April 12, 2019

Honorable Mayor, Members of the City Council, and Members of the Planning Commission
211 Hillcrest Avenue
Marina, CA 93933
Attn: Christy Hopper, Planning Services Manager and Deborah Mall, Deputy City Attorney
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SUBJECT: HWG COMMENTS ON REMY MOOSE MANLEY LETTER ATTACHMENTS PREPARED BY HGC, EKI, AND AGF FOR CITY OF MARINA PLANNING COMMISSION HEARING AGENDA ITEM #6A ON MPWSP COASTAL DEVELOPMENT PERMIT HELD ON FEBRUARY 14, 2019

Dear Mayor Delgado, and Members of the City Council and Planning Commission:

This letter provides the responses of the Hydrogeologic Working Group (HWG) to Remy Moose Manley (RMM) Letter attachments prepared by three Marina Coast Water District (MCWD) consultants: Hopkins Groundwater Consultants (HGC), EKI, and the Aqua Geo Frameworks (AGF) for the City of Marina Planning Commission Hearing Agenda Item #6a on February 14, 2019. The comments raised by HGC, EKI, and AGF either were raised and addressed in the California Public Utilities Commission (CPUC) proceedings or could have been. Further, MCWD consultants raise nothing new of significance that affects the analyses of the Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) or the CPUC's conclusions.

EXECUTIVE SUMMARY

The technical comments in the letters/technical memorandums (TMs) from HGC, EKI, and AGF submitted during the February 14, 2019 City of Marina hearing center around three main topic areas: Dune Sand Aquifer (DSA) hydraulic gradients, the aerial electromagnetic (AEM) study results, and the Sustainable Groundwater Management Act (SGMA) and associated Groundwater Sustainability Plan (GSP). Our high-level summary comments on materials and information presented by MCWD consultants are provided below, with a detailed comment response section following this Executive Summary.

HWG summary responses to comments made in the February 14 submittal of MCWD consultant comments related to DSA gradients are:

- The HWG already addressed most of the February 14 information and comments about potential for seaward DSA gradients in our January 25, 2019 response to MCWD/consultant presentations/letters/TMs provided at the January 8, 2019 meeting;
- Groundwater level data collected in the Monterey Peninsula Water Supply Project (MPWSP) wells in 2018 are not new and different compared to previous groundwater level data;

- Contrary to MCWD consultant characterization of calendar or water years as very dry to normal based on use of a single City of Salinas climate station, HWG review of six other nearby climate stations shows water years 2015/2016 combined were above normal rainfall and water years 2017/2018 combined were well above normal rainfall;
- Net long-term hydraulic gradients are more important than seasonal and year-to-year fluctuations; previous geochemical analyses documented historical/current seawater intrusion impacts in the Dune Sand and 180-(FTE) aquifers;
- Even under a hypothetical future scenario of reversed (seaward) gradients, groundwater quality impacts from seawater flowing to MPWSP wells within the capture zone (i.e., ocean water replacing existing brackish water) will be equal to or reduced in inland extent compared to the historical/current landward gradient scenario;

HWG responses to comments made in the February 14 submittal of MCWD consultant comments related to the AEM study are:

- The HWG already addressed most of the February 14 information and comments about the AEM study in our January 25, 2019 response to MCWD/consultant presentations/letters/TMs provided at the January 8, 2019 meeting and our March 6, 2019 response to Dr. Knight's letter;
- The AEM study conducted in the Marina area did not identify or quantify occurrence of fresh water;
- A total dissolved solids (TDS) value of 3,000 milligrams per liter (mg/L) correlates to a chloride value greater than 1,000 mg/L in the Marina area; thus, no comparison of AEM study results should be made with Monterey County Water Resources Agency (MCWRA) seawater intrusion mapping, which uses 500 mg/L as its threshold;
- There are major challenges and uncertainty in trying to interpret inverted AEM data simultaneously for both lithology and salinity;
- While the AEM study makes an attempt to resolve inverted AEM data relative to salinity (with mixed results), there was essentially no attempt to develop and apply AEM data correlations to lithology;
- The AEM study only uses seven boreholes (within the Marina AEM flight line area) with lithologic logs, borehole geophysical logs, and water quality data for calibration of inverted AEM data, which is insufficient to calibrate the AEM data;
- The AEM study depth of investigation was limited to 50 meters (165 feet) near the coast (i.e., did not reach the 180/400-Foot Aquitard and 400-Foot Aquifer);
- HWG review indicates that attempts by AGF (and others) to correlate inverted AEM resistivities to chloride and/or TDS to demonstrate occurrence of claimed gaps in the 180/400-foot Aquitard are incorrect and not valid;

- In general, the MPWSP will reduce any potential flow from the 180-FTE Aquifer to 400-Foot Aquifer because heads will be reduced in the 180-FTE Aquifer but not at all (or very minimal) in the 400-Foot Aquifer.
- The Fort Ord monitoring data is not "new" as it has been collected from the same wells for many years, remains consistent over time, and is not located in the potential MPWSP impact area.

HWG responses to comments made in the February 14 submittal of MCWD consultant comments related to SGMA are:

- The HWG already addressed most of the February 14 information and comments about SGMA in our January 25, 2019 response to MCWD/consultant presentations/letters/TMs provided at the January 8, 2019 meeting;
- MCWD consultant claims that SGMA requires reversal of hydraulic gradients <u>are incorrect</u>;
- A groundwater extraction barrier is a viable solution to the seawater intrusion issue discussed in the GSP; in addition, expansion of the partial seawater intrusion barrier that would be created with implementation of the proposed MPWSP project also remains an option.

HWG responses to comments made in the February 14 submittal of MCWD consultant comments related to other topics not covered above include:

- Claims that the MPWSP will somehow harm or destroy existing MCWD sources of groundwater <u>are completely invalid</u>, as the MPWSP will not extract water from the 400-Foot and Deep Aquifers;
- Most of the comments by MCWD consultants are tied to their hypothesis that a significant body of usable potable/fresh groundwater exists inland of the CEMEX property and MPSWP project location, which would be impacted by the proposed MPWSP project. This is simply not the case (both the existence of said developable fresh water bodies and impacts to claimed hypothetical fresh water from the proposed MPWSP) as documented repeatedly by the HWG in various reports and letters, and also as documented by the MCWRA and the CPUC EIR Team in various other documents.

More specific and detailed responses to MCWD's consultant comments submitted at the February 14 City of Marina hearing are provided below.

Detailed Responses to Attachments

1. HGC Letter (February 14, 2019)

    A. HGC refers to the belief of others that the area south of Salinas River was fully intruded with seawater (Page 2).

    HWG Response: *This has been stated by HGC and responded to previously; but again, no one stated previously (or believed) that this area was fully intruded with sea water as it* *only takes a very small percentage of seawater (approximately 2%) to render groundwater non-potable and unusable. Therefore, claims of the area not being fully intruded or having only a small percentage of sea water (e.g., 5%) are misleading and meaningless, because it indicates that the water has salinity levels rendering it non-potable and unusable due to sea water intrusion.*

B. HGC refers to the area south of Salinas River as having hydrogeologic conditions very different from the area north of Salinas River (Footnote 1: Pages 1 and 2).

HWG Response: *As described in detail in the HWG Report (November 2017), while there are some differences in geologic depositional environments the aquifers and aquitards are continuous/connected beneath the Salinas River and there are no hydraulic barriers to horizontal groundwater flow. Also, the proposed project does not pump 27,000 AFY; but rather the proposed project pumps approximately 17,400 AFY.*

C. HGC makes various comments on the groundwater model used in the Final Environmental Impact Report (FEIR) (Page 2).

HWG Response: *These comments present no new information and were addressed in the FEIR.*

D. Comments about changes in Dune Sand Aquifer groundwater gradients (Page 3).

HWG Response: *This issue was addressed in our January 25, 2019 letter. Also, we note that HGC admit they raised the same issue previously in comments on the EIR/EIS; so again, none of this constitutes new information.*

E. HGC makes comments about HWG members (Footnote 2, Page 3).

1. HGC states that, "…HWG members have varied throughout project development and field testing and over the course of the EIR study process."

   HWG Response: *This statement is completely inaccurate; the HWG members have remained the same throughout the HWG's existence.*

2. HGC states with regard to Mr. Feeney and Mr. Durbin, "It may be that this affiliation and perhaps even anticipation of continued or future work with Cal-Am has influenced the perspective of the HWG on this project."

   HWG Response: *Whereas we have serious concerns and disagreement with the professional opinions of the consultant team for MCWD, we would never impugn their motivation for their opinion. California Code Title 16 Division 29, 3000-3067 Section 3065 presents Professional Standards and Code of Professional Conduct. We* *quote " A licensee shall not falsely or maliciously attempt to injure, impugn, or injure the professional reputation or business of others." HGC's comment suggests that our motivations are informed by economic consideration. We find this counter to the Code of Ethics and offensive.*

Mr. Durbin and Mr. Feeney are not beholden to Cal-Am in any way. Hydrogeologic consultants work for many different clients over their lifetimes, and it is a violation of professional ethics to impugn their reputation by implying they are biased if they ever worked for Cal Am. Mr. Feeney has done considerable work for MCWD in the past, so one could argue Mr. Feeney is biased towards MCWD's interests as well. Mr. Durbin previously opposed Cal Am near the beginning of this very same process prior to all the additional field data collected and analyses performed by HWG over the last five years, which are the basis for his current opinions. Furthermore, Mr. Durbin is in the process of closing his business and planning his retirement, which should suggest no interest in future work with CalAm.

F. HGC characterizes rainfall over the 2013 to 2018 time period as very dry to normal (Pages 6 to 8).

HWG Response: *There are six climate stations in the MPWSP vicinity for comparison to the station used by HGC, as summarized in **Table 1**. As is apparent from review of **Table 1**, HGC has cherry-picked the climate station with the least rainfall compared to normal during the 2015 to 2019 period. Review of all stations shows that the combination of water years 2015 and 2016 were slightly above normal and the combination of water years 2017 and 2018 were well above normal. Water year 2017 was clearly one of the wettest on record. Thus, various statements about 2018 water levels representing average conditions and previous years being drought conditions are inaccurate. In fact, the entire 2015 to 2018 period is cumulatively well above average for rainfall.*

G. HGC makes comments about the southern boundary of $(\text{NMGWM})^{2016}$ domain (Page 9).

HWG Response: Groundwater model comments were previously addressed in the FEIR. The HWG notes that these comments are not relevant to the superposition version of the *NMGWM*^{2016} *used by the CPUC EIR Team. Furthermore, what is occurring in the perched/mounded aquifer at the southern end of the groundwater model domain (approximately four miles from proposed MPWSP intake wells) has no material impact on model results relative to predicted project impacts.*

H. HGC makes reference to a unique source of recharge (Pages 11-12).

HWG Response: *This argument has been made many times before by HGC and has been previously responded to by HWG (HWG, August 2018; HWG, January 2019). Again, there is nothing unique about recharge to the perched/mounded aquifer and such recharge is accounted for in HWG analyses.*

I. HGC makes comments about fresh water being present in the project vicinity (Pages 13-15).

HWG Response: *This argument has been made many times before by HGC and has been responded to by HWG (HWG, August 2018). The AEM study utilizes an improper standard of 3,000 mg/L TDS to define fresh water (i.e., source of drinking water), whereas the standard definition of freshwater is less than 1,000 mg/L TDS. Therefore, the AEM study does not delineate fresh water, but rather attempts to delineate areas of brackish water. In addition to our previous responses, we note that <u>even other AEM studies define fresh water as TDS < 1,000 mg/L</u>, brackish water as 1,000 to 10,000 mg/L, and saline water as TDS > 10,000 mg/L (Levi, et. al., 2008).*

J. Figure 4 (Page 13).

1. Top portion of Figure 4. HGC shows an AEM profile from the Preliminary AEM Report, for which the HWG had overlaid the stratigraphy in its November 2017 report. HGC added arrows showing his interpretation of hypothetical groundwater flow paths.

   HWG Response: *HGC shows an outdated (and subsequently modified AEM profile due to previous HWG comments) AEM profile that displays the unsaturated zone as containing lower salinity groundwater. HGC carries this error further showing a groundwater flow arrow in the unsaturated zone on this profile. Using the information on the incorrect figure, showing the darker blue color representing higher inverted apparent resistivity in the unsaturated zone, provides support to the HGC's opinion as to the magnitude of freshwater recharge to the underlying 180-FTE Aquifer. In fact, it is interesting to note that the perched/mounded aquifer saturated zone in this profile has groundwater of lower inverted apparent resistivity (i.e., implication being it is more saline, although as is true for the entire AEM study, it is difficult to distinguish salinity from lithology) than is present in topmost portion of the underlying 180-FTE. Once the unsaturated zone is eliminated from this figure (see same profile provided in Final AEM Report), it is apparent that mixing of groundwater from the perched/mounded aquifer cannot account for lower salinity groundwater in the topmost portion of the underlying 180-FTE Aquifer. In reality, the explanation is that there is a seawater intrusion wedge in the underlying 180-FTE with lower salinity groundwater overlying higher salinity groundwater within the aquifer, which is exactly what would be expected in a sea water intruded area.*

2. Top portion of Figure 4. HGC shows an arrow pointing downward across the 180/400-Foot Aquitard in the vicinity of MW-7. (Page 13).

   HWG Response: *There are a few important points to discuss here, some of which are illustrated on the attached **Figure 1**. First is that the depth of investigation (DOI) near the coast was limited and did not extend to or through the 180/400-Foot Aquitard or into the underlying 400-Foot Aquifer (see page 13 and Figures 4 and 5 from Final AEM Report). Therefore, the inverted apparent bulk resistivity shown for 180/400-Foot Aquitard and 400-Foot Aquifer west of MW-7 (to the left of MW-7 on the figure) is unknown and should not even be shown on this profile (i.e., the AEM imaging of the 400-Foot Aquifer west of MW-7 is invalid). Second, we note that even attempts to extend apparent inverted bulk resistivity below the DOI in MW-1 and MW-4 (Figures 4 and 5 of Final AEM Report) do not match particularly well with the lower borehole resistivity (implying higher salinity, although not accounting for lithology) in the top of the 400-Foot Aquifer. Third, there is no calibration of AEM data to the 400-Foot Aquifer in this area even where MPWSP borehole data and well data are available. This is due to a combination of the limited DOI west of MW-7 and the fact that MPWSP borehole well data only penetrate the upper 50 feet of the 400-Foot Aquifer throughout the area. Finally, review of field/lab based TDS/chloride concentrations in the upper portion of the 400-Foot Aquifer (MW-1D, MW-3D, MW-4D, MW-7D) show highest salinity at the coast and gradually decreasing salinity inland (from about 31,000 mg/L TDS and 17,000 mg/L chloride at the coast to about 27,700 mg/L TDS and 13,700 mg/L chloride at MW-7D). These water quality data from MPWSP monitoring wells in the 400-Foot Aquifer stand in direct opposition to interpreted AEM data for the 400-Foot Aquifer (shown in HGC Figure 4), which shows lower salinity at the coast and increasing salinity inland to MW-7D and further inland (see attached **Figure 1**). From a practical perspective, this (AEM data interpretation) can't be correct because salinity would not be greater further inland and away from the coast when seawater is clearly entering the aquifer from the seabed. Thus, monitoring well data proves the inverted AEM data interpretation is flawed and invalid in the 400-Foot Aquifer where HGC shows a flow arrow crossing the 180/400-Foot Aquitard in Figure 4.*

3. Lower portion of Figure 4. HGC circles two areas of purported gaps in the Fort-Ord Salinas Valley Aquitard (FO-SVA) (i.e., clay layer beneath perched/mounded aquifer), and one area of purported gap in the 180/400-Foot Aquitard. (Page 13).

   HWG Response: *Although this particular cross-section actually lacks sufficient data to fully define the presence/absence of a gap in the perched/mounded aquitard in the area circled by HGC on the upper western portion of the section (as demonstrated by question marks), neither the HWG nor anyone else ever claimed* *there was necessarily a continuous clay layer underlying the entire perched/mounded aquifer. In terms of the lower western portion of the section circled by HGC for the 180/400 Aquitard, review of available data does not indicate a gap in the aquitard based on consideration of all available lithology, water level, pumping test, and water quality data. As noted by HWG before, regardless of potential for gaps in the 180/400-Foot Aquitard, the reduction of heads in the 180-FTE from pumping of the proposed MPWSP will actually decrease downward vertical flow from the 180-FTE to underlying 400-Foot Aquifer due to a lower vertical downward gradient.*

K. Comments about HGC accounting for the ocean as a recharge boundary (Page 14).

HWG Response: *HGC refers here to the ocean as a recharge boundary only in the context of being the source of salinity for sea water intrusion under ambient conditions (i.e., not in relation to MPWSP pumping). Our comments on this topic have been with respect to the cone of depression and capture zones related to proposed MPWSP pumping, which remain unaddressed by HGC and other MCWD/Marina consultants.*

L. HGC states, "The rate of fresh water recharge appears to be approximately equal to the rate of seawater intrusion into the shallow aquifer zones. This balance has caused the denser salt water to move downward through the 180-400-Foot Aquitard into the 400-Foot Aquifer inland of the Project Area (see Figure 4)." (Page 14).

HWG Response: *Although HGC acknowledges here that seawater intrusion is occurring in the shallow aquifers, no data or analysis is provided to support the statement that fresh water recharge is equal to the rate of seawater intrusion. Furthermore, as demonstrated elsewhere (see items 1.J.2 and 3.F.7), HGC's groundwater flow arrow* across the 180/400-Foot Aquitard is based upon inaccurate AEM data interpretation.

M. Discussion of MW-7 and Figure 5 (Pages 14-15).

1. HGC refers to previous HWG statements about MW-7 borehole data that were in the HWG Technical Report (November 2017), regarding comparison of water quality in MW-7S to AEM resistivity values at elevation -20 meters in the Stanford AEM profile (from their August 2017 public presentation) that included a resistivity scale/legend where resistivity values were labeled "Saline" and "Fresh".

   HWG Response: *First, HWG notes that at the time of preparation of our Technical Report, the only available AEM information for HWG review was from the Stanford presentation on Preliminary AEM results (i.e., despite its earlier date of June 16, 2017, the Preliminary AEM Report had not yet been made available for HWG/public review). Regardless of whether the log resistivity value is closer to 1.5 or 2 ohm-m,* *the associated TDS value of approximately 215 mg/L (compared to the 68 mg/L stated previously) makes no material difference to the point of that discussion in the HWG Technical Report, i.e., that the profile in the Stanford Preliminary AEM Results presentation misrepresented (and implied) the resistivity scale as being groundwater resistivity by its labeling using the words "Saline" and "Fresh".*

2. HGC states borehole geophysics indicates groundwater quality in the unscreened zone from 95 to 125 feet below ground surface (bgs) must be of lower TDS (less than 1,200 mg/L) than MW-7S zone screened from 60 to 80 feet bgs.

   HWG Response: *We note that there is no available water quality data to document the actual water quality of this unscreened zone; thus, HGC's comment is speculation to begin with. In fact, this is one of our points about the challenge of calibrating inverted AEM data to zones between screened monitoring well intervals. Also, the 95 to 125 foot depth interval is within the upper portion of the 180-FTE and it would not be surprising if this zone were of lower salinity due to it being part of a sea water intrusion wedge.*

3. HGC states, "The groundwater elevations observed in MW-7S at over 8 feet above mean sea level (NAVD88) are sufficient to impede salt water intrusion to depths of up to 200 feet."

   HWG Response: *First, it is clear from monitoring reports that sea water intrusion already exists in MW-7M at depths much shallower than 200 feet. Second, given that groundwater elevations in MW-7M are below sea level, it is clear that heads in MW-7S are* irrelevant to and won't prevent sea water intrusion in the 180-FTE.

N. HGC states, "…the groundwater recharge for the aquifers in this area of the basin is enhanced by inflow from the semi-perched DSA and recharge from the Salinas River, which along with pumping restrictions, has either slowed or reversed seawater intrusion in the shallower aquifers in the project area." (Page 16).

HWG Response: *This statement is not new and has been addressed by HWG before. First, it is important to note that essentially nothing has changed about local recharge from the time before seawater intrusion began until today, and nothing will change regarding recharge in the future related to proposed MPWSP pumping. The fact that local recharge is insufficient to prevent or slow sea water intrusion is well established fact based on historic/current sea water intrusion.*

O. HGC states, "While the DSA is not directly a major source of groundwater to historical production wells, it is locally a major source of freshwater supply to the underlying aquifers from which most wells produce." (Page 16).

HWG Response: *First, as stated above – there will be no impacts to natural recharge mechanisms related to the proposed project. Second, as evaluated in the FEIR, there are no production wells in the underlying 180-FTE Aquifer anywhere near the MPWSP. Third, the whole concept expressed here <u>is one of several red herrings put forth by HGC</u>. HGC keeps raising issues that are of <u>no practical significance</u> to the proposed MPWSP project, and neglects to acknowledge that MCWD can pursue the same projects (even if any patches of truly fresh water really did exist) with or without the MPWSP.*

2. EKI Memo (February 13, 2019)

   A. EKI claims that their memo, "…provides critical new and existing information that demonstrates substantial changes to the Final Environmental Impact Report/Environmental Impact Statement…" are needed. (Page 1)

   HWG Response: *The HWG and CPUC EIR Team have separately addressed EKI comments in previous documents. EKI repeats many of their previously responded to comments in this February 2019 memo. Nonetheless, HWG provides a few additional responses to comments below.*

   B. Under Item 2, EKI makes several statements regarding Fort Ord data and groundwater levels/quality in the shallow aquifers.

   1. EKI states that, "…HWG…characterize all groundwater within the vicinity of the Project as brackish…because of seawater intrusion…They dismiss the findings of the…AEM Study…which shows that significant quantities of water with less than 3,000 milligrams per liter…TDS exist in the Dune Sand Aquifer and Upper-180 Foot Aquifer." (Page 3).

   HWG Responses: *EKI fails to mention that by only attempting to characterize groundwater with up to 3,000 mg/L TDS, the AEM study only attempts to define areas of brackish water with TDS up to 3,000 mg/L. Given that brackish water is generally defined as groundwater with TDS between 1,000 and 10,000 mg/L TDS, and notwithstanding all previous HWG comments about the uncertainty of what was actually quantified in the AEM study, even if one accepted the volumes of water quantified in the AEM study as actually being below 3,000 mg/L TDS, all the AEM study does is quantify brackish water. Thus, the AEM study does not provide evidence at odds with how EKI claims the HWG has characterized the MPWSP project vicinity.*

   2. EKI claims HWG does not consider that groundwater in the DSA and upper portion of 180-Foot Aquifer provides a) natural recharge, b) protective groundwater elevations

that serves to limit seawater intrusion, and the potential impact of the proposed MPWSP on items a) and b) above. (Page 3).

HWG Response: *The HWG has previously and continues to acknowledge that natural recharge occurs to the Dune Sand and other shallow aquifers in the project area, and in fact, directly incorporates such natural recharge in our analyses. While the details of how the claimed protective groundwater elevations actually protect against seawater intrusion are not explained by EKI, the reality is that all available hydrogeologic data (including the AEM study) demonstrate historical and ongoing sea water intrusion in the MPWSP project area. Thus, without the MPWSP project, sea water intrusion has been and is occurring in spite of natural recharge and the purported protective barrier provided by the recharge. As stated by HWG before, the proposed MPWSP will not impact natural recharge mechanisms and will act as a partial extraction barrier to ongoing seawater intrusion further inland of the proposed slant wells.*

3. EKI cites “new” Fort Ord monitoring data from December 2018 to support AEM study results showing areas of groundwater with TDS less than 3,000 mg/L. (Pages 3 to 5).

HWG Response: *EKI does not provide the actual referenced Fort Ord monitoring data or map of labeled well locations, so there is no actual data for the HWG to review. However, the Fort Ord monitoring data is not “new” as it has been collected from the same wells for many years; thus, EKI could have and to some degree has referred to Fort Ord monitoring data in previous documents during the EIR process. In addition, the Fort Ord monitoring data is not located in the potential MPWSP project impact area.*

4. EKI provides a diagram of the conceptual site model for Former Fort Ord on page 4.

HWG Response: *As has been noted by HWG before, there are significant differences in the hydrogeology between Fort Ord and the MPWSP project vicinity. One important difference is the lack of the Intermediate 180-Foot Aquitard in the MPWSP project vicinity.*

5. EKI states, “The new data from Fort Ord indicates that seepage from the Dune Sand Aquifer near Monterey Bay (where water levels are above sea level) into the underlying 180-Foot Aquifer (where water levels are below sea level) has effectively stopped seawater intrusion in the Upper 180-Foot Aquifer and limits seawater intrusion within the lower 180-Foot Aquifer and 400-Foot Aquifer in the southern portion of Fort Ord.” (Page 5).

HWG Response: *Some of the key issues to note in this EKI statement are: 1) the Fort Ord data presented by EKI is not “new” for reasons cited about in item 2.B.3, 2) the* *presence/absence of sea water intrusion is related to many more factors than cited above by EKI, and 3) the southern Fort Ord area is far removed from and irrelevant to the MPWSP area.*

6. EKI states, "This natural barrier appears to be undermined north of Fort Ord through groundwater extraction and/or discharges of seawater into the DSA at the CEMEX Plant, and would likely be further disturbed by the Project." (Page 5).

HWG Response: *This is an example of a completely unsupported statement/conclusion. No evidence is provided for this statement. Seawater intrusion has been occurring in the MPWSP Project vicinity for 60+ years. In fact, the well (14S-1E-013J2) at the CEMEX plant, which was drilled in 1968, originally produced from the 180 and 400-ft aquifers. In 1969 the well became too salty to use as wash water so the perforations in the 180-ft zone were sealed. Subsequently, in the early 1980's the 400-ft zone became salty. Yet EKI apparently suggests it is all due to wash water percolation and extraction of minor amounts of groundwater from the 400-Foot Aquifer at the CEMEX plant. There is no data or evidence provided to support this EKI statement/conclusion.*

7. EKI states, "The HWG…claims that there is no hydraulic connection between the Dune Sand Aquifer and the Upper 180-Foot Aquifer and the water 'spills' over the edge of the Salinas Valley Aquitard. Yet they provide no data to support their hypothesis." EKI goes on to make claims about the Fort Ord data being relevant to this discussion, and that if the groundwater is spilling over the FO-SVA Aquitard from the perched/mounded Aquifer into the underlying aquifer it would be more saline because no protective head would exist. EKI concludes, "…the new data demonstrate that the HWG's hypothesis is incorrect." (Page 5).

HWG Response: *This is an interesting comment by EKI <u>in that it completely undermines HGC's hypothesis about shallow groundwater flow in the area</u>. EKI appears to be stating that groundwater in the perched/mounded aquifer is not spilling over the edge of the FO-SVA Aquitard, whereas this is what HGC is claiming. In addition, EKI confuses and mischaracterizes previous HWG work and comments due to improper use of terminology (e.g., EKI's use of "Dune Sand Aquifer" here should be referred to as the perched/mounded Aquifer or A Aquifer; EKI's use of "Salinas Valley Aquitard" here should refer to Fort-Ord Salinas Valley Aquitard (FO-SVA); also, EKI reference to a formal "Upper 180-Foot Aquifer" here implies the existence of an intermediate 180-Ft Aquitard that is not present in the MPWSP vicinity). While EKI does not provide any actual data or analysis to support their claim that HWG's hydrogeologic conceptual model (HCM) regarding the perched/mounded aquifer is incorrect, the HWG published all the data and analyses supporting our HCM in our Technical Report (November 2017). EKI also neglect* *to mention that the proportion of water spilling over the edge of the FO-SVA Aquitard is so small compared to the total volume and rate of groundwater movement in the underlying aquifer that it would not be expected to substantially alter water quality or head of the underlying aquifer (for example; in addition to differences in water levels, note differences in nitrate in MW-7S and MW-7M). Furthermore, the water quality of the underlying aquifer along the edge of the FO-SVA aquifer would be expected to have lower salinity in the upper portion (compared to lower portion) of the aquifer related to the dynamics of sea water intrusion and the occurrence of a sea water wedge.*

8. EKI repeats their previous comments/discussion from January 2019 regarding purported seaward gradients and relationship to capture zones (Pages 5 and 6).

HWG Response: *The HWG addressed these issues in our January 25, 2019 letter.*

C. Under Section 3, EKI states, "…the Project will reduce freshwater recharge to the Basin and will degrade water quality…" (page 6).

HWG Response: *This is a repeat of previous statements made by EKI and/or others and has repeatedly been addressed by the HWG. To summarize, the proposed MPWSP will not impact recharge to the basin and water quality impacts will be limited to flow paths direct from the ocean to MPWSP slant wells (which would encompass an equal or smaller inland extent if groundwater gradients were somehow reversed).*

Under Section 4, EKI repeats several comments about SGMA. Although generally addressed previously by HWG and CPUC, a few additional comments are provided below.

1. EKI states, "In order to avoid undesirable results related to seawater intrusion…historical landward groundwater gradients will need to be reversed…or an injection barrier will need to be constructed." (Page 8).

HWG Response: *SGMA does not require gradients to be reversed, or the currently sea water intruded area to be restored (relative to January 2015 conditions). EKI also neglects to mention that an extraction barrier is probably a more likely solution to the sea water intrusion barrier problem in Salinas Valley, as an injection barrier would require a source of water to inject and all wastewater is already being utilized for the OneWater project.*

2. EKI states, "Seawater intrusion is caused by landward (i.e., inland) hydraulic gradients, and as long as those gradients persist then seawater intrusion will continue to worsen." (Page 8).

HWG Response: *The HWG notes that in this statement EKI acknowledges that there are current inland hydraulic gradients in the proposed MPWSP area causing sea water intrusion.*

3. EKI states in discussing hypothetical flat gradients that capture zones would, “extend radially outward until recharge matches rates of groundwater extraction…” (Pages 8 and 9).

HWG Response: *EKI ignores the effect of the ocean as a recharge boundary adjacent to the proposed MPWSP wells in describing groundwater flow under a flat gradient; therefore, their description is inaccurate and incomplete.*

4. EKI states, “…the HWG argues that the Project will aid in stopping salt water intrusion as it will stop some salt water from entering the basin while landward gradients exist. This conclusion is incorrect. In order to be an effective barrier to salt water intrusion, the Project’s slant wells would need to extend along the entire coastline of the Monterey and 180/400 Foot Subbasin, which is not being proposed.” (Page 9)

HWG Response: *The HWG (as well as CPUC EIR Team) only said that incoming salt water within the MPWSP capture zone will be prevented from moving further inland, and never stated incoming sea water outside the MPWSP capture zone would be prevented from continuing further inland like it is doing now without the MPWSP. However, EKI is correct that additional extraction wells could potentially be added north and south of the MPWSP capture zone as part of SGMA and the Salinas Valley Groundwater Basin GSP to provide a more effective regional barrier to sea water intrusion as a future project.*

5. EKI states, “…while the TDS concentrations of spring 2018 samples, collected by pumping/purging the wells, are greater than those estimated from EC measured in the in-situ probes under ambient non-pumped conditions, this only reinforces the fact that relatively fresher water exists in the upper portion of the water column, as measured by the probes, than in the deeper portions of the well screen.” (Page 12).

HWG Response: *The HWG generally agrees here with EKI that less saline water will tend to be present in the upper portion of a given aquifer compared to groundwater with higher salinity in the lower portion of an aquifer. This is called a seawater wedge.*

6. EKI states, “In its 25 January 2019 letter, HWG…claims that recent data are only representative of very wet conditions. However, review of hydrologic conditions shows that current conditions are more representative of average non-drought conditions than those evaluated in the FEIR/EIS.” (Page 13).

HWG Response: *As explained elsewhere in this letter in our response to HGC (Item 1.F), review of multiple climate stations shows that HGC/EKI cherry-picked the one station showing much lower rainfall totals over the 2015-2018 period (than the six other nearby stations) and that review of rainfall data from five other local stations and a second Salinas station all show above average rainfall for both two-year periods (2015/2016 and 2017/2018) and well as for the entire four year period from 2015 to 2018. A departure from mean rainfall graph for the Marina station is provided in the attached **Figure 2**. This graph demonstrates that the period from 2015 to 2018 was an upward trending wet period. **Figure 2** also illustrates that 60 percent of years since 1961 have had cumulatively below average rainfall, and therefore this represents a more normal condition.*

D. In their conclusions, EKI makes reference to, "inland hydraulic gradients, which are causing ongoing seawater intrusion…" (Page 14).

HWG Response: *The HWG notes that when it serves to make a certain point EKI claims there are currently inland hydraulic gradients, and when it serves best to make a different point EKI claims there are currently seaward hydraulic gradients.*

3. AGF Technical Memorandum (February 11, 2019)

A. The Preface section item 4 recommends that MCWD conduct annual AEM investigations (Page 1).

HWG Response: *This seems like a conflict of interest as AGF appears to be asking MCWD for an annual contract to perform ongoing consultant services, which requires them to promote the value of the AEM study conducted in 2017 in discrediting the HWG, MCWRA, and the CPUC EIR Team. Regardless, the HWG acknowledges that periodically repeating certain types of geophysical measurements (e.g., borehole induction logging) can be useful in complex geophysical settings such as Marina. Thus, it is possible repeated AEM surveys that incorporate the range of potential baseline conditions (i.e., dry and average years, in addition to wet years), are conducted with consistent flight paths, equipment, and methodologies, and that have independent and public review of all field data, inversions, calibration to field data, and hydrogeologic interpretations could potentially be useful.*

B. In the Introduction, AGF states that, "…AGF is working in collaboration with Stanford University to map the subsurface geology and determine the aquifer properties in the investigation area using ground truth from existing boreholes and monitoring wells." (Page 2).

HWG Response: *It is not clear from the Final AEM Report how AEM data was converted/interpreted to "map the subsurface geology" or "determine the aquifer properties". While the Final AEM Report does make some attempt to correlate AEM data to salinity (our comments on this are provided elsewhere), it is not clear how the AEM data was converted/correlated and applied to map lithology (which is necessary to map subsurface geology). In fact, it is not possible to uniquely correlate AEM data to both lithology and salinity in settings with variable salinity and variable lithology as occurs in the MPWSP area. Furthermore, the Final AEM report makes no reference to converting/correlating AEM data to aquifer properties, which typically include hydraulic conductivity, transmissivity, specific yield, specific storage, and porosity. In fact, when the volumes of brackish water are being quantified in the Final AEM Report, the authors state, "Without knowing at least the average porosity of each aquifer, reliable groundwater volumes are difficult to estimate."*

C. In the Introduction, AGF states that, "AGF designed the airborne survey, oversaw the AEM data acquisition in mid-May, performed 'in the field' Quality Assurance on the data acquisition vendor, and then processed, edited, and numerically inverted the acquired data…AGF advised Stanford with the interpretation and integration of the AEM inversion results." (Page 2).

HWG Response: *Given AGF's description of its broad and extensive role stated above and the additional involvement of HGC as the AEM study hydrogeologist, it is difficult to understand what independent role Stanford personnel had in this AEM study with respect to data collection or interpretation. These AGF statements suggest this is really more of a MCWD consultant study than a Stanford study.*

D. Under Item 1 AGF states, "HWG does not state what is 'very misleading' about the August 2017 presentation. They just make the statement." (Page 2).

HWG Response: *HWG have pointed a few of the misleading aspects of this presentation previously, for example:*

1. *Presentation graphics, profiles, and animations showed the unsaturated zone as dark blue high resistivity, and included it as part of the fresh water in the area (HWG, November 2017; HWG, January 2018).*
2. *Presentation graphics and profiles label bulk resistivity as "saline" and "fresh" implying a direct correlation to water quality. (reproduced as Figure 3-9 of HWG Technical Report, November 2017; HWG, January 2018).*
3. *By labeling the blue color as "fresh" on the bulk resistivity scale, subsequent profiles and animations showing bulk resistivity colored blue in the unsaturated zone*

throughout the profiles/animations and upper portion of saturated zone in some areas gave the impression to the public of abundant "fresh" water when, in fact, the blue color showed water in the unsaturated zone and primarily brackish water in the saturated zone (HWG, November 2017; HWG, January 2018).

4. *Presentation graphics and profiles show a clear sea water intrusion wedge in the 180-FTE Aquifer, which is supported by MPWSP MW data. However, this is discussed as a freshwater zone/wedge (HWG, January 2018).*
5. *AEM profiles showed imaging to depths of 170 meters (about 560 feet) adjacent to the ocean shoreline with high salinity in the subsurface throughout the column. The subsequent Final AEM Report acknowledged the depth of investigation along the coast was limited to 50 meters (about 165 feet). This is important for multiple reasons, including that AEM imaging of the 400-Foot Aquifer near the coast is the primary basis for the AGF claim of a 180/400-Foot Aquitard gap further inland (HWG, August 2018).*
6. *There was no acknowledgment of the great uncertainty (and non-uniqueness) in hydrogeologic interpretations (and still isn't to this day) based on AEM data impacted by both lithologic and salinity variations (HWG, January 2018).*
7. *There was insufficient acknowledgement of this being a one-time snapshot study conducted immediately at the conclusion of one of the wettest years on record (HWG, January 2018).*
8. *There was inadequate acknowledgement that the AEM study used only 7 boreholes with lithologic logs, borehole geophysical logs, and water quality data during the August 2017 presentation. However, Mr. Gottschalk did acknowledge this fact after his subsequent April 2018 presentation when questioned about it by a Board member (HWG January 2018; HWG August 2018).*
9. *The presentation had no significant discussion of the uncertainty in trying to interpret inverted AEM data in terms of both lithology and salinity simultaneously (HWG, August 2018).*

E. Under Item 2, AGF make several points about the purported use of 318 control points in the AEM study.

1. AGF makes reference to use of "Every borehole of the 318 available", but only "if they were in reasonable proximity to an AEM flight line." (Page 4)

   HWG Response: *This statement leaves unclear how many of the purported 318 boreholes were actually used in any capacity. In fact, review of AGF Figures 1 and 2 shows, in part, how misleading this claim is because although Figure 1 (same as Figure 12 from AGF April 2018 TM) shows only the area of AEM flight lines, Figure 2* *shows that a large portion and possibly the majority of the 318 boreholes appear to be outside of the AEM flight line area. For the one limited profile example provided in AGF Figure 2, it is not clear how these boreholes were used for AEM data calibration given that no borehole geophysical logs are shown, no water quality data are shown, some boreholes are very limited in depth, and there are several different borehole lithologies for a given AEM inverted resistivity color. In fact, it appears quite likely that no other borehole geophysical logs or water quality data within the AEM flight line area were used in the analysis aside from MPWSP monitoring wells. At the very least, any other such data (borehole geophysical logs or water quality data) are not documented sufficiently for review by anyone in the Final AEM Report because it was not released for public review with the Report or provided to the CPUC.*

2. AGF states, "Statements by HWG stating that only 7 of the 318 boreholes were used and that "there is a very high level of uncertainty in the interpretation of AEM data" are not based on fact. More of these plots can be provided upon request to MCWD." (Page 4)

   HWG Response: *All such plots similar to AGF Figure 2 should have been entered into the EIR and CPUC record and made available for HWG, EIR Team, and public review at the time the AEM Report was submitted into the EIR and CPUC record. Our point about the uncertainty in the inverted AEM data interpretation is well illustrated on AGF Figure 2. In particular, as we note above, is the fact that several different borehole lithologies occur for a given AEM inverted resistivity color. While this is true of all three (or five if you count the shallow boreholes) boreholes, quick examination of the second borehole from the left side of the cross-section (borehole I.D.'s are illegible) illustrates this point well.*

3. AGF states their Figure 2 provides an, "…example of preliminary inversion results from 21 May 2017 showing use of the 318 boreholes…" (Page 4).

   HWG Response: *This statement raises further questions about whether or not the AEM data interpretation is still preliminary as of February 2019. The HWG notes that the profile in* ***Figure 2*** *shows 5 boreholes, of which two are very shallow and of little use. Furthermore, this particular AEM profile line appears to be the longest one in the survey and extends over a distance of approximately 60,000 feet (11 miles), an average of one borehole every 12,000 to 20,000 feet. None of the three boreholes shown (five including two very shallow boreholes) are near the potential project impact area. Furthermore, it is curious that MPWSP MW-1 is not shown on the profile that goes right through it and would represent the one potential true* *calibration point given it has detailed lithologic data logged by a geologist, borehole geophysical logs, and water quality data from three different depth intervals.*

4. **Figure 2** shows AEM inversion data for a depth in excess of 300 meters (about 1,000 feet) near the coast. (Page 5)

   HWG Response: *It is not clear why an AEM study with a stated depth of investigation of 50 meters near the coast (page 13 of Final AEM Report) is showing AEM imaging in excess of 300 meters along the coast.*

5. Stanford graduate student Ian Gottschalk acknowledged in his Final AEM study presentation in Marina (April 16, 2018) when questioned by a Board member that the AEM study was only calibrated to the seven MPWSP boreholes.

   HWG Response: It is not clear how public statements by Mr. Gottschalk are consistent with AGF claims of calibrating inverted AEM data to 318 boreholes.

F. Under Item 3 AGF makes several statements and attempts to provide additional analyses of inverted AEM data to justify previous comments about aquitard gaps (Pages 4 through 19).

1. AGF states, "The question brought up by HWG concerns what is the nature of the 180ft/400ft Aquitard in the vicinity of the MPWSP area of activity."

   HWG Response: *The majority of the AGF response here is devoted to a belated attempt to justify some of their previous comments. This analysis could have been and should have been presented with submittal of the AEM Report into the CPUC proceedings for HWG, CPUC EIR Team, and public review at that time. Thus, while it certainly doesn't constitute new information since the data was collected in May 2017 and the Final AEM Report issued in March 2018, the HWG offers some responses below to AGF's belated attempt to justify some of their previous comments.*

2. AGF notes that the chloride concentrations were calculated based on a study conducted in Florida (Page 4).

   HWG Response: *As already comment on in HWG's August 15, 2018 letter, it remains unclear how AGF and the AEM study team can justify use of a formula and conversion factors from a study conducted in a completely different hydrogeologic setting in Florida.*

3. AGF provides a series of figures (Figures 3 to 16) related to "AEM-to-chlorine concentration conversion". (Pages 6 to 19).

   HWG Response: *Several of these AGF figures are discussed in more detail below. However, it is apparent the profiles in these figures are uncalibrated to field data. In fact, the figures are not even calibrated to the readily available data from the MPWSP boreholes. See further discussion in items 3.F.6 through 3.F.8 below.*

4. AGF states, "…the reader must keep the nature of the basic geology in the area (Dune Sand material, 180 ft aquifer, 180 ft/400 ft aquifer) in mind when examining the 2D profiles of chloride concentrations." (Pages 6 to 7).

   HWG Response: *The discussion by AGF here is essentially saying that the reader must have a preconceived notion of the geology/stratigraphy in mind when viewing the AEM profiles of chloride concentrations because the AEM data does not provide lithology information due to interference from salinity variations.*

5. AGF states, "At a depth of 30 m in borehole MW-8, clay is shown to have a resistivity of 6-8 ohm-m…Resistivities of 6-8 ohm-m correspond to chloride concentrations of about 2,729 mg/L to about 1,813 mg/L per Fitterman and Prinos (2011)…" (Page 8).

   HWG Response: *There is no monitoring well screen in the referenced clay layer in MW-8, so there is no way to verify or validate the AGF estimated chloride concentration of 1,813 to 2,729 mg/L derived from the Florida equation and resistivities of 6-8 ohm-m. However, taken at face value, such a chloride concentration is indicative of a TDS concentration well in excess of 3,000 mg/L. The underlying coarse-grained zone comprising the 180-FT Aquifer has borehole resistivities ranging from about 1 to 20 ohm-m and associated measured chloride concentrations on the order of 10,000 mg/L (and TDS of about 21,000 mg/L) based on collected water quality samples. Without prior knowledge of the distribution of lithologies, the clay resistivity range of 6-8 ohm-m is fully encompassed within the coarse-grained material resistivity range of 1 to 20 ohm-m, indicating there would be no way to distinguish lithology from these AEM data away from a MPWSP boring/monitoring well with any reasonable confidence or certainty.*

6. With regard to **Figures 6 through 8** showing AEM flight lines along the coast through CEMEX property, AGF states, "The depth to top of the likely clay zone (tan-colored zone) on L200202 is about 120 m…, for L200301 the depth is about -135 m…, and for L200501 the depth is about 119 m…" (Page 8).

HWG Response: *The Final AEM Report (page 13) states that the DOI near the coast is limited to no more than 50 meters, which is considerably shallower than the depth of imaging discussed by AGF in this comment.*

7. Following up on the sentence above, in reference to AEM flight lines shown in **Figures 6, 7, and 8** (about 800 to 1,800 feet inland from coast) AGF states, "These depths suggest that the saltwater intrusion is contained in the Dune Sand Aquifer, the 180 ft Aquifer, and part of the 180 ft/400 ft Aquitard, but not down into the 400 ft Aquifer." A subsequent paragraph states in reference to the AEM flight line in Figure 10 (about 4,000 feet inland), "…it appears that the high chloride concentration zones have moved deeper, and interpreted to be very likely into the 400 ft aquifer." AGF then states in a following paragraph that the Figure 11 AEM flight line (about 5,000 feet inland), "…is interpreted as being very apparent that the high chloride concentration materials are now within the 400 ft Aquifer." AGF concludes by saying based on the above interpretation of inverted AEM data that, "…there is a gap in the 180 ft/400 ft Aquitard just east of the MPWSP activity area. " (i.e., about 4,000 to 5,000 feet inland) (Page 8).

HWG Response: *The aquitard gap analysis by AGF summarized above is entirely predicated on not having seawater intrusion in the 400 foot aquifer extending perpendicular from the coast to a point between approximately 4,000 to 5,000 feet inland, where seawater intrusion into the 400-Foot Aquifer suddenly begins in the 400-Foot Aquifer (i.e., high chloride concentrations are not present from coast to about 4,000 to 5,000 feet inland). MPWSP monitoring wells MW-1D and MW-3D are screened in the upper 50 feet of the 400-Ft Aquifer (approximately 300 and 1,000 feet from the coast) and have TDS concentrations of 30,700 to 31,800 mg/L (and 16,600 to 16,900 mg/L chloride). MPWSP monitoring wells MW-4D and MW-7D are screened in the upper 50 feet of the 400-Ft Aquifer (approximately 2,500 and 5,800 feet from the coast) and have TDS concentrations of about 29,000 (15,000 mg/L chloride) and 27,700 mg/L (13,700 mg/L chloride), respectively (**Table 2**). These field and lab determined salinity data show the upper 50 feet of the 400-FT Aquifer is heavily intruded at least from the coast to MW-7, and likely well beyond. This field/lab data is in direct contrast to the inverted and interpreted AEM data depicted and discussed by AGF on pages 8 through 19. While AGF describes saltwater intrusion not being present in the 400-Ft Aquifer between the coast and a point well inland of the CEMEX property, field water quality data shows close to seawater concentrations of TDS and chloride in the very same area that AGF claims AEM data shows not be intruded by seawater (see attached **Figure 1**). Because lithology cannot be determined using the inverted AEM data due to salinity variation, the claim of an aquitard gap here is solely based on interpreted water quality being low salinity near the coast in the 400-Ft Aquifer and suddenly showing high salinity* *water only at a point well inland of the CEMEX property. Thus, the entire discussion on pages 8-19 using Figures 6 to 16 is clearly invalid and wrong. It also demonstrates that even the limited borehole data with lithologic/geophysical logs and water quality data (i.e., the MPWSP boreholes/monitoring wells) that were available for use by AGF were not used to constrain/calibrate their inverted AEM data interpretations.*

8. AGF states with regard to its Figure 11, "The depth to the 1,000-3,000 mg/L [chloride] material is about 218 m (715 ft) and there are clearly two different zones of high concentrations with a clay zone in between just north of the MPWSP activity area. In fact, what is clear from L2012201 in Figure 11 is that there is indeed no aquitard material in line with the MPWSP activity area; i.e., there is a gap in the 180 ft/400 ft Aquitard just east of the MPWSP activity area." (Page 8).

HWG Response*: Figure 11 and the other associated figures described in item 3.F.7 are clearly inaccurate. This is demonstrated by review of available MPWSP monitoring well data in this area as summarized in the attached* ***Table 2****. These data show chloride concentrations ranging from approximately 17,000 mg/L at the coast to 14,000 mg/L about 6,000 feet inland within the upper portion of the 400-Ft Aquifer. These actual field/lab measured values far exceed the estimated chloride concentrations by AGF, which appear to range from about 3,000-5,000 mg/L near the coast (where actual values are about 17,000 mg/L) to about 7,000-10,000 mg/L at distances of 4,000 to 5,000 feet inland (where actual values are about 14,000 mg/L) of the coast. In the color-coding scheme used by AGF, the actual field-measured chloride values for AGF Figures 6 through 11 all fall well within the dark brown color band range (chloride 10,000 to 19,000 mg/L), yet all of these AGF figures show the 400-ft Aquifer within the much lower chloride concentration yellow color band with an AEM estimated chloride concentration of 3,000 to 10,000 mg/L. Clearly, actual field-based chloride data were not used to calibrate or constrain AGF's analysis of AEM data, not even from the seven boreholes that are otherwise claimed to have been used for calibration of inverted AEM resistivity values.*

G. Under Item 4 in response to HWG comments about AEM study authors and consultants (HGC, EKI, Jacobson James, AGF) defining fresh water as containing TDS up to 3,000 mg/L AGF states, "Nowhere within the Final AEM Report dated March 15, 2018 is there an equivalency made between TDS up to 3,000 mg/L and fresh water." (Page 20).

HWG Response: *First, we note that AGF acknowledges here that the AEM study conducted in Marina does not delineate fresh water. Second, we note that the terms fresh and fresh water are used throughout the Preliminary AEM Report, appearing no less than seven times on page 1 alone and approximately 40 times in the 15-page report* *overall. After HWG pointed out this incorrect, inaccurate, and misleading use of the terms fresh and fresh water, the Final AEM Report mostly switched to use of the term "source of drinking water", which is used throughout the report. As any hydrogeologist or non-hydrogeologist would associate a "source of drinking water" with fresh water, this is merely an attempt to mislead the reader into thinking the AEM study defines zones of fresh water without saying it directly as was done in the Preliminary AEM Report. Meanwhile, MCWD and consultants writing letters/TMs on behalf of MCWD/Marina to oppose the MPWSP continue to use the terms fresh, fresh water, and source of drinking water quite liberally to support their claims, including in reference to results of the AEM study.*

H. Under Item 5, AGF makes several comments, which largely repeat previous comments made by AGF, regarding HWG conversion of TDS to electrical conductivity (EC) and HWG translation of AEM resistivities to TDS (Pages 20 to 21).

HWG Response: *The HWG previously responded to and addressed comments repeated here by AGF in previous documents (HWG, January 4, 2018; HWG, August 15, 2018). However, some additional responses are provided below.*

1. AGF states that in, "…the Final AEM Report dated March 15, 2018, there are several discussions and presentations of data to support the correlation of measured/inverted resistivities to TDS and chloride concentrations." (Page 20).

   HWG Response: *The Final AEM Report states, "the Monterey County Water Resources Agency uses chloride concentrations to map saltwater intrusion in the Northern Salinas Valley, since high chloride concentrations are indicative of seawater." However, the Final AEM Report does not provide any attempt to correlate measured/inverted resistivities to chloride concentrations as claimed in this AGF comment. This is interesting in that interpretation of AEM data in the Final AEM Report itself and as used/referenced by other consultants is used to discredit seawater intrusion mapping done by MCWRA. Yet, they can't even compare AEM results to MCWRA mapping because the Final AEM Report only attempts to delineate TDS up to 3,000 mg/L (brackish water) and greater than 10,000 mg/L (saline water), while the MCWRA agency mapping is based on chloride concentrations. Furthermore, the chloride threshold of 500 mg/L used by MCWRA as being indicative of sea water intrusion, which is about 10 times greater than background levels in fresh water, does not correlate to a TDS level of 3,000 mg/L in the Marina area (500 mg/L chloride equates to a TDS concentration much lower than 3,000 mg/L in the Marina area). Thus, Final AEM Report maps showing MCWRA mapping of salt water intrusion (e.g., Figures 2, 23, 24, 25) overlaid by* *claimed pockets of fresh water (i.e., low TDS groundwater, source of drinking water) is inaccurate and misleading, not to mention it is an apples to oranges comparison.*

2. AGF refers to a previous comment they made about HWG use of Stanford preliminary AEM results presentation slide 22, where the color coded scale labeled log resistivity was changed to log resistivity of groundwater (Page 21).

   HWG Response*: The legend in Figure 3-10 labeled "Log Resistivity (ohm-m) of Groundwater" correlates to the groundwater resistivity/conductivity from water quality samples collected from the various wells screens for MW-1, MW-4, MW-6, and MW-7 depicted in the figure. The three screened intervals for each monitoring well in the figure are color-coded to correlate to the legend. The color-coding outside of the monitoring wells reflects bulk resistivity provided in the Stanford profile shown on Figure 3-9, and does not correlate to the legend. The main point being made here by HWG really has nothing to do with the labeling of the legend, as described in the following paragraph from the HWG Technical Report associated with Figure 3-10:*

   "An overlay of the geology on the Stanford profile showing the perched and regional water tables is provided in Figure 3-10. This overlay shows that the shallow, dark blue areas in the Marina uplands represent the unsaturated zone above the perched water table. Figure 3-10 also shows a seawater wedge in the 180-Foot Aquifer with lower salinity water in the shallow portion of the 180-Foot Aquifer inland of MW-7 underlain by high salinity water in the lower portion of the aquifer. The 400-Foot Aquifer is indicated to be seawater intruded throughout this profile. The observations and interpretations related to the Stanford profile described above are consistent with MPWSP monitoring well data and the hydrogeologic conceptual model developed by the HWG."

   AGF has ignored the main points being made by HWG here, and instead focused only on what they had thought was mislabeling of the legend (which in reality was just a misunderstanding on AGF's part of how HWG used the legend in Figure 3-10).

3. AGF tries to make a point about the HWG previously converting an electrical conductivity value of 100 uS/cm to a TDS value of 68 mg/L, stating no conversion formula was provided and that AGF did an online search showing conversions could range from 51 to 64 mg/L TDS. The comment also states AGF isn't clear if HWG was converting the bulk resistivity or groundwater resistivity. (Page 21).

   HWG Response: *Overall, whether the TDS value is 68 mg/L or slightly lower is not material to the HWG discussion being referenced in this comment by AGF. The conversion formula was based on initial comparison of lab TDS to conductivity values provided in the monthly monitoring reports, which accounted for temperature dependence, etc. Further description of the HWG evaluation of the relationship was* *provided in publicly available monthly monitoring reports since 2015 as described below:*

A plot of TDS:EC ratio versus EC has been provided in all of the weekly Monitoring reports since the first baseline report was issued in February/March 2015 until the test pumping ended in February 2018. The TDS:EC ratio plot has been provided in all monthly reports since test pumping was completed. The initial TDS:EC ratio versus EC plot was produced from the water quality data collected from zone testing in the exploratory boreholes. However, with on-going collection of samples from the monitoring well network and the test slant well, the plot was updated in November 2015 using data from 133 groundwater quality samples from the period February 2015 through November 2015. The slope of the line for the plot was y = 0.69x - 220.28. The plot was again updated using data from 323 groundwater quality samples collected from the monitoring network and test slant well from February 2015 through December 2017. The slope of the line for the plot was y = 0.69x - 297.73. As is apparent, the TDS:EC ratio versus EC plot results will vary slightly depending on the size of the "x" values. For an EC of 24,000 us/cm the calculated TDS will result in an EC:TDS ratio of about 0.68. For an EC of 5,000 us/cm the calculated TDS will result in an EC:TDs ratio of about 0.65. The use of either ratio value gives essentially the same TDS result for the purposes of the AEM results discussion provided in the HWG Technical Report.

4. AGF repeats a previous comment related to borehole MW-7 resistivities (Page 21).

   HWG Response: *AGF misunderstood the point being made by the HWG in the discussion of MW-7 on page 57 of the HWG Technical Report (November 2017). The point of the HWG discussion was to illustrate that the figure from Stanford's Preliminary AEM Results presentation (reproduced as Figure 3-9) in the HWG Report incorrectly applied the terms "fresh" and "saline" to the Log Resistivity scale in their profile. Stanford's labeling of the scale implied that resistivity shown in the profile represented groundwater resistivity/conductivity. The HWG was merely demonstrating that the Stanford resistivity scale does not correspond to water quality; hence, the use of the terms "fresh" and "saline" on the scale was misleading and inappropriate.*

I. Under Item 6, AGF revisits a previous comment made by HWG that noted the April 2018 AGF TM makes reference to use of a study from Florida to convert AEM bulk resistivity to groundwater conductivity (Pages 22 to 24).

1. AGF states, "Absolutely nowhere in the AGF Tech Memo of 16 April 2018, let alone on page 15, is it stated that the analysis of the water quality in the Final AEM Report by Stanford 'relied on data from Florida'." (Page 22).

   HWG Response: *AGF devotes two full pages (pages 15 and 16) in their April 2018 TM to discussion of utilizing data from Florida to show how they made a conversion of bulk resistivity to groundwater conductivity for the Marina area AEM study. They do this despite stating, "We recognize that there will be a difference in the character of the electrical conductivity of the saline water in southern Florida and in the Monterey Bay." AGF also state, "To get an a more accurate analysis we would compile local borehole water sampling results…and compare with the bulk AEM resistivity." So essentially, after the Final AEM Report was published in March 2018, the coauthors state they could have done a more accurate analysis if only they had calibrated to local borehole data instead of data from Florida to convert bulk resistivity to groundwater conductivity.*

2. AGF states, "…the Final AEM report documents which data was used for the conversions applied in the report including borehole water quality and geophysical logs from Seaside Basin Water Master Sentinel and MPWSP wells." (Page 22).

   HWG Response: *It is important to note a few key aspects of Final AEM Report use of data from the four Seaside Basin Water Master (SBWM) Sentinel wells: 1) the seaside wells are located about five miles south of the MPWSP project area; 2) hydrogeologic conditions in the Seaside Basin and zones screened in the Seaside Sentinel wells are substantially different from the 180/400 groundwater subbasin where proposed MPWSP wells are located; in fact, there is an entirely separate groundwater basin (Monterey Subbasin) located in between the subbasin where MPWSP wells are located and the subbasin (Seaside) where the Seaside Sentinel wells are located; 3) The shallowest screens in the SBWM Sentinel wells are at depths of 1,100 feet in the northern most well and 800 feet in the southern most well; thus, they are screened at much greater depths and in different geologic formations than the MPWSP wells; 4) the water quality data from SBWM Sentinel wells reflects cross-flow between screen intervals; these wells were really more designed for use as induction log conduits; 5) an AEM survey was not conducted in the Seaside Subbasin; thus, the correlation of resistivities to freshwater and saltwater is not based on AEM data; and 6) the SBWM Sentinel wells have no water quality data from shallower zones and thus no such data for calibration in the Marina area AEM study.*

3. Regarding use of data from Florida, AGF goes on to state, "The reason for AGF using the Florida data is that the water quality data local to the AEM investigation area was not available to work with." (Page 22).

   HWG Response: *This is a curious statement by AGF given that, at a minimum, detailed water quality data (along with borehole lithologic and geophysical logs) were available for AGF's use from the 24 MPWSP monitoring wells and was made publicly available long before the Final AEM Report was completed.*

4. AGF states, "Usually, in order to make the conversion from bulk resistivity to groundwater resistivity/conductivity, a comparison table and regression analysis is carefully developed consisting of sampled groundwater conductivities and TDS's and AEM resistivities at the same locations and depths, if possible. In order to make a reasonable approximation, a search and examination of the published literature for a similar analysis at a similar site resulted in finding a USGS Open-File Report…describing salt water intruding into the Everglades in southern Florida." (Page 22).

   HWG Response: *The hydrogeology in the southern Florida Everglades couldn't be more different than the hydrogeology in the Marina area. Description of the Florida Everglades as a "similar site" is very inaccurate and misleading. As described above, given that the required data (i.e., "groundwater conductivities and TDS's and AEM resistivities") were available from 24 MPWSP monitoring wells (at a minimum), it is unclear why resorting to a study for an entirely different hydrogeologic environment 3,000 miles away was necessary. Regardless of how AEM study coauthors used or didn't use the Florida equation in the Final AEM Report, the bottom line is that AGF's usual methodology of developing a regression analysis using local data apparently wasn't done and is not presented in the Final AEM Report.*

5. With regard to the Marina AEM study, AGF Item 6.4 states they were, "…using the Florida conversion relationship between the AEM data and the groundwater conductivity because we don't yet have the local relation for the Marina area….", and "…the Marina AEM resistivity to groundwater resistivity relationship hasn't been defined…" (Pages 23 and 24).

   HWG Response: *These statements by AGF just reinforce our responses above that as of the date of the current AGF TM (February 8, 2019), they have no "local relation for the Marina area" to convert bulk resistivity to TDS. Furthermore, the comparison of applying the Florida formula to one data point in MPWSP MW-7 is far from adequate to justify use of the Florida formula in the Marina area.*

J. Under Item 7, AGF takes issue with a couple previous HWG statements (Page 25).

1. AGF states that a previous HWG statement regarding "…technical issues and flaws in the AEM study" is lacking in "specifics that can be responded to".

   HWG Response: *This is a peculiar statement by AGF given that our specific comments regarding AEM study technical issues and flaws are described in great detail in multiple documents to which AGF has generated multiple documents trying to respond to HWG comments on the AEM study. Please refer to the Detailed Comments section of our August 15, 2018 letter for specifics.*

2. AGF misinterprets the HWG statement, "it is clear that within the sea water intruded areas of the aquifers mapped by MCWRA, pumping of a new or existing production well within this area will immediately or quickly produce water with elevated salinity that is unfit for human consumption or agricultural irrigation" by stating the following, "This can only be interpreted as saying that pumping 'within the sea water intruded areas of the aquifers mapped by MCWRA' will be acquiring fresher water that is originally not high in salinity and that will then 'immediately or quickly' become more saline." (Page 25).

   HWG Response: *Pumping a well that immediately produces high salinity water unfit for human consumption in no way implies it initially produces fresh water.*

K. AGF's main point under their Item 8 is that the Final AEM Report uses the word "potential" in front of the term "drinking water" in the text of the Final AEM Report (Page 25).

HWG Response: *On pages 56-57 of the Final AEM Report, the authors refer to "drinking water" and "sources of drinking water" without prefacing the word/term with "potential" on 24 occasions. Furthermore, many figures in the Final AEM Report are titled "Source of Drinking Water" with no use of the word "Potential" (e.g., Figure 22, Figure 23, Figure 24, Figure 25). Regardless, the term "potential drinking water" is actually meaningless, because one can say that any non-potable water (which the identified waters are) is a potential source of drinking water, even sea water; it is only a matter of how much treatment is required (e.g., desalination).*

L. Under Item 9, AGF states that if the HWG does not respond to a given point made by AGF in their TMs, it must mean HWG agrees with AGF's point (Page 26).

HWG Response: *With all the voluminous pages of insufficiently supported and inaccurate conclusions and statements made by consultants working for MCWD and Marina, it is not the responsibility of the HWG to respond to and counter each and every incorrect/unsupported statement made by those consultants. If this were the case, it* *would be nearly impossible for the HWG to publish any response documents in a sufficiently timely manner. Furthermore, if the same logic were applied in reverse, there are many more unanswered points/comments/responses made by HWG to MCWD/Marina consultant documents. In no way does a lack of HWG response automatically imply agreement with a given statement made by MCWD/Marina consultants.*

Responses to Selected Meeting Transcript Statements

4. Planning Commission Meeting on February 14, 2019

A. On page 63 of the meeting transcript the EKI states, "…this is data from the AEM study…The blue here is the area of freshwater within the dune sand aquifer as well as the 180-foot aquifer that was mapped by the AEM study."

HWG Response: *This is another example of AEM study results being misrepresented as fresh water, whereas the AEM study only attempted to define areas of brackish water with TDS up to 3,000 mg/L. In fact, MCWD consultants are at odds with each other on this point as AGF states (page 20 of their April 11, 2018 Memo), "Nowhere within the Final AEM Report dated March 15, 2018 is there an equivalency made between TDS up to 3,000 mg/L and fresh water."*

B. On pages 64-65 of the meeting transcript EKI states, "You have the water that infiltrates into what's known as the A aquifer at Fort Ord. It's the same as the dune aquifer – the dune sand aquifer."

HWG Response: *This is an example of EKI's use of misleading terminology. The "A" Aquifer at Fort Ord is not equivalent to the Dune Sand Aquifer in the MPWSP vicinity. As described in detail in the HWG Technical Report, the "A" Aquifer at Fort Ord is a part of the perched/mounded aquifer in the MPWSP vicinity (which is hydraulically disconnected from the DSA located oceanward of the perched/mounded aquifer).*

C. On page 66 of the meeting transcript EKI states, "So you can see that there's a much larger impact once the gradient flattens and/or reverses."

HWG Response: *In trying to correlate this statement with EKI's presentation, it appears that EKI is referring to slide 8 of 18, which shows hypothetical capture zones under a landward gradient (top right of slide) and a seaward gradient (bottom right of slide). The hypothetical landward gradient figure on the top right is generally correct. However, the hypothetical seaward gradient figure on the bottom right is very inaccurate and misleading because it completely ignores the ocean recharge boundary. It also appears that slide 9 of 18 was referred to in EKI's statement above, which shows figures from Hydrometrics TM for a landward gradient (top right) and seaward gradient* *(bottom right). What is important to note here are the following points: a) these figures are for vertical intake wells located several hundred feet inland of the shoreline; b) the flow paths sourced from the ocean (which represent the potential project impact relative to increasing existing brackish water TDS concentrations) extend inland approximately the same distance for both a landward and seaward gradient. Therefore, the potential impact area is not "much larger" as claimed by EKI when considering the source of potential impacts is ocean-sourced flow paths to the proposed MPWSP slant wells (i.e., the potential impact area is not the entire capture zone under flat/reversed gradients).*

D. On page 67 of the meeting transcript EKI states the following in reference to a cumulative departure rainfall graph, "This is the data from – starting about 1980 at the CEMEX station…the Cal-Am study happened at the very bottom of that dry period."

HWG Response: *While we address the broader misrepresentation of rainfall data from 2015 to 2018 elsewhere in our detailed comments above (Item 1.F), we add the following comments to this discussion by EKI at the meeting: a) there is no CEMEX rainfall station, so we assume EKI is referring here to the same Salinas Airport station mentioned elsewhere in MCWD consultant letters/TMs; b) EKI's graph shows the bottom of the recent drought occurred in 2013, which does not correspond to the period of test slant well (TSW) operation and MPWSP monitoring well (MW) data collection; c) the period of TSW operation and MW data collection from 2015 to 2018 is indicated to be a wet period (as evidence by upward trend in cumulative departure line) even for the climate station EKI relies on to misrepresent rainfall over this period along the coast (as explained above in item 1.F).*

E. On pages 72-73, AGF states, "Here's some comments on your work by HWG, and what's going on? And I went through their EIR very carefully, and I found a lot of inconsistencies and comments without specifics."

HWG Response: *It is unclear to what document AGF is referring since AGF does not specify the document being discussed. Therefore, HWG are unable to provide a response to this particular comment referring to work by HWG.*

F. On page 74 AGF states, "We try to give you a good story to try to understand what is going on in a given area. So it's many more wells than this seven."

HWG Response: *After the above statement, AGF goes on to describe how they used two of the seven MPWSP boreholes in their AEM study. There is no description of how any other wells were used (beyond the seven MPWSP boreholes) except to show a few lithologic logs plotted on an AEM resistivity profile (for which there is no apparent correlation or calibration of AEM data to the lithology shown). While looking at AEM* *data alone may seemingly tell a good story, it is important that the story supplement and reflect the reality of borehole lithology, borehole geophysics, and borehole water quality (as opposed to being at odds with borehole data).*

G. On page 75 of the meeting transcript, AGF refers to a short interval on the well log for MPWSP MW-7 located between two screened zones and states, “If I was a farmer, and I wanted to find freshwater, this is where I’m going to go.”

HWG Response: *As noted elsewhere, the water quality of this zone is speculation on the part of AGF because there is no water quality data to verify or validate TDS concentrations. However, a more important point to be made here is that water flowing to a well screening a portion of an aquifer flows both laterally and vertically to the well screen. A local example of this is documented for MCWD Well No. 5, which initially showed groundwater in the well with electrical conductivity of about 500 uS/cm that subsequently increased to over 13,000 uS/cm within just a few hours of pumping (Staal, Gardner and Dunne, 1991). We do know that the water quality immediately above and below the referenced depth interval has non-potable TDS concentrations, and we know pumping of a well screened only in the referenced depth interval will quickly draw in saline water from above and/or below to become unusable even if we accepted the speculative and hypothetical premise of this zone initially containing TDS concentrations below 1,000 mg/L. Finally, the most important point to be made here is that if it were indeed a viable fresh water zone as claimed by AGF, the farmer he refers to is smart enough to find it and utilize it (and to the best of our knowledge, local farmers are pumping only from the Deep Aquifer in the zone of sea water intrusion that encompasses MPWSP MW-7).*

H. On page 76, AGF goes through a lengthy explanation of how they normally would compile local groundwater quality data to compare with AEM data, and develop a regression relationship between formation resistivity and water resistivity. After the above description of what they would normally do, AGF then explains (at bottom of page 76/top of page 77) that they actually used data and formulas from Florida.

HWG Response: *After the above lengthy explanation, AGF stated that HWG said you can’t use Florida data/formulas for the coast of California. AGF’s response to HWG was, “And I’m saying, well, maybe that’s true.” Regardless of the subsequent attempt to justify their use of the Florida data/formula by applying the Florida equation to one data point (which is obviously nowhere near adequate to justify use of the Florida formula along Monterey Bay), AGF has already made HWG’s main point here regarding the uncertainty of this particular analysis.*

I. On pages 78-79, AGF is essentially summarizing data presented in pages 4 through 19 of their TM regarding a claimed gap in the 180/400-Foot Aquitard about 5,000 feet inland of the coast (this is addressed above in detailed comments Items 1.J.2 and 3.F.6 through 3.F.8, and shown to be an invalid interpretation). In referring to the CPUC EIR Team not using AGF's interpretation of an aquitard gap at this location, AGF states, "And data that doesn't match their agenda was somehow not used, not available."

HWG Response: *Here again, as was the case with HGC trying to impugn the integrity of Mr. Feeney and Mr. Durbin, it appears AGF is trying to do the same thing with the CPUC EIR Team. We would refer to reader to the response to HGC on this topic in detailed comments item 1.E.2.*

J. On page 80, AGF makes reference to the peer review of the 2015 DEIR groundwater model performed by Lawrence Berkeley National Lab (LBNL), and implies that LBNL comments were not addressed.

HWG Response: *The implication here is incorrect; the CPUC EIR Team independent groundwater modelers (HydroFocus) made modifications to the model based on LBNL and their own peer review. These modifications are incorporated in the FEIR.*

K. On page 83 of the meeting transcript, HGC paraphrases an HWG comment regarding hydraulic gradients as follows, "Why are you just looking at the end data? Why don't you compare it with the data in the middle? Well, the well is pumping. We don't have static conditions, so you can't see what the actual gradient is. It's one that is induced by the pumping well."

HWG Response: *HGC neglects to mention that the test slant well was not pumping between early June and late October of 2015 and between early March and early May of 2016. Due to TSW pumping water level impacts being limited to wells MW-1S/M and MW-3S/M and the quick recovery of water levels upon turning the pump off due to the adjacent ocean recharge boundary, static water level conditions existed for essentially the entire time the TSW pump was off, thereby allowing plenty of time for late Spring to Fall 2015 and late Winter to Spring 2016 static groundwater level data collection.*

L. On pages 92-95 of the meeting transcript, there is a question and answer sequence between a Commissioner and AGF (Mr. Asch). The Commissioner is referring to the LBNL peer review and asking Mr. Asch (who is a California geophysicist (GP), but not a California PG/CHG or groundwater modeler) about LBNL's review of the 2015 DEIR groundwater model. The Q&A appears to question the thoroughness of the LBNL peer review, and centers around the distinction between LBNL peer reviewing the model just to see if they get the same results using the same inputs as the consultants who created the model vs. also evaluating the model inputs themselves. The implication of the Q&A from both parties is that LBNL only peer reviewed the model to confirm that when they run the model with the same model inputs used by the consultants they get the same results.

HWG Response: *HWG review of the LBNL peer review report notes at the top of page 22 of the LBNL peer review report they state, "Having reported on our groundwater modeling review above, we turn now to a review of the conceptual model of the hydrostratigraphic units in the vicinity of the CEMEX site." LBNL then proceeds to document their review of the hydrogeologic conceptual model for the MPWSP vicinity used as model input on pages 22 through 28. Thus, Mr. Asch did not correctly answer the Commissioner's questions regarding the completeness of the LBNL review. The HWG also notes that LBNL peer review comments were addressed in the revised and updated groundwater model developed by independent CPUC EIR Team hydrogeologists (HydroFocus). In a public meeting held in Carmel on September 1, 2016, LBNL presented results of their peer review and HydroFocus described how they were incorporating and addressing LBNL peer review comments in the EIR.*

M. On pages 134 to 137, a MCWD Board member (speaking as a private citizen) refers to researchers and Ph.Ds as not having an agenda and, "just trying to get the science right." He then goes on to say with regard to researchers/Ph.D.s, "I'd be really upset if my science was called into question…"

HWG Response: *Again, the implication here seems to be that the CPUC EIR Team and/or the HWG have a particular "agenda" behind their science, which appear to be further attempts to impugn the integrity of the HWG and others. Furthermore, the speaker basically states that if you are a researcher and/or have a Ph.D., your science should not be subjected to peer review and/or criticism by others (or at least others who are not researchers and/or Ph.D.s). There are many points that HWG could make here, but many of them are documented in other reports/letters prepared by HWG. Thus, we limit our comments here to the following: 1) the Marina area AEM study was conducted by a team of MCWD consultants along with Stanford, and MCWD consultants have acknowledged doing the bulk of the work; 2) in the HWG's opinion, the AEM study has been used (primarily by MCWD consultants) to discredit the HWG, Monterey County Water Resources Agency, and the CPUC EIR Team based on flawed and/or inaccurate interpretations of the inverted AEM data; 3) because of these two points above, it is well within the rights of the HWG and the expectations of fellow scientists that the HWG would comment on the uncertainties and inaccuracies of the inverted AEM data hydrogeologic interpretations presented in the Final AEM Report and especially as* *further expounded upon by the MCWD GM and MCWD consultants. We would further note that two members of the HWG hold Ph.D.s, Dennis Williams and Barry Keller. Dr. Keller has a Ph.D. in geophysics. Dr. Williams has served as Research Professor and Instructor for the University of Southern California and was a primary author for the well-known hydrogeology textbook "Handbook of Groundwater Development". In addition, Mr. Durbin worked for the United States Geological Survey (USGS) for several years conducting groundwater research resulting in many USGS publications. The only "agenda" the HWG has is to get the science right for the MPWSP.*

N. Meeting transcript statements not responded to above by HWG.

HWG Response: *Just to be clear, the fact that HWG has responded above only to selected statements made at the public hearing (and has not commented on the majority of the statements made by various speakers) should not be inferred by others in any way to mean that HWG agrees with those statements/comments.*

Sincerely,

The Hydrogeologic Working Group (Dennis Williams, Tim Durbin, Martin Feeney, Peter Leffler)

Dennis Williams

Tim Durbin

Martin Feeney

Peter Leffler

Attachments:

Table 1	Monterey Bay Precipitation Station Summary
Table 2	Summary of MPWSP Monitoring Well Chloride and TDS Concentrations Relative to AGF Chloride Profile Figures
Figure 1	Comparison of AEM Profile with Field/Lab Based Chloride Concentrations
Figure 2	Annual Precipitation and Cumulative Departure from Mean Annual Precipitation in Marina, CA (1961-2018)

REFERENCES

Aqua Geo Frameworks (AGF), *Response to Comments on Aqua Geo Frameworks (AGF) Technical Memo to MCWD dated April 16, 2018 in HWG Comments on Technical Appendices/Attachments to Letters Submitted by MCWD and City of Marina to the CPUC and MBNMS on April 19, 2018, Dated August 15, 2018*, February 11, 2019.

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EKI Environment & Water, *Inadequate Assessment of Potential Groundwater Impacts, Monterey Peninsula Water Supply Project, Marina Coast Water District, California (EKI B60094.09*), February 13, 2019.

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The Hydrogeologic Working Group (HWG), *HWG Hydrogeologic Investigation Technical Report*, November 6, 2017.

HWG, *Memorandum Responding to Comments on HWG Hydrogeologic Investigation Technical Report*, January 4, 2018.

HWG, *HWG Comments on Technical Appendices/Attachments to Letters Submitted by MCWD and City of Marina to the CPUC and MBNMS on April 19, 2018, Letter to John Forsythe/CPUC and Paul Michel/MBNMS*, August 15, 2018.

HWG, *HWG Comments on Technical Presentations and Letters/Memorandum Prepared by HGC, EKI, and MCWD for City of Marina Public Workshop on MPWSP Coastal Development Permit Held on January 8, 2019*, January 25, 2019.

HWG, *HWG Responses to Dr. Knight Letter Addressed to HWG and Submitted During City of Marina Planning Commission Hearing on MPWSP Coastal Development Permit Held on February 14, 2019*, March 6, 2019.

Staal, Gardner, and Dunne, *Ground Water Quality Assessment – District Well No. 5*, Letter Report prepared for Marina County Water District, 1991.

LIST OF ACRONYMS & ABBREVIATIONS

AEM	Aerial Electromagnetics
AGF	Aqua Geo Frameworks
bgs	below ground surface
Cal Am or CalAm	California American Water Company
CPUC	California Public Utilities Commission
DSA	Dune Sand Aquifer
DEIR	Draft Environmental Impact Report
DOI	depth of investigation
EC	Electrical Conductivity
EIR	Environmental Impact Report
EIR/EIS	Final Environmental Impact Report/Environmental Impact Statement
FEIR	Final Environmental Impact Report
FO-SVA	Ford Ord Salinas Valley Aquitard
GM	General Manager
GSP	Groundwater Sustainability Plan
HCM	Hydrogeologic Conceptual Model
HGC	Hopkins Groundwater Consultants
HWG	Hydrologic Working Group
LBNC	Lawrence Berkeley National Lab
MCWD	Marina Coast Water District
MCWRA	Monterey County Water Resources Agency
mg/L	Milligrams per Liter

LIST OF ACRONYMS & ABBREVIATIONS (CONT.)

MPWSP	Monterey Peninsula Water Supply Project
MW	Monitoring Well
RMM	Remy Moose Manley
SBWM	Seaside Basin Water Master
SGMA	Sustainable Groundwater Management Act
TDS	Total Dissolved Solids
TM	Technical Memorandum
TSW	test slant well
USGS	United States Geological Survey
180-FTE Aquifer	180-Foot Equivalent Aquifer

Tables

Table 1: Monterey Bay Precipitation Station Summary

Precipitation Station	Water Year Percent of Normal					Combined Water Years Percent of Normal		
	2015	2016	2017	2018	2019[a]	2015/2016	2017/18	2015-2018
Santa Cruz	75	111	174	67	111	93	120	107
Watsonville	84	125	185	69	119	105	127	116
Marina	87	131	162	79	NA	109	121	115
Monterey	81	109	NA	80	131	95	NA	NA
Carmel	89	133	138	75	187	111	107	109
Average	83	122	166	74	137	103	119	112

Salinas Precipitation Stations

WRCC Salinas	87	121	138	72	NA	104	105	105
HGC/EKI Salinas	77	104	128	55	NA	91	92	91
HGC/EKI Percent Difference Compared to Average	-7	-15	-23	-26	NA	-11	-23	-19

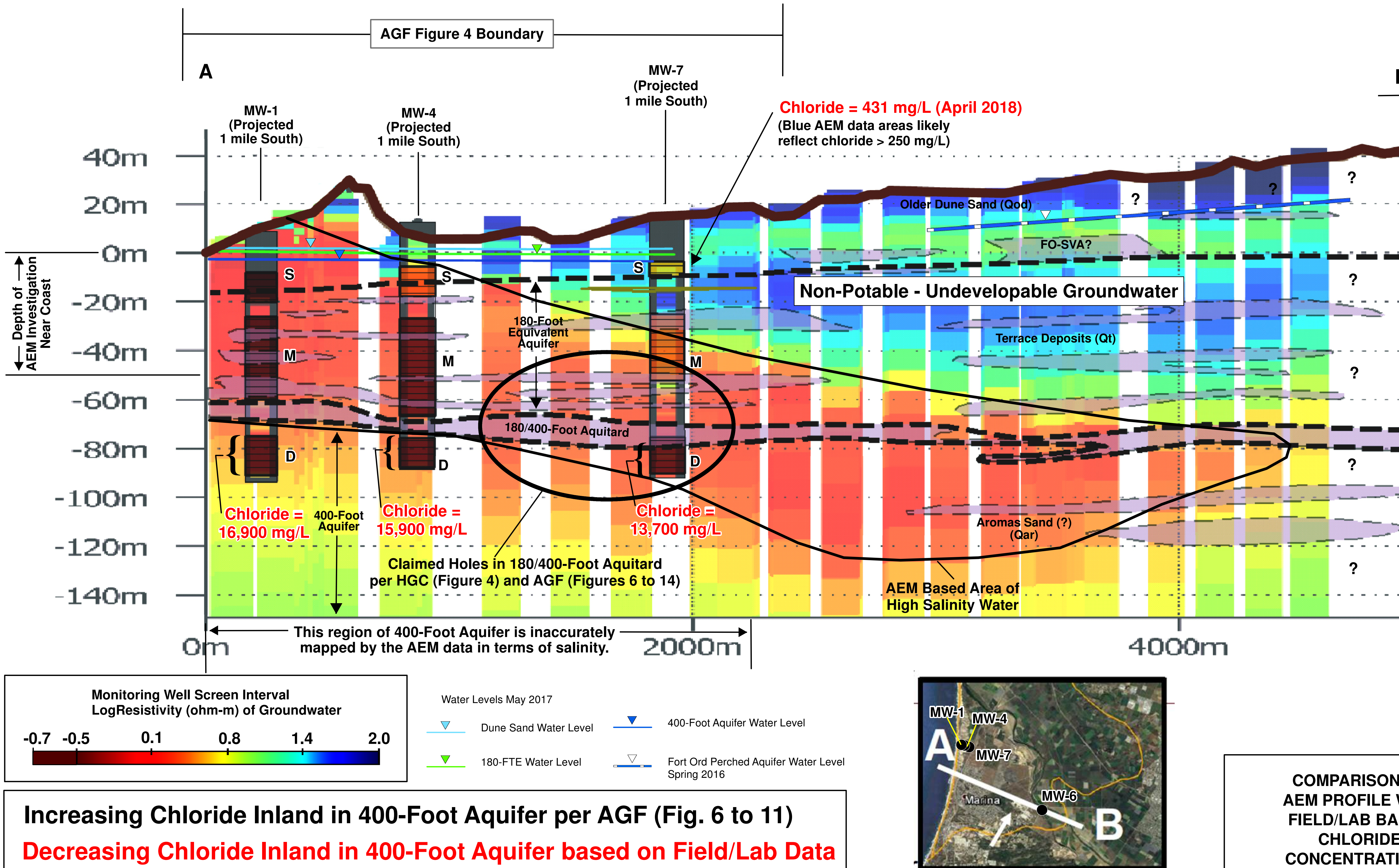
Notes:

a: Through End of February 2019.

Table 2: Summary of MPWSP Monitoring Well Chloride and TDS Values Relative to AGF Chloride Profile Figures

MPWSP MW ID/AGF Figure No.	Distance Inland (feet)	400-Ft Aquifer Chloride/TDS (mg/L)	AGF TM/AEM Study Interpretation	HWG Comments
MW-1D	300	16,900/30,700	"…salt water intrusion is…not down into the 400 ft Aquifer."	Available MPWSP data from MW-1D and MW-3D show nearly complete seawater intrusion in 400-Ft Aquifer at coast.
NA/Figure 6	800	NA		
MW-3D	1,000	16,600/31,800		
NA/Figure 8	1,800	NA		
MW-4D	2,500	14,967/28,833		Available MPWSP from MW-4D located closer to ocean than this AGF profile line show very high chloride levels and heavy seawater intrusion in 400-Ft Aquifer.
NA/Figure 9	3,000	NA	High chloride concentration water is in the 180/400 ft Aquitard but has not reached the 400 ft Aquifer.	
NA/Figure 10	4,000	NA	"…high chloride concentration zones have moved deeper, …very likely into the 400 ft aquifer."	
NA/Figure 11	5,000	NA	"…very apparent that high chloride concentration materials are now within the 400 ft aquifer."	Available data from MW-7D show very high chloride concentrations in 400-Ft Aquifer, but lower than MPWSP monitoring wells closer to ocean.
MW-7D	5,800	13,700/27,700		

Figures



COMPARISON OF AEM PROFILE WITH FIELD/LAB BASED CHLORIDE CONCENTRATIONS

FIGURE 1

W:\GIS_proj\mcwsp_cal_am\HWG_Summary_Rpt\3_Fig_1_Stanford_plot_with_geology_3-20-19.mxd

19-Mar-19

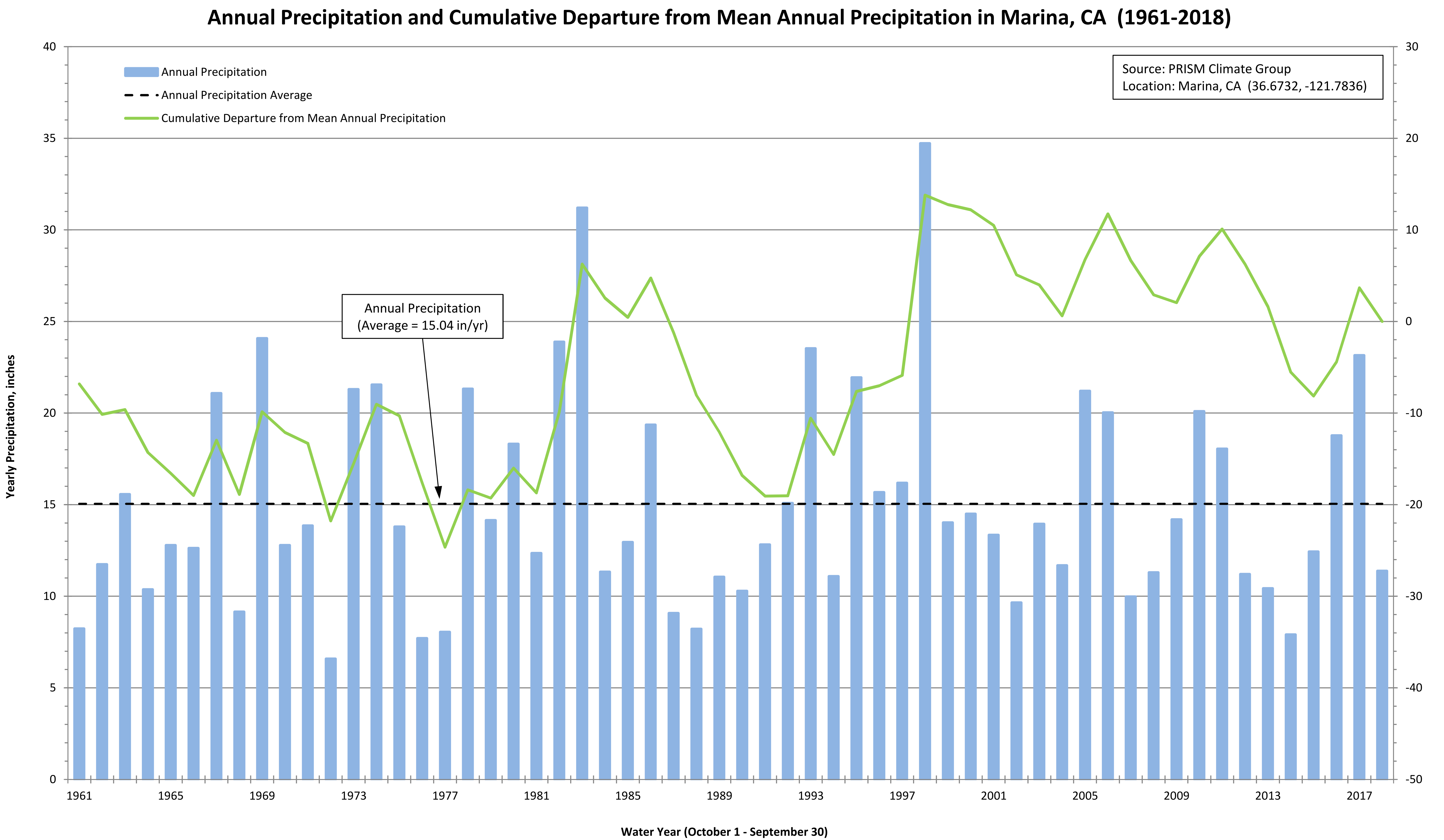

Annual Precipitation and Cumulative Departure from Mean Annual Precipitation in Marina, CA (1961-2018)
Annual Precipitation
Annual Precipitation Average
Cumulative Departure from Mean Annual Precipitation
Source: PRISM Climate Group
Location: Marina, CA (36.6732, -121.7836)
Annual Precipitation
(Average = 15.04 in/yr)
Yearly Precipitation, inches
Cumulative Departure from Mean Annual Precipitation, inches
Water Year (October 1 - September 30)
40
35
30
25
20
15
10
5
0
30
20
10
0
-10
-20
-30
-40
-50
1961
1965
1969
1973
1977
1981
1985
1989
1993
1997
2001
2005
2009
2013
2017

FIGURE 2