Composition Based on Brackish Groundwater TDS Concentrations.

These estimates indicate the range of fresh and brackish groundwater percentages that would be required to be returned to the SVGB given present water quality conditions in shallow and middle aquifers at MW-4. Brackish groundwater samples proximate to the TSW indicates the average TDS concentration is between 12,350 and 17,700 mg/l. Based on these brackish groundwater concentrations and using the present average feedwater salinity (29,900 mg/l) previously estimated from the February 2017 samples (Geoscience, 2017), the amount of groundwater produced by the MPWSP from the SVGB would range between 4,596 and 6,152 afy (17 to 22.8 percent).

Table 4 – Feedwater Composition Based on Brackish Groundwater TDS Concentrations

WATER QUALITY SOURCE	OCEAN WATER SALINITY (MG/L)	GROUND-WATER SALINITY (MG/L)	FEED-WATER SALINITY (MG/L)[3]	GROUND-WATER (%)	OCEAN WATER (%)	ESTIMATED ANNUAL QUANTITY RETURNED (AFY)
BASIN AVE.	33,500	440[1]	29,900	10.9	89.1	2,943
WQCP	33,500	3,000	29,900	11.8	88.2	3,187
MW-4S	33,500	12,350[2]	29,900	17.0	83.0	4,596
MW-4M	33,500	17,700[2]	29,900	22.8	77.2	6,152
MW-5S	33,500	1,142	29,900	11.1	88.9	3,004
MW-5M	33,500	559	29,900	10.9	89.1	2,951
MW-6S	33,500	608	29,900	10.9	89.1	2,955
MW-6M	33,500	966	29,900	11.1	88.9	2,988
MW-7S	33,500	1,200	29,900	11.1	88.9	3,009
MW-7M	33,500	3,832	29,900	12.1	87.9	3,276

1 – AVERAGE INLAND WATER SALINITY FROM (GEOSCIENCE, 2015a)
2 – AVERAGED FROM DATA IN (GEOSCIENCE, 2015p) TABLE 2
3 – AVERAGED FROM TSW LABORATORY TESTS IN FEBRUARY 2017 (GEOSCIENCE, 2017)

For comparison, the present feedwater concentration would require 2,943 afy be returned to the SVGB as groundwater produced with an average TDS concentration of 440 mg/l. Using the RWQCB WQCP TDS concentration of 3,000 mg/l as usable groundwater indicates over 3,187 afy would need to be returned to the SVGB to mitigate groundwater pumped as a feedwater supply. These estimates ignore the salt water recharged to the aquifer inland of the TSW by the CEMEX operations.

Moreover, the project return water proposed would not ensure that there is no injury to SVGB groundwater users. While the return water proposal would likely increase groundwater levels in other areas of the SVGB around Castroville, it would not address potential harms to present and future legal users in the Marina Subarea.

DEIR/EIS's assumption that the "Settlement Agreement on MPWSP Desalination Plant Return Water" will mitigate the project's groundwater impacts to the SVGB and the Marina Subarea is not supportable:

On **Page 2-38 and 39**, the DEIR/EIS states:

> CalAm has worked with other stake-holders to develop its current proposal for returning water to the Basin. The construct proposed was not an identified option at the time that the SWRCB Report was prepared and thus was not specifically addressed therein, but appears to advance the goals stated in the Report for returning water to the Basin. CalAm proposes to deliver fully desalinated water to end users for use in lieu of existing groundwater production from the SVGB.
>
> The two points of delivery would be (i) to the Castroville Community Services District (CCSD) to supply water for municipal purposes (e.g., typical drinking, bathing, sewer, watering and other non-agricultural water uses) and (ii) to the Castroville Seawater Intrusion Project (CSIP) pond or directly into the reclaimed water CSIP pipe for use by the agricultural users that obtain water through CSIP. Under these return water locales, the clean desalinated water would be provided for municipal or agricultural use (respectively) in lieu of pumping Basin water in an amount equal to the quantity of return water. The return water would be supplied as follows:
>
> 1. At the start-up of the MPWSP, 175 acre feet of return water would be provided to CSIP.
>
> 2. Each year, 805 acre feet of return water will be provided to CCSD, even if the calculated amount of Basin water withdrawn by MPWSP is less than that amount.
>
> 3. To the extent that the calculated amount of Basin water withdrawn by MPWSP exceeds 805 acre feet, that excess amount will be provided to CSIP.
>
> Water is expected to be returned between May and November of the same calendar year as it is withdrawn (see Chapter 3, operating table) such that the senior overlying and prescriptive users would not suffer harm from loss of water. As examined by the groundwater modeling and explained in the Groundwater Resources section, this proposed return water plan would improve groundwater conditions in the 400-Foot Aquifer underlying the CSIP, CCSD and adjacent areas because water levels would increase as a result of in-lieu groundwater recharge, and would benefit each of the aquifers by either reducing the area of influence of the MPWSP or by increasing groundwater levels in other areas. Since this return option would essentially put the Basin in a "no net loss" position in terms of fresh water quantity and would benefit legal water users by providing fresh water for beneficial use in lieu of Basin pumping, it appears consistent with the Report and enhances the preliminary conclusion that CalAm would likely possess water rights for the project.

<u>HGC Comment No. 10</u>:

First, the 175-acre feet of return water would be provided to CSIP at the start-up of the MPWSP grossly underestimates the amount of groundwater that modeling shows will be pumped during the initial start-up period. See HGC Comment Nos. 1 and 5.

Second, the statement that the project would benefit each of the aquifers by either reducing the area of influence of the MPWSP or by increasing groundwater levels in other areas is misleading. While the proposed return water agreement would likely increase groundwater levels in other areas, it would not reduce the area of influence within the Marina Subarea. Moreover, the DEIR/EIS suggestion that the project would benefit legal water users is only a half-truth as it fails to acknowledge that it does not address potential harms to present and future legal users in the Marina Subarea.

For this mitigation measure to be effective, the water user receiving the offset supply to reduce pumping must be located in the Marina Subarea of the SVGB affected by the project (i.e., south of the Salinas River). To avoid potential injury to the Marina Subarea, the DEIR/EIS should also analyze potential mitigation through injection well sites to ensure they will mitigate the projects impacts on the SVGB to a less-than significant level (i.e., no degradation of water quality in the Marina Subarea). We note that placing the wells in the wrong location could actually push groundwater impacted by seawater into aquifer areas that are currently fresh to slightly brackish in quality, but usable.

<u>DEIR/EIS's discussion of the project's consistency with Monterey County Water Resources Agency (MCWRA) Agency Act is misleading and inaccurate.</u>

On **Pages 2-39 and 40**, the DEIR/EIS states:

> … the State Water Resources Control Board Report, discussed in detail above, raises the question as to whether the Agency Act would apply to all of the proposed project groundwater extractions given the location of some screens of the slant wells outside the jurisdictional boundaries of the County:
>
> > The applicability of the Agency Act to the MPWSP is unclear. As currently proposed, the project would use slanted wells and have screened intervals located seaward of the beach. Although the project would serve areas within the territory of the MPWSP, the points of diversion for these proposed wells may be located outside the territory of MCWRA as defined by the Agency Act.
>
> Report at 39. The Agency Act's effect on project feasibility may be minimized by virtue of its application only to water drawn through well screens located within County jurisdiction.
>
> Assuming, however, that the Agency Act would apply to the entire project, the Report (while acknowledging that the SWRCB is not the body charged with interpreting the Agency Act) opines that the project would appear consistent with

the Agency Act and the Ordinance given that the project would return to the Basin any quantity of fresh water withdrawn from the Basin. The Report states:

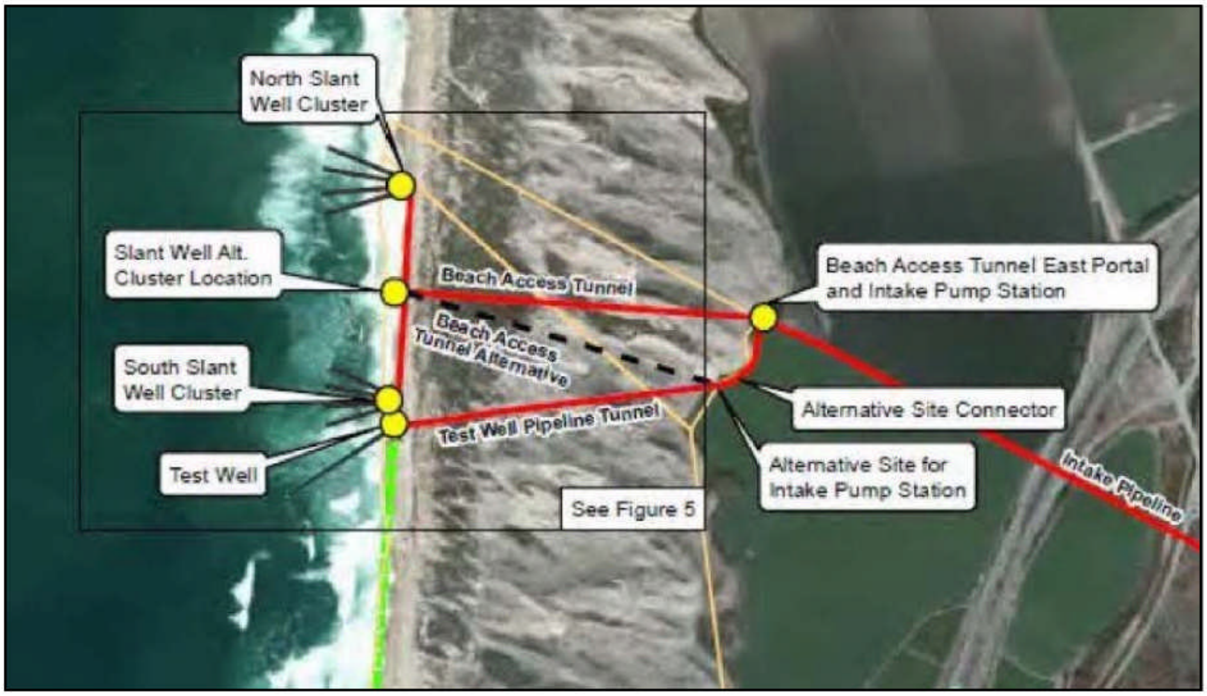
> Based on the State Water Board's analysis, as reflected in the Report, the Project as proposed would return any incidentally extracted usable groundwater to the Basin. The only water that would be available for export is a new supply, or developed water. Accordingly, it does not appear that the Agency Act or the Ordinance operate to prohibit the Project. The State Water Board is not the agency responsible for interpreting the Agency Act or MRWCA's ordinances. It should be recognized, however, that to the extent the language of the Agency Act and ordinance permit, they should be interpreted consistent with policy of article X, section 2 of the California Constitution [declaring that the waters of the state shall be put to maximum beneficial use], including the physical solution doctrine . . .

Report at 40. Therefore, it appears at least preliminary reasonable to conclude that the project would be consistent with the Agency Act and the Ordinance such that those laws would not impair project feasibility.

HGC Comment No. 11:

First, the DEIR/EIS presents inconsistent and misleading language regarding the location of the well screens. As the DEIR/EIS preparers are aware, the project's slant well locations have moved significantly landward when compared to the originally proposed project intake location evaluated by the SWRCB (see Figure 4, SWRCB, 2013). The conceptual location and design of the original slant well seawater intake system array is shown in Diagram 6 – Original Test Slant Well Design Evaluated by SWRCB. Contrary to this original design, the proposed slant well designs and locations disclosed in the DEIR/EIS indicate a majority of the well screen sections are now located landward of the shoreline. In addition, only the deepest portions of the well screens would potentially be located beneath the ocean floor with the shallower well screen intervals producing from the Dune Sand Aquifer and located onshore (see DEIR/EIS, Chapter 3, Figures 3-3a and 3-3b, and Table 3-2). Thus, the project does not appear to comply with the MCWRA Agency Act (also see details on, Geoscience, 2015a, Figures 47, 48, and 51 to 69) as the DEIR/EIS suggests. The DEIR/EIS must be revised to address consistency with the Agency Act based on the percentage of the well screens for each test well that has screened intervals located landward of the beach mean high water line to assess consistency with the MCWRA Agency Act. It is also not clear if the SWRCB would have arrived at the same conclusions if it had been reviewing the presently proposed intake design.

Diagram 6 – Original Test Slant Well Design Evaluated by SWRCB



Second, it is unclear as to what is considered "usable groundwater." To be consistent with the RWQCB WQCP, all water under 3,000 mg/l TDS would need to be returned (RWQCB, 2011). See HGC Comment No. 21.

Finally, we note that the Agency Act further empowers the MCWRA to prevent extraction of groundwater from particular areas of the SVGB if needed to protect groundwater supplies. As discussed in these comments, the project will adversely impact groundwater supplies. Therefore, the DEIR/EIS must address compliance with this mandate also.

DEIR/EIS's discussion of the project's consistency with the Annexation Agreement is not supported by the evidence.

On **Page 2-42**, the DEIR/EIS states:

> Moreover, even if annexation of the CEMEX property to MCWD's benefit assessment zones were to take place in the future, triggering the 500 afy groundwater withdrawal limitation, it appears that operation of the MPWSP could still be feasible. CalAm could conceivably construct and employ an injection well on the CEMEX property to return 500 afy to that property such that the MPWSP would have a net-zero effect on groundwater from the CEMEX land and conceivably could operate regardless of whether the 500 afy groundwater withdrawal limitation were imposed at some point in the future.

HGC Comment No. 12:

There is no evidence to support the conclusion that returning 500 afy to the CEMEX property would ensure that no more than 500 afy groundwater was withdrawn from the project as limited by the Annexation Agreement. In fact, the evidence indicates substantially more groundwater would need to be injected to demonstrate consistency with the agreement.

Comments on DEIR/EIS Chapter 3 (Project Description).

DEIR/EIS's project description inaccurately suggests the TSW's groundwater impacts were fully evaluated by the California Coastal Commission:

The DEIR/EIS at **Page 3-2** states:

> To inform the final design of the subsurface slant wells and the MPWSP Desalination Plant treatment system, and to collect geologic and hydrogeologic data needed for Federal, state, regional, and local permits for the full-scale project, CalAm built a test slant well at the same location as the seawater intake system for the proposed Project. CalAm currently is operating the test slant well as a pilot program to collect data. Construction of the test slant well and operation of the pilot program was covered under separate environmental review. The test slant well is permitted to operate until February 2018 and it is not part of the proposed Project being evaluated in this EIR/EIS. If the MPWSP with subsurface slant wells at CEMEX is not approved and implemented, the test well would be removed. However, if the proposed subsurface slant wells at CEMEX are ultimately approved as part of the proposed Project, CalAm would convert the test slant well into a permanent well and operate it as part of the seawater intake system. The conversion and long-term operation of the well has not been covered under previous approvals and is evaluated in this EIR/EIS as part of the proposed project.

HGC Comment No. 13:

I have previously provided comments on the California Coastal Commission's analysis of the TSW in the *MCWD v. California Coastal Commission* litigation. Please refer to my comments addressing the inadequacies in the Coastal Commission environmental review of the TSW. I further note the project should return the groundwater that has been pumped to date by the TSW as mitigation for the project's cumulative impacts to groundwater.

DEIR/EIS's project description inaccurately suggests all slant wells would extend offshore:

On **Pages 3-15 through 17**, the DEIR/EIS states:

> The nine new permanent slant wells would be approximately 900 to 1,000 feet long and drilled at approximately 14 degrees below horizontal to extend offshore

to a distance of 161 to 356 feet seaward of the MHW line (except #8, which would not extend past the MHW line) and to a depth of 190 to 210 feet beneath the seafloor. This means that although all construction activities and ground disturbance would occur above mean sea level and landward of the MHW line, the well casings would extend subsurface and seaward of the MHW line and below the seafloor within MBNMS. Each well would be screened for approximately 400 to 800 linear feet at depths corresponding to both the Dune Sand Aquifer and the underlying 180-Foot-Equivalent Aquifer of the Salinas Valley Groundwater Basin. CalAm would operate eight wells at a time at approximately 2,100 gallons per minute (gpm) per well and maintain the other two wells on standby.

Table 3-2 presents the total length of each slant well extending seaward of the MHW line. Because the slant wells would be drilled at a 14-degree angle, the horizontal distance to which the wells would extend seaward of the MHW line would be slightly shorter than the length of the well casing. This is illustrated in Figure 3-3b, Illustrative Cross-Sectional View of Subsurface Slant Wells.

The 10 slant wells would be located at six sites along the back of the dunes: four sites (the test slant well site and three new sites) would each have one slant well, and two sites would have three slant wells (see Figure 3-3a). The well sites are numbered sequentially, with Site 1 being the northernmost site and Site 6 the southernmost site. The test slant well would be converted into a permanent well at Site 1. The nine new permanent wells would be drilled over a total distance of about 900 feet at Sites 2 through 6. The wellheads of the three new permanent wells at Site 2 would be located about 300 feet south of Site 1. Sites 3, 4, and 5 would be spaced approximately 250 feet apart and would have one slant well each. Site 6 would have three wells.

HGC Comment No. 14:

Again, we note that as designed, most of the slant well screen sections are not below the ocean floor and "seaward of the Mean High Water (MHW) line." See HGC Comment No. 11. We further note that the drilling technology utilized by the project has physical limitations. To the extent the drag (friction) on the drill casing exceeds the ability of the drill rig or the strength of the drill casing material being used, the length of the wellbore could be shortened and the well screen production sections would be that much more short of being offshore. In fact, it is our understanding the TSW is significantly shorter than designed due to drilling problems. The DEIR/EIS has not disclosed these problems or described how they will be resolved for new slant wells. If the seawater intake facilities were actually located at a shallow depth and a sufficient distance offshore, the problems with SVGB groundwater production would be mitigated.

Comments on DEIR/EIS Chapter 4.4 (Groundwater Resources).

DEIR/EIS's analysis of groundwater impacts fails to consider or disclose best available information in evaluating potential impacts to the SVGB and the Marina Subarea:

On **Page 4.4-4**, the DEIR/EIS states:

> This chapter's description of the groundwater system underlying the project area reflects the scientific community's current understanding of the subsurface geologic units and the depth and extent of the aquifers and aquitards …This comprehensive description of the groundwater system was developed through the collaborative efforts of recognized experts in Monterey Bay coastal geology and groundwater, as well as stakeholders in the groundwater use and management process who are familiar with this region. This body of expertise is the Hydrogeology Working Group (HWG), with members that represent the Salinas Valley Water Coalition, the Monterey County Farm Bureau, California American Water Company (CalAm); the CPUC/MBNMS CEQA/NEPA team members attend the meetings.[1] To identify the area's hydrology, the HWG relied on previous groundwater studies, published geologic maps, observation of well performance, water quality data, and findings from site-specific subsurface investigations and modeling. The data review and eventual formulation of an evidence- and science-based understanding of the local and regional hydrogeology required several years. So, to enable analysis of the impacts of the proposed project, this EIR/EIS presents the best information available for describing the hydrogeologic setting of the study area.
>
> [1] The HWG developed a collaborative plan of investigation to assess the hydrogeologic conditions in the project area. The draft work plan provided a phased approach to progressively investigate the hydrogeology and the potential effects of the project on aquifers from the use of subsurface slant wells for obtaining feedwater supply. The final work plan incorporated comments and recommendations by members of the HWG, and covered the investigative steps needed to evaluate the project impacts (Geoscience, 2013c). The final work plan became the hydrogeology investigation roadmap and resulted in the implementation of the fieldwork and modeling efforts described in the approach to analysis, Section 4.4.3.2.

HGC Comment No. 15:

As discussed herein, there are major holes in the project data set, analysis, and modeling. Initially, the TSW was installed along with the project monitoring wells during an extended drought period. Therefore, the conclusions reached from evaluation of these data are limited to these dry climatic conditions and cannot represent wet or average water year conditions within the Salinas Valley that affect the Marina Subarea. Recently during the 2016-2017 water year, abundant rainfall has ended the drought conditions and for the first time in the project 1 ½-year-baseline data set that is presently being established, the shallow monitoring wells MW-6S, MW-8S, and MW-9S show the result of significant recharge from the river (see Diagram 2). This recharge resulted in water level elevations ranging from approximately 7.5 feet amsl in MW-8S to 17.5 feet amsl in MW-6S. These observations show that the river recharges the Dune Sand Aquifer in the vicinity of the Marina Subarea. However, it is not clear if the high water levels were purely a result of excess river flows, or a result of inflation of the rubber dam located downstream of MW-6. This occurrence is not discussed in the DEIR/EIS, nor was it recognized or discussed in the TSW Long Term Monitoring Report No. 96 and HWG Monthly Monitoring Report No. 16 where it is plainly visible (see Geoscience, 2017, Figure 2-5). This additional recharge mechanism substantiates the inference that protective groundwater levels in the Marina Subarea are maintained under average climatic conditions and have prevented saltwater intrusion into the Dune Sand Aquifer. This condition has likely protected the 180-FTE Aquifer and preserved the freshwater condition observed in MW-5M and MW-6M. Without a data set from a sufficiently long baseline period, the analysis that forms the "evidence- and science-based understanding of the local and regional hydrogeology" is biased by the limited baseline period observed along with the conclusions that are derived from it.

Next, the field work plan discussed in footnote 1 developed by the HWG also included a monitoring well (MW-2) which was to be located away from the CEMEX site and parallel to the coastline. Because MW-2 was never drilled, data are not available to evaluate the shallow coastal conditions in the Dune Sand Aquifer at a location removed from the influence of the CEMEX operations. These plant operations routinely discharge seawater into the dune sands landward of the TSW. The saline water originates from the dredge pond operations and from up to 500 afy produced from the CEMEX wells that draw from the seawater intruded 400-Foot Aquifer. Without MW-2, the effect of the CEMEX discharges on the TSW water quality cannot be determined. This artificial saltwater influence is not evaluated and will not be present further south along the coast where the remaining intake wells will be located. See HGC Comment No. 33 and Diagram 7.

The difficulty with model calibration in the Dune Sand and 180-FTE Aquifers south of the river is believed to largely result from a lack of data that developed the understanding of the hydrogeology and the aquifers recharge mechanisms that were used by the United States Geological Survey (USGS) in the SVIGSM. When this was discovered, the DEIR/EIS modeling effort abandoned the poorly calibrated NMGWM and switched to the superposition model, which still used the same aquifer parameters. Any error that was in the poorly calibrated area of the NMGWM south of the Salinas River, was brought into the superposition model and subjected to a new set of model boundary conditions. As such, the use of the inferior superposition model approach cannot show cumulative effects. Also, because the model is not a dual density model, it cannot be used to show effects of the CEMEX operation on the water quality produced by the TSW and ultimately the water quality changes in the Marina Subarea aquifers.

In summary, the DEIR/EIS's statement that its evaluation of groundwater impacts is based on an evidence- and science-based understanding of the local and regional hydrogeology and the best information available for describing the hydrogeologic setting of the study area, in fact, is not supportable. Importantly, the DEIR/EIS does not discuss how the project will affect protective groundwater levels necessary to abate seawater intrusion in the SVGB and subsequently affect future sustainable conditions as discussed above and further below.

<u>DEIR/EIS's analysis of groundwater impacts misrepresents baseline conditions in the Dune Sand Aquifer:</u>

On **Pages 4.4-6 through 4.4-8**, the DEIR/EIS states:

> The Older Dune Sand, referred to as the Dune Sand Aquifer, extends to 85 to 95 feet below the ground surface beneath the CEMEX site and is about 60 feet thick at the locations of the proposed slant wells. The shallow aquifer underlying the Moss Landing Area is referred to as the Perched A Aquifer and differs from the Dune Sand Aquifer in that it is underlain by a defined layer of less permeable, fine-grained sediments known as the Salinas Valley Aquitard. Water quality of the Perched A Aquifer and Dune Sand Aquifer is directly influenced and controlled by seawater. Because of the aquifer's proximity to the ocean, most of the water in the Dune Sand Aquifer has been intruded by seawater and is considered saline to brackish (Kennedy/Jenks, 2004). This influence decreases inland where the infiltration of precipitation and applied agricultural water has more of an influence. Figure 4.4-3 presents a west to east geologic cross section that illustrates the relationship of the aquifers and geologic units from the CEMEX area to east of Highway 1 and Del Monte Boulevard. The upper portions of the proposed slant wells at the CEMEX of the proposed slant wells at the CEMEX site would have well screens installed across them, and would draw water from these deposits.

<u>HGC Comment No. 16</u>:

Based on data provided by the TSW investigation, the DEIR/EIS's statement that "Dune Sand Aquifer is directly influenced and controlled by seawater" is inaccurate. More importantly, the DEIR/EIS fails to quantify the fresh water held in storage in the Dune Sand Aquifer between the Salinas River and Fort Ord. It also does not estimate the amount of recharge the aquifer receives annually and the direction of flow in the the Dune Sand Aquifer beneath the confining layer (-2-Foot Aquifer). Without this information, it is impossible for experts, much less the public, to understand the project's potential impacts.

In Table 4.4-1 on page 4.4-6, the DEIR/EIS states: "shallow groundwater is not expected within the elevated dune deposits, except in localized low-lying areas along the coastline." This conclusion fails to recognize the protective head that is provided by this layer of the Dune Sand Aquifer along the coastline and, therefore, further undermines the project's evaluation of potential impacts to the groundwater system. We further note that relying on broad statements about the occurrence of seawater intrusion from a 2004 study (KGC, 2004) that did not have the benefit of the data being generated by the TSW project is not scientifically supportable because it inappropriately ignores the data that has been developed for project analysis. The DEIR/EIS's conceptual description of seawater in the Dune Sand Aquifer, which is being inferred from "the aquifers proximity to the ocean" is then offset by the statement that "this influence decreases inland where the infiltration of precipitation and applied agricultural water has more of an influence" does not remedy this problem. Without any attempt to quantify the fresh water held in storage in the Dune Sand Aquifer between the Salinas River and Fort Ord, neither experts nor the public can assess the project's potential impacts as noted above. Also, see Comment No. 3.

DEIR/EIS's analysis of groundwater impacts ignores available information demonstrating 180-Foot Aquifer is not unconfined rendering its analysis and modeling inadequate:

On **Page 4.4-11**, the DEIR/EIS states:

> At the CEMEX site, the Dune Sand Aquifer and the 180-FTE Aquifer are unconfined, as there are no extensive overlying low-permeability clay units.
>
> The Terrace Deposits of the 180-FTE Aquifer are composed of former alluvial fan and river floodplain deposits, possibly with some marine terrace deposits that contain sand, silt, and gravel now buried under the coastal dunes. There is groundwater within the Terrace Deposits, which extend to 240 to 255 feet below the ground surface beneath the CEMEX site, and are about 135 feet thick at the proposed slant well locations, thinning seaward. Based on the recent groundwater testing data discussed in the Groundwater Quality subsection below, the quality of water in the 180-FTE Aquifer is directly influenced by seawater; this influence extends for miles inland, as discussed below in the Seawater Intrusion section. The lower portion of the proposed slant wells at the CEMEX site would have well screens installed across and would draw water from these deposits.

HGC Comment No. 17:

Initially the DEIR's statements that Dune Sand Aquifer and the 180-FTE Aquifer are unconfined at the CEMEX site appear to conflict with the previous acknowledgement that the 180-FTE is semi-confined (Geoscience, 2015r, page 5), which indicate that the originally unconfined nature of the aquifer and its communication with the overlying Dune Sand Aquifer is overstated. This is not insignificant as the higher degree of confinement in the 180-FTE Aquifer will likely result in a greater radius of influence and more drawdown at further distances than the DEIR/EIS model presently predicts. Moreover, the presence of an aquitard layer just inland of the project area is documented by other studies including (Harding ESE, 2001, Plates 1 through 6, and Ahtna, 2015).

The DEIR's statement that recent groundwater testing shows the quality of water in the 180-FTE Aquifer is directly influenced by seawater is misleading. As discussed in Comment No. 3, data obtained from the TSW phase of work indicate that the blanket concept that all groundwater in the 180-FTE Aquifer is saline for miles inland is inaccurate. (See also Figures 1, 2, and 5).

DEIR/EIS's analysis of groundwater impacts inaccurately describes groundwater flow in the Dune Sand Aquifer:

On **Page 4.4-14**, the DEIR/EIS states:

> The MCWRA conducts a groundwater monitoring program throughout the Salinas Valley that for the fall 2013 monitoring event included 61 wells in the 180-Foot Aquifer and 103 wells in the 400-Foot Aquifer (Brown and Caldwell, 2015). Water-level data collected from wells in the study area indicate that the direction of groundwater flow is from the ocean to inland, as shown on Figures 4.4-5 and 4.4-6.
>
> In the Pressure and East Side Areas, groundwater flows northwest from the upper reaches of the SVGB until it reaches the city of Salinas, at which point groundwater in both the 180-Foot and 400-Foot Aquifers flows towards a groundwater depression north of the city (MCWRA, 2014b). Along the coast, flow in both the 180-Foot and 400-Foot Aquifers is towards the east, or landward, and has resulted in seawater intrusion. At the proposed slant well locations, the Dune Sand and 180-FTE Aquifers along the coast are hydraulically connected to the Pacific Ocean, as verified by the saline chemistry of the groundwater samples collected from borings drilled along the coast. The groundwater flow patterns within the Dune Sand Aquifer are not known but, based on the aquifer depth and geologic structure, it is reasonable to expect that they would be tidally controlled, with little to no net horizontal flow in any particular direction.
>
> There is a groundwater divide along the north side of the SGB separating groundwater flow paths between the SGB and the SVGB in both the shallow and deep aquifers, as illustrated on Figures 4.4-7 and 4.4-8. The SGB has been divided into four subareas, with the northern two composing the Northern Subbasin and the southern two composing the Southern Subbasin. The proposed ASR injection/extraction wells would be located near the northern border of the Northern Subbasin. There is a groundwater depression in both the shallow and deep aquifers in the Northern Subbasin, resulting in some landward flow along the coast (HydroMetrics, 2015).

<u>HGC Comment No. 18</u>:

The DEIR/EIS's description of the groundwater flow pattern in the Dune Sand Aquifer is inaccurate and based on available data (Harding ESE, 2001, Ahtna, 2015) it likely affects the ability to calibrate the model in the area south of the river. The conceptual complexity of the groundwater flow in the project area is shown in Diagrams 1 and 2 above. Most critically, without using available information and filling data gaps, the DEIR/EIS's description of baseline coastal aquifer flow conditions makes it impossible to quantitatively analyze the project's potential impacts on water quality. As explained in Comment No. 3, the project inland monitoring wells discovered a significant amount of freshwater and brackish groundwater within the Marina Subarea of the project area of influence.

One such discovery was well MW-5S, which was constructed in the Dune Sand Aquifer that is perched on top of a regional clay layer. Adjacent the Salinas River at the Monterey Peninsula Landfill, this aquifer zone is designated as the 35-Foot Aquifer. This same Dune Sand Aquifer layer was also identified to the south in the Fort Ord cleanup site where it was designated as being perched/semi perched on top of the FO-SVA. Available groundwater elevation data from the Dune Sand Aquifer wells constructed for the TSW project were combined with data from the regional landfill, Fort Ord cleanup, and Beacon Gas Station cleanup sites to construct Figure 6 – Dune Sand Aquifer Groundwater Elevation Contour Map (attached to these comments). As shown, groundwater is flowing into the Marina Subarea on top of the FO-SVA layer from the area of aquifer recharge to the south. Data for the Dune Sand Aquifer used to construct this figure were obtained from readily available consultant reports and are shown in Figure 7 – Fort Ord Cleanup Site Groundwater Elevation Data, Figure 8 – Monterey Peninsula Landfill Groundwater Elevation Data, and Figure 9 – Beacon Gas Station Groundwater Elevation Data (attached to these comments). The most important aspect of these data is that perched groundwater is flowing toward the coast and infiltrating into the underlying -2-Foot Dune Sand Aquifer and the underlying semi-confined 180-FTE Aquifer. This source of recharge is unique to the Marina Subarea portion of the SVGB and is believed to contribute to protective groundwater conditions.

DEIR/EIS's investigation of the project area is inadequate to support the DEIR/EIS's groundwater impacts analysis:

On **Pages 4.4-21 and 22**, the DEIR/EIS states:

> CalAm commissioned a subsurface soil and groundwater investigation to further understand the existing subsurface geologic units, aquifers, and water quality of the proposed slant well locations on the CEMEX site. The investigation included the installation of nested monitoring wells and the test slant well, subsurface lithologic logging, soil and groundwater sample analysis, aquifer testing, and aquifer conditions modeling (Geoscience, 2013c, 2016a, 2016b). Figure 4.4-9 shows the locations of the nested monitoring wells. The nested wells have screen intervals to discretely sample the Dune Sand Aquifer, 180-FTE Aquifer, and the 400-Foot Aquifer depth intervals. The subsurface investigation provided information and data to better characterize the subsurface stratigraphy, aquifer conditions, how the aquifer responds to pumping, and groundwater chemistry at various depth intervals. Updated information on subsurface materials informed the design of the proposed slant wells, and data on groundwater flow characteristics and water chemistry facilitated further refinement of the groundwater models used to analyze project impacts.

> The proposed slant wells would draw water from the Dune Sand Aquifer and the 180-FTE Aquifer from about 30 feet below msl to 200 feet below mean sea level (Geosciences, 2016b). As discussed above in Section 4.2, the Dune Sand Aquifer overlies the 180-FTE Aquifer with no aquitard /between the units. The test slant well is screened across both units and has been sampled on a weekly basis when operational. Table 4.4-4 summarizes water quality results from the May 19, 2016, sampling event. The table also provides the chemical composition of seawater; as the comparison shows, the water quality from the test slant well closely resembles the average seawater TDS concentration found along the central coast of California.

HGC Comment No. 19:

We note that the boreholes referenced by this discussion are all close to the ocean and not representative of background data at inland locations that will be affected by the MPWSP. These data show only near shoreline conditions. As shown by the water composition in MW-4 (see Table 2, Diagram 5 above, and Figure 1 attached to these comments), the water quality begins to change significantly within a short distance of the coastline. Also, there is no discussion about the CEMEX operations that discharge saline water inland of the TSW which serves to create a saline mound of groundwater and bias the produced TSW water quality. See HGC Comment No. 33.

Because there is a lack of discussion of the groundwater quality in SVGB Pressure Area south of the Salinas River, the discussion of borehole data improperly implies water quality is the same throughout the project area of influence. It is reasonable to assume that the water quality at the CEMEX site would be worse than quality further inland where recharge from the Dune Sand Aquifer is likely occurring along with recharge from the Salinas River. The interconnectivity of the -2-Foot Aquifer beneath the Monterey County Landfill and the shallow Dune Sand Aquifer screened by MW-1, MW-3, MW-4, MW-7, and MW-8 is indicated by the study (Geoscience, 2016). This aquifer is also recognized as being recharged by the Salinas River in this area of the Marina Subarea (Geoscience, 2016). The recent water level rise in MW-6, MW-8, and MW-9 (Geoscience, 2017, Figures 2-5, 2-7, and 2-8) when winter rains resulted in significant river flows shows the likely hydraulic connectivity between the river and these wells and that this inland freshwater recharge keeps the saline groundwater close to the coast in the Dune Sand Aquifer (see Diagrams 1, 2, 5 above, and Figure 1 attached).

DEIR/EIS's groundwater impacts analysis baseline description of seawater intrusion in the SVGB, particular the Marina Subarea, is misleading and conflicts with available information:

On **Page 4.4-28 through 4.4-32**, the DEIR/EIS states:

> Figures 4.4-10 and 4.4-11 illustrate the seawater intrusion areas as of 2013 within the 180-Foot and 400-Foot Aquifers, respectively (MCWRA, 2015). Seawater intrusion occurs when ocean water enters fresh groundwater aquifers at the coast and migrates inland. The salty seawater combines with the fresh groundwater to

create a mixture referred to as brackish. Brackish groundwater can contain Total Dissolved Solids (TDS) concentrations ranging from that of seawater (about 35,000 mg/L) down to 500 mg/L near the leading edge of the inland seawater intrusion front. Brackish water in the 180-foot aquifer near the proposed project ranges from about 5,000 mg/L to 29,000 mg/L. The California Secondary Drinking Water Standard was amended in 2006 to include a Maximum Recommended Level for TDS in drinking water of 250 mg/L (Cal. Code Regs., tit. 22, § 64449). The MCWRA define the leading edge of inland seawater intrusion as groundwater containing TDS at 500mg/L or more.

The current, standard practice for monitoring the inland advance of seawater intrusion involves TDS analysis of groundwater from a select group of monitoring wells that intersect the seawater-intruded aquifers. The TDS concentration data are used to identify the areas of the aquifer intruded by seawater and to plot the leading edge of the inland seawater intrusion front. The more groundwater wells available in the monitoring program, the better regional seawater intrusion is represented. Regular annual monitoring data can be used to estimate the rate at which seawater is migrating inland. The MCWRA has been conducting seawater intrusion monitoring for many years using several groundwater wells in the western end of the Salinas Valley.

Geophysics are giving researchers the opportunity to study seawater intrusion using high-resolution, regional scale imaging. The technique, sometimes referred to as Electrical Resistivity Tomography (ERT), can be used to differentiate salty water from fresh water hundreds of feet beneath the ground. Electrical resistivity imaging uses a series of sensors placed along a transect line on the ground surface. An electrical current is applied and the sensors measure the electrical resistance the current encounters as it travels at depth between the sensors. Salty water has a lower resistance than freshwater, due to the higher TDS. The high and low resistivity zones in the subsurface are displayed as a series of colors in a cross section that indicate areas of fresh water, brackish water and seawater. Over the past few years, Stanford environmental geophysics researcher Rosemary Knight has conducted a study to determine the viability of using electrical resistivity techniques to study seawater intrusion along the coast of the Monterey Bay. Professor Knight's initial survey was conducted along a 4-mile segment parallel to the beach between the cities of Seaside and Marina. The study found that the electrical resistivity readings positively correlated with measured TDS concentrations to a depth of 500 feet in four area groundwater wells.

Salinas Valley Groundwater Basin

…. The 2013 estimates of seawater intrusion within the 180-Foot and 400-Foot Aquifers indicate that seawater has intruded to a maximum of approximately 8 miles and 3.5 miles inland, respectively, as inferred from chloride concentrations greater than 500 mg/L. The seawater intrusion degraded groundwater supplies, requiring urban and agricultural supply wells within the affected area to be abandoned or destroyed (MCWRA, 2001). Increased degradation of coastal groundwater aquifers led to restrictions on drilling groundwater wells and extracting groundwater from areas affected by seawater intrusion, as discussed in Section 4.4.2, Regulatory Framework. Such restrictions are intended to reduce further inland migration of seawater and reduce the landward advance of the seawater/freshwater interface.

Seaside Groundwater Basin

Groundwater pumping from aquifers in the SGB has exceeded recharge and freshwater inflows that caused pumping depressions near the coast, as shown on the groundwater flow maps for both the shallow aquifer zone (see Figure 4.4-7) and the deep aquifer zone (see Figure 4.4-8) (HydroMetrics, 2015). In addition, seawater intrusion has occurred just north of the SGB in the adjacent 180/400 Foot Aquifer Subbasin of the SVGB, as discussed above. The boundary between these two basins is a groundwater divide that migrates in response to variations in natural recharge and pumping on either side of the divide. HydroMetrics noted increased chloride concentrations in two wells along the coast, although the concentrations have not yet exceeded drinking water standards. These conditions all suggest that the SGB could be vulnerable to seawater intrusion.

HGC Comment No. 20:

Data developed by the TSW project indicates the DEIR/EIS's baseline description is inaccurate. While effects of seawater intrusion are evident significant distances inland, the entire area between the seawater intrusion front defined by ongoing study (MCWRA, 2014) and the coastline where the MPWSP intake system is proposed is not all intruded by seawater. Since the cessation of pumping in restricted areas along the coast, the hydrologic balance in the groundwater system has changed. Additional field data must be obtained in the area directly affected by the project to define the pre-project baseline conditions that have developed over the last two decades (see attached Figures 1 and 2). As the DEIR/EIS recognizes, the more groundwater wells available in the monitoring program, the better regional seawater intrusion is represented. South of the Salinas River, the MCWRA program lacks sufficient monitoring wells within the Marina Subarea. Moreover, there is no monitoring or mapping for the Dune Sand Aquifer. The seawater intrusion section incorrectly states that "the MCWRA define the leading edge of inland **seawater intrusion as groundwater containing TDS at 500 mg/L or more**." [emphasis added] The MCWRA study tracks the concentration of chloride and defines seawater intrusion as groundwater containing 500 mg/l or more of chloride, not TDS. The discussion interjects a reference to the highest drinking water standard for TDS of 250 mg/l without mentioning that municipalities can serve a municipal drinking water supply that occasionally exceeds 1,000 mg/l TDS concentration. The discussion continues to indicate low TDS concentrations are used as the basis for seawater intrusion. This whole section is misleading and misinforms the public and the Commissioners.

This discussion is also in direct conflict with the groundwater quality objectives shown in Table 4.4-6 where the 180-Foot Aquifer objective is 1,500 mg/l TDS concentration. This does not indicate that the aquifer objective promotes a component of seawater intrusion as implied by the previous discussion.

DEIR/EIS's groundwater impacts analysis fails to address conflicts with the SWRCB's WQCP; MPWSP would likely violate WQCP's anti-degradation policy:

On **Page 4.4-35** , the DEIR/EIS states:

The RWQCB has established water quality objectives for selected groundwater resources; these objectives serve as a basis for evaluating water quality management in the basin. Specific water quality objectives have been defined for the 180-Foot Aquifer and 400-Foot Aquifer for the SVGB, as listed in Table 4.4-6 below.

TABLE 4.4-6 - GROUNDWATER QUALITY OBJECTIVES

AQUIFER	TDS	CHLORIDE	SULFATE	BORON	SODIUM	NITRATE AS NITROGEN
180-FOOT	1,500	250	600	0.5	250	1
400-FOOT	400	50	100	0.2	50	1

NOTES: All concentration are in milligrams per liter (mg/L) SOURCE: RWQCB, 2011b.

The Basin Plan would apply to the treated water to be injected into the proposed ASR injection/extraction wells because it could affect the quality and beneficial uses of the Basin's groundwater. Accordingly, these project elements would be subject to regular water quality monitoring by the RWQCB. This water quality monitoring would ensure that any deviation from the established objectives is identified and corrected pursuant to Basin Plan requirements.

HGC Comment No. 21:

The DEIR/EIS only addresses whether the project "operational discharges" of the MPWSP would be consistent with the provisions of the SWRCB Anti-Degradation Policy (Chapter 4.3) and the project's ASR injection wells. The DEIR/EIS must be revised to also address whether the extraction proposed by the project is consistent with the SWRCB's Anti-Degradation Policy. As discussed herein, it appears the project will violate the RWQCB WQCP objectives by degrading the water quality within the SVGB over a significant area. The model results indicate that areas of the Pressure Area that range from brackish to fresh will be degraded and will become hypersaline as a result of project pumping. Drawdown effectuated in the onshore portion of the aquifer system that is beyond the capture zone of the slant wells is a cumulative effect that will contribute to a greater onshore gradient and proportionally increase the rate of seawater intrusion into those portions of the SVGB.

This section of the DEIR/EIS also fails to discuss the regulatory guidance in the 2011 WQCP for the Central Coast Basin where Resolution No. 88-63 is incorporated by reference and applies to the proposed project. The WQCP may be found at http://www.waterboards.ca.gov/rwqcb3/publications_forms/publications/basin_plan/docs/basin_plan_2011.pdf, and Resolution No. 88-63 is Appendix A-9 of the WQCP. Resolution No. 88-63 sets forth the following policy regarding surface and ground water within the project area and indicates that all surface and ground waters of the State are considered suitable, or potentially suitable, for municipal or domestic water supply with the exception of:

a. The TDS exceeds 3,000 mg/l (5,000 µmhos/cm, electrical conductivity);

b. Contamination exists, that cannot reasonably be treated for domestic use;

c. The source is not sufficient to supply an average sustained yield of 200 gallons per day;

This indicates that based upon Resolution No. 88-63, the feedwater, which includes "developed water" that is not suitable or potentially suitable for municipal or domestic water supply purposes, is water that exceeds 3,000 mg/l TDS, in order to be eligible as "developed water." The DEIR/EIS's focus on the groundwater quality objectives and failure to discuss this standard does not sufficiently inform the public or the decision makers of the potential impacts of producing groundwater for the project that is potentially suitable for municipal or domestic uses either through treatment or blending. This reference indicates that at least the 3,000 mg/l TDS concentration should be utilized in determining the production of usable groundwater from the SVGB and not the inland average of 440 mg/l. It should also be recognized that MW-5S, MW-5M, MW-6S, MW-6M, MW-7S, MW-8S all contain groundwater that meets the WQCP objective of 1,500 mg/l TDS concentration. See HGC Comment Nos. 1, 3, and 10 to understand the significance of this issue.

DEIR/EIS fails to address Sustainable Groundwater Management Act and the MPWSP likely conflicts with the Act:

On **Page 4.4-37**, the DEIR/EIS states:

> Adopted in 2014, the Sustainable Groundwater Management Act (SGMA) provides local agencies the capability to customize groundwater sustainability plans to their regional economic and environmental needs. SGMA creates a framework for sustainable, local groundwater management in California. The DWR and the SWRCB are the lead state agencies responsible for developing regulations and reporting requirements necessary to carry out SGMA. DWR sets basin prioritization, basin boundaries, and develops regulations for groundwater sustainability. The SWRCB is responsible for fee schedules, data reporting, probationary designations and interim sustainability plans (DWR, 2016a). The

State of California has designated the Salinas Valley as a priority basin and stakeholders have been working since 2015 to form a Groundwater Sustainability Agency for the Salinas Valley. The MPWMD applied to alter the boundaries of the Seaside/Corral de Tierra areas so they are similar to the adjudicated boundaries of the Seaside Basin. While the SGMA does not have a direct impact on the MPWSP, it is included here as it is new legislation affecting both the Salinas Valley Groundwater Basin and the boundaries of the adjudicated Seaside Basin. The proposed project would not adversely affect groundwater management in the Basin, because it would be extracting groundwater that is not presently being used as a potable or an irrigation supply. Rather, when considering seawater intrusion and water surface elevations in the 400-Foot Aquifer, the proposed project may have a positive contribution to the sustainable management of groundwater. Regarding the former, groundwater modeling shows that the proposed project would retard the advance and limit the ultimate inland extent of seawater intrusion. With respect to the latter, by returning in-lieu desalinated water to the CCSD, the proposed project would provide recharge benefits to groundwater levels in the 400-Foot Aquifer. For these reasons, the proposed project would not conflict with the SGMA.

HGC Comment No. 22:

The DEIR/EIS discussion of the MPWSP's consistency with the Sustainable Groundwater Management Act (SGMA), which became effective January 1, 2015, is grossly inadequate. The SGMA defines "basin" as either a subbasin or a basin. (Water Code, § 10721, subd. (b).) The California Department of Water Resources had previously classified the 180/400 Foot Aquifer Subbasin as a high-priority subbasin and in January 2016, the Subbasin was designated as a Critically Overdrafted Basin. (http://www.water.ca.gov/groundwater/sgm/pdfs/COD_BasinsTable.pdf) Both the MPWSP's slant wells and desalination plant are located within the 180/400 Foot Aquifer Subbasin.

Because of the Critically Overdrafted Basin classification, the 180/400 Foot Aquifer Subbasin is required to adopt a State-approved groundwater sustainability plan (GSP) or coordinated GSPs by January 31, 2020. The GSP must include measurable objectives and milestones in increments of five years to achieve sustainability within 20 years of the GSP adoption, which would be no later than January 31, 2040, in the case of the 180/400 Foot Aquifer Subbasin. Because of these existing conditions, it is false to state "the proposed project would not adversely affect groundwater management in the Basin, because it would be extracting groundwater that is not presently being used as a potable or an irrigation supply". Ultimately, the stakeholders forming the sustainable Groundwater Management Agency (GMA) will be responsible to deal with any adverse impacts that result from the project.

While the DEIR/EIS focuses on whether the MPWSP pumping will injure any legal user of the groundwater, it fails to address whether MPWSP pumping will further injure the overdrafted, seawater-intruded groundwater subbasin and prevent the subbasin from full groundwater sustainability within the Marina Subarea. (Water Code, § 10727.2, subd. (b)(1)). Given the MCWD's and other concerted efforts to address seawater intrusion and over-pumping, the DEIR/EIS's failure to address this issue should be considered a serious flaw.

The Marina Subarea of the SVGB must be included in an adopted groundwater sustainability plan due to its designation as a priority subbasin. The Act requires "the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing implementation of measures targeted to ensure that the applicable basin [or subbasin] is operated within its sustainable yield." (Water Code, § 10721, subd. (t).) The sustainability goal must be achieved in the subbasin or basin within 20 years of the implementation of the groundwater sustainability plan. (Water Code, § 10727.2, subd. (b).) **"Sustainable yield"** is defined as **"the maximum quantity of water,** calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, **that can be withdrawn annually from a groundwater supply without causing an undesirable result."** (Water Code, § 10721, subd. (v), emphasis added.) The DEIR/EIS does not address the MPWSP's potential impacts on sustainable yields in the Marina Subarea or the SVGB. Nor does it address reasonably foreseeable projects that must be proposed to bring the Marina Subarea of the SVGB into compliance with SGMA.

Instead, the DEIR/EIS assumes there is no benefit to the local development and use of the brackish or fresh quality groundwater contained within the coastal portion of the SVGB Pressure Area. It fails to consider the use of treatment or blending of this groundwater for future sustainable uses within the basin. The MPWSP as proposed, however, will remove freshwater and the brackish groundwater influenced by seawater and replace it with highly saline groundwater (pure seawater) by inducing seawater intrusion. The DEIR/EIS ignores the potential for local SVGB users to use the brackish groundwater supply as a beneficial use for sustainable basin management efforts and that seawater intrusion is identified as an undesirable result. It also fails to address how the MPWSP will impact potable water within the Marina Subarea as noted above and discussed below.

While the DEIR/EIS references the recent State of the Salinas River Groundwater Basin Report, dated January 16, 2015, from the Monterey County Water Resources Agency, the DEIR/EIS fails to discuss or heed its recommendation. The Report notes that based on the continued large storage declines in the East Side and Pressure Areas (and resulting groundwater head declines and seawater intrusion), the current distribution of groundwater extractions is not sustainable. Seawater intrusion can account for up to 18,000 afy of the total storage loss of 24,000 afy. Sustainable use of groundwater will only be achieved by aggressive and cooperative water resources planning to mitigate seawater intrusion and groundwater head declines. As the Salinas River Groundwater Basin Report concluded:

> The consequences of no-action under continued drought conditions will be the imminent advancement of seawater intrusion within the next few years and the continued decline of groundwater head. Both of these conditions would necessitate the drilling of deeper groundwater wells to produce the quantity and

> quality of water needed for consumptive use and irrigation. The installation of deeper wells may not be feasible in some areas because of lower groundwater yield and water quality in the Pressure Deep Aquifer. A more sustainable and long term management practice would encourage a Basin-wide redistribution and reduction of groundwater pumping, which would require cooperative and aggressive resource management. The unsustainability of the current distribution of groundwater extractions has long been recognized by various investigators, and Basin- wide redistribution and reduction of pumping have been recommended previously (e.g. DWR, 1946).

(Report at p. ES-12; see also p. 6-3.) Based on this conclusion, the Salinas River Groundwater Basin Report provided several options for reducing storage losses in the SVGB. One option was to reduce pumping in the Pressure and East Side to assist in mitigating some of the anticipated effects of the extended drought on groundwater storage and water quality. **The report noted that shifting of pumping to areas further away from the coast would also be helpful,** as long as it is shifted south of the current head trough in the East Side Subarea. **A second alternative was shifting of some pumping from the P-180 and P-400 Aquifers to the Pressure Deep Aquifer to reduce the storage deficit in the shallower aquifers.** The MPWSP's proposed slant wells are inconsistent with the Report's recommendations for addressing continued declining aquifer heads, water storage losses, and seawater intrusion in the Basin. The slant wells represent a significant increase in pumping from the Dune Sand Aquifer and 180-foot Aquifers in the Marina Subarea over existing conditions and will reverse the cumulative efforts of MCWD and others to shift production to other aquifer zones and reduce pumping in the 180-foot aquifer in order to reduce seawater intrusion. The DEIR/EIS also does not consider cumulative impacts on future plans to expand these groundwater management efforts.

Notably, the DEIR/EIS, also fails to discuss historical studies that have indicated there are 2 locations at the shoreline where seawater inflow preferentially follows the paths of greatest hydraulic conductance (least impedance to flow) when onshore gradients induce landward flow of groundwater (KJC, 2004, Page ES-15, Figure 3). The main pathway identified is located north of the Salinas River where the greatest amount of seawater has intruded into the heavily used portion of the Pressure Area. The second preferential pathway for flow is located south of Marina and allows seawater to flow into the aquifers beneath the Fort Ord Area. This area is south of the boundary defined as the Pressure Area by some studies, but within the Pressure Area defined by other studies. The CEMEX site lies midway between these 2 areas of preferential seawater intrusion and does not directly intercept either of these main areas of onshore flow. The potential impact of this condition, or the relocation of the project further north or south to better benefit the coastal conditions is not discussed in the DEIR/EIS.

As previously discussed, the project will contribute to the present overdraft of the SVGB and effectively induce the SGMA identified undesirable result of seawater intrusion. While the DEIR/EIS indicates the project would not conflict with the SGMA, the study does not mention groundwater dependent ecosystems and the potential undesirable result that may occur within the coastal dunes when water levels are lowered to levels below the root zones of groundwater dependent plants. The study also does not address how the replacement of a floating freshwater lens along the shoreline with seawater could potentially impact salt sensitive plants within the area of project influence.

In summary, the DEIR/EIS provides insufficient discussion of the effect and application of the most notable development in California water law in the past century, the enactment of the SGMA and the proposed slant wells are inconsistent with the Salinas River Groundwater Basin Report recommendations to shift pumping away from the coast and into deeper aquifers.

The DEIR/EIS's discussion of the project's consistency with MCWRA Agency Act and MCWRA Ordinance 3709 is misleading and inaccurate.

On **Page 4.4-38**, the DEIR/EIS states:

> As discussed more fully in Section 2.7, Water Rights, given the locations of the slant well screens beyond the jurisdictional boundaries of the County, it is not clear whether the Agency Act applies to the proposed project. However, as further discussed in that section, were the Agency Act to apply, it is preliminarily reasonable to conclude that the proposed project would be consistent. This is because the proposed project would return to the SVGB any incidentally extracted useable groundwater. The water available for export would be new supply, or developed water, not extracted from the SVGB.
>
> MCWRA Ordinance 3709 prohibits drilling into and pumping groundwater from the 180-Foot Aquifer within specific onshore areas, designated as Territories A and B (MCWRA, 1993). The proposed seawater intake system would be located at the westernmost edge of Territory B. Although the wells would be drilled within Territory B, the source water for the proposed project would be extracted from beneath the ocean floor, an area not located within the restrictive territories identified by Ordinance 3709. As with the Agency Act, it is not clear that the MCWRA Ordinance 3709 applies to the proposed project. However, for the same reasons presented above, if it were to apply, it is preliminarily reasonable to conclude that the proposed project would be consistent. This issue is discussed further in Section 2.7, Water Rights.

HGC Comment No. 23:

As noted above, the DEIR/EIS's statement that the locations of the slant well screens are "beyond the jurisdictional boundaries of the County" is inconsistent with the DEIR/EIS's project description. As addressed above in HGC Comment No. 12, only the deepest portions of the well screens would potentially be located at a depth of a couple hundred feet beneath the ocean floor with the shallower well screen intervals producing from the Dune Sand and 180-FTE Aquifers and located onshore and within the jurisdictional boundaries of the County. (see DEIR/EIS, Chapter 3, Figures 3-3a and 3-3b, and Table 3-2). The DEIR/EIS must be revised to address the percentage of the well screens for each test well that has screened intervals located landward of the beach to assess consistency with the MCWRA Agency Act.

Second, it is unclear as to what is considered "any incidentally extracted useable groundwater." As noted above, to be consistent with the RWQCB WQCP all water with TDS levels under 3,000 mg/l would need to be returned (RWQCB, 2011). See also HGC Comment No. 3, explaining that the MPWSP slant wells will likely extract significant amounts of groundwater from the Marina Subarea because the area is not completely filled with seawater.

As discussed above, many of the MPWSP's proposed slant wells will not actually extend beneath the ocean floor and a large section of the well screens that produce groundwater is onshore within the restrictive territory identified by Ordinance 3709. The well designs shown in the DEIR/EIS indicate the onshore sections of the well screens that will contribute groundwater to the slant well facilities and are not "beneath the ocean floor." The DEIR/EIS does not demonstrate through use of a territorial boundary map that the slant well configurations and designs are located outside Territory B and comply with the ordinance.

While the DEIR discusses the Agency Act and recognizes the provisions in Ordinance 3709, it has not demonstrated that operation of the proposed MPWSP well facilities as designed will not violate both regulations.

The DEIR/EIS's modeling relies on the Geosciences 2016 CEMEX Model Update, which makes a number of unsupported assumptions based on the lack of available data.

On **Page 4.4-42 and 4.4-43**, the DEIR/EIS states:

> CalAm installed the test slant well to further evaluate subsurface conditions and to test the response of the Dune Sand Aquifer, the 180-FTE Aquifer, and the 400-Foot Aquifer to pumping. The results have been used to refine the groundwater models and inform the analysis of the proposed project. The first phase of the test slant well investigation began with the construction of a 724-foot long test well drilled at an angle of 19 degrees below horizontal at the CEMEX site. Special Condition 11 of the Coastal Development Permit, "Protection of Nearby Wells," requires the MPWSP HWG to establish baseline water and TDS levels prior to commencing the long term pumping tests (Geoscience 2015b). The long-term pumping test began in mid-April 2015, and results are available at http://www.watersupplyproject.org/#!test-well/c1f1l.
>
> **Monitoring Wells Installation and Testing**
>
> To monitor the response of the aquifers to pumping from the test slant well and verify that the aquifers would respond as simulated by the groundwater modeling discussed below, CalAm installed a network of monitoring well clusters at the locations shown on Figure 4.4-9, along with a water level data logger in the pond that CEMEX uses to dredge sand (Geoscience, 2016b). The details of the

subsurface exploration including boring logs, well construction details, field screening tests results, and laboratory analytical results are presented in a report titled: Monterey Peninsula Water Supply Project, Hydrogeologic Investigation, Technical Memorandum (TM2) Monitoring Well Completion Report and CEMEX Model Update (Geosciences, 2016b). The Hydrogeological Working Group peer reviewed TM2 before the final document was released; that document is also discussed in Section 4.2, Geology, Soils, and Seismicity. Four of the monitoring well clusters are located west to east along the CEMEX access road, from near the proposed slant wells to near the CEMEX facility entrance. Monitoring well clusters were also installed at the proposed desalination plant site on Charles Benson Road, at the intersection of Lapis Road and Del Monte Road, and along West Blanco Road about 4 miles southeast of the CEMEX site. The clusters monitor water levels and chemistry in the Dune Sand, 180-FTE, and 400-Foot Aquifers. Groundwater elevation and water quality data developed from monitoring the cluster wells are presented in the impact analysis, below.

HGC Comment No. 24:

First, my comments and testimony in the *MCWD v. Coastal Commission* case addressed Technical Memorandum No. 1 that did not establish baseline conditions at MW-4 or any of the other required monitoring wells. Rather, the memorandum included a cursory discussion of water levels at some of the monitoring wells over a period of weeks (or a couple months depending on the date of their construction) and then provides a Section 7.0 entitled "Recommended Monitoring of Baseline and TDS Levels," which suggests a method for evaluating impacts without actually establishing baseline water levels. (See Geoscience 2015p, Technical Memorandum, p. 14.) There was no information regarding tidal, seasonal, or climatic variations in the memorandum. In fact, it was even unclear what was being considered as pre-pumping conditions.

With its predecessor (TM1), TM2 (Geoscience, 2016) provides information on all the wells constructed to date, and attempts to summarize baseline conditions, the TSW and monitoring wells were installed during a drought. The single season groundwater contour maps for the fall of 2015 inadequately show the coastal conditions in the Marina Subarea of the SVGB. Notable, until the spring of 2017, the river and its reservoir system have been stressed by reduced rainfall. Showing seasonal low water levels during an extended dry period does not sufficiently portray the dynamic system that has largely been undocumented. For instance, the entire record of MW-6S shows a relatively constant level for the A Aquifer with the seasonal variation of approximately 1 to 1.5 feet between April 2015 and December 2016. With the end of the drought, we see an entirely new dynamic. The water level in the fall of 2015 was 7.8 feet (see TM2, Figure 10) and only changed when storm flows resumed in the river. As winter rains filled reservoirs and caused tributary runoff, the Salinas River flows began to show a huge source of recharge to the A Aquifer zone. MW-6S rose from its steady trend approximately 10 feet resulting in shallow groundwater levels of over 17 feet amsl. The TSW project may be developing baseline data, but this source of recharge to the shallow A Aquifer, -2-Foot Aquifer, and Dune Sand Aquifer was not apparent in previous data. The 2015 fall season water level in MW-7S used for contouring was 3.9 feet amsl. The level was observed to rise to about 6 feet amsl after the winter rains of 2015, and it remained above 5.5 feet amsl throughout 2016. These are all protective water levels for the Dune Sand Aquifer. But now the coastal water levels are at approximately 8 feet amsl and rising. This protective head condition could only be speculated, prior to this year's observations and was based on the fresh water quality present in the aquifer instead of seawater. There were no baseline data available in this central area of the Marina Subarea prior to TSW project monitoring.

Furthermore, as actual field data are being developed, the adequacy of the originally proposed work plan for field investigations must be reviewed and revised. Recent findings indicate that Monitoring Well No. 2 should provide valuable information for understanding the changes in the hydrogeology that occur south of the CEMEX site where the intake wells are proposed and project impacts would occur. This monitoring well has not yet been constructed. Recent information indicates that the complexities of the hydrogeology in the Marina Subarea are not well understood and should be further investigated to fully define the potential MPWSP impacts.

The degree of uncertainty in the DEIR/EIS's groundwater modeling is intolerable due to its failure to utilize the best available information:

On **Pages 4.4-43 through 4.4-51,** the DEIR/EIS describes the investigation of groundwater conditions and modeling, and provides the following assessment of the "Limitations of Groundwater Models" at Page **4.4-44:**

> Groundwater models simulate aquifer conditions based on a specific set of data that describes parameters such the subsurface characteristics, groundwater flow, and land use. The more robust the data set, the more capable the model will be to accurately simulate subsurface conditions. Most groundwater models use conservative input parameters so that the output overstates the actual aquifer response. Nevertheless, groundwater models are mathematical-based computer programs that rely on input parameters and, consequently, there is a degree of uncertainty. However, the models used to analyze the proposed project have been used previously and have benefited from input data derived from site-specific subsurface information. Given that, and given the fact that these models were calibrated with known data, the level of degree of uncertainty for this analysis is considered tolerable.

On Page **4.4-47**, however, the DEIR/EIS further reveals it did not use the prior models:

> For this project, the NMGWM is converted to a superposition model and only solves for the groundwater changes due solely to the proposed project. These changes are independent of the effects from the other stresses on the basin such as

seasonal climate and agricultural pumping trends, other pumping wells, injection wells, land use, or contributions from rivers. By using superposition, the actual effects of only the proposed project can be isolated from the combined effects of all other basin activity. For example, when the NMGWM reports a 1-foot drawdown in a well, it is understood that the one foot of drawdown would be the effect on the basin of the proposed project only. That well may experience greater drawdown due to other stresses, such as drought or other nearby pumping wells, or may experience increases in water levels due to reduced regional pumping or an extremely wet year. But the proposed project's contribution to that drawdown in the well would remain only 1-foot. Superposition is described in Appendix E2, Section 5.2.

Then on Page **4.4-49**, however, the DEIR/EIS further reveals it did not determine return water that would be required or address cumulative impacts (other than sea level rise):

Return Water Considerations

The MPWSP proposes to return a certain fraction of water (referred to here as return water) extracted by the slant wells to water users in SVGB as desalinated product water … The exact quantity of water to be returned annually would vary and would be determined each year using a mathematical formula. However, for groundwater modeling and impact analysis purposes in this EIR/EIS, it is estimated that somewhere between 0 and 12 percent of the source water withdrawn for the project would comprise water originating from the inland aquifers, and thus would be returned to the basin. The water would be returned to the SVGB through deliveries of up to 800 afy of desalinated product water to the Castroville Community Services District (CCSD). This water would be piped to the CCSD and the CSIP and provided to water customers instead of their pumping an equal amount from the ground. This method of returning water is referred to as in-lieu recharge because the delivered water would reduce the need to pump groundwater in corresponding quantities. The NMGWM accounts for the 0 to 12 percent range by simulating the aquifer response in the various scenarios with a 0, 3, 6, and 12 percent returned product water.

Model Period

The model period for the NMGWM is 63 years. The model scenarios are run over a set time period, beginning with the baseline conditions and extending out to a future point in time, typically set as the life span of a given project. Over this time period, land use, climate conditions, and, if located along the coast, sea level rise would be expected to change. ***However, as discussed above, superposition modeling does not account for other stresses on the basin except for the effects***

on groundwater flow from projected sea level rise over the 63 years of modeled operations. (emphasis added)

HGC Comment No. 25:

As discussed in HGC Comment No. 5, the level of degree of uncertainty in the DEIR/EIS's modeling is intolerable given its failure to utilize the best available information.

As previously discussed, ***the recalibrated NMGWM^{2016} was not successful*** at providing shallow groundwater responses to project pumping and in fact may be less representative of real world conditions than the predecessor model NMGWM^{2015}. The CEMEX model is too small to be used to project aquifer parameters across the NMGWM domain. The SVIGSM is inappropriately constructed in the project area and did not include boundary recharge into the Dune Sand Aquifer or the existence of the FO-SVA and cannot be used to feed realistic input into the NMGWM^{2016}. The unsuccessful calibration attempts prevented using data developed from the site specific study unless a new model was constructed. ***Instead and because of these failings, the effort to use a calibrated model was aborted and the superposition model was constructed.*** The superposition, however, uses the hydraulic conductivity values for aquifers in the Marina Subarea from the ***recalibrated NMGWM^{2016}***, which did not predict water levels within an acceptable error range, and therefore its results are similarly unreliable, if not worse. Moreover, while the superposition model can simulate drawdowns, it can't be used to evaluate the project's impacts on water quality or the project's potential cumulative impacts. It is also incapable of showing the water budget (from different sources) and boundary conditions dictate results by limiting drawdown effects. As a result, it cannot be used to estimate the amount of return water or evaluate whether the project is performing as expected in the future. Finally, the DEIR's reliance on the modeling to date to evaluate the project's potential impacts on groundwater in the Marina Subarea is not tolerable based on the DEIR/EIS's own evaluation criteria.

DEIR/EIS's analysis of potential impacts to the Salinas Valley Groundwater Basin is based on an inadequate investigation of baseline conditions in the Marina Subarea and fatally flawed modeling that does not utilize the best available information:

On **Page 4.4-57,** the DEIR/EIS provides the following threshold of significance for Impact 4.4-3:

> Deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level during operations. (Less than Significant)

HGC Comment No. 26:

Given the DEIR/EIS's inadequate investigation of baseline conditions in the Marina Subarea and flaws in its modeling, there is no way for the public or Commission to make an informed decision on the project's potential groundwater impacts for the reasons discussed in HGC Comment Nos. 5 and 25 above and further below. We note that the threshold includes "interfering substantially with groundwater recharge," which would include the interception of recharge before it reaches its area of replenishment and/or beneficial use. Notable, groundwater recharge can serve many purposes including replenishing groundwater being removed, diluting groundwater as it is flowing through an area, and/or maintaining a sufficient head to prevent the movement of poor quality water in an undesirable direction. As discussed above, the superposition groundwater model constructed and utilized to assess impacts in the DEIR/EIS is incapable of predicting the impact of the project on any of these groundwater recharge benefits. As a result, the DEIR/EIS's less than significant determination is speculation at best.

The DEIR/EIS's analysis of potential impacts to the Salinas Valley Groundwater Basin groundwater supply is based on an inadequate investigation of baseline conditions in the Marina Subarea and fatally flawed modeling that does not utilize the best available information:

On **Page 4.4-57,** the DEIR/EIS states:

> The first step in this analysis was to determine the pumping scenario that would have the most profound aquifer response surrounding the slant wells at the CEMEX site in order to conservatively judge potential impacts. Extracting groundwater from slant wells at the CEMEX site could cause an aquifer response up to 4 miles inland. Figure 4.4-13 shows the cone of depression with -1, -5, -10, and -20-foot drawdown contours and the extent of pumping influence in the 180-FTE Aquifer; these drawdowns would stabilize within five years after pumping begins, and would remain stable as long as the MPWSP is pumping. For purposes of this impact analysis, this model scenario assumes that no water would be returned to the SVGB and the sea level would be consistent with current levels. This scenario generates the most pronounced cone of depression with the largest area of influence because groundwater would not be returned to the basin, and because current sea level would not increase groundwater levels and gradients at the coast as it is expected to do in the next 63-years. This scenario is used to represent the maximum area of pumping influence. In other words, Figure 4.4-13 depicts the improbable worst case aquifer response from the proposed project.

HGC Comment No. 27:

The DEIR/EIS representation that Figure 4.4-13 depicts the improbable worst case aquifer response from the proposed project is simplistic and the discussion should actually clarify it is the worst case that the superposition model can simulate. This error is significant and results in the DEIR/EIS failing to evaluate potential impacts on future inland water quality degradation, on depletion of storage, on Groundwater-Dependent Ecosystems, and the project's consistency with the requirements under the SGMA.

The DEIR/EIS's analysis of potential impacts to the Salinas Valley Groundwater Basin groundwater supply is based on an inadequate investigation of baseline conditions in the Marina Subarea and fatally flawed modeling that does not utilize the best available information:

On **Page 4.4-57 through 4.4-59,** the DEIR/EIS states:

> The second step in this analysis was to use the drawdown contour map on Figure 4.4-13 to determine the area of influence and maximum drawdown caused by the slant well pumping. As shown by modeling results depicted on Figure 4.4-13 the center of the cone of depression and thus, the capture zone for the slant wells show that the majority of the groundwater drawn into the proposed MPWSP slant wells would originate in the aquifer zones located at and offshore of the coast and would be composed primarily of seawater. This is illustrated by the configuration of the cone of depression shown in Figure 4.4-13. The western extent of the cone of depression is just offshore and in close proximity to the slant wells where the drawdown is deepest and contours are steeper, indicating more flow to the slant wells and higher yield near the coast. At the coast, seawater entering the slant wells would have the shortest and least restricted pathway through the overlying sea floor deposits. The drawdown contours extend inland but at considerably shallower gradients, between -1 and -5 feet, indicating that the inland basin is less permeable, and that groundwater must flow through thicker sediments to reach the slant wells. This additional resistance to flow reduces the volume of water available to the slant wells and flattens the gradient. The cone of depression shown on Figure 4.4-13 illustrates that the majority of the water pumped at the slant wells would originate at the coast and just offshore, where the drawdown is most pronounced while a smaller volume of groundwater would be extracted from the inland portion of the 180-Foot Aquifer.

HGC Comment No. 28:

While the superposition model results can illustrate the concept of groundwater flow direction, it cannot quantify the amount of seawater or fresh groundwater that will be produced. The discussion about the apparent resistance to flow from the landward side of the project and that the inland basin is less permeable is merely an observation of the lower hydraulic conductivity values assigned in the model domain inland of the CEMEX site. As discussed above, hydraulic conductivity values assigned in the superposition model are based on the ***recalibrated NMGWM^{2016}*** model and therefore are not reliable.

<u>DEIR/EIS's analysis of potential impacts to the Salinas Valley Groundwater Basin groundwater supplies is based on an inadequate investigation of baseline conditions in the Marina Subarea and fatally flawed modeling that does not utilize the best available information:</u>

On **Page 4.4-59,** the DEIR/EIS states:

> The third step in this analysis was to assess the quality and current use of the groundwater that would be extracted by the slant wells. The MPWSP slant wells would not extract potable groundwater. The groundwater in the 180-foot Aquifer that is underlying the area influenced by the MPWSP pumping, up to about 4 miles inland, has been intruded with seawater for decades, and far exceeds the State Drinking Water Standard of 500 mg/L of total dissolved solids (TDS).23 The inland groundwater has been degraded by legacy and ongoing seawater intrusion and is not being produced for beneficial potable uses. Figure 4.4-10, above, shows the areas of groundwater in the 180-Foot Aquifer degraded by seawater intrusion over time. The CEMEX site and the area of influence from slant well pumping in the 180-FTE are well within the area degraded by historical sea water intrusion.
>
> Recent testing for TDS in groundwater within the area of influence of the proposed MPWSP slant well pumping verifies the degree of seawater intrusion. Water samples from Monitoring Well MW7M (180-FTE Aquifer) and MW-7D (400-Foot Aquifer), located just over a mile southeast from the proposed slant well location, contained TDS concentrations at 3,832 mg/L and 26,700 mg/L, respectively. Samples from Monitoring Well MW-8M and MW8D, located 1.5 miles to the northeast, had TDS concentrations of 24,000 mg/L and 583 mg/L, respectively. Monitoring Well MW-9S (Dune Sand Aquifer) and MW-9M (180-FTE Aquifer), located 2 miles to the northeast, had TDS concentrations of 3,204 mg/L and 29,000 mg/L, respectively. These data show that groundwater within the inland area of influence of the proposed MWSP slant wells is brackish with elevated TDS attributable to seawater intrusion; the groundwater in the Dune Sand, 180-FTE and 400-foot Aquifer is therefore unsuitable for potable supply.
>
> Current groundwater production in the Dune Sand Aquifer, the 180-FTE Aquifer, and the 400-Foot Aquifer, which are projected to exhibit a response to MPWSP slant well pumping, is limited to minor irrigation and dust control. There are no water supply wells pumping potable water. Most of the wells in this area are no longer active because of seawater intrusion. Furthermore, groundwater production is restricted within the seawater intruded coastal areas in the vicinity of the CEMEX site through MCWRA Ordinance 3709, which prohibits drilling wells and pumping groundwater from the 180-FTE Aquifer in order to protect groundwater resources. The slant wells at CEMEX and the area of pumping

influence east of CEMEX are within the jurisdictional boundary of Ordinance 3709.

HGC Comment No. 29:

First, while the statement that "the MPWSP slant wells would not extract potable groundwater" may be accurate, it is also misleading. While it is true that once the freshwater produced from the inland side of the intake wells is mixed with ocean water, it will no longer be "potable," the statement is misleading to the lay reader because it incorrectly suggests/implies that no potable groundwater would be drawn into the slant wells. Therefore, the DEIR/EIS should clarify this statement and recognize that the project's slant wells would extract both seawater and freshwater and/or brackish groundwater suitable for beneficial uses.

Second, the DEIR/EIS only discusses the groundwater that would be extracted from 180-FTE Aquifer and provides a broad sweeping statement that 180-FTE Aquifer: a) is seawater up to about 4 miles inland, b) has been intruded for decades, and c) far exceeds the State Drinking Water Standard of 500 mg/L Critically, the DEIR/EIS fails to address the Dune Sand Aquifer implying there is no beneficial uses for the water that the aquifer contains. As explained in HGC Comment No. 3, the water quality data developed by the project show fresh water within 2 miles of the coast in the 180-FTE and 400 Foot Aquifers (see Diagram 5 above). The Dune Sand Aquifer contains fresh water within 1 mile of the coast and is believed to be contributing to protective conditions in the underlying 180-FTE Aquifer through recharge along the coast (see attached Figures 1 and 4).

The statements regarding seawater intrusion into the 180-FTE Aquifer are only partially correct and thus misleading. The DEIR/EIS's statement that the 180-FTE Aquifer groundwater has been degraded (a relative term) by legacy and ongoing seawater intrusion is accurate, but the suggestions that it is completely intruded to about 4 miles inland is false. As previously explained, the TSW findings show that inland of the project location this aquifer has fresh water at MW-5 and MW-6 (see attached Figures 1 and 2).

The DEIR/EIS's claim that recent testing for TDS in groundwater within the area of influence of the proposed MPWSP slant well pumping verifies the degree of seawater intrusion but it shows significant amounts of brackish and fresh groundwater in areas where the aquifers where inferred to be completely filled with seawater (see attached Figures 4 and 5).

Finally, using the DEIR/EIS's statement that characterizes the groundwater in the 180-FTE Aquifer as far exceeding the State Drinking Water Standard of 500 mg/L, the DEIR/EIS improperly limits its analysis to whether the project will directly impact "potable" uses. The DEIR/EIS fails to address whether the project will have a direct, indirect, or cumulative impacts on all types of beneficial uses of groundwater in Marina Subarea aquifers. The DEIR/EIS is careful not to say "**all uses,**" it merely concludes that "groundwater in the Dune Sand, 180-FTE and 400-foot Aquifer is therefore unsuitable for potable supply", which again is extremely misleading. This approach implies that if groundwater is not suitable to meet the highest drinking water standards without blending or treatment, it has no beneficial use. This is distracting from the reason why decades of seawater intrusion (which is not a linear process) has not rendered the entire coastal area completely full of salt water and how recent management efforts have abated intrusion to its current position and slowed its rate of advancement.

Coastal farming has been impacted by saltwater intrusion for over 70 years and yet it continues to produce groundwater inland. Initially, dilution of minor seawater incursions with freshwater sources onshore could make the salinity of the groundwater supply tolerable. Dilution of legacy saline water along the coast and further inland is visible from both water quality measurements taken by the TSW program and by the lack of advancement of the 500 mg/l chloride front observed between 2011 and 2013. While greater management efforts are planned to further reduce pumping along the coastal portion of the SVGB, natural and artificial replenishment of freshwater to the coastal portion of the basin serves to dilute and make the originally unsuitable quality of groundwater acceptable for beneficial uses decades later and miles inland.

At the time of the TSW investigation, the groundwater within a half mile of the coast shows significant dilution in certain areas of certain aquifer zones (see Diagram 5 above) and within a mile of the coast, fresh water is present that could be used for irrigation of several types of crops and for potable consumption (with nitrate removal). The key issues are really that the TSW project findings are helping to develop our understanding of the natural groundwater recharge and flow conditions in the Marina Subarea and that management strategies are beginning to manifest visible beneficial results.

A better understanding of the present condition would be that the effects of seawater intrusion since 1944 extends significant distances inland, but the extent of intrusion varies along the coast (particularly in the Marina Subarea) and accurate maps of this intrusion do not currently exist. Notably, as shown by the TSW project data (Geoscience, 2015p, Table 2), and contrary to the implication of statements elsewhere in the DEIR/EIS, seawater does not occupy the 180-Foot/180 FTE Aquifer or the 400-Foot Aquifer between the CEMEX site and 8 miles inland or 3.5 miles inland, respectively (See HGC Comment No. 4, Table 2, Diagram 4 above, and Figures 1 through 5 attached to this letter). These statements and similar statements throughout the DEIR/EIS must be revised so the public and decision makers are not led to believe all the groundwater in the Marina Subarea is contaminated by seawater and that all management efforts have failed.

Furthermore, the concept that wells that are located within the radius of influence and screened in the 180-Foot and 400-Foot Aquifers have been brackish-to-saline for years, and are no longer serving irrigation or potable uses is also misleading given the well production prohibition zone along the coast has stopped well production in these affected aquifer zones. The prohibition of pumping along the coastal portion of the SVGB, including the Marina Subarea, as a management effort has almost entirely removed active wells in the Dune Sand Aquifer and the 180-Foot/180-FTE Aquifer from operation (except the CEMEX wells). As discussed above, this lack of pumping (and other conservation efforts) has resulted in restoring groundwater quality and improved protective heads from seawater intrusion in the Marina

Subarea even during the current extended drought period. The DEIR/EIS's discussion of the lack of facilities that would be directly impacted by the MPWSP's operational drawdown is not surprising nor particularly relevant to whether the MPWSP would result in adverse impacts to the Marina Subarea and the SVGB as a whole. The bigger question is whether the project would result in a "net deficit in aquifer volume" as it relates to long-term water quality impacts and basin management efforts, not drawdown impacts on proximal well facilities operations. For these reasons and those discussed above, the DEIR/EIS analysis of MPWPS potential to cause a "net deficit in aquifer volume" (loss of storage) as it relates to long-term water quality impacts and basin management efforts is woefully inadequate.

The DEIR/EIS's conclusion that the project impacts to Salinas Valley Groundwater Basin groundwater supplies is less than significant must be updated based on new modeling results that address cumulative impacts and disclose the amount groundwater supplies within the Marina Subarea that will be depleted:

On **Page 4.4-60**, the DEIR/EIS states:

> The proposed project would not deplete groundwater supplies; it would extract primarily seawater and a smaller volume of brackish inland groundwater from a localized area with only minor localized groundwater drawdown. The area influenced by the MPWSP groundwater pumping is within a zone that is degraded by seawater intrusion and therefore unusable for potable water supply due to its high salinity. When desalinated water is returned to the basin as part of the MPWSP, groundwater conditions in the 400-Foot Aquifer underlying the CSIP, CCSD, and adjacent areas would improve as water levels increase as a result of in-lieu groundwater recharge. The return water component of the MPWSP would benefit each of the aquifers by either reducing the area of influence or by increasing groundwater levels in other areas. The effects of return water on the basin water levels are discussed below and shown on Figures 4.4-14 through 4.4-16. If the proposed project did not return any water, localized depressed groundwater levels would persist in the three affected aquifers throughout the life of the project. However, the area affected by groundwater pumping would remain localized and the proposed project would continue to extract only brackish, degraded groundwater from the coast and, to a lesser extent, the inland portion of the aquifer. Based on the conclusions of this analysis, this impact would be less than significant.

HGC Comment No. 30:

The statement that "The area influenced by the MPWSP groundwater pumping is within a zone that is degraded by seawater intrusion and therefore unusable for potable water supply due to its high salinity" assumes there is no way to pump brackish groundwater and clean it up for beneficial potable uses. This is false. As discussed above, the shallow aquifers in the coastal area are not presently pumped because of a management strategy that has been employed to abate seawater intrusion and not solely because it has a component of seawater present.

Again, the DEIR/EIS's statement that the "proposed project would not deplete groundwater supplies" is misleading to the public and the Commissioners. With only a month to review the ***recalibrated NMGWM^{2016}*** and superposition model due to the CPUC's failure to make this information available until February 16, 2017, we have worked with GeoHydros to analyze groundwater depletion from the proposed production of 27,000 afy. Based on this review of ***recalibrated NMGWM^{2016}***, which likely understates the project's impacts as discussed above, the MPWSP would initially produce approximately 30 percent of its supply from groundwater. Again, if the model was properly calibrated, this number could be higher. Nonetheless, the water budget clearly shows the project will draw a substantial portion of groundwater during the initial year at minimum. Moreover, the water budget also show that project would significantly reduce groundwater storage within the Marina Subarea. The DEIR/EIS must be revised to disclose the amount of Marina Subarea groundwater supplies that would be depleted by the project. Without this information, it is impossible for the public and Commissioners to propose or evaluate potential mitigation measures. While the CPUC may determine that the impacts to groundwater supplies in the Marina Subarea are significant and unavoidable, it cannot approve the project without disclosing this condition and allowing public comment on this impact.

In addition, the DEIR/EIS's characterization of the project as creating only a "minor localized groundwater drawdown" is misleading and fails to acknowledge the magnitude of the groundwater extraction proposed. As designed, a single well would produce 2,100 gpm and the operation of 8 wells would total 16,800 gpm. That rate of groundwater extraction would fill an average size swimming pool in 1.5 to 2 minutes. Different than other municipal wells that cycle to meet day time demands and then rest at night, the MPWSP intake wells would pump constantly. Similarly, the suggestion that the project would only draw a small amount of brackish groundwater from the inland side of the project is significantly downplaying the quantity to be produced. Annually, the project production of groundwater would fill a 2,700-acre reservoir with water to a depth of 10 feet. After 10 years, the reservoir would be one hundred feet deep.

Finally, the return water component of the MPWSP would benefit each of the aquifers "by either reducing the area of influence **or** by increasing groundwater levels in other areas" does not address or mitigate impacts to the Marina Subarea aquifers directly impacted by the project.

Again, groundwater production should be calculated to include the 3,000 mg/l beneficial use standard provided in the WQCP. The amount of groundwater return to the basin needs to be specifically indicated and analyzed to determine the effectiveness of its implied mitigation of the potential project impacts.

The DEIR/EIS's conclusion that the project impacts to the existing wells is less than significant must be updated based on new modeling results that address cumulative drawdown levels:

On **Page 4.4-68**, the DEIR/EIS states:

> The nearby groundwater production wells affected by the change in groundwater levels are built in the Dune Sand Aquifer, 180-FTE Aquifer, or the 400-Foot Aquifer and thus have casings, pumps, and screens at depths considerably deeper than the depths at which MPWSP pumping could affect the water levels. A water level decline between 1 and 5 feet would not expose screens, cause damage, or reduce yield in the groundwater supply wells influenced by MPWSP pumping. Based on the modeled response of the 24.1-mgd extraction rate at the CEMEX site, the impact on nearby water supply wells would be less than significant.

HGC Comment No. 31:

As discussed above, the superposition model does not address cumulative drawdown and therefore does not address the project's potential to impact existing wells under cumulative conditions, which could include extended drought periods.

The DEIR/EIS's conclusion that the impacts of the project on the surface water-groundwater interaction at the Salinas River and Tembladero Slough is inconsistent with the conclusions in the Alternatives Section regarding Elkhorn Slough:

On **Page 4.4-70**, the DEIR/EIS states:

> The NMGWM can estimate the loss of groundwater outflow to a surface water feature such as the Salinas River. Based on the modeling, the estimated volume of groundwater removed from the river recharge system would be approximately 400 afy. A similar condition exists for Tembladero Slough, where the volume of groundwater removed by the slant well pumping from that system would be about 65 afy. The volume of water flowing to the ocean through the Salinas River in 2012 was about 250,000 afy, so the reduction of 400 afy is about 0.16 percent of the total flow. From a surface water supply standpoint, this magnitude of groundwater diversion from the Salinas River would be a minor, if not immeasurable, reduction in surface water supply. The same conclusion is applied to the Tembladero Slough, where the removal of 65 afy of groundwater discharge would not constitute a recognizable loss in supply for that system. The reduction of surface water attributable to slant well pumping is not a substantial reduction of water supply and thus this impact would be a less than significant impact.

On **Page 5.5-114**, the DEIR/EIS states:

> Unlike the proposed project, groundwater modeling (see Appendix E2) indicates pumping from the slant wells at Potrero Road would result in a cone of depression in the underlying groundwater aquifers that would draw or divert water from

> Elkhorn Slough. This drawdown impact is discussed in Section 5.5.4, Groundwater Resources, and presented in Figure 5.5-2. The modeling cannot predict the amount of water diverted from Elkhorn Slough although it must be conservatively assumed, based on the predicted areal extent of the drawdown, that operations could potentially adversely affect aquatic habitat in Elkhorn Slough due to reduced surface water flow and volumes. This would be an increased level of impact compared to the proposed project and because there is no method to mitigate for impacts on surface water flow and volumes in Elkhorn Slough, Alternative 1 would result in an increased impact conclusion on marine species, natural communities or habitat, protected wetlands or waters, and critical habitats compared to the proposed project, significant and unavoidable.

HGC Comment No. 32:

The assessment of the impact of surface water losses from these features due to the project pumping is general and compared to annual conditions that don't consider low-flow or no-flow conditions resulting from seasonal or climatic dry periods. This may be largely a result of the inadequacy of the NMGWM^{2016} prior to switching to use of the superposition model. In addition, the DEIR's conclusion regarding the potential impacts to the Salinas River and the Tembladero Slough are inconsistent with its treatment of Elkhorn Slough in the Alternatives Chapter.

The DEIR/EIS's discussion of the surface water-groundwater interaction at CEMEX fails to analyze or disclose how the TSW's impacts were effected by CEMEX operations making the revised modeling subject to untolerable uncertainty.

On **Page 4.4-70 through 4.4-72**, the DEIR/EIS states:

> The CEMEX facility has several ponds on its property. The largest pond, located to the north of the slant wells, is the source of the sand mined by CEMEX. The impact analysis of MPWSP pumping effects on recharge considered the largest pond to determine whether the proposed project would have an adverse impact on its recharge or on the current sand mining operations. A significant impact would occur if the proposed pumping at CEMEX reduced recharge to the Dune Sand Aquifer or interfered with or otherwise limited the ability of CEMEX to operate due to intolerable draw down in its main sand mining pond.
>
> **Pond Operation**
>
> The bottom of the large CEMEX dredge pond is assumed to be at about 10 to 20 feet below the surface water level in the pond (Geoscience, 2015b). The water level in the pond is in hydraulic connection with the ocean, receiving ocean water as seepage through the beach sand and occasional storm surges over the beach and into the pond. Winter storm surges push sand with very little silt or clay particles over the beach and into the largest pond, and the sand settles to the bottom of the pond. CEMEX then dredges the sand from the pond, sorts the sand

into different grain sizes depending on the desired end product, and washes the sand to remove residual salts from seawater. The wash water is routed to the smaller ponds located north and east of the location of the proposed slant wells, where the seawater seeps into the sand and migrates back to the ocean. The larger, deeper sand source pond is in an area composed entirely of sand. The water level in the largest pond is controlled by the ocean tides (Geoscience, 2015b). Occasionally, storm surges remove the sand barrier between the larger dredge pond and the ocean and the pond temporarily becomes a small bay, as occurred in March 2016. The smaller, shallower wash water ponds are fed entirely by the wash water and are not directly connected to either to the ocean or the underlying groundwater; wash water either evaporates or infiltrates into the shallow sand and migrates to the ocean.

A water level transducer was installed in the large dredge pond on the CEMEX property to monitor changes in water elevations. The most recent monitoring report indicates that the pond is tidally influenced (Geoscience, 2015a, b) due to the proximity of the pond to the ocean (within 200 feet). In addition, the pond water level monitoring indicates that the sand mining operations conducted on Monday through Friday also affect pond water levels. Pond water levels fluctuate and decrease during the week as sand and water is pumped out of the pond and then stabilize on Saturday and Sunday when the sand mining operations are closed.

Impact Analysis for CEMEX Dredging Pond Drawdown

This impact analysis is based on the analysis completed for the test slant well, which was completed in September 2014, and is also informed by data that was generated in April 2015 after a five-day constant discharge pump test of the test slant well.

In the September 2014 analysis, the localized CEMEX model was used to determine whether the dredge pond would be influenced by pumping at the proposed test well operating at 2,500 gallons per minute (gpm) (Geoscience, 2014a). The localized CEMEX model simulates the response of the Dune Sand Aquifer in its second, third, and fourth vertical layers. The depth of the large dredge pond falls within the second and part of the third model layer so the response in the dredge pond would be captured as a response in the upper portion of the Dune Sand Aquifer. The CEMEX model simulated the test well pumping for 8 months at 2,500 gpm. The results of the model run showed a drawdown at the dredge pond of about 1 foot. If a drawdown of 1 foot occurred for a pumping rate of 2,500 gpm from one well (the test slant well), there is a possibility that additional drawdown would occur in the pond during operation of the all of the proposed slant wells, which would operate at the combined pumping rate of 24.1 mgd or about 16,736 gpm. However, when compared to the daily tidal fluctuations in the dredge pond water levels of up to eight feet throughout the year, the decline in the water surface of any depth would be masked by the consistent recharge and tidal influence from the ocean.

On March 8, 2015, a water-level transducer was installed in the dredge pond, and it has been collecting data ever since. In April 2015, a five-day constant-discharge pumping test was conducted (Geoscience, 2015b). The transducer showed a series of cyclical fluctuations from March 8 through March 21, followed by relatively flat levels through April 2, followed by similar pattern of cyclical fluctuations at similar elevations through April 11. The cyclical fluctuations are due to a combination of tidal influence and the routine dredging of the pond for sand. The early March fluctuations, which occurred before the pumping test, and the early April fluctuations, which occurred during the pumping test, show a similar pattern at about the same water level, indicating that the water level in the dredge pond was not being influenced by the pumping of the test slant well. This also indicates that as the pond is dredged, the water levels quickly recover, with seawater seeping through the loose sand on the beach.

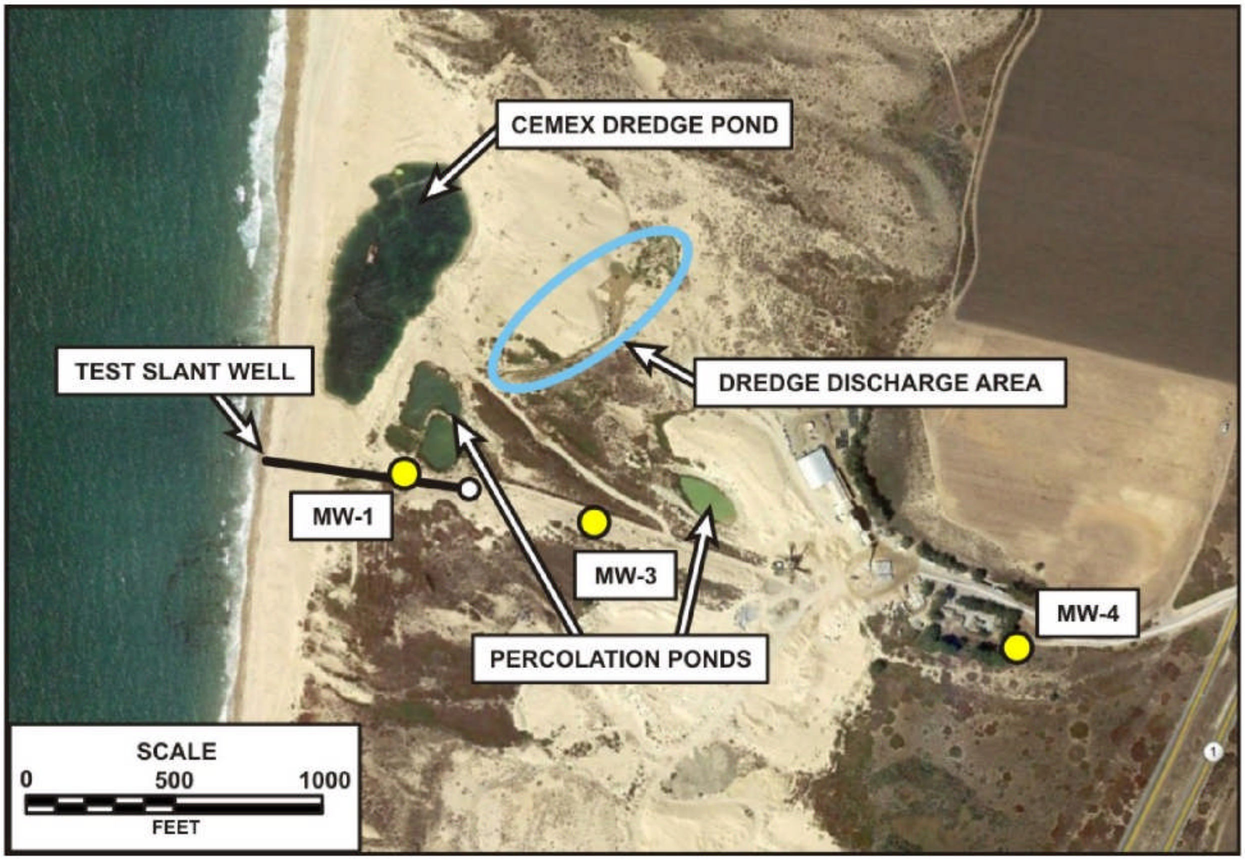
While pumping at the slant wells could elicit a drawdown response in the large dredge pond over periods of extended pumping, the magnitude of that response would not interfere with recharge to the Dune Sand Aquifer, nor would it inhibit sand mining operations by depleting available water supplies to the pond. This impact is less than significant.

HGC Comment No. 33:

While the project may not significantly impact CEMEX's dredge pond operations, the DEIR/EIS fails to disclose how CEMEX's operations affected the test slant well discharge water quality and whether they would have similar effects on the 9 additional slant wells proposed further south and away from the dredge pond, the dredge pond discharges, and wash water containment ponds infiltration. Notably, due to CEMEX operation, the measured values relevant to salinity (specific conductivity, TDS, and practical salinity units (PSU)) provided by the TSW laboratory results and field measurements are not representative of what is expected from the larger MPWSP source wells array. At the time the higher salinity water quality samples were taken, the CEMEX dredge pond, which is in close proximity to the test well and inland of the shoreline, was breached for a significant period of time and directly filled by ocean water. It is likely the significant increase in salinity readings in the TSW during and following this period of time. The result was a large surge of ocean water into the dredge pond area overlying the inland portion of the beach adjacent to the test well. This condition will not persist throughout the year and is not present at the other proposed MPWSP source well locations.

Additionally, the CEMEX plant operations have influenced shallow groundwater quality in this reach of the shoreline for decades. As shown on Diagram 7 – CEMEX Surface Water Features August 2013, the test slant well is located adjacent to numerous sources of saline water that are not present at other locations along the coast in particular where the other source water wells are proposed.

Diagram 7 – CEMEX Surface Water Features August 2013



These localized sources of salt water shown in Diagram 7 significantly influence the quality of the shallow groundwater that is observed in MW-1, MW-3, MW-4 and produced by the test slant well. The results in an overestimation of the seawater component flowing landward from the shoreline and an under estimation of the return water that will be required for mitigation.

The depletion of these landward sources of seawater is evident in the declining specific conductance trend for the TSW since November of 2016 (see Figure 3-12, Geoscience, 2017) and the overall decline in specific conductance trend in MW-4S since operation of TSW (see Figure 3-3, Geoscience, 2017).

Finally, I would note that this comment was provided to the CPUC in my testimony regarding the return water proposal, but the DEIR/EIS still does not address this issue.

The DEIR/EIS's conclusion that Impact 4.4-3 is less than significant is not supported by the best available scientific evidence and must be updated based on new modeling:

On **Page 4.4-73 through 4.4-74**, the DEIR/EIS concludes:

> The proposed project would extract mostly seawater and some brackish groundwater from a localized area; no fresh water supplies would be removed from the basin. When water is returned to the basin, groundwater conditions in the 400-Foot Aquifer underlying the CSIP and CCSD and adjacent areas would improve. Water levels in nearby wells may decline in the 180-FTE Aquifer between 1 and 5 feet, but that would not expose screens, cause damage, or reduce yield in the groundwater supply wells. Injection and extraction through the ASR well system would be managed so that the water provided from the desalination plant would not constitute a net change in storage. The reduction of surface water from the Salinas River attributable to slant well pumping would not be a substantial loss to water supply, nor would it constitute a substantial interference to surface water recharge. Pumping at the slant wells could cause drawdown in the large dredge pond over periods of extended pumping, but the magnitude of that response would not interfere with recharge. The MPWSP may slightly increase the area of impervious surface in the project area, but it would not reduce the potential for surface water to recharge the underlying aquifers. Impacts associated with changes to groundwater recharge during the operation of all project facilities would be less than significant.

HGC Comment No. 34:

As explained above, the DEIR/EIS's conclusion regarding Impact 4.4-3 are based on assumptions that conflict with the best available evidence and groundwater modeling that fails to assess cumulative conditions. The DEIR/EIS's conclusion that no fresh water supplies would be removed from the basin is not based on modeling capable of evaluating this criteria or other scientifically acceptable criteria. As a result the DEIR/EIS's conclusion the impact is less than significant is pure speculation. More importantly, it conflicts with available information regarding the groundwater conditions in the Marina Subarea and ignore the project's impacts on water quality.

The DEIR/EIS's conclusion that Applicant Proposed Measure 4.4-3 is not necessary to avoid impacts to the groundwater aquifers in the Marina Subarea is unsupportable; the measure, however, is inadequate to ensure the project would not result in significant impact:

On **Page 4.4-68**, the DEIR/EIS states:

> CalAm recognizes the long-term nature of the proposed project and the need to provide continued verification that the project would not contribute to lower groundwater levels in nearby wells within the SVGB. So, as part of the project, CalAm proposes to expand the existing regional groundwater monitoring program to include the area where groundwater elevations are anticipated to decrease by one foot or more in the Dune Sand

Aquifer and the 180-FTE Aquifer. This constitutes an Applicant-Proposed mitigation measure that is presented and evaluated at the end of Impact 4.4-3.

On **Page 4.4-74 and 75**, the DEIR/EIS further provides:

The project applicant has proposed to expand the existing regional groundwater monitoring program to include the area where groundwater elevations are anticipated to decrease in the Dune Sand Aquifer and the 180-FTE Aquifer. ***This Applicant Proposed Measure is not required to reduce a potential impact to less than significant. [emphasis added]***

… Applicant Proposed Measure 4.4-3: Groundwater Monitoring and Avoidance of Well Damage.

Prior to the start of MPWSP construction, the project applicant, working with the MCWRA, shall fund and develop a groundwater monitoring and reporting program that expands the current regional groundwater monitoring network to include the area near the proposed slant wells. Once expanded, the program will monitor groundwater levels and water quality within the area where groundwater elevations are anticipated to decrease in the Dune Sand Aquifer and the 180-FTE Aquifer and within at least one mile outside of the predicted radius of influence. The area of groundwater monitoring shall be determined by MCWRA and the MPWSP HWG. The elements of the groundwater monitoring program proposed under this measure are described below.

• Using a current survey of wells within the pumping influence of the slant wells, CalAm will offer to private and public well owners the opportunity to participate in a voluntary groundwater monitoring program to conduct groundwater elevation and quality monitoring. The voluntary groundwater monitoring program shall include retaining an independent hydrogeologist to evaluate the conditions and characteristics (e.g., well depth, well screen interval, pump depth and condition, and flow rate) of participating wells prior to the start of slant well pumping. Water elevation and quality monitoring shall begin following initial groundwater well assessment.

• Based on a review of the well network of voluntary well owners, CalAm will identify areas lacking adequate groundwater data and if deemed necessary, install new monitoring wells. These new wells would be in the 180-Foot Aquifer.

• Seven clusters of monitoring wells were recently completed on and near the CEMEX property. These well clusters monitor various depths within the Dune Sand Aquifer, the 180-Foot Aquifer, and the 400-Foot Aquifer and shall be included in the monitoring network.

• Using the groundwater data developed through the voluntary well monitoring program and data gathered at the new monitoring wells, ***CalAm will evaluate***

> ***whether project pumping is causing a measurable and consistent drawdown of local groundwater levels in nearby wells that is distinguishable from seasonal groundwater level fluctuations. In the event that a consistent and measurable drawdown is identified, CalAm will determine if the observed degree of drawdown would damage or otherwise adversely affect active water supply wells. [emphasis added.]*** Adverse effects from lowered groundwater levels in existing active groundwater supply wells can include cavitation due to exposure of the well screen, water elevation declines that draw water below pump intakes, reduced well yields and pumping rates, and changes in groundwater quality indicating that project pumping is drawing lower quality water toward the well. Adverse effects would only occur in active wells; inactive wells would not be considered for mitigation.
>
> • If it is determined that a nearby active groundwater well has been damaged or otherwise negatively affected by the project pumping of the slant wells, the project applicant shall coordinate with the well owner to arrange for an interim water supply and begin developing a mutually agreed upon course of action to repair or deepen the existing well, restore groundwater yield by improving well efficiency, provide long term replacement of water supply, or construct a new well.
>
> Applicant Proposed Measure 4.4-3 would monitor changes in the groundwater surface elevations caused by the proposed pumping at the slant wells through a voluntary program and use of new groundwater monitoring wells. If it is determined that the project is causing groundwater levels to damage local active wells, this measure would ensure that active wells are repaired or replaced. Implementation of Applicant Proposed Mitigation Measure 4.4-3 is not necessary to address any significant project effect.

HGC Comment No. 35:

The fact that "CalAm recognizes the long-term nature of the proposed project and the need to provide continued verification that the project would not contribute to lower groundwater levels in nearby wells within the SVGB," but the CPUC and Monterey Bay National Marine Sanctuary (MBNMS) do not recognize the need for continued monitoring is troubling. As explained above, the DEIR/EIS's conclusion regarding Impact 4.4-3 are based on assumptions that conflict with the best available evidence and groundwater modeling that fails to assess cumulative conditions. The superposition model cannot assess water quality impacts or cumulative conditions. The DEIR/EIS itself acknowledges the "Limitations of Groundwater Models" at Page 4.4-44. As noted above, there are no borehole results or monitoring wells located in the project coastal area south of the test slant well or in the area between the project and Dune Sand Aquifer within the Fort Ord area. Thus, the DEIR/EIS's conclusion that additional monitoring is not required to ensure the project's impacts are less than significant is unsupportable.

Moreover, the Applicant Proposed Measure 4.4-3 even if adopted as mandatory mitigation would not reduce the project's potential groundwater impacts to a less-than-significant level. First, the measure fails to identify where additional monitoring wells will be located. In addition, leaving this decision to CalAm as well as the responsibility to evaluate whether project pumping is causing a measurable and consistent drawdown of local groundwater levels in nearby wells that is distinguishable from seasonal groundwater level fluctuations is problematic given CalAm's advocacy positions regarding the test slant well to date. Rather, another public agency with the expertise and jurisdiction to enforce the mitigation measure and be responsible for implementing the corrective action measures must be identified. The mitigation measure also needs to be expanded to ensure that the project does not directly, indirectly or cumulatively cause undesirable results as defined under the SGMA. It should also require a pumping curtailment or other measures to address the potential undesirable impacts that could result from the project. As discussed above, without modeling or other scientifically supported estimates of future groundwater levels and groundwater quality impacts, it will be impossible to determine whether the project pumping is causing a measurable or consistent drawdown in the affected aquifers.

The DEIR/EIS's conclusion that the project impacts to groundwater quality within the slant well pumping area of influence is less than significant, is inadequate and must be updated based on new modeling results:

On **Page 4.4-76**, the DEIR/EIS states:

> From the time the slant wells begin pumping, and throughout the life of the project, local groundwater quality around the slant wells and within the cone of depression could change from the brackish quality it is now to higher salinity groundwater. The degradation in water quality (measured as an increase in TDS) would occur because the slant wells would draw in the brackish water that is currently in the aquifer formation and seawater would flow in to replace it. This effect would be most detectable near the coast at the CEMEX site and less pronounced inland because seawater would enter the slant wells more readily closer to the Monterey Bay compared to farther east where a smaller fraction of brackish groundwater would be drawn from the inland portion of the aquifers.
>
> This impact analysis considers whether this projected degradation in localized water quality would constitute a significant impact. A significant impact would occur if the proposed project violated water quality standards or degraded a groundwater source such that it would interrupt or eliminate the available potable groundwater for other users in the basin. Groundwater in the Dune Sand and the 180-FTE Aquifers within the area projected to be affected by slant well pumping is not used for potable supply or irrigation. As stated in Impact 4.4-3, the use of

> the current groundwater production in this area is limited to minor irrigation and dust control. There are no water supply wells pumping potable water, and most of the wells in this area are no longer active because of seawater intrusion. Furthermore, groundwater production is restricted in the vicinity of the CEMEX site through MCWRA Ordinance 3709, which prohibits drilling wells and pumping groundwater from the 180-FTE Aquifer in order to protect groundwater resources.
>
> Based on current groundwater quality and the minimal groundwater use within the area affected by slant well pumping, the localized change in groundwater quality that could occur as a result of slant well pumping is not expected to violate water quality standards or interrupt or eliminate the potable or irrigation groundwater supply available to other basin users. Therefore, this impact is considered less than significant.

<u>HGC Comment No. 36</u>:

The DEIR/EIS limits its analysis to whether the project would violate water quality standards or degrade the groundwater source such that it would interrupt or eliminate "the available potable groundwater for other users in the basin." As noted above, the DEIR/EIS's assumption that any water that does not meet the most stringent potable water standards has no beneficial uses and can be degraded without causing any significant impact is inconsistent with the SWRCB Basin Plan and SWRCB Anti-Degradation Policy. Moreover, also explained above, the TSW monitoring results show there are significant areas of freshwater within within the cone of depression. Finally, we note that changing fresh quality and slightly brackish groundwater within the Marina Subarea to hypersaline water will impact the ability to meet the SGMA's mandates. The statement that "the ***localized change in groundwater quality that could occur (emphasis added)*** as a result of slant well pumping is not expected to violate water quality standards" is misleading and inaccurate. The suggestion that water quality changes could occur indicates that they also could not. The DEIR should identify under what scenarios the project would not change the water quality in the Marina Subarea. As discussed above, causing any area of the basin that is fresh in quality or slightly brackish to become hypersaline will violate the basin WQCP objectives of 1,500 mg/l TDS. Therefore, the DEIR/EIS must be revised to disclose this impact is significant. If feasible mitigation is not identified that would reduce this impact to a less than significant level, which may be the case, the DEIR/EIS must disclose the impact would remain significant and unavoidable AFTER all feasible mitigation is adopted.

<u>The DEIR/EIS's conclusion that the project impacts to groundwater quality within the slant well pumping area of influence is less than significant, is inadequate and must be updated based on new modeling results:</u>

On **Page 4.4-77**, the DEIR/EIS states:

> As shown on Figures 4.4-10 and 4.4-11, the current location of the seawater/freshwater interface is about 8 miles inland in the 180-Foot Aquifer and

3.5 miles inland in the 400-Foot Aquifer. Once operational, the proposed slant wells would extract 24.1 mgd from the subsurface. A significant impact would occur if the proposed project caused the seawater/freshwater interface to migrate further inland, thereby exacerbating the seawater intrusion condition in the SVGB.

The effects on seawater intrusion were evaluated using the NMGWM with particle tracking (described in the Approach to Analysis section, above). Figure 4.4-17 shows the coastal seawater intrusion in the SVGB using the seawater/freshwater interface location estimated by the MCWRA and shown in Figures 4.4-10 and 4.4-11. Before running the model to simulate the 63 years of operation, individual water "particles" were placed along the leading edge of the mapped seawater intrusion front. Without the project, these particles are expected to continue to migrate inland with the movement of the seawater/freshwater interface. The NMGWM is a superposition model, meaning that modeled project effects are isolated from all other stresses in the basin, such as the effects from other groundwater pumpers, inland pressure gradients, injection systems, and recharge. In superposition, the NMGWM output is therefore the change attributable solely to the slant well pumping. Figure 4.4-17 depicts the resulting particle-tracking outputs, showing that a number of particles radiate away from the seawater/freshwater front back towards the coast. In Figure 4.4-17, some particle locations change substantially, whereas others do not. As to those that do change, the change in particle location shows where the seawater front would be after 63 years of MPWSP pumping if that was the only factor affecting groundwater movement in the basin (no recharge, no groundwater pumping, no pressure gradients, etc.). Therefore, Figure 4.4-17 illustrates the MPWSP's contribution to redirecting or reversing the inland advance of seawater intrusion. Because there are many stresses in the basin, the MPWSP project would not necessarily draw the leading edge of the seawater intrusion line back towards the coast to the extent shown by the particle-tracking output, but it does indicate that the MPWSP provides a benefit for the basin. Based on the particle-tracking results, the MPWSP would not exacerbate seawater intrusion, and groundwater extraction from the coast, as part of project operations, would be expected to retard future inland migration of the seawater/freshwater interface. The proposed project would facilitate the reduction of seawater intrusion in the long term, and the impacts of the proposed project are considered less than significant.

HGC Comment No. 37:

As noted above, the MCWRA maps used to justify the DEIR/EIS position are included with this response letter and include recent data from the TSW project that contradict the blanket statement that the freshwater/seawater interface is 8 miles inland (see attached Figures 1 through 5 and Diagram 5). Moreover, MCWRA does not have any maps for the extent of seawater intrusion into the Dune Sand Aquifer. In fact, the DEIR/EIS does not address or evaluate potential impact to the Dune Sand Aquifer. As discussed above, the Dune Sand Aquifer water elevations indicate it flows toward the ocean (see Diagram 2 above and Figure 6 attached). Therefore, the project's impact on lowering heads within the Dune Sand Aquifer will induce seawater intrusion where it presently does not exist. The DEIR/EIS's failure to analyze or disclose this impact lacks any support and conflicts with the best available information. Moreover, increasing seawater intrusion into the Dune Sand Aquifer will in turn likely increase seawater intrusion into the lower aquifers that currently are recharged by freshwater from the Dune Sand Aquifer. Therefore, the DEIR/EIS must be revised to disclose this impact is significant. If feasible mitigation is not identified that would reduce this impact to a less than significant level, which may be the case, the DEIR/EIS must disclose the impact would remain significant and unavoidable AFTER all feasible mitigation is adopted.

The DEIR/EIS's conclusion that the project impacts to groundwater quality associated with existing groundwater remediation systems is less than significant, as mitigated, is inadequate and must be updated based on new modeling results that address cumulative impacts:

On **Page 4.4-86**, the DEIR/EIS concludes:

> **Impact Conclusion Groundwater Quality**
>
> For the slant wells, the seawater/freshwater interface would migrate back toward the ocean, which would be a less-than-significant impact. For the slant wells, the potential impact of interference with existing remediation systems would be reduced to less than significant with the implementation of Mitigation Measure 4.4-4. For the ASR injection/extraction wells, the net addition of injection water is considered a less than significant impact. For the ASR injection/extraction wells, the potential impact of interference with existing remediation systems would be less than significant. The operation of all other project facilities would have no impact on groundwater quality.
>
> Therefore, for the proposed project as a whole, the potential operations impacts would be less than significant with mitigation, relative to groundwater quality.

HGC Comment No. 38:

As discussed above, the presence of the FO-SVA and the groundwater gradient in the perched Dune Sand Aquifer control the present migration of contamination beneath the Fort Ord remediation site. As previously indicated, the project's increased production from the Dune Sand Aquifer could result in significantly more drawdown than previously anticipated which could accelerate or even change the direction of the contaminant plumes. This should be re-evaluated when the $NMGWM^{2016}$ is appropriately revised and calibrated or a new dual density model is constructed. Mitigation Measure 4.4-4 is problematic and unlikely to ensure the project's impacts are mitigated for the same reasons identified in my comments about Mitigation

Measure 4.4-3 – namely the mitigation is delegated to Cal-Am without any meaningful performance standards.

The DEIR/EIS's conclusion that the project cumulative groundwater impacts is less than significant is inadequate and must be updated based on new modeling results that includes cumulative impacts:

On **Page 4.4-90**, the DEIR/EIS concludes:

> Because the MPWSP combined with the possible RUWAP desalination element would not result in a significant adverse cumulative impact and may have beneficial consequences, and the Salinas Valley Water Project Phase II and the Interlake Tunnel would have beneficial effects, the cumulative effect of these four possible projects on groundwater resources would be less than significant. Therefore, the proposed project would not have a cumulatively considerable contribution to a significant cumulative impact during operations (less than significant).

HGC Comment No. 39:

The DEIR/EIS's analysis of cumulative impacts fails to account for how groundwater conditions have changed over time and how they are likely to change in the future without the project. In fact, the DEIR/EIS acknowledges its modeling "only solves for the groundwater changes due solely to the proposed project." It goes on to expressly state:

> These changes are independent of the effects from the other stresses on the basin such as seasonal climate and agricultural pumping trends, other pumping wells, injection wells, land use, or contributions from rivers. By using superposition, the actual effects of only the proposed project can be isolated from the combined effects of all other basin activity. For example, when the NMGWM reports a 1-foot drawdown in a well, it is understood that the one foot of drawdown would be the effect on the basin of the proposed project only. That well may experience greater drawdown due to other stresses, such as drought or other nearby pumping wells, or may experience increases in water levels due to reduced regional pumping or an extremely wet year. But the proposed project's contribution to that drawdown in the well would remain only 1-foot. Superposition is described in Appendix E2, Section 5.2.

The DEIR/EIS suggests this limited approach to figuratively assessing the project's potential cumulative impacts to groundwater is permissible because baseline conditions reflect the contributions of past actions on groundwater resources within the geographic scope. This approach ignores that groundwater conditions have changed over time under baseline conditions and will continue to change in the future from other stressors. As noted above, the DEIR/EIS acknowledges this possibility. The fact that the modeling exists and has been run for the project (but the results not disclosed) and that it address these additional stressors is inexplicable. Even if the DEIR/EIS preparers believe this modeling provides flawed results, the information must be disclosed (with an explanation regarding the flawed results) so the public can comment on the information and the decision makers can take it into account.

Finally, the cumulative impacts analysis must be revised to consider reasonably foreseeable projects that will be necessary under the SGMA. See discussion of no project alternative (DEIR/EIS, p. 5.5-84 ["Existing, ongoing regional groundwater pumping would continue throughout the Salinas Valley, as would efforts to develop a sustainable groundwater management plan."]).

DEIR/EIS Chapter 7 (Alternatives).

DEIR's discussion of slant wells ignores the fact that slant wells are an unproven technology.

Other than the recently completed TSW, there is only one slant well that has been successfully constructed to date in Dana Point, California. As addressed in the CCC's "Final Report: Technical Feasibility of Subsurface Intake Designs for the Proposed Poseidon Water Desalination Facility at Huntington Beach, California:

> When it was built and tested in 2006, it was test pumped at 2,000 gpm and displayed a well efficiency of 95%. Recent longer term testing of the completed test well in 2012 documents the reduction in well efficiency from the original value of 95% in 2006 to 52% in 2012 (GeoScience, 2012). Given this observed reduction in efficiency over a short period, the long-term performance of the technology has yet to be confirmed.
>
> … Slant wells completed in the Talbert aquifer would draw large volumes of water from the Orange County Groundwater Basin, which in itself is considered a fatal flaw. Recent public comments have suggested that pumping seawards of the Talbert Salinity Barrier could have beneficial impacts in managing seawater intrusion. In the Panel's opinion, however, this benefit is too uncertain to overcome the ISTAP conclusion about the fatal flaw of this technology as applied to the proposed Huntington Beach site. **The advantage of having a subsea completion is largely lost in confined aquifers *(emphasis added).*** The performance risk is considered medium, as the dual-rotary drilling method used to construct the wells is a long-established technology, but there is very little data on the long-term reliability of the wells. Maintainability is also a critical unknown issue.
>
> … Slant wells tapping the Talbert aquifer would interfere with the management of the salinity barrier and the management of the freshwater basin, and further, would likely have geochemical issues with the water produced from the aquifer (e.g., oxidation states of mixing waters).

(CCC's "Final Report: Technical Feasibility of Subsurface Intake Designs for the Proposed Poseidon Water Desalination Facility at Huntington Beach, dated October 9, 2014, pp. 37, 56, 64, available at http://www.coastal.ca.gov/pdf/ISTAP_Final_Phase1_Report_10-9-14.pdf.)

HGC Comment No. 40:

We were surprised the DEIR/EIS does not discuss the CCC's Report or efficiency issues raised in the report (although it is referenced on 5.3-57) given that Martin Feeney, a Hydrogeologic Working Group member, was one of the Report's authors and Geoscience was involved in the well construction and testing. While the efficiency problems from the Dana Point may not manifest themselves at the CEMEX site, there is a considerable risk that has been identified by previous study. Therefore, the DEIR/EIS should discuss mitigation in the event there is a considerable drop in efficiency as it would likely eliminate the MPWSP's ability to provide return water. Alternatively, this could be considered a fatal flaw for the project.

The Potrero Road site appears to be a superior site for subsurface seawater intake facilities. Given aquifer parameter estimations and hydraulic boundary condition assumptions made in the model, a test well at the Potrero Road site is necessary to determine the accuracy of the aquifer parameter estimations and assumptions.

The DEIR/EIS on **p. 5.4-15** states:

> Alternative 1 would contain the same elements as the proposed project and would produce the same volume of product water. However, because of the hydrogeology of the Potrero Road area, Alternative 1 would draw a greater volume of water from the Salinas Valley Groundwater Basin than the proposed project. In the event the Salinas Valley Return Water obligation is determined to be 12 percent (the highest return value simulated), Alternative 1 would meet the need for replacement supplies and meeting peak month demand, but limited supply would be available for other uses, including accommodating tourism demand under recovered economic conditions. Alternative 1 would not provide sufficient supplies to serve existing vacant legal lots of record and would therefore, not meet the project objective/need for water, some of which was to support limited growth (e.g., Objective 6).

The DEIR/EIS then further states on **p. 5.5-86 through 5.5-90**:

> **Effects on the Perched-A Aquifer**
>
> Slant well pumping at Potrero Road would create a cone of depression in the Perched-A Aquifer that would extend up to 5 miles inland, as shown in Figure 5.5-2.4 The extent of modeled drawdown in the Perched-A Aquifer is almost twice the inland distance modeled at CEMEX for the proposed project because: 1) the Perched-A Aquifer is not as thick as the Dune Sand Aquifer underlying the CEMEX site, and 2) the ocean water capture zone is restricted at Potrero Road to the Perched-A Aquifer (the wells would not also be screened in the 180/180-FTE

Aquifers) because the underlying Salinas Valley Aquitard separates the Perched-A Aquifer from the 180-Foot Aquifer. The 1-foot drawdown response would be similar in the Perched-A Aquifer with and without modeled return water scenarios (0, 3, 6, and 12 percent), because the resulting in-lieu recharge in the 400-Foot Aquifer would have a negligible effect on recharge in the Perched-A Aquifer. Modeling indicates that pumping under Alternative 1 would influence the Perched-A Aquifer north of Potrero Road and the cone of depression would encompass the mouth of the Elkhorn Slough and about 1 mile inland up the slough (a portion of which is within MBNMS). This effect is shown by the 1-foot drawdown contour lines on Figures 5.5-2 and 5.5-3 and these results suggest a direct or indirect effect of project pumping at Potrero Road on the surface water-groundwater interaction in the Elkhorn Slough. For example, the slant well pumping at Potrero Road could draw in groundwater that would otherwise flow to recharge the Slough, or draw surface water directly from the Slough that would not occur under the proposed project. However, quantification of such an effect is not feasible within the context of the model given the location of Elkhorn Slough relative to the northern boundary of the NMGWM.

Effects on the 180-Foot Aquifer

Figure 5.5-3 shows the effects on the 180-Foot Aquifer from slant well pumping for Alternative 1, for varying percentages of Salinas Valley return water (0, 3, 6 and 12 percent return water). The modeled aquifer response shows a cone of depression that extends a maximum of about 4 miles inland with 0 percent return water, and the maximum extent of the cone is reduced by about 2 miles with increased percentages of return water. The modeled drawdown in the 180-Foot Aquifer is not directly due to project pumping because the slant wells at Potrero Road would not be screened in the 180-Foot Aquifer; rather, the water lost through extraction from the Perched-A Aquifer that would have otherwise infiltrated to and recharged the 180-Foot Aquifer may have been interpreted by the model as drawdown due to pumping. Similar to the effects on the Perched-A Aquifer, the response from slant well pumping (1-foot contour line at 0 percent and 3 percent return water) extends north to partially encompass the mouth of the Elkhorn Slough, indicating a possible surface water-groundwater interaction with the Slough. However, quantification of such an effect is not feasible within the context of the model given the location of Elkhorn Slough relative to the northern boundary of the NMGWM.

Pumping Response on 400-Foot Aquifer

Figure 5.5-4 shows the effects of the slant well pumping at Potrero Road on the 400-Foot Aquifer. The 1-foot drawdown contour, representing 0 percent return water, shows the largest area of drawdown extending about 2 miles inland and offshore about 0.75 mile. The 1-foot drawdown contour with 3 percent return water extends inland only about 1.5 miles and offshore about 0.5 mile. There is also a localized groundwater level increase in Castroville with 3 percent return water. The 1-foot contour resulting from 6 percent return water shows a groundwater level rise in Castroville, as does the 12 percent return water contour that is almost 5 miles in diameter. The response from slant well pumping, as shown by the 1-foot drawdown contour at 0 percent and 3 percent return water, extends north to partially encompass the mouth of the Elkhorn Slough. Given the depth of the 400-Foot Aquifer and the presence of the Salinas Valley Aquitard, it is unlikely that there would be a direct surface water-groundwater interaction between the Elkhorn Slough and the 400-Foot Aquifer. The water lost through extraction from the Perched-A Aquifer that would have otherwise infiltrated to and recharged the 400-Foot Aquifer was likely interpreted by the model as drawdown in the 400-Foot Aquifer and given the location of Elkhorn Slough relative to the northern boundary of the NMGWM, quantification is not feasible within the context of the model.

Analysis and Conclusion of Operational Impacts

Pumping of slant wells at Potrero Road under Alternative 1 would extract mostly seawater and inland brackish water from an area where groundwater is not extracted for beneficial uses by others. There would be some degree of water level increase in areas of the 400-Foot Aquifer as a result of the Salinas Valley return water. No groundwater supply wells are currently pumping within the area of influence of the affected aquifers; therefore, Alternative 1 would have a reduced potential for impact on supply at nearby wells compared to the proposed project. However, like the proposed project, and would result in the same impact conclusion as the proposed project, less than significant. However, like the proposed project, Applicant-Proposed Mitigation Measure 4.4-3 (Groundwater Monitoring and Avoidance of Well Damage) would be implemented under Alternative 1, in recognition of the need to provide continued verification that project pumping from Alternative 1 would not impact groundwater levels in neighboring wells or contribute to seawater intrusion within the SVGB.

Regarding Water Quality Impacts, the DEIR/EIS states on p. **5.5-90**:

Similar to the proposed project, Alternative 1 would gradually and locally degrade groundwater quality from brackish to more saline as project pumping continues. However, this degradation would not violate water quality standards or interrupt or eliminate groundwater supply for other users. Groundwater modeling results show that Alternative 1 slant well pumping would hold back inland migration of the seawater intrusion front similar to the proposed project. However, because the effects of slant well pumping at Potrero Road would extend farther north than the proposed project, it would have a greater positive influence on the northern half of the seawater intrusion front compared to the proposed project.

> Unlike the proposed project, Alternative 1 groundwater extraction would occur too far north to interfere with groundwater remediation systems currently operating at the former Fort Ord Army base. Therefore, the Alternative 1 intake system would not interfere with active remediation systems or contaminant plumes, the impact would be decreased compared to the proposed project and Mitigation Measure 4.4-4 (Groundwater Monitoring and Avoidance of Impacts on Groundwater Remediation Plumes) would not have to be implemented. Like the proposed project, operation of the ASR system would have a less-than-significant impact related to groundwater quality.
>
> In summary, project pumping at Potrero Road, like the proposed project at CEMEX, would cause the brackish groundwater to locally turn more saline, but not in violation of water quality standards; it would hold back seawater intrusion similar to the proposed project but would have a greater positive effect on the northern portion of the intrusion front; and it would eliminate the potential interference with existing contaminant plumes and remediation systems at the former Fort Ord military base as a result of slant well operation, eliminating the need for mitigation. Therefore, Alternative 1 would result in a reduced impact conclusion on groundwater quality compared to the proposed project, less than significant.

Regarding operational impacts on marine biological resources, the DEIR/EIS states on p. **5.5-114**:

> Unlike the proposed project, groundwater modeling (see Appendix E2) indicates pumping from the slant wells at Potrero Road would result in a cone of depression in the underlying groundwater aquifers that would draw or divert water from Elkhorn Slough. This drawdown impact is discussed in Section 5.5.4, Groundwater Resources, and presented in Figure 5.5-2. The modeling cannot predict the amount of water diverted from Elkhorn Slough although it must be conservatively assumed, based on the predicted areal extent of the drawdown, that operations could potentially adversely affect aquatic habitat in Elkhorn Slough due to reduced surface water flow and volumes. This would be an increased level of impact compared to the proposed project and because there is no method to mitigate for impacts on surface water flow and volumes in Elkhorn Slough, Alternative 1 would result in an increased impact conclusion on marine species, natural communities or habitat, protected wetlands or waters, and critical habitats compared to the proposed project, significant and unavoidable.

HGC Comment No. 41:

Our review of the project field investigations study indicate that the Potrero Road site hydrogeology and aquifer property estimations were defined by 5 formation samples collected from a single borehole (Geoscience, 2014). The hydraulic conductivity values estimated from the grain-size analyses of those samples show a highly permeable aquifer that would yield water to well facilities with up to 3 times the performance of wells at the CEMEX site. Compared to the 6 boreholes drilled at the CEMEX site during the initial study, there are limited data from which to build a high level of confidence in the model input parameters and subsequent model results and DEIR/EIS conclusions about the viability of the Potrero Road site. Similarly, the NMGWM used substantial water level data from the 180-Foot Aquifer for model calibration, but no well data from the Dune Sand/A Aquifer zone that is the target for production by the Potrero Road alternative.

The vertical hydraulic conductivity used in the model (0.16 feet/day) at the Potrero Road site is not only untested and not substantiated by production test data, it is 2 orders of magnitude less than the CEMEX site estimate (15 feet/day). While the horizontal hydraulic conductivity value was estimated at 2 times greater than the modeled value at the CEMEX site, the reduced vertical hydraulic conductivity indicates a confined/semi-confined condition. The simulated impact of these aquifer parameter estimations results in a significant impedance to vertical flow from the ocean floor and a reduced amount of seawater infiltration estimated by the model. The greater horizontal hydraulic conductivity combined with reduced vertical flow results in a greater amount of groundwater production estimated. Should the actual aquifer conditions allow greater vertical flow from the ocean floor, the model simulations would indicate a significantly greater production of seawater and far lower production of groundwater.

The designs of slant well facilities at the Potrero Road site extend significantly further offshore with a majority of the well screen sections beneath the ocean floor (Geoscience, 2014, Figures 49, 50, and 68 to 84). The wells are significantly shallower in depth and located above SVA only in the Dune Sand/A Aquifer. This design and configuration would result in little impact on the 180-Foot Aquifer, below the SVA, and is closer to the ocean floor, which is better positioned for inducing seawater infiltration. Water quality test data indicate the salinity of the groundwater in the Dune Sand/A Aquifer at Potrero Road is virtually seawater (34,000 to 34,853 mg/l TDS).

Aside from the aquifer parameter estimations and hydraulic boundary condition assumptions made by the study, the Potrero Road site appears to be a superior site for subsurface seawater intake facilities. For this reason, we recommend the MPWSP construct a TSW at the Potrero Road Site to determine the accuracy of the aquifer hydraulic conductivity estimations that were derived from an empirical estimation method. If the assumed conditions that are simulated in the model are biased by the lack of data, the model results are overstating the groundwater that will be produced from the Dune Sand/A Aquifer zone and underestimating the amount of seawater that would be produced by an intake system at the Potrero Road site.

The DEIR/EIS should consider relocation of the MPWSP's subsurface intake wells either further north or south to better benefit the coastal conditions in the Pressure Area where seawater inflow preferentially follows the paths of greatest hydraulic conductance

HGC Comment No. 41:

Historical studies have indicated that there are 2 locations along the coastal portion of the Pressure Area where seawater inflow preferentially follows the paths of greatest hydraulic conductance (least impedance to flow) and where onshore gradients induce landward flow of groundwater (KJC, 2004, Page ES-15, Figure 3). The main pathway is located north of the Salinas River where the greatest amount of seawater has intruded into the heavily used portion of the Pressure Area. The second preferential pathway for flow is located south of Marina and allows seawater to flow into the aquifers beneath the Fort Ord Area. This area is south of the boundary defined as the Pressure Area by some studies, but within the Pressure Area defined by other studies. The CEMEX site lies midway between these 2 areas of preferential seawater intrusion and does not directly intercept either of these main areas of onshore flow. The potential impact of this condition, or the relocation of the project further north or south to better benefit the coastal conditions is not discussed in the DEIR/EIS.

DEIR/EIS Chapter 4.6 (Terrestrial Biological Resources).

On p. 4.6-3, the DEIR/EIS defines the area studied for potential impacts to terrestrial biological resources:

> Study area encompasses a 50-foot buffer around the project area. A 50-foot buffer around the project area was established as the survey area to ensure biological resources within the project area and immediate adjacent vicinity were assessed for potential direct and indirect project impacts.

HGC Comment No. 42:

The study area fails to account for potential operation impacts from the slant well drawdown and water quality impacts on groundwater-dependent ecosystems. The significant drawdown and changes to water quality have the potential to impact wetlands and other biological resources that rely on the groundwater resources within the project area of influence. The DEIR/EIS must be revised to disclose, analyze, and mitigate potential impacts on groundwater-dependent ecosystems within the operational area of influence. A cursory review of the Figure showing "Vegetation Communities and Potential Wetlands and Waters in the Terrestrial Biological Resources Study Area" shows resources both within and outside the areas evaluated by the study that are within the drawdown contours of the project and could be adversely impacted by the project's reduction of water levels and water quality. The SGMA defines adverse impacts to groundwater dependent ecosystems as an undesirable result and further supports the need for additional analysis that extends beyond construction related impacts.

Conclusion

Based on the findings of our review, HGC concludes that at a minimum the DEIR/EIS needs revision to include an adequate description of baseline conditions as they are presently being observed and the unique hydrogeology of the Marina Subarea portion of the SVGB. The DEIR/EIS must also utilize the information developed from the TSW field investigations and available from other studies in the Marina Subarea to refine and fully calibrate the NMGWM^{2016} or preferably construct a dual density model that would generate a reasonable level of confidence in the simulated effects of the MPWSP. Without this information, it is impossible to determine whether the project's significant impacts on groundwater levels (storage) and water quality can be mitigated to a less than significant level.

The revised DEIR/EIS must also provide analysis of alternatives that could satisfy the project's water demand requirements. That discussion must compare the impacts of each alternatives water intake sources (e.g. slant wells, Ranney collectors, beach infiltration galleries, horizontal directional drilling, etc.) with real data, not conjecture. Without a revised DEIR/EIS that provides this information, it is impossible to make an informed decision regarding the potential impacts of the project on the SVGB, particularly the aquifers in the Marina Subarea, and whether feasible alternatives to the project would reduce the project's significant impacts. We also conclude that if the seawater intake facilities were located a sufficient distance offshore beneath the ocean floor and effectively inducing seawater infiltration, the groundwater impacts from the MPWSP to the SVGB could be mitigated.

Sincerely,

HOPKINS GROUNDWATER CONSULTANTS, INC.

Curtis J. Hopkins
Principal Hydrogeologist
Certified Engineering Geologist CEG 1800
Certified Hydrogeologist CHg 114

Attachments: Figure 1 - Average Chloride Concentrations Dune Sand and 180-Foot Aquifer
Figure 2 – Average Total Dissolved Solids Concentrations Dune Sand and 180-Foot Aquifer
Figure 3 – MRWPCA Wells in 400-Foot Aquifer
Figure 4 – Stiff Diagrams Dune Sand and A Aquifer
Figure 5 – Stiff Diagrams 180-Foot Aquifer
Figure 6 – Dune Sand Aquifer Groundwater Elevation Contour Map
Figure 7 – Fort Ord Cleanup Site Groundwater Elevation Data
Figure 8 – Monterey Peninsula Landfill Groundwater Elevation Data
Figure 9 – Beacon Gas Station Groundwater Elevation Data

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FIGURES

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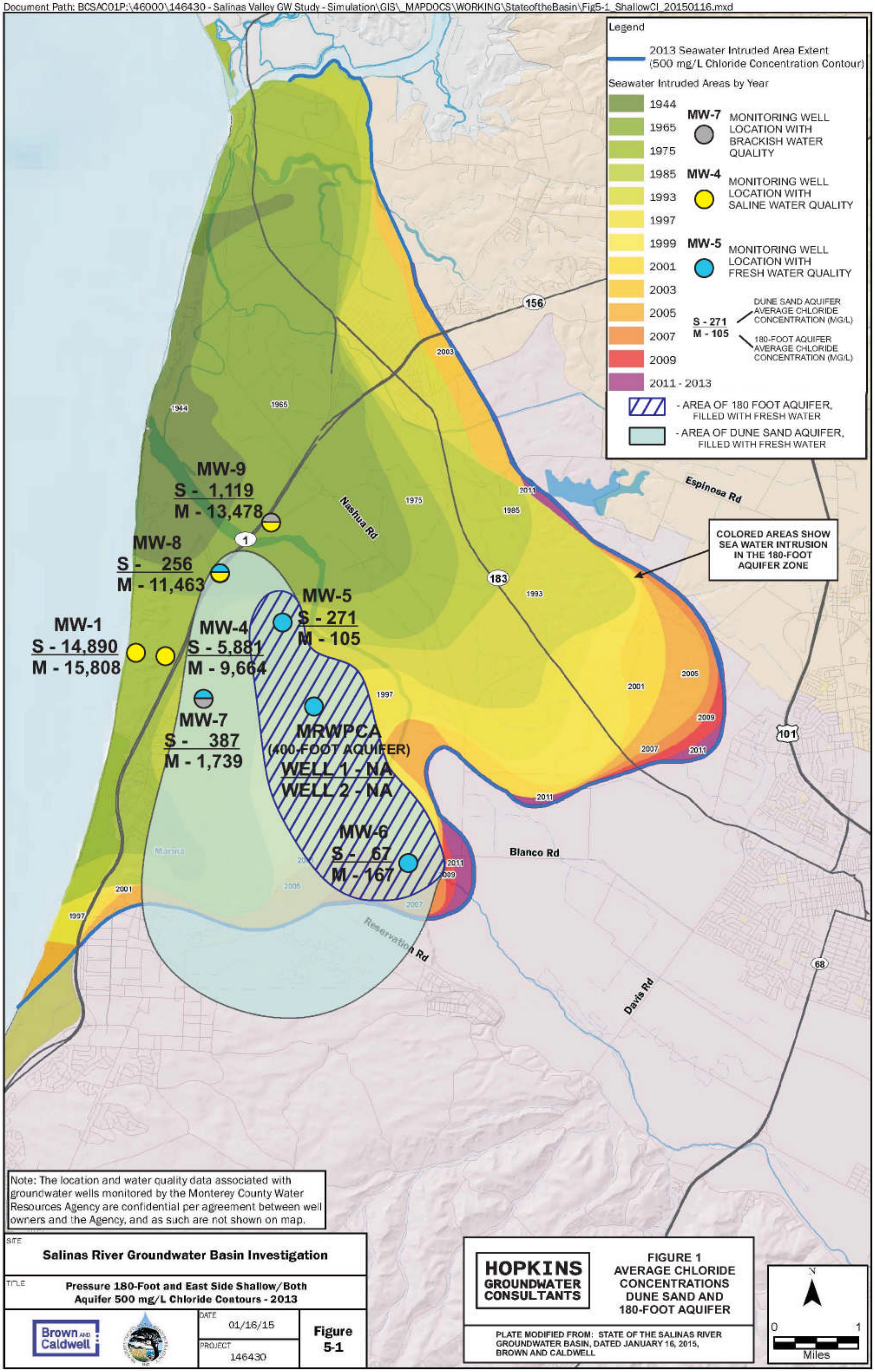

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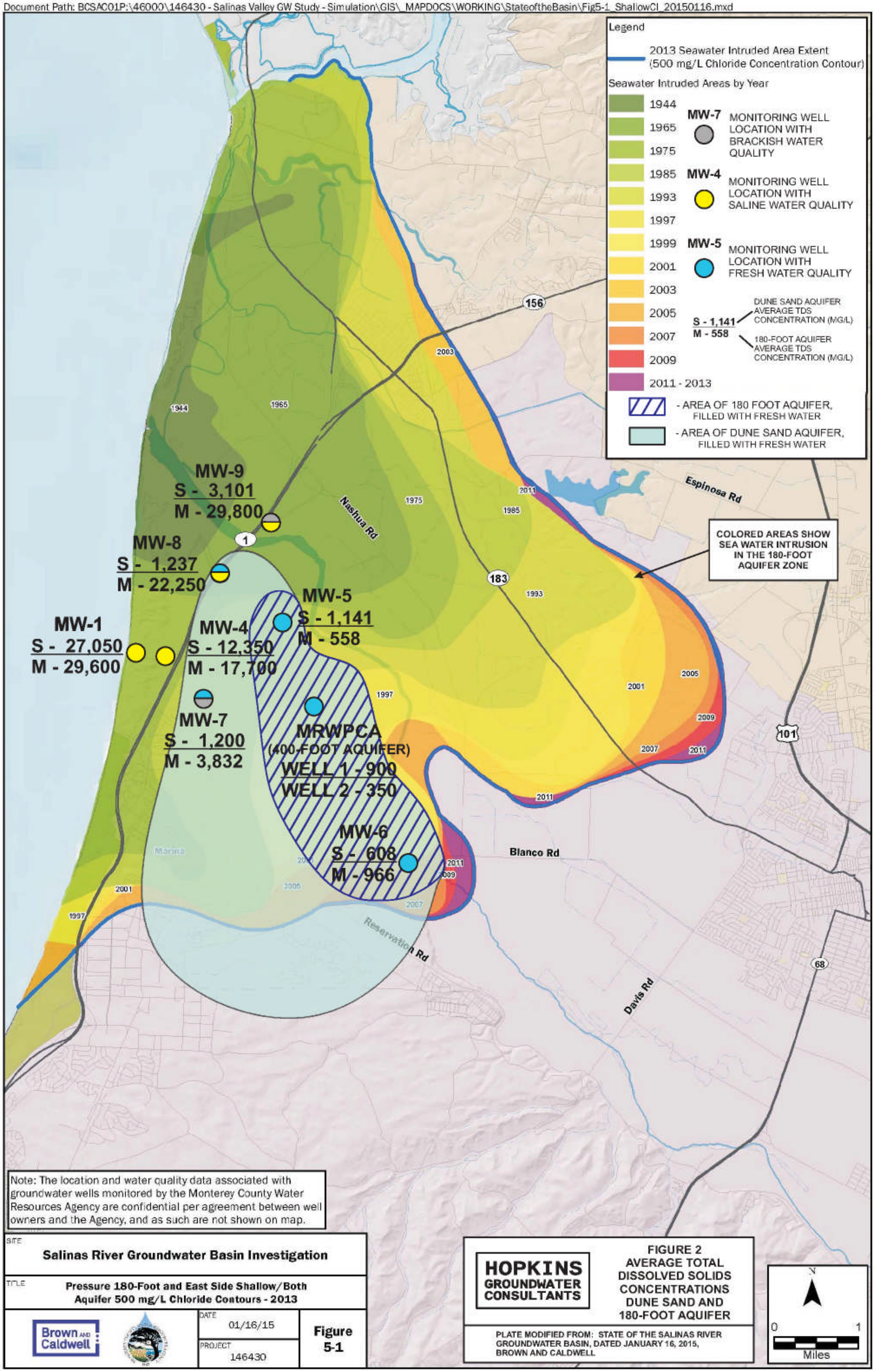

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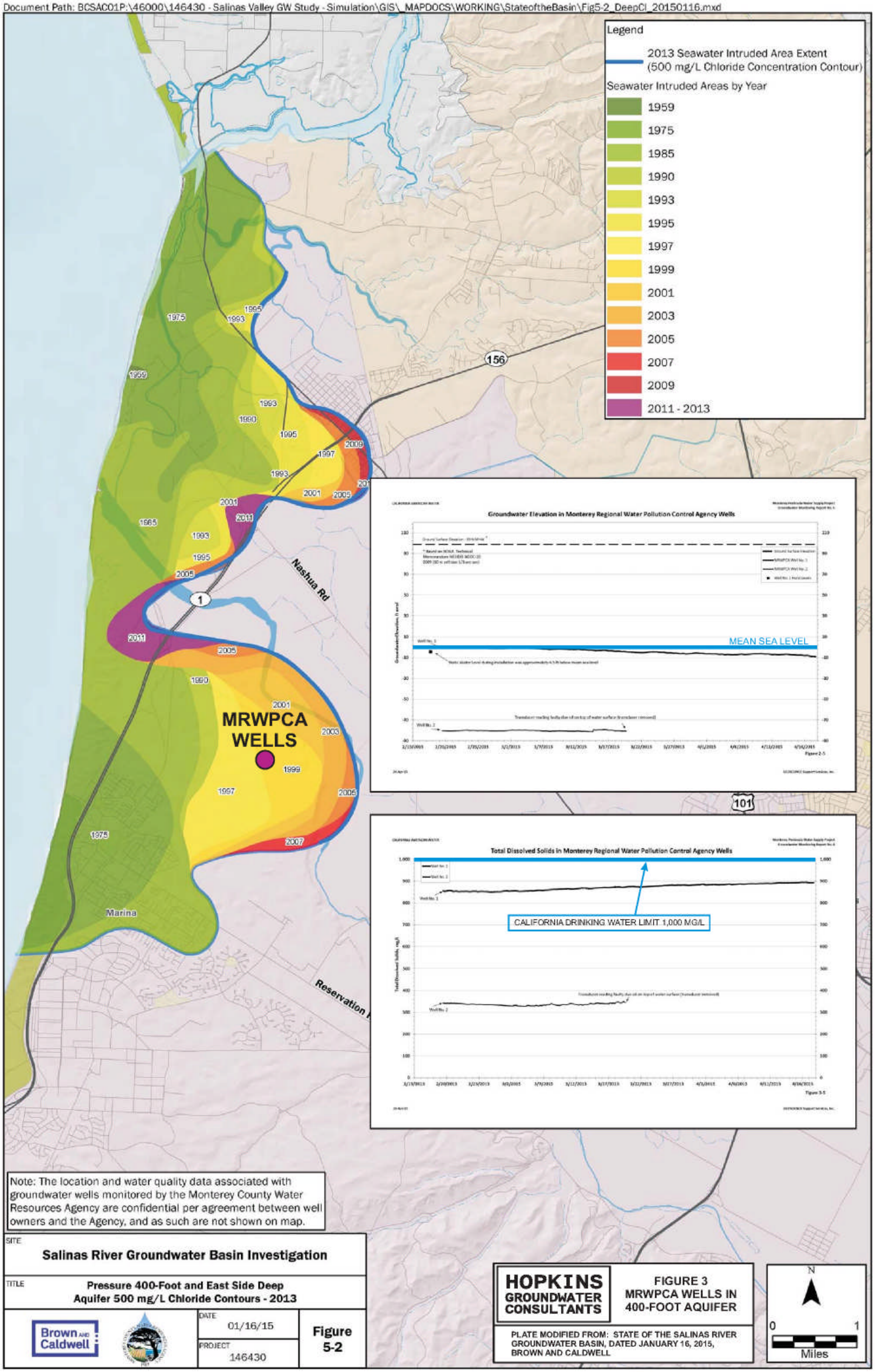

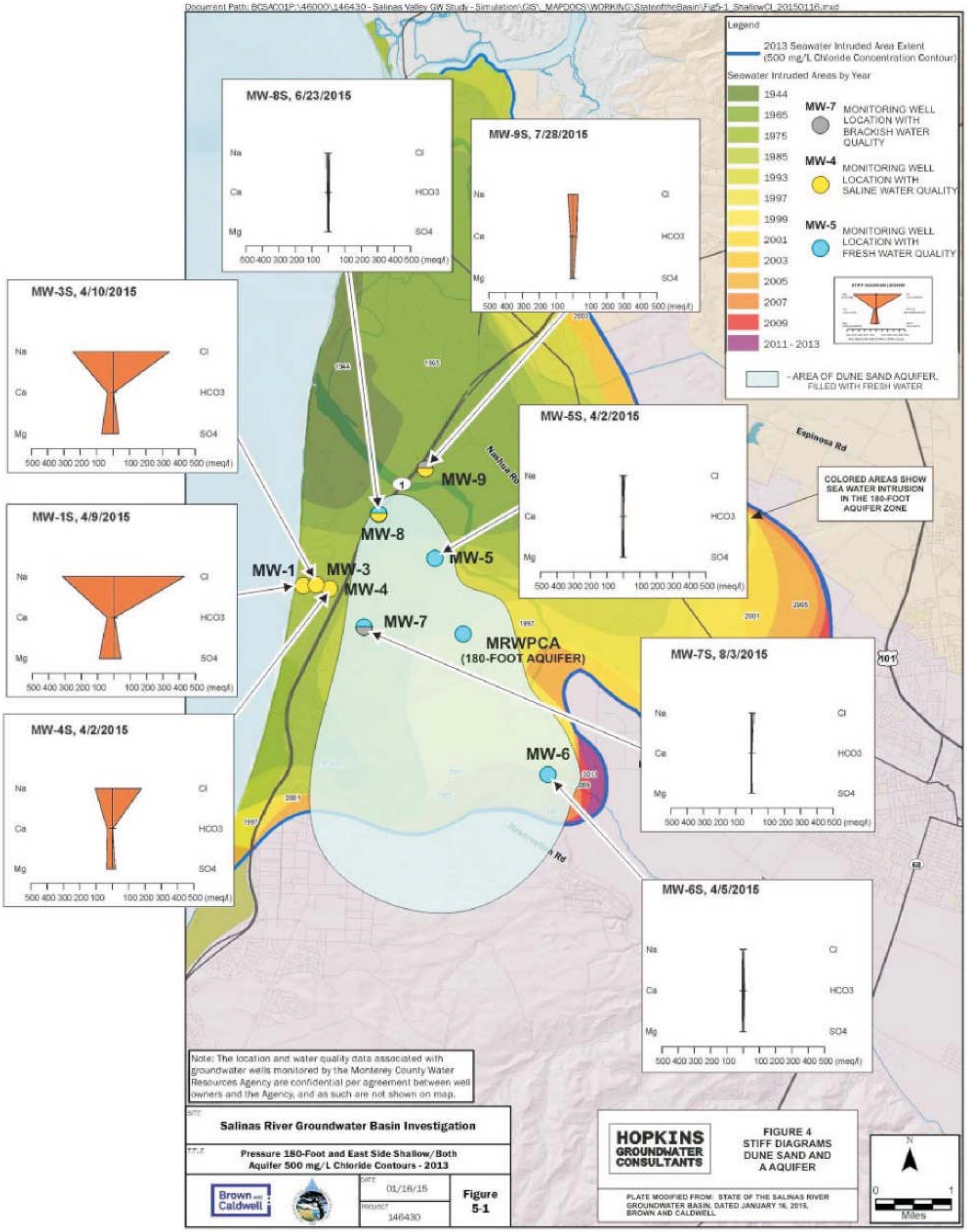

Legend
2013 Seawater Intruded Area Extent (500 mg/L Chloride Concentration Contour)
Seawater Intruded Areas by Year
1944
1965
1975
1985
1993
1997
1999
2001
2003
2005
2007
2009
2011 - 2013
MW-7 MONITORING WELL LOCATION WITH BRACKISH WATER QUALITY
MW-4 MONITORING WELL LOCATION WITH SALINE WATER QUALITY
MW-5 MONITORING WELL LOCATION WITH FRESH WATER QUALITY
- AREA OF DUNE SAND AQUIFER, FILLED WITH FRESH WATER
MW-8S, 6/23/2015
MW-9S, 7/28/2015
MW-3S, 4/10/2015
MW-1S, 4/9/2015
MW-4S, 4/2/2015
MW-5S, 4/2/2015
MW-7S, 8/3/2015
MW-6S, 4/5/2015
Na
Ca
Mg
Cl
HCO3
SO4
500 400 300 200 100 100 200 300 400 500 (meq/l)
MW-1
MW-3
MW-4
MW-5
MW-7
MW-8
MW-9
MW-6
MRWPCA (180-FOOT AQUIFER)
Espinosa Rd
Nashua Rd
Reservation Rd
COLORED AREAS SHOW SEA WATER INTRUSION IN THE 180-FOOT AQUIFER ZONE
Note: The location and water quality data associated with groundwater wells monitored by the Monterey County Water Resources Agency are confidential per agreement between well owners and the Agency, and as such are not shown on map.
Salinas River Groundwater Basin Investigation
Pressure 180-Foot and East Side Shallow/Both Aquifer 500 mg/L Chloride Contours - 2013
Brown and Caldwell
01/16/15
146430
Figure 5-1
HOPKINS GROUNDWATER CONSULTANTS
FIGURE 4
STIFF DIAGRAMS
DUNE SAND AND A AQUIFER
PLATE MODIFIED FROM: STATE OF THE SALINAS RIVER GROUNDWATER BASIN, DATED JANUARY 16, 2015, BROWN AND CALDWELL
N
0 1
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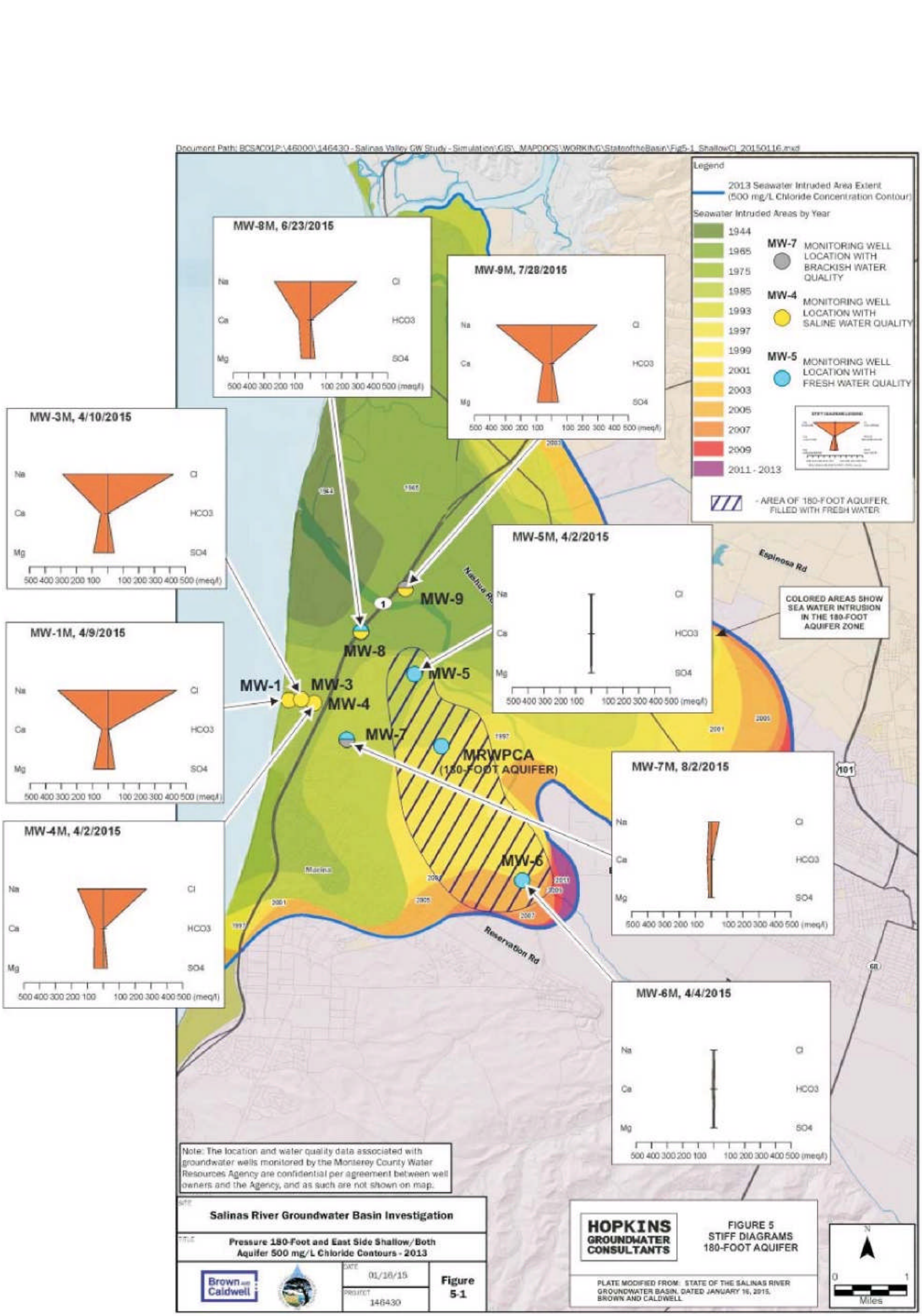
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Legend
2013 Seawater Intruded Area Extent (500 mg/L Chloride Concentration Contour)
Seawater Intruded Areas by Year
1944
1965
1975
1985
1993
1997
1999
2001
2003
2005
2007
2009
2011 - 2013
MW-7 MONITORING WELL LOCATION WITH BRACKISH WATER QUALITY
MW-4 MONITORING WELL LOCATION WITH SALINE WATER QUALITY
MW-5 MONITORING WELL LOCATION WITH FRESH WATER QUALITY
- AREA OF 180-FOOT AQUIFER, FILLED WITH FRESH WATER
MW-8M, 6/23/2015
MW-9M, 7/28/2015
MW-3M, 4/10/2015
MW-1M, 4/9/2015
MW-4M, 4/2/2015
MW-5M, 4/2/2015
MW-7M, 8/2/2015
MW-6M, 4/4/2015
Na
Ca
Mg
Cl
HCO3
SO4
500 400 300 200 100
100 200 300 400 500 (meq/l)
MW-1
MW-3
MW-4
MW-5
MW-7
MW-8
MW-9
MW-6
MRWPCA (180-FOOT AQUIFER)
Espinosa Rd
Reservation Rd
Marina
COLORED AREAS SHOW SEA WATER INTRUSION IN THE 180-FOOT AQUIFER ZONE
Note: The location and water quality data associated with groundwater wells monitored by the Monterey County Water Resources Agency are confidential per agreement between well owners and the Agency, and as such are not shown on map.
Salinas River Groundwater Basin Investigation
Pressure 180-Foot and East Side Shallow/Both Aquifer 500 mg/L Chloride Contours - 2013
Brown and Caldwell
01/16/15
146430
Figure 5-1
HOPKINS GROUNDWATER CONSULTANTS
FIGURE 5
STIFF DIAGRAMS
180-FOOT AQUIFER
PLATE MODIFIED FROM: STATE OF THE SALINAS RIVER GROUNDWATER BASIN, DATED JANUARY 16, 2015, BROWN AND CALDWELL
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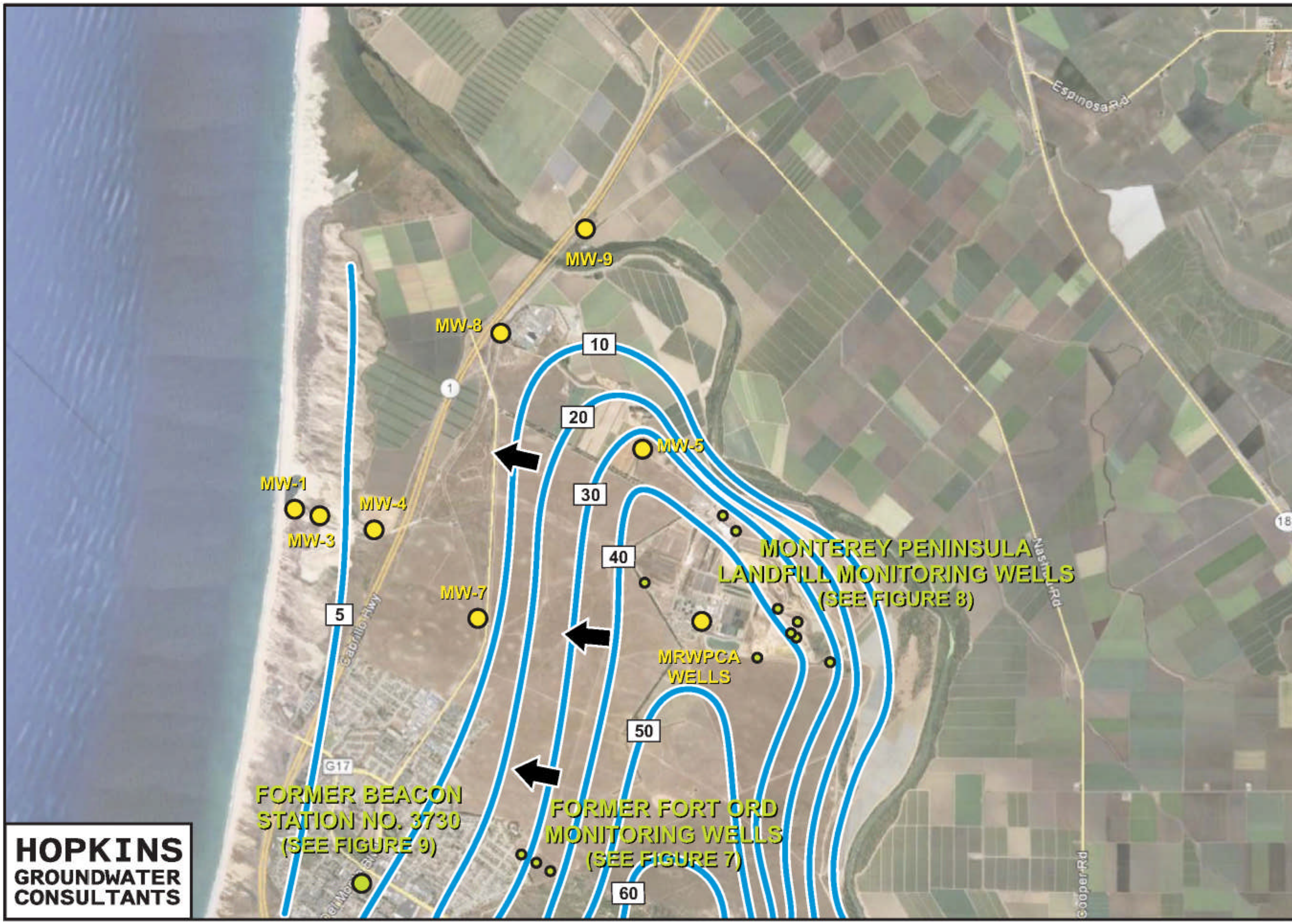
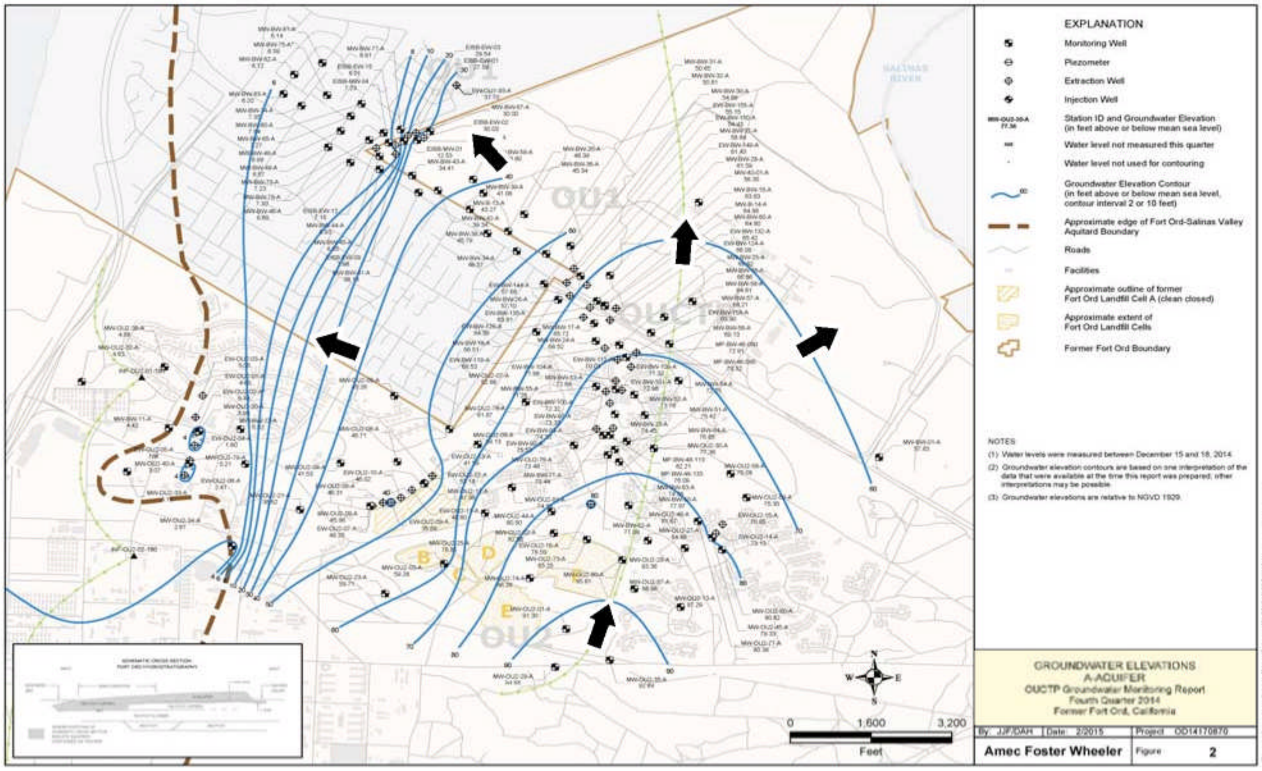
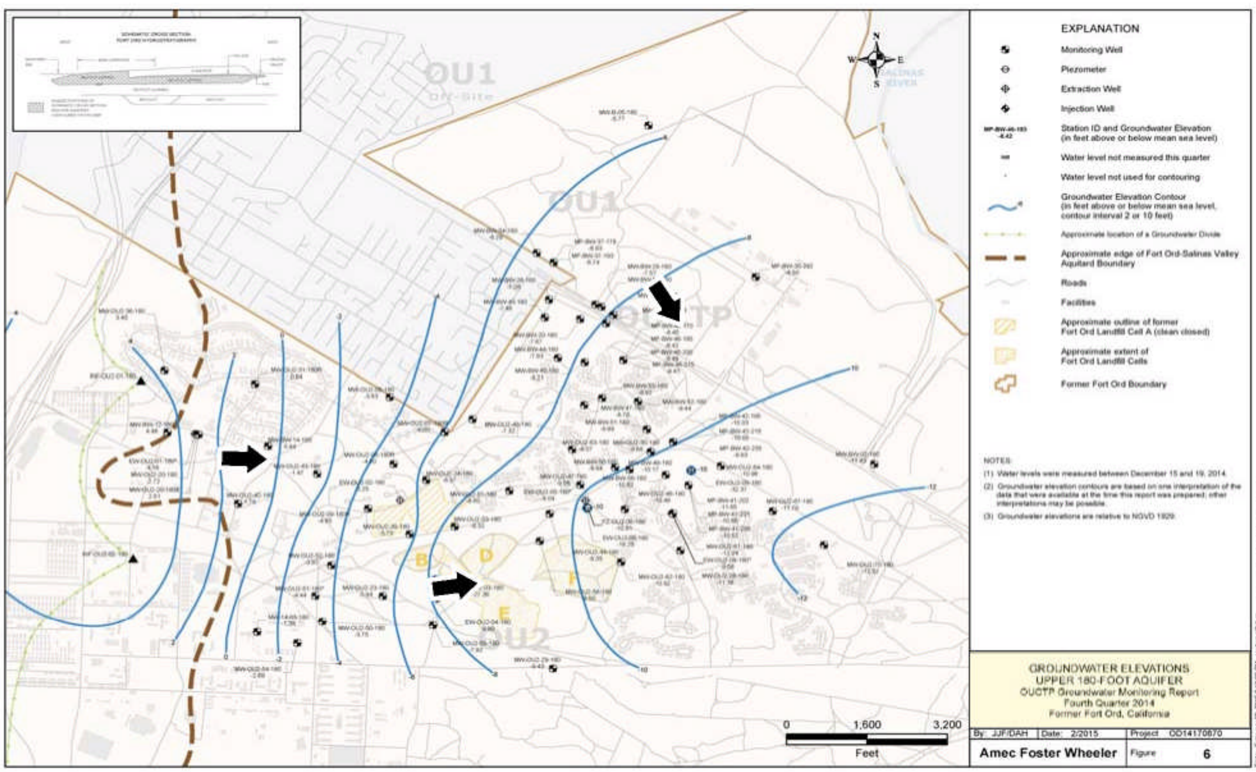


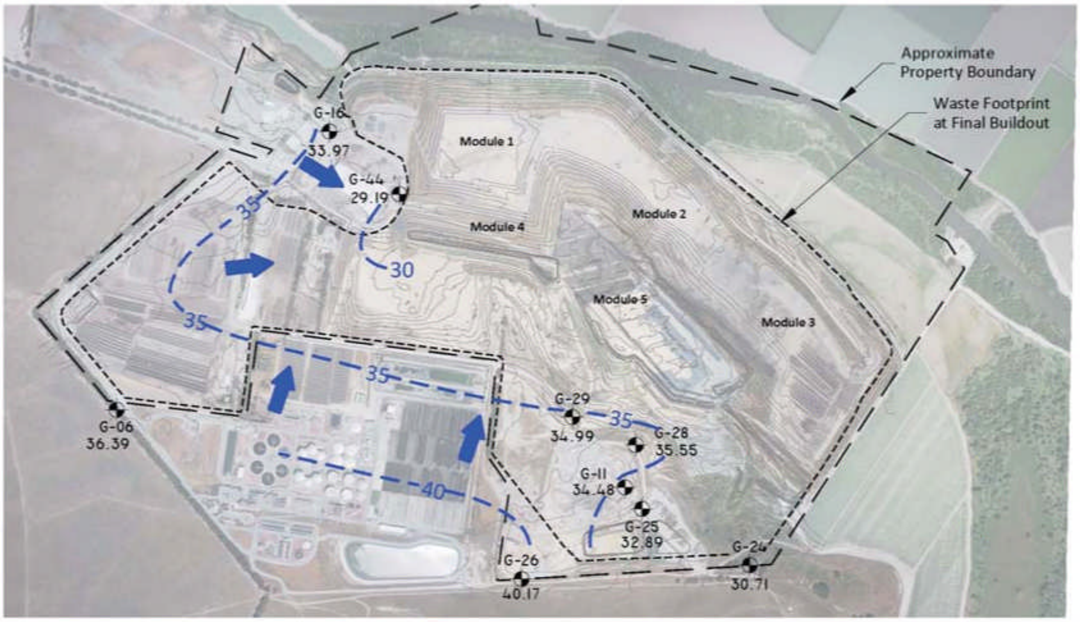
FIGURE 6
DUNE SAND AQUIFER
GROUNDWATER ELEVATION
CONTOUR MAP





HOPKINS GROUNDWATER CONSULTANTS

FIGURE 7
FORT ORD CLEANUP SITE
GROUNDWATER ELEVATION DATA



NOTES:
1. Depths to Groundwater Measured 03/06/2014
2. Contours are Based on Limited Data and are Approximate
3. Horizontal Gradient 0.003 ft/ft to 0.006 ft/ft

RMC GEOSCIENCE

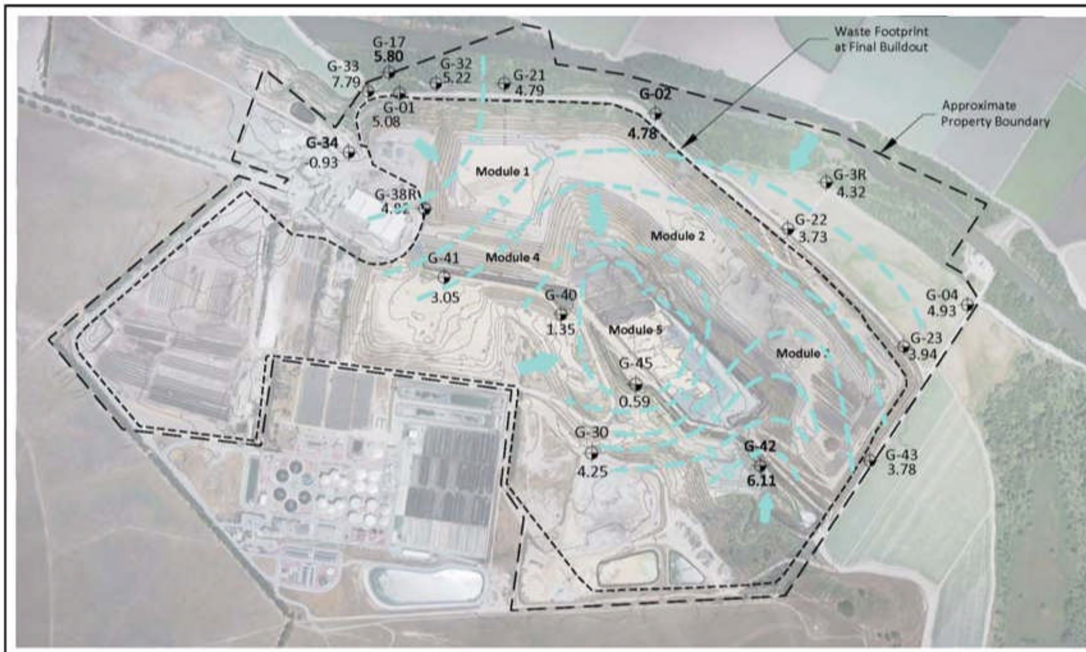
WATER QUALITY MONITORING REPORT
Monterey Peninsula Landfill

35 FT AQUIFER APPROX. CONTOURS OF EQUAL GROUNDWATER ELEVATION

DATE: 05/2014

FIGURE: 3

0 300 600 FEET



0 300 600 FEET

NOTES:
1. Depths to Groundwater Measured on 03/06/2014 Contours of Equal Groundwater Elevation are Based on Limited Data and are Approximate
2. Approximate Gradient Based on Contours is 0.001 ft/ft to 0.006 ft/ft

RMC GEOSCIENCE

WATER QUALITY MONITORING REPORT
Monterey Peninsula Landfill

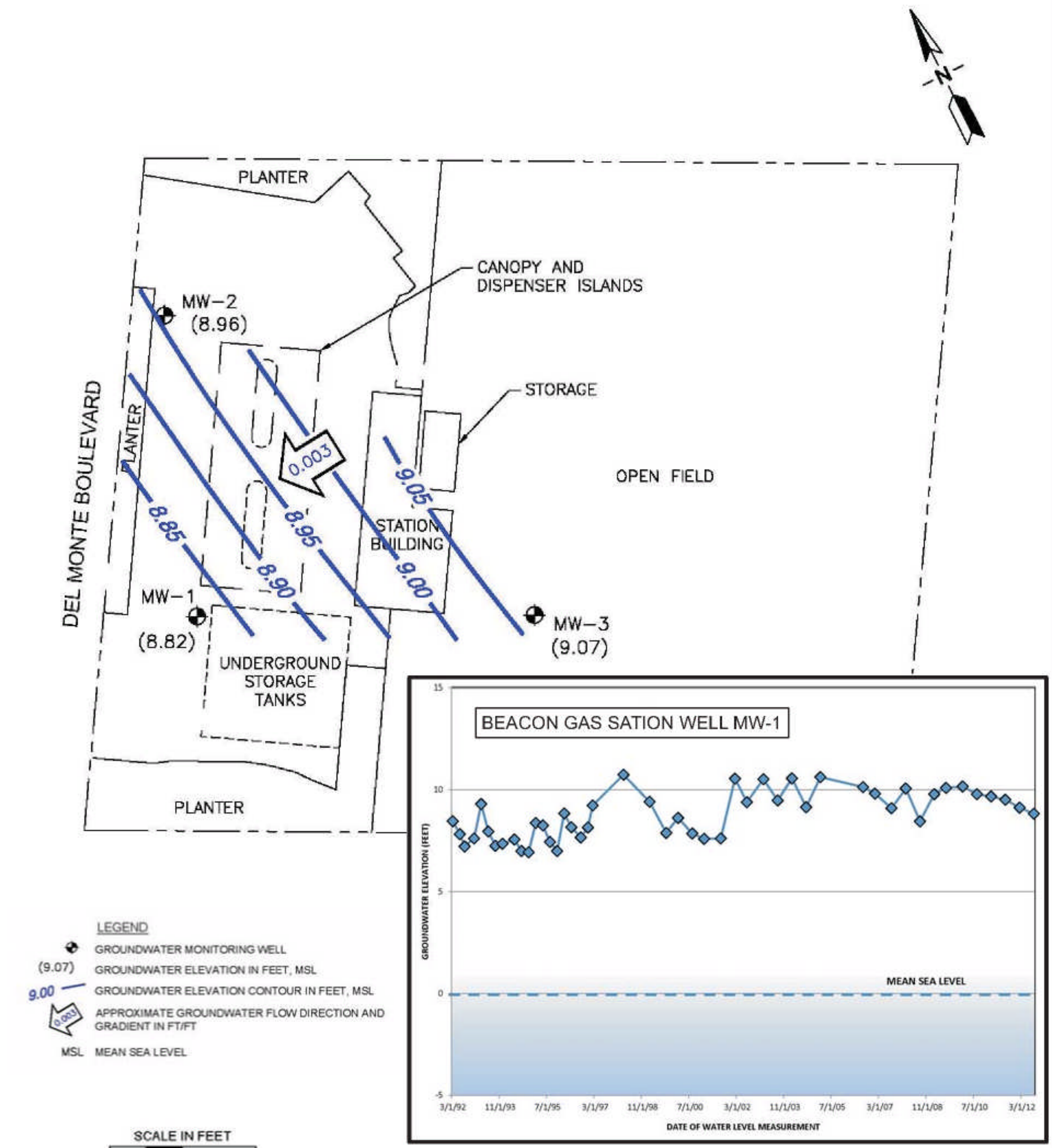
-2 FT AQUIFER APPROXIMATE CONTOURS OF EQUAL GROUNDWATER ELEVATION

DATE: 05/2014

FIGURE: 4

HOPKINS GROUNDWATER CONSULTANTS

FIGURE 8
MONTEREY PENINSULA LANDFILL
GROUNDWATER ELEVATION DATA



HOPKINS GROUNDWATER CONSULTANTS

FIGURE 9
BEACON GAS STATION
GROUNDWATER ELEVATION DATA

REF. 213_001\213.009.004 2SA12 figures.dwg
Base Map from Kadence Consultants, Inc.

PREPARED BY

TRINITY source group, inc.
Environmental Consultants

500 Chestnut Street, Suite 225
Santa Cruz, California 95060
v: 831.426.5600
f: 831.426.5602

GROUNDWATER ELEVATION CONTOUR MAP,
AUGUST 14, 2012
Former Beacon Station No. 3730
3144 Del Monte Boulevard
Marina, California

PROJECT:
213.009.004

FIGURE:
2

Resume

HOPKINS
GROUNDWATER
CONSULTANTS

Curtis J. Hopkins
Principal Hydrogeologist

EDUCATION:

B.A. Geological Sciences, University of California Santa Barbara, 1986
Credential in Ground Water Science, Ohio State University, National Water Well Association, 1991

QUALIFICATIONS:

Professional Geologist, California No. 5695
Certified Engineering Geologist, California No. EG1800
Certified Hydrogeologist, California No. HG 114

EXPERIENCE:

Mr. Hopkins has over 27 years of experience as the manager and/or lead investigator of groundwater development projects. These projects include groundwater basin resource availability and management studies, artificial recharge and recovery programs, brackish and saline groundwater supply development studies for desalination projects, and forensic groundwater studies utilizing isotope geochemistry and surface geophysical methods. Mr. Hopkins' technical experience has focused on constructing groundwater models, providing well design and well construction specifications for public bid, and directing construction management for numerous production and injection well projects. His work throughout central and southern California has included hydrogeologic study in coastal areas where seawater intrusion into aquifer systems is a significant concern and impacts of groundwater extractions and/or the design of abatement programs must be considered.

Mr. Hopkins has served as an expert witness and provided technical support for cases involving well construction disputes, impacts from groundwater pumping, groundwater management, water quality impacts, and water rights issues. He has provided responsible hydrogeologic services for numerous water resource projects that include groundwater development and monitoring programs, and basin safe yield studies in both fractured bedrock and sedimentary basin aquifer systems. He has extensive experience in conducting aquifer tests and performing data analysis to determine aquifer parameters and groundwater supply availability. Mr. Hopkins' has considerable experience evaluating well performance and the suitability of rehabilitation and/or redevelopment options to cost effectively repair or increase production in aging wells.

Before focusing his education on groundwater resources, Mr. Hopkins was a geophysical technician and conducted borehole geophysical surveys for Water Well Surveys and subsequently, Westech Geophysical, of Ventura California. During his 2-1/2 years with Westech, he operated geophysical exploration equipment and provided field interpretation of borehole and cased hole geophysical logs that were conducted for production, injection, and monitoring well projects. Mr. Hopkins' also worked on numerous water well rehabilitation or redevelopment projects for aging wells with structural problems or declining production.

Hopkins Groundwater Consultants, Inc. was incorporated in August 2001. The following project list is partly experience gained by Mr. Hopkins, while working over

Curtis J. Hopkins
Principal Hydrogeologist

the previous 14 years (1987 to 2001) with his former employer, Fugro West, Inc.

Santa Paula Basin Technical Advisory Committee, Professional Support to City of San Buenaventura (2009 to Present). Participate in TAC meetings and TAC Working Group Technical evaluations of the Santa Paula Groundwater Basin conditions and historical changes in basin conditions. Contribute technical review of annual basin conditions reports submitted to the Court, and provided a study of historical changes in the Santa Paula Basin that contribute to long-term water level variations.

Foster Park Well Field Water Supply Master Plan, City of San Buenaventura, Ventura River Basin. Project manager and lead investigator for evaluation of the City of Ventura Foster Park well field located in the Upper Ventura River alluvial groundwater basin. A detailed study of the historical river supply was conducted and included construction of a Modflow groundwater flow model to estimate the potential to discontinue use of the City surface diversion structure and produce the entire river supply from a well field. Existing well facilities were evaluated and tested to determine their structural condition, production potential, aquifer properties, and future well placement alternatives. The findings of the study concluded the City could produce the historical supply from wells and provided potential well construction locations. This study was performed in conjunction with design engineering provided by Kennedy Jenks Consultants.

City of Santa Paula Water System Master Plan, Santa Paula and Fillmore Basins. Project manager and lead investigator for evaluation of the City of Santa Paula well field located in the eastern Santa Paula groundwater basin. Conducted a detailed study of the historical municipal supply and provided an update of anticipated groundwater conditions in the basin that would affect the proposed City scheme of water and wastewater treatment. The study developed an understanding of water quality and well yields that could be obtained from the shallow, intermediate, and deep aquifer zones. Existing well facilities were evaluated to determine their structural condition, production potential, aquifer properties, and the anticipated remaining service life of each well facility. The findings of the study concluded that a failure of Well 12 would virtually render 1 of the 2 City water treatment plans inoperable. In addition, the study estimated the frequency of well rehabilitation requirements and projected the timing for future well construction. The findings of the study were incorporated in the comprehensive master plan and utilized to develop the City's water system capitol improvements and operations budgets. This study was performed in conjunction with design engineering provided by Boyle Engineering Corporation.

City of Santa Paula Municipal Groundwater Supply Wellfield Alternatives Study, Santa Paula Basin. Project manager and lead investigator for evaluation of the City of Santa Paula well fields located in the eastern Santa Paula groundwater basin and evaluated the adequacy of the produced water quality to meet the proposed City water and wastewater treatment strategy. The findings of the study concluded the City could produce the required low chloride groundwater supply from wells located east of Santa Paula Creek. The study also prioritized well facility needs in the existing wellfield locations.

City of Camarillo Groundwater Production Alternatives and Well Siting Study, Pleasant Valley Basin. Project manager and lead investigator for evaluation of the City of Camarillo well fields located in the northern Pleasant Valley Groundwater Basin and evaluated the adequacy of the produced water quality to meet the proposed City water supply strategy. The findings of the study concluded the City could produce substantially more groundwater in the vicinity of its northern most wellfield, but the quality of produced groundwater was superior at its southern wellfield location. Both locations were subject to the Fox Canyon Groundwater Management Agency ordinance.

Northeast Pleasant Valley Basin Surface Water and Groundwater Study, Calleguas Municipal Water District. Project manager and lead investigator for evaluation of the groundwater conditions in the northeastern Pleasant Valley Groundwater Basin. The study evaluated the effluent dominated source of recharge to the basin from the Arroyo Las Posas/Calleguas Creek flows. The study documented the gradual degradation in produced water quality during the approximate 200-foot rise in groundwater levels, which occurred over an approximate 10-year period.

City of Oxnard Blending Station No. 3 Well Site Relocation Project and Emergency Aquifer Storage and Recovery Project, Oxnard Plain Basin. Project manager and lead investigator for evaluation of the groundwater conditions in the Oxnard Plain Groundwater Basin for establishment of a municipal supply. The study evaluated the hydrogeology in the northeast area of the City and determined 4 wells could be constructed on the same site into the Oxnard Aquifer, Mugu Aquifer, and upper Hueneme Aquifer zones without mutual interference impacts during pumping. Hopkins provided subsequent well construction inspection services and summarized the production potential and aquifer condition encountered by each well. Provide professional development and oversight of City emergency ASR program utilizing Well No. 29, which was designed for this purpose in the upper Hueneme Aquifer. The program conducted successful operations of storage and subsequent recovery of 1,200 acre-feet of imported water supply from Calleguas Municipal Water District.

Well Site Evaluation, Groundwater Supply Development Project, Alameda County Flood Control and Water Conservation District, Zone 7 Water Agency. Contract Manager and lead investigator for groundwater development project. Zone 7 is increasing its capability to produce groundwater for emergency supply and drought period shortfalls. The groundwater expansion project incorporates seasonal groundwater injection, storage, and extraction of surplus surface water supplies. Test wells were constructed to obtain water quality data and aquifer parameters that were used to estimate well design capacities and provide well interference analyses. Six well sites in the Pleasanton/Livermore area were evaluated to determine the suitability of the aquifer system for proposed groundwater development.

Reclaimed Water Injection/Extraction Alternatives, Las Virgenes Municipal Water District. Contract Manager and lead investigator for development of groundwater conjunctive use options considered in an environmental impact assessment for LVMWD Malibu Creek Discharge Avoidance Study. The project included the conceptual design and study of groundwater injection and extraction options that would prevent discharge to Malibu Creek and augment the reclaimed water supply to balance with peak summer demands. Mr. Hopkins evaluated groundwater quality impacts, aquifer storage capacities, and operational limitations of proposed injection/extraction facilities for each of the viable groundwater alternatives. This study was performed in conjunction with design engineering provided by Boyle Engineering Corporation.

Saline Groundwater Supply Study, Cooperative Desalination Study, Central Basin Municipal Water District. Project Manager and lead investigator for the study managed by the Central Basin District on behalf of the City of Long Beach Water Department, Metropolitan Water District of Southern California, Southern California Edison Company (SCE), Water Replenishment District of Southern California (WRD), and West Basin Municipal Water District. Mr. Hopkins developed conceptual project alternatives for producing saline groundwater to supply raw water to a desalination facility to be located at the SCE Los Alamitos Generation Station in Long Beach. The study included installation and testing of demonstration wells and a canal infiltration assessment to model the multiple aquifer system beneath the site. The comprehensive model evaluated the amount of infiltration that could be induced from groundwater production located between the SCE ocean water intake canals and the San Gabriel River, and assessed the impacts on the WRD groundwater injection barrier (for seawater intrusion). This study was performed in conjunction with design engineering provided by Black and Veatch.

Hydrogeological Evaluation of Groundwater Supply Alternatives for the Integrated Water Plan Project EIR, City of Santa Cruz. Project manager and lead investigator for the evaluation of impacts of the groundwater production scenarios in the coastal Purisima Formation aquifer system. The study evaluated the impacts of continued operation of the Beltz well field in a historically manner that varied annually based on climatic conditions. Annual production ranged from 30 to 1,200 acre-feet per year and impacts evaluated included subsidence, seawater intrusion, depletion of storage, well interference, and surface water body or stream depletion. This study was performed in conjunction with the project environmental planning study provided by EDAW.

North Coast Brackish Groundwater Desalination Project and Hydrogeologic Evaluation of Groundwater Supply Alternatives, City of Santa Cruz. Project manager and lead investigator for the evaluation of brackish groundwater in a coastal bedrock aquifer system for use as a raw water supply to a desalination facility. Subsequent redirection of this project expanded the scope to include hydrogeologic evaluation of all the coastal groundwater supply options available to the City. Each option was evaluated to determine the water quality, seasonal availability, safe yield, and extraction facility requirements. This study was performed in conjunction with design engineering provided by Carollo Engineers.

North Las Posas Basin Aquifer Storage and Recovery Demonstration Project, Groundwater Supply Investigation, Metropolitan Water District of Southern California and Calleguas Municipal Water District. Project manager and lead investigator of the hydrogeologic assessment of aquifer conditions used in a comprehensive study and conceptual design of a 250,000 acre-foot groundwater injection and storage project. The comprehensive data review and summary of the Las Posas Groundwater Basin conditions were used to recommend the optimal location of the proposed injection well field and identify existing wells that were appropriate for immediate injection pilot testing. This study was performed in support of a comprehensive conceptual program study provided by CH2MHILL.

Desalination Water Supply Study, Saline Groundwater Alternative, City of San Buenaventura. Project manager and lead investigator for a coastal groundwater study to assess the technical feasibility of using saline groundwater wells to provide a feed water supply for a desalination facility. Test wells were constructed at three locations along the City beach to provide data to assess groundwater quality issues, aquifer properties of the beach sands, and allow flow modeling of groundwater production scenarios. Production scenarios incorporated a shoreline collection system of multiple well points and radial collector wells with horizontal screens that would extend offshore beneath the surf zone. This study was performed in conjunction with design engineering provided by Boyle Engineering Corporation.

Desalination Water Supply Study, Saline Groundwater Alternative, City of Santa Cruz. Principal in charge and lead investigator for a coastal groundwater study to assess the technical feasibility of using saline groundwater produced from shoreline well facilities as feed water for a desalination plant. A detailed study of the coastal hydrogeology was performed to develop a preliminary understanding of the production potential. Production scenarios included a shoreline collection system of multiple well points and/or radial collector wells with horizontal screens that would extend offshore beneath the surf zone. The findings of the study indicated that the required supply could not be provided from conventional coastal wells or lateral collector wells along the shore. This study was performed in conjunction with design engineering provided by Carollo Engineers.

City of Santa Paula Well Facility Siting Study. Project manager and lead investigator for evaluation of potential well sites located within and proximate to the City boundary. The study provided a detailed evaluation of over 30 potential well sites and rated and ranked the sites with criteria developed to identify site suitability. The findings of the study concluded the City should construct wells in three different locations to maintain a stable supply until construction of the proposed water softening/treatment facility. The study also scored the well sites in each wellfield location and identified the highest ranking sites that would provide the greatest benefits to the City water system.

Curtis J. Hopkins
Principal Hydrogeologist

City of Ventura Well Rehabilitation Projects; Saticoy Well No. 2, Victoria Well No. 2, and Nye Well No. 7. Hopkins conducted a well conditions review study, developed a well repair and rehabilitation program and project specifications for solicitation of contractor bids, and provided construction management inspection services for a 400-foot deep well, 2,000 gpm capacity (Saticoy Well No. 2, included swage patch repair and cement seal prior to rehabilitation), 1,200-foot deep well 3,000 gpm capacity (Victoria Avenue Well No. 2), and 75-foot deep 1,500 gpm capacity (Nye Well No. 7, included installation of a stainless steel liner during rehabilitation).

Well Rehabilitation Projects. Hopkins conducted well conditions review studies, developed well repair and rehabilitation programs and prepared technical specifications for solicitation of contractor bids, and provided construction management inspection service for numerous municipal water supply well projects. Well repair methods have included reperforation of the original well casing and installation of well liners and swage patches. Well rehabilitation methods utilized for each well is unique based on specific well conditions and included chemical (acid wash treatments), mechanical (brushing, bailing, swabbing, and jetting), detonation, and hydraulic well redevelopment methods. Well rehabilitation services were provided for clients that include: **Crestview Mutual Water Company**; Well No. 5 (1,400-foot deep well, 1,000 gpm capacity); **City of Santa Cruz**; Beltz Well Nos. 8 and 9 (200-foot deep wells, 800 gpm capacity); **Del Norte Mutual Water Company**; Greenhill Well No. 10 (1,200-foot deep well, 600 gpm capacity); **City of South Gate**; Well No. 27 (900-foot deep well, 1,500 gpm capacity) and Well No. 25 (1,300-foot deep well, 2,500 gpm capacity); **United Water Conservation District**; PTP Well No. 2 (1,100-foot deep well, 1,800 gpm capacity) and El Rio Well No. 11 (300-foot deep well, 2,500 gpm capacity); **City of Modesto** FMC Well No. 6 (270 feet deep well, 1,500 gpm capacity); **Willdan/Morongo Band of Indians** Morongo Well No. 5 (450 feet deep well, 1,200 gpm capacity); **City of Santa Paula**; Well No. 12 (700 feet deep well, 2,000 gpm capacity); **County of Ventura**; Well Nos. 2, 15, 95, 96, 97, and 98 (depths of up to 1,500 feet and capacities in the range of 1,000 to 1,800 gpm); **Hiji Brothers**; Freidrick Well No. 4, Kotaki Well No. 1, Montoalvo Well, Round Mountain, and Cawelti Wells (400- to 900-foot deep wells, 600 to 1,200 gpm capacities); **Grether Farming Company**: Rancho Roberto Well No. 2, Rancho Medio Dia Well No. 3 (1,000 and 1,400-foot deep wells, 600 to 1,200 gpm capacities).

Well Siting, Design, Specifications Preparation, and Construction Management of Water Supply Wells for Municipal Water Agencies. Clients included the cities of San Buenaventura, Oxnard, Santa Barbara, and Santa Cruz; County of Ventura; United Water Conservation District; Las Virgenes Municipal Water District; Alameda County Zone 7 Water Agency; and Carpinteria County Water District. Conduct well siting studies to determine optimal well locations and provide construction manager for municipal well projects in both fractured bedrock and sedimentary basin aquifer systems. Well construction methods used for test hole and/or final well completion include cable tool, direct air rotary, dual-air rotary (casing advancement), air hammer, direct and reverse circulation mud rotary drilling methods. Well design capacities range up to 4,000 gpm with completion depths of over 1,200 feet.

TECHNICAL ADVISORY GROUPS

Antelope Valley Well Technical Advisory Committee, Los Angeles County Department of Public Works, Waterworks Division, Lancaster California. Provided professional advice on the technical aspects of the County well construction specifications being used in the Antelope Valley. Meetings were conducted between February and May 2008.

Fox Canyon Groundwater Management Agency, Technical Advisory Group, Ventura, California. Provide professional, review, analysis, and advice on the technical issues related to ongoing groundwater management agency strategies to achieve groundwater basin management objectives (2008 to 2010).

PROFESSIONAL AFFILIATIONS:

American Public Works Association
American Water Works Association
Association of California Water Agencies
Association of Ground Water Scientists and Engineers
Association of Water Agencies of Ventura County
California Groundwater Association, Technical Division
Channel Counties Water Utilities Association
Coast Geologic Society
Groundwater Resources Association of California