Technical Memorandum October 8, 2016

To: John H. Farrow, M.R. Wolfe Associates, P.C., Attorneys-at-Law

From: Timothy K. Parker, PG, CEG, CHG, Parker Groundwater

Subject: Technical Review of Draft Subsequent Environmental Impact Report for the Monterey Downs and Monterey Horse Park and Central Coast Veterans Cemetery Specific Plan (DSEIR) and the Final Subsequent Environmental Impact Report for the Monterey Downs and Monterey Horse Park and Central Coast Veterans Cemetery Specific Plan (DSEIR)

At your request, I have reviewed the Draft Subsequent Environmental Impact Report for the Monterey Downs and Monterey Horse Park and Central Coast Veterans Cemetery and the Final Subsequent Environmental Impact Report for the Monterey Downs and Monterey Horse Park and Central Coast Veterans Cemetery Specific Plan (FSEIR) together with the documents cited in the discussion below. My conclusions are set out below.

I am a California Professional Geologist (License #5584), Certified Engineering Geologist (License # EG 1926), and Certified Hydrogeologist (License #HG 12), with over 25 years of geologic and hydrologic professional experience. I serve as a member of the Technical Advisory Committee to the Monterey County Water Resources Agency in connection with its ongoing study of the Salinas Valley Groundwater Basin that is mandated by Policy PS 3.1 of the 2010 Monterey County General Plan. The purpose of that study is to evaluate historic data and trends in seawater intrusion and groundwater levels in the Salinas Valley Groundwater Basin, to evaluate the likely future groundwater demand, to determine whether groundwater level declines and seawater intrusion are likely to continue through 2030, and to make recommendations for action. This study has not been concluded, but a preliminary report was released in January 2015 by the prime consultant for the PS-3.1 study.[1] My Resume and Project Experience are attached.

A. Cumulative pumping in the Salinas Valley Groundwater Basin (SVGB) and its Pressure Subarea has resulted in aquifer depletion and associated seawater intrusion, and current groundwater management efforts are not sufficient to avoid this significant cumulative impact.

1. Overdraft and seawater intrusion in the Salinas Valley Groundwater Basin

The project will obtain its water supply from wells in the 180/400-Foot Aquifer Subbasin ("180/400-Foot Aquifer" or "Pressure Subarea") at the northwest end of the Salinas Valley

---

[1] MCWRA, State of the Salinas River Groundwater Basin, January, 2015, available at http://www.mcwra.co.monterey.ca.us/hydrogeologic_reports/documents/State_of_the_SRGBasin_Jan16_2015.pdf.

Groundwater Basin. DSEIR p. 4.19-2 to 4.19-3. The Pressure Subarea is one of the eight subbasins making up the Salinas Valley Groundwater Basin (SVGB).[2] Overdraft in the Pressure Subarea has averaged about 2,000 acre-fee per year ("afy") from 1944 to 2014, and the Basin as a whole is "currently out of hydrologic balance by approximately 17,000 to 24,000 afy."[3] Pumping from the Basin has exceeded recharge since the 1930s, causing seawater intrusion as inland groundwater elevations dropped below sea level, permitting the hydraulically connected seawater to flow inland.[4] Seawater intrusion has advanced more than 5 miles inland, rendering significant groundwater unusable for irrigation or domestic uses.[5]

The rate of seawater intrusion is variable, increasing and decreasing with changes in precipitation, but the long-term trend has been a progressive advance in both the 180-foot and 400-foot aquifers.[6] The current prognosis for the Pressure Subarea is for further seawater intrusion due to continued groundwater elevations below sea-level including the latent effects of the recent drought:

> The fact that groundwater elevations are well below the documented protective elevations indicates that the P-180 Aquifer continues to be susceptible to seawater intrusion, and it is unlikely that this situation will be reversed in the coming years, particularly if the current drought conditions continue. Based on the observed time lag (latency) between the end of the historic drought (WY 1991) and the end of the resulting chloride concentration increase (around 1999), one can predict that the 2013 chloride levels reported for coastal wells could show upward concentration trends over the coming years as the SWI front advances, even if wetter climate conditions return. The study area has had three straight years of severe drought

---

2 MCWRA, Protective Elevations to Control Seawater Intrusion in the Salinas Valley ("Protective Elevations"), 2013, p. 2, available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_II/documents/ProtectiveElevationsTechnicalMemorandum.pdf; MCWRA, State of the Salinas River Groundwater Basin, 2015, Section 3.

3 MCWRA, State of the Salinas River Groundwater Basin, pp. 6-3.

4 MCWRA, Protective Elevations, pp. 4—5; MCWRA, State of the Basin, pp. 2-4, 5-2; MCWRA, Salinas Valley Water Project Draft EIR ("SVWP DEIR"), 2001, pp. 1-2 to 1-8, available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_I/documents/DEIR_EIS_2001/2001%20SVWP_DEIR_2001.pdf.

5 MCWRA, State of the Salinas River Groundwater Basin, pp. 5-2 to 5-6; *see also* California Department of Water Resources, Bulletin 118, Salinas Valley Groundwater Basin, 180/400 Foot Aquifer Subbasin, available at http://www.water.ca.gov/groundwater/bulletin118/basindescriptions/3-04.01.pdf.

6 MCWRA, State of the Salinas River Groundwater Basin, pp. 5-2 to 5-9.

> conditions, and continued drought conditions are projected to cause substantial declines in both groundwater head (Section 3.4) and storage (Section 4.4).[7]

The California Department of Water Resources (DWR) is required by the Sustainable Groundwater Management Act to designate as "critically overdrafted" those groundwater basins for which "continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts."[8] DWR identified the 180/400-Foot Aquifer of the Salinas Valley Groundwater Basin as critically overdrafted in January 2016.[9]

2. Efforts to control seawater intrusion

The Monterey County Water Resources Agency ("MCWRA") and predecessor agencies have implemented several projects to address seawater intrusion by storing surface water, increasing recharge, and reducing groundwater pumping along the coast.[10] These include the Nacimiento and San Antonio Reservoirs, water recycling to support the Castroville Seawater Intrusion Project, and the Salinas Valley Water Project (SVWP). The SVWP is the most recent of these projects, completed in 2010.

The EIR for the SVWP explains that seawater intrusion is determined by the amount and location of pumping, and varies in response to annual patterns of precipitation. Because coastal pumping causes greater intrusion impacts, the most effective mitigation for seawater intrusion is a reduction of pumping in coastal areas.[11] However, total pumping in the hydraulically connected SVGB also matters:

> [P]umping in the coastal area closest to the seawater intrusion front has a greater influence on seawater intrusion than pumping in a valley area more distant from the front. Nevertheless, pumping in each area affects seawater intrusion because <u>each subarea draws water from the same Basin.</u>[12]

---

7 MCWRA, State of the Salinas River Groundwater Basin, pp. 5-7 to 5-8, see Tables 3-2 and 4-6 in Sections 3.4 and 4.4.

8 DWR, Critically Overdrafted Basins, available at http://www.water.ca.gov/groundwater/sgm/cod.cfm.

9 DWR, Critically Overdrafted Basins (1/2016), available at http://www.water.ca.gov/groundwater/sgm/pdfs/COD_BasinsTable.pdf.

10 Marina Coast Water District (MCWD), Urban Water Management Plan (UWMP), 2010, pp. 30-31.

11 MCWRA, SVWP Final EIR, p. 2-36, available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_I/documents/Final%20EIR-EIS%20SVWP_RTC-Vol%201.pdf.

12 MCWRA, SVWP Final EIR, p. 2-35 to 2-36 (emphasis in original).

The 2002 SVWP EIR predicted that the SVWP could halt seawater based on the amount and location of 1995 demand.[13] However, it could not assure that the SVWP would halt seawater intrusion in 2030, even though total demand was estimated to decline, because of projected urban growth and associated higher demand in the northern end of the Basin, e.g., the Fort Ord area.[14]

> As noted in Section 3.2.4, overall water demand in the Basin is anticipated to decline by 2030, but total urban needs are projected to increase from 45,000 acre-feet per year (AFY) in 1995 to 85,000 AFY (a 90% increase) based on projected growth, a large part of which is expected to occur in the northern end of the valley. The modeling shows that with projected 2030 demands, seawater intrusion with implementation of the proposed project may total 2,200 acre-feet per year (AFY) (10,500 AFY of intrusion is anticipated to occur without the project). For this reason, the Draft EIR/EIS reports that the SVWP may not halt seawater intrusion in the long term.[15]

The SVWP EIR also cautioned that "any additional water needs within an intruded groundwater basin would exacerbate seawater intrusion."[16]

3. Seawater intrusion will not be controlled by current management efforts because demand has exceeded projections.

Attachment 1 presents a discussion of the SVWP modeling assumptions compared to subsequent conditions and a discussion of MCWRA's current acknowledgement and scientific documentation that the existing groundwater management projects are not sufficient to halt seawater intrusion in the SVGB. Attachment 1 demonstrates that:

- The SVWP EIR assumed that Basin groundwater pumping would decline substantially from 1995 to 2030, from 463,000 afy to 443,000 afy, based on large expected reductions in agricultural pumping, which dominates Basin water demand. However, groundwater pumping in the 20 years since 1995 substantially exceeded 1995 levels, averaging well over 500,000 afy.

- Modeling for the SVWP understated the level of post-1995 pumping that has actually occurred and that, in any event, the SVWP EIR only claimed the SVWP would halt seawater intrusion based on 1995 land use.

- The existing groundwater management projects have only been able to slow seawater intrusion. While reports show that the rate of seawater intrusion has

13 MCWRA, SVWP DEIR, pp. 3-23 to 3-24.

14 Id.

15 MCWRA, SVWP Final EIR, p. 91.

16 MCWRA, SVWP Draft EIR, p. 7-7.

declined since the last drought-induced spike in intrusion during 1997-1999, intrusion continues. Furthermore, a new drought-induced spike, which typically follows a drought after a lag period of some years, is now likely to occur due to the latent effects recent drought.[17]

- Thus, MCWRA has concluded that a new project or projects supplying an additional 48,000 afy of groundwater recharge, over and above that supplied by the SVWP, would be required in order to maintain protective groundwater elevations sufficient to control seawater intrusion.

B. The Monterey Downs SEIR's discussion of water supply impacts focuses on water supply allocation and reliability of pumping systems and assumes that the Salinas Valley Water Project will halt seawater intrusion.

The DSEIR reports that, pursuant to a 1993 agreement annexing the Fort Ord are into Zones 2 and 2A of the Monterey County Water Resources Agency, Marina Coast Water District (MCWD) may withdraw up to 6,600 afy from the SVGB for use in the Ord Community. (DSEIR p. 4.8-9.) The DSEIR reports that the Fort Ord Reuse Authority (FORA) has sub-allocated this 6,600 afy to the member agencies that have local land use jurisdiction in the Ord Community; that those member agencies have in turn allocated some of their sub-allocations to approved development projects; and that Seaside and Monterey County still retain 412.9 afy of their respective sub-allocations that have not yet been committed to approved projects. (DSEIR p. 4.19-2 to 4.19-5.) The DSEIR concludes that this unallocated water would be sufficient to support Phases 1-3 of the project, but that additional water supplies would be required for Phases 4-6. (DEIR p. 4.19-24, 4.8-34.)

The Monterey Downs DSEIR concludes that Phases 1-3 of the project will not have a significant impact on groundwater because (1) those phases "would only use groundwater that is within MCWD's existing 6,600 AFY allocation" and (2) "MCWD's groundwater supply is considered reliable on a quantity and quality basis." (DSEIR p. 4.8-34; see DSEIR p. 4.19-32.) As discussed in the next two sections, neither of these two reasons for concluding the impact is not significant are justified.

The conclusion that "MCWD's groundwater supply is considered reliable on a quantity and quality basis" (DSEIR p. 4.8-34) is taken from the Water Supply Assessment (WSA).[18] The WSA information in taken in turn from the MCWD 2010 Urban Water Management Plan (UWMP).[19] In support of the claim that the water supply is "reliable" the FSEIR also cites studies estimating project water demand and evaluating stormwater runoff and recharge; however these additional documents are concerned with project demand estimates, sewer

---

17 MCWRA, State of the Salinas River Groundwater Basin, pp. 5-7 to 5-8.

18 MCWD, Water Supply Assessment and Written Verification of Supply for Monterey Downs Specific Plan, 2012, pp. 22-23.

19 MCWD, Urban Water Management Plan (UWMP), 2010, p. 53.

usage estimates, and stormwater runoff, and do not provide any discussion of groundwater impacts to the SVGB due to increased pumping that is not contained in the WSA and UWMP.[20]

The UWMP's discussion of water supply "reliability" cited by the WSA is expressly based on the claims that the SVWP will in fact eliminate overdrafting and prevent saline contamination and that pumping will respect "long-term safe yields:"

> 5.1 Water Supply Reliability - Single and Multiple Dry Year and Demand Comparison
>
> The Urban Water Management Planning Act requires a description of a water provider's supply reliability and vulnerability to shortage for an average water year, a single dry year or multiple dry years. Such analysis is most clearly relevant to water systems that are supplied by surface water. Since the bulk of MCWD's supply is groundwater and the remainder is from desalinated supply, short- and medium-term hydrologic events over a period of less than five years usually have little bearing on water availability. Groundwater systems tend to have large recharge areas. The Salinas Basin is aided by two large storage reservoirs, Nacimiento and San Antonio, providing about 700,000 ac-ft of storage. These reservoirs regulate surface water inflow to the basin shifting winter flows into spring and summer releases for consumptive use, which also allows for increased basin recharge. The Salinas Valley Water Project is expected to increase the average level of groundwater storage, moving the basin from a situation where average storage is declining to a net increase in storage of about 6,000 ac-ft annually. Provided groundwater is protected from contamination and long-term safe yields in the basin are respected, water is available annually without regard to short-term droughts. This is due to the large storage volume of the basin that can be utilized to offset annual variations in surface runoff. Therefore, MCWD's groundwater supply is fully available in annual average, single dry year and multiple dry years.[21]

The 2010 UWMP discusses previous groundwater management efforts including the Nacimiento and San Antonio reservoirs and the Castroville Seawater Intrusion Project (CSIP).[22] The UWMP then states that the SVWP was developed to "fully eliminate basin

---

20 See e.g., DSEIR pp. 4.8-48 to 4.8-49, FSEIR, pp. 11.4-1623, 11.4-1628 to 11.4-1629, 11.4-1611, 11.4-1569, 11.4-1574, 11.4-1575, 11.4-1585, citing Monterey Horse Park Project Water Demand and Sewage Generation (Horse Park Water Sewer) (Whitson Engineers, August 16, 2012); Water Supply Assessment and Written Verification of Supply for the Monterey Downs Specific Plan (Schaaf & Wheeler Consulting Engineers, November 6, 2012);Water Supply Assessment for the Monterey Downs Specific Plan Update to Table 5-2 (Marina Coast Water District, November 28, 2012); City of Seaside – Monterey Downs WSA Supplement (Diamond West Incorporated, February 21,2014); and Monterey Downs Water and Sewer Demand Study (WSDS) (Diamond West Incorporated, September 24, 2012).

21 MCWD, 2010 UWMP, p. 53.

22 MCWD, 2010 UWMP, pp. 30-31.

overdraft and seawater intrusion," and claims that "MCWRA modeling concludes that this component will eliminate basin overdraft and intrusion."[23] The 2010 UWMP reports that the SVWP assumes that there will be a 20,000 afy reduction in SVGB demand by 2030, consistent with the SVWP EIR's modeling assumptions.[24] The 2014 WSA Supplement prepared by Diamond West on behalf of the applicant reports these UWMP claims that the SVWP will reverse the overdraft condition (result in a "net increase in storage of about 6,000 ac-ft annually"), avoid saline contamination, and that SVGB demand is projected to decline 20,000 afy by 2030.[25]

However, the DSEIR, the WSA, and the WSA Supplement all fail to report that the UWMP acknowledges that the seawater intrusion front continues to advance in the vicinity of the Marina and Ord Community, and threatens the wells supplying the Ord Community.[26] They also fail to report that the UWMP states that the SVWP is expected to halt seawater intrusion only based on a 1995 pumping baseline, that "it is uncertain whether this outcome will be borne out at currently expected levels of pumping increases in the coastal margins of the Pressure subarea," and that MCWRA has also documented that the SVWP "may not halt intrusion in the long run and that additional surface water delivers into the coastal region" may be needed.[27] Neither the SEIR, the WSA, or the WSA Supplement discuss MCWRA's current reports and documentation, discussed in Attachment 1, that (1) SVGB demand has exceeded the demand projections used by the SVWP modeling, (2) actual pumping in the SVGB is unsustainable without adverse impacts because it exceeds the long-term safe yield, and (3) additional groundwater management projects, which are neither committed nor funded, are needed to halt seawater intrusion caused by current pumping because the SVWP will not do so.

C. The Monterey Downs SEIR analysis is based on the unfounded assumption that there would be no significant impact as long as total Fort Ord pumping is less than 6,600 afy; however, any additional pumping will further aggravate existing seawater intrusion regardless of whether portions of the 6,600 afy remain unallocated.

As noted, a major premise of the SEIR's conclusion that water supply impacts for Phases 1-3 are not significant is that the project "would only use groundwater that is within MCWD's existing 6,600 AFY allocation." (DSEIR p. 4.8-34.) However, the existence of a water supply

[23] MCWD, 2010 UWMP, p. 31.

[24] MCWD, 2010 UWMP, p. 41.

[25] Diamond West, WSA Supplement, 2014, p. 13.

[26] See MCWD, 2010 UWMP, p. 36.

[27] MCWD, 2010 UWMP, p. 42.

entitlement does not imply that there are no impacts from using that water. The relevant question for CEQA impact analysis is whether increased pumping to support the project will cause physical impacts, regardless of any entitlement to use that water. As discussed below, additional pumping in the SVGB, especially in the coastal areas, will in fact aggravate seawater intrusion, but the DSEIR does not acknowledge this as a relevant basis for impact analysis.

The SEIR purports to tier from the Program EIR prepared for the Base Reuse Plan in 1997 (the BRP PEIR). However, the BRP PEIR did not assume that there would be no significant groundwater impacts unless and until Ord Community pumping reaches 6,600 afy. The BRP PEIR analysis of water supply impacts makes it clear that FORA did not necessarily expect that 6,600 afy could be pumped from beneath Fort Ord without causing further seawater intrusion, and its mitigation does not permit the agencies to delay a solution if intrusion persists.

The BRP PEIR impact analysis qualifies any reliance on the 6,600 afy allocation by stating that a potable water supply is "assumed to be assured from well water until a replacement is made available by the MCWRA," but only "provided that such withdrawals do not accelerate the overdraft and seawater intrusion problems in the Salinas Valley groundwater aquifer." (BRP PEIR p. 4-53 (emphasis added)). It states that the 6,600 afy "could" support the first phase of Ord community development through 2015 and then notes "given the existing condition of the groundwater aquifer, there is public concern over the ability of the water wells to 'assure' even the 6,600 afy." (BRP PEIR p. 4-53.) Thus, the BRP EIR evaluates the impacts of the BRP through 2015 in two distinct analyses, one of which assumes that 6,600 afy can be supplied without impacts and the other of which assumes that it cannot. In particular, it provides that "[a]ssuming groundwater wells on former Fort Ord were able to supply 6,600 afy," an additional 7,932 afy of supply would be required by 2015. (BRP PEIR, p. 4-53.) However, it then provides in the alternative that "[i]f groundwater wells were unable to supply the projected 2015 demand of 6,600 afy of water for former Fort Ord land uses, e.g., if pumping caused further seawater intrusion into the Salinas Valley Aquifer," additional supplies would have to be developed sooner, and even further recommends "that an alternate water supply source, such as on-site storage facilities, be considered." (BRP PEIR, p. 4-54.)

The BRP PEIR provides specific policy requirements to ensure adequate, timely mitigation of seawater intrusion, mitigation that may need to be implemented before 6,600 afy is committed or pumped for new development. Policy B-1 requires that the FORA members "shall ensure additional water supply." Policy B-2 requires conditioning project approval on verification of an "assured long-term water supply." Policy C-3 requires the member agencies cooperate with MCWRA and MPWMD "to mitigate further seawater intrusion based on the Salinas Valley Basin Management Plan." Program C-3.1 requires the member agencies to work with the water agencies "to estimate current safe yields within the context of the Salinas Valley Basin Management Plan for those portions of the former Fort Ord overlying the Salinas Valley and Seaside groundwater basins, to determine available water supplies." MCWRA has now determined that the safe yield of the Pressure Subarea is about 110,000 to 117,000 afy and that existing pumping exceeds this safe yield by about 12,000 to 19,000 afy.[28] Indeed, the BRP PEIR acknowledges that pumping in the 180-foot and 400-foot aquifers had "exceeded safe yield, as indicated by seawater intrusion and water levels below sea level." (BRP PEIR p. 4-63.) The BRP PEIR states that the "conditions of the 900-foot aquifer are uncertain", including the safe yield and whether the aquifer is in overdraft. *Id.*

The BRP PEIR explains that Policies B-1, B-2, and C-3 are intended to "affirm the local jurisdictions' commitment to preventing further harm to the local aquifers . . . by limiting development in accordance with the availability of secure supplies." (BRP PEIR, p. 4-55.) The explicit provisions for determination of safe yield and for acceleration of water supply projects if 6,600 afy cannot be supplied without further seawater intrusion clearly demonstrate the intent that the member agencies not simply defer action until 6,600 afy has been allocated to development projects if seawater intrusion continues. To the contrary, it seems clear that the BRP PEIR directed the member agencies "to mitigate further seawater intrusion" by, among other things, ensuring that groundwater pumping beyond the determined safe yield is not permitted for new development projects. The BRP PEIR's cumulative analysis makes it clear that Policy C-3 does not permit uncritical reliance on a 6,600 afy allocation: "existing water allocations of 6,600 afy . . . would allow for development to proceed to the year 2015, provided that seawater intrusion conditions are not exacerbated (Policy C-3)." (BRP PEIR p. 5-5 (emphasis added).)

In sum, unlike the Monterey Downs DSEIR, the BRP PEIR does not assume that the 6,600 afy entitlement is a sufficient basis to determine whether there will be a significant water supply impact from continued groundwater pumping.

As discussed above, the problem of seawater intrusion continues its march inland, requiring deeper replacement wells as the volume of usable groundwater declines, and has not been solved in the 19 years since the certification of the 1997 BRP PEIR. In fact, since the certification of the 1997 BRP PEIR, seawater intrusion maps and tables demonstrate an advance of over 2 miles in the seawater intrusion front in the 180-foot aquifer in the Fort Ord area and substantial advances elsewhere in both the 180-foot and 400-foot aquifers have occurred.[29] As the UWMP discloses, as wells have become contaminated, it has been necessary to drill new wells farther inland and to increase pumping from the as-yet uncontaminated 900-foot aquifer.[30] And there are no currently committed, funded projects that are expected to solve the problem. As discussed below, the SEIR presents no evidence that pumping from the 900-foot aquifer will avoid aggravation of seawater intrusion, and

---

[28] MCWRA, State of the Salinas River Groundwater Basin, p. 4-25.

[29] MCWRA, State of the Salinas Valley Groundwater Basin, 2015, pp. 5-2 to 5-5.

[30] MCWD, 2010 UWMP, pp. 33-37.

there is clear evidence to the contrary. In light of this, the SEIR should disclose that increased pumping to support Phases 1-3 of the project would have a potentially significant impact or could make a considerable contribution to a significant cumulative impact on the groundwater aquifer from which the project would be supplied.

The most recent comprehensive study to the SVGB demonstrates that there is a direct connection between any additional groundwater pumping in the Pressure Subarea and increased seawater intrusion. The 2015 State of the Salinas Valley Groundwater Basin Report indicates that the Pressure Subarea remains in overdraft and that groundwater elevations are well below documented protective elevations.[31] Thus, it concludes that the " P-180 Aquifer continues to be susceptible to seawater intrusion, and it is unlikely that this situation will be reversed in the coming years, particularly if the drought conditions continue."[32] The report also states that "groundwater elevations well below the protective elevations indicate that the P-400 Aquifer continues to be susceptible to SWI, particularly if the current drought conditions continue into the coming years."[33] The report recommends reducing existing pumping in the Pressure Subarea because "the current distribution of groundwater extractions is not sustainable."[34] The report explain that over the period of analysis, from 1953 to 2013, there has been an average loss of storage for the entire SVGB of from 17,000 afy to 24,000 afy.[35] "Seawater intrusion can account for 18,000 afy of the total storage loss of 24,000 afy."[36] In short, each additional acre-foot of pumping in the Pressure Subarea induces an additional 0.75 acre-foot of seawater intrusion.

D. The Monterey Downs SEIR analysis is based on the unfounded assumption that there would be no significant impact as long as supply is "reliable."

As noted above, the other major premise of the SEIR's conclusion that water supply impacts for Phases 1-3 would not be significant is that "MCWD's groundwater supply is considered reliable on a quantity and quality basis." (DSEIR p. 4.8-34.) Here, "reliability" as the term is used in the DSEIR, WSA, and UWMP, does not imply that there would be no significant groundwater impact from using the supply.

First, a UWMP and a WSA are required to address "reliability" of a water supply, by which the law simply requires analysis of whether water will be available during normal, single

31 MCWRA, State of the Salinas Valley Groundwater Basin, 2015, p. 5-7.

32 MCWRA, State of the Salinas Valley Groundwater Basin, 2015, p. 5-7.

33 MCWRA, State of the Salinas Valley Groundwater Basin, 2015, p. 5-8.

34 MCWRA, State of the Salinas Valley Groundwater Basin, 2015, p. 6-3.

35 MCWRA, State of the Salinas Valley Groundwater Basin, 2015, p. ES-16.

36 MCWRA, State of the Salinas Valley Groundwater Basin, 2015,, p. ES-16.

dry, and multiple dry years.[37] A groundwater water supply may be reliable, in the sense that water would remain available even during a multi-year drought, even though the use of that water causes significant impacts to the aquifer. For example, notwithstanding the ongoing seawater intrusion caused by continuing overdraft conditions, MCWD and other users have thus far been able to move pumping inland and to tap deeper aquifers to secure groundwater supplies. However, the ability to pump from an underground reservoir of stored groundwater that is large enough to smooth out climatic variation simply does not imply that this pumping is without impacts, such as groundwater depletion, mining and further aggravation of seawater intrusion.

Second, the WSA and 2010 UWMP cite the purported efficacy of the SVWP as the basis for claiming that the water supply is "reliable." However, the claims these documents make for the SVWP are overstated, since the SVWP EIR did not indicate that seawater intrusion would be halted with any certainty by 2030, and these documents are now outdated since the MCWRA now has documented that the SVWP will not in fact prevent continuing seawater intrusion. As discussed in Attachment 1, the future demand assumptions made by the SVWP EIR and used for modeling the efficacy of the SVWP projected declining water usage in the SVGB, from 463,000 afy in 1995 to 443,000 afy in 2030. Reported pumping in the 20 years since 1995 has not declined but has in fact averaged 502,161 afy (and adjusted to include an estimate for non-reporting wells in these zones, the average is 529,024 afy). Thus, MCWRA reports document that the SVWP will not halt seawater intrusion. To halt seawater intrusion, the County must reduce coastal pumping by 48,000 afy, which would require securing additional surface water supplies to be used to replace that groundwater pumping in coastal areas.[38]

Third, the WSA cites the fact that the 900-foot aquifer has not yet shown signs of seawater intrusion as evidence of a "reliable" supply.[39] The fact that MCWD has so far been able to relocate wells, deeper or farther inland, to find a water supply not yet subject to intrusion does not mean that increased pumping does not cause additional impacts. Furthermore, as discussed below neither the WSA nor the SEIR provide an adequate discussion of the potential impacts from increased pumping of the 900-foot Aquifer (the Deep Aquifer), which include impacts to the overlying 180-foot and 400-foot aquifers of the Pressure Subarea and impacts to the 900-foot aquifer itself. As discussed below, increased pumping of the 900-foot aquifer may induce increased seawater intrusion into the overlying 180-foot

---

37 Water Code §§ 10631(c) (UWMP must assess reliability for average, single dry, and multiple dry years), 10910(c)(3) (WSA must discuss water availability during normal, single dry, and multiple dry water years); see MCWD, 2010 UWMP p. 53 (reliability discussion); MCWD, WSA, pp. 3, 22-23 (reliability discussion).

38 MCWRA, Protective Elevations, pp.1, 11.

39 MCWD, WSA, p. 23.

and 400-foot aquifers, will deplete the 900-foot aquifer itself, and it may in fact result ultimately in seawater intrusion into the 900-foot aquifer.

E. Increased pumping of the 900-foot aquifer will deplete the 900-foot aquifer, may induce additional seawater intrusion, and neither the DSEIR nor FSEIR provide an adequate discussion of this.

LandWatch's Comments PO 208-5 to 208-14 request information about the specific aquifers from which water will be pumped because (1) the DSEIR implies that water can be supplied safely from the 900-foot aquifer even if the 180-foot and 400-foot aquifers are contaminated by seawater, but (2) it also states that there is a hydraulic connection and recharge relation between the 180-foot, 400-foot, and 900-foot aquifers. LandWatch's comments reflect the concern that increased pumping from the 900-foot aquifer could further intrude the 180-foot and 400-foot aquifers and may also intrude the 900-foot aquifer itself. The FSEIR does not supply the requested information and improperly dismisses its relevance because it fails to acknowledge that increased pumping from the 900-foot (Deep) aquifer may induce increased seawater intrusion in the hydraulically connected upper aquifers and fails to discuss risks to the 900-foot aquifer.

1. <u>The FSEIR fails to address LandWatch's comments and requests for information</u>.

LandWatch asked how much is pumped from each of the 180-foot, 400-foot, and 900-foot aquifers under baseline conditions and how much will be pumped in the future. (Comment PO 208-5.) In response the FSEIR states that the DSEIR's analysis is "based on the adopted MCWD 2010 UWMP, and the details concerning aquifer operations do not affect the DSEIR's analyses." (FSEIR, p. 14-4-1022.) However, the UWMP does not provide the requested information regarding existing and projected pumping by aquifer. (Note that Table 4.8-1 in the DSEIR provides pumping <u>capacity</u> by well and by aquifer, but it does not provide baseline or projected pumping <u>volumes</u>. (DSEIR, p. 4.8-10.))

LandWatch asked that the SEIR identify studies cited by the DSEIR, in particular the "recent stratigraphic analyses" that "have indicated" a hydraulic connection between the 180-foot, 400-foot, and 900-foot aquifers. (Comment PO 208-5.) The FSEIR repeated the DSEIR's claim and cited the MCWD 2010 UWMP (FSEIR, p. 11.4-1020), but it did not identify the recent stratigraphic analyses. The MCWD UWMP does not provide stratigraphic analysis. The UWMP does cite WRIME's 2003 "Deep Aquifer Investigative Study," which may possibly be one of the stratigraphic analyses referenced by the DSEIR, although this is unclear because it is not recent.[40] However, as discussed below, WRIME 2003 indicates that increased pumping of the 900-foot aquifer will not be without impacts.

LandWatch asked that the SEIR explain the DSEIR's claims that 1) evidence now shows a hydraulic connection between the 180-foot, 400-foot, and 900-foot aquifers and 2) the 900-

40 MCWD 2010 UWMP, p. 36.

foot aquifer is a series of aquifers not all of which are hydraulically connected. (PO 208-5.) LandWatch asked whether this implied that only portions of the 900-foot aquifer are connected to and recharged by the 180-foot and 400-foot aquifers. (PO 208-5.) LandWatch asked if there is in fact any recharge other than from the 180-foot and 400-foot aquifers. (PO 208-5.) However, the FSEIR simply repeated the DSEIR's discussion (FSEIR p. 11.4-1020) without addressing these questions.

LandWatch asked if the wells in the 900-foot aquifer that would support the project are in an area of that aquifer that is recharged by the 180-foot and 400-foot aquifers. (PO 208-6.) The FSEIR again simply repeated the DSEIR's claims that 1) evidence now shows a hydraulic connection between the 180-foot, 400-foot, and 900-foot aquifers and 2) the 900-foot aquifer is a series of aquifers not all of which are hydraulically connected and then stated that "it would be speculative to state exactly which aquifer would supply the Project, since they are connected hydraulically." (FSEIR p. 11.4-1022.) As discussed below, a hydraulic connection between the 180-foot, 400-foot, and 900-foot aquifers means that all pumping will continue to aggravate depletion of the upper aquifers and increase seawater intrusion, and where the deeper 900-foot aquifer is isolated it will cause significant depletion of the 900-foot deeper aquifer, which the SEIR fails to disclose.

The DSEIR's statement that portions of the 900-foot aquifer are <u>not</u> hydraulically connected to other portions of the 900-foot aquifer would allow for the possibility that those unconnected portions are also isolated from the 180-foot and 400-foot aquifers, which would be highly relevant to whether pumping those areas would affect seawater intrusion in the 180-foot and 400-foot aquifers. The FSEIR fails to address this possibility. However, as discussed below, even though there are two distinct aquifers of the Deep Aquifer system,[41] increased pumping from the deeper of these two aquifers is not viable due to the lack of yield.[42] Furthermore, evidence from WRIME's 2003 Deep Aquifer Investigative Study indicates that increased pumping from the upper Deep Aquifer will increase the ongoing depletion of the upper aquifers and has the associated potential to increase seawater intrusion.[43]

LandWatch requested that the SEIR explain whether recharge to the 900-foot aquifer from the seawater-intruded 180-foot and 400-foot aquifers could contaminate the 900-foot aquifer, whether increased pumping in the 900-foot aquifer would increase this risk, and how much pumping from the 900-foot aquifer is sustainable. (PO 208-7 through 208-11.) The FSEIR states that "the 900-foot aquifer is not expected to be contaminated by saltwater through recharge from the 180-foot and 400-foot aquifer, as the MCWD wells are outside of the area <u>currently</u> affected by seawater intrusion." (FSEIR p. 11.4-1022 (emphasis added).)

---

41 WRIME, Deep Aquifer Investigative Study, 2003, p. 5-1.

42 WRIME, Deep Aquifer Investigative Study, 2003, p. 4-7.

43 WRIME, Deep Aquifer Investigative Study, 2003, pp. 5-1 to 5-2.

The response misses the point that there is a significant potential for future contamination of the 900-foot aquifer as seawater intrusion advances to the areas where there is vertical connectivity between all of the aquifers. The response simply fails to make any assessment of this potential as requested by comments. As discussed above and in the attachment, current studies confirm that the seawater intrusion front does in fact continue to advance due to groundwater pumping in excess of recharge. As discussed immediately below, studies confirm that there is vertical connectivity between the 180-, 400-, and 900-foot aquifers. That connectivity, and the induced leakage from the upper aquifers as the Deep Aquifer system is pumped, provides a preferential pathway for seawater intrusion into the Deep Aquifer system.

The FSEIR's responses also miss the point that increased pumping from the 900-foot aquifer further contributes to the existing intrusion of the 180-foot and 400-foot aquifers. The UWMP cites WRIME's 2003 "Deep Aquifer Investigative Study" as evidence that pumping from the Deep Aquifer will in fact induce increased seawater intrusion to the upper aquifers due to vertical connectivity between the three aquifers.[44] However, neither the WSA nor the SEIR, which cite other portions of the UWMP, report this conclusion from the UWMP.

2. Increased pumping from the Deep Aquifer system will deplete the 900-foot aquifer and may induce additional seawater intrusion.

Analysis in WRIME 2003 supports the conclusion that increased pumping from the 900-foot aquifer would induce additional intrusion into the 180-foot and 400-foot aquifers:

> The response curves indicate that additional increases in the deep aquifer groundwater pumping in the coastal areas may induce additional reduction in the groundwater heads, and subsequently additional landward subsurface flows from across the coastline.[45]

Modeling in WRIME 2003 indicates that increasing pumping of the deep aquifer by 1,400 afy over the 2,400 afy baseline 2003 pumping level would lower groundwater levels in the 180-foot, 400-foot, and Deep Aquifers, would induce vertical flows from the upper to the lower aquifers, and would induce substantial coastal groundwater flow, i.e., seawater intrusion.[46] In short, increased pumping from the Deep Aquifer systems appears likely to induce seawater intrusion in the upper aquifers (the 180-foot and 400-foot aquifers) even if

---

44 MCWD, 2010 UWMP, p. 36.

45 WRIME, Deep Aquifer Investigative Study, 2003, p. 5-2, attached.

46 WRIME, Deep Aquifer Investigative Study, 2003, pp. 4-11 to 4-12.

the Deep Aquifers are not yet intruded. The SEIR fails to discuss or disclose this, even in response to LandWatch's questions.

WRIME 2003 provides further evidence that there are two distinct 900-foot aquifers. In particular, it concludes that the uppermost deep aquifer is in the Paso Robles Formation and the lowermost is in the Purisima Formation and that the "Purisima Formation is relatively isolated hydraulically from the overlying Paso Robles Formation near the coast."[47] However, the lack of hydraulic connection between the two distinct aquifers of the Deep Aquifer system does not matter with respect analysis of induced seawater intrusion. This is because WRIME 2003 concludes that recharge to both the Paso Robles and Purisma portions of the deep aquifer come from the overlying aquifers: "[t]he areal distribution and stratigraphic location of the Paso Robles and Purisma Formations limit recharge to leakage from overlying aquifers," i.e., the 180-foot and 400-foot aquifers.[48] Furthermore, as noted, increased pumping from the lower Deep Aquifer is not viable due to lack of potential yield.[49]

WRIME 2003 concludes that there was an equilibrium between pumping from the 900-foot aquifer and its recharge from the overlying aquifers back in 2003.[50] It also concludes that "the volume of groundwater in storage in the lower aquifers is small" and that "[i]ncreased production would likely come from increased leakage."[51] Thus, it concludes that increases in pumping of the 900-foot aquifer may induce additional intrusion in the upper aquifers.[52] Only a small portion of coastal pumping came from the Deep Aquifer in 2003. The SVWP EIR reports that 90% of groundwater pumping north of Salinas came from the 400-foot aquifer and only 5% from deep aquifer as of 2003.[53] Thus, the shift from the 400-foot to the 900-foot aquifer to support increased pumping for the Ord Community since 2003 will likely upset that equilibrium noted by WRIME and will have a potentially substantial effect on the 900-foot and overlying aquifers, either by depleting the 900-foot aquifer, by increasing the induced seawater intrusion in the upper aquifers, or both.

---

47 WRIME 2003, pp, 5-1 to 5-2.

48 WRIME 2003, p. 5-1.

49 WRIME, Deep Aquifer Investigative Study, 2003, p. 4-7.

50 WRIME 2003, p. 5-1.

51 WRIME 2003, p. 5-1.

52 WRIME 2003, p. 5-2.

53 SVWP DEIR, pp. 5.3-1 to 5.3-3.

In sum, the implications from WRIME 2003 are, first, that pumping from the 900-foot aquifer may continue to induce seawater intrusion to the aquifers above it because those aquifers will be induced to leak downward to provide recharge.[54]

Second, if increased leakage from the upper aquifers were less than the increased pumping rate, the 2003 equilibrium between recharge and pumping would be upset and the 900-foot aquifer would be depleted because the only source of recharge is the overlying aquifers and the "volume of groundwater in storage in the lower aquifers is small."[55] Thus, increased pumping of the 900-foot aquifer must either deplete the 900-foot aquifer via mining or induce seawater intrusion in the upper aquifers by increasing their leakage, neither of which are acknowledged by the SEIR.

Third, if and when the seawater intrusion front of the 180-foot and 400-foot aquifers moves inland over the areas of vertical connectivity between the 180-foot, 400-foot, and 900-foot aquifers, increased pumping of the 900-foot aquifer may result in its recharge with saline contaminated water from the 180-foot and 400-foot aquifers. Interaquifer flow from a contaminated upper aquifer to a lower aquifer as a source of salinity contamination of the lower aquifer has already been documented between the 180-foot and 400-foot aquifers in the Fort Ord area due to thin or missing aquitard, direct hydraulic connection, or wells that act as conduits between aquifers.[56] The agricultural wells that also tap the Deep Aquifer system[57] typically have long screened intervals to maximize production; and this cross connection of multiple aquifers increases the potential for downward vertical migration of contamination.[58] Interaquifer flow from well bores is common. For example, in the Santa Clara Valley, USGS estimated that the majority of recharge to deeper zone aquifers was from well bores.

There is already possible evidence of potential seawater intrusion into the Deep Aquifer system provided in the State of the Salinas River Groundwater Basin Report. Two Deep Aquifer hydrographs in the Pressure Subarea show increasing Chloride indices; one of which more than doubled between 1980 and 2013; the other showed an increasing trend

---

[54] WRIME 2003, p. 5-1 ("increased production would likely come from increased leakage").

[55] WRIME 2003, p. 5-1.

[56] MCWRA, State of the Salinas River Groundwater Basin, p. 5-8.

[57] MCWD, 2015 draft UWMP, p. 38, available at http://www.mcwd.org/docs/agenda_minutes/2016-06-06_board/Item%2011-A%20-%20MCWD%20Draft%202015%20UWMP%20v20160520.pdf.

[58] Hanson, et al., Comparison of groundwater flow in Southern California coastal aquifers, Geological Society of America, Special Paper 454, 2009, pp. 6-7, 11, 13, 14, 19, 26, available at https://www.researchgate.net/publication/279335540_Comparison_of_groundwater_flow_in_Southern_California_coastal_aquifers.

until sampling stopped in about 2000.[59] The Report does not address this trend in Chloride concentration in the Deep Aquifer in the narrative. However it does note that the groundwater levels "exhibit an overall steady decline since approximately 2003."[60] The Report states that of 580 measurement points used in the study, only 12 are screened with the Deep Aquifer in the Pressure Subarea,[61] underscoring the dearth of groundwater level and groundwater quality data available for the Deep Aquifer in the Pressure Subarea, and associated higher uncertainty for predicting the potential for significant impacts from the pumping deeper in the basin.

Finally, the SEIR also fails to disclose and discuss the fact that the 900-foot aquifer itself may be open to Monterey Bay, providing a direct route for seawater intrusion to that aquifer without mediation by the upper aquifers. The BRP PEIR states that "there is no evidence that the Deep Zone is not connected to the ocean." (BRP PEIR, p. 4-57.) The recent State of the Basin report also states that "[u]nlike the P-180 and P-400 Aquifers, it is not known whether the or not the Pressure Deep Aquifer is hydraulically connected to the ocean."[62] If it is connected, there is an additional path to intrusion into the 900-foot aquifer that could be induced by increased pumping.

F. The Monterey Downs SEIR fails to provide an adequate cumulative analysis because the relevant scope of cumulative analysis is the hydraulically connected SVGB, not merely the BRP area, and because there is no basis to deem an additional 250 afy of pumping to be less than a considerable contribution to a significant cumulative impact merely because it represents a small percentage of total SVGB pumping.

LandWatch objected that the DSEIR limits the geographic scope of the cumulative analysis of groundwater supply impacts to Fort Ord projects. (DEIR 4.8-47, 4.19-30 to 4.19-32.) Thus, the DSEIR does not provide baseline or projected future demand for the Pressure Subarea or the SVGB as a whole, or identify either the projects that would contribute to the cumulative impacts or a summary of projections of the water demand of those projects. As discussed, it is well understood that, while coastal pumping has the greatest effect, seawater intrusion is a result of cumulative overpumping from all areas of the SVGB, because these areas are hydraulically connected.[63] The fact that actual current baseline pumping for the SVGB as a whole is well in excess of the pumping assumed in the SVWP EIR, and that this pumping is projected to substantially exceed the level assumed by the SVWP EIR, is highly

---

59 MCWRA, State of the Salinas River Groundwater Basin, Figure 3-8.

60 MCWRA, State of the Salinas River Groundwater Basin, p. 3-16.

61 MCWRA, State of the Salinas River Groundwater Basin, p. 3-16.

62 MCWRA, State of the Salinas River Groundwater Basin, p. 6-4.

63 MCWRA, SVWP Final EIR, p. 2-35 to 2-36.

relevant to the analysis of the extent of cumulative impacts in the form of seawater intrusion.

As LandWatch pointed out, the BRP PEIR did assess cumulative impacts of Fort Ord groundwater pumping in the regional context of total demands on the SVGB and, indeed, concluded that the cumulative impact of the BRP was significant and unavoidable. (BRP PEIR p. 5-5.) The Monterey Downs SEIR does not report this analysis or conclusion.

The FSEIR acknowledges that the geographic scope of the SEIR's cumulative analysis does not coincide with the geography in the BRP PEIRs' cumulative impact analysis because it is limited to the BRP area, unlike the BRP PEIR's regional analysis. (FSEIR p. 11.4-1024.) The FSEIR argues that the DSEIR has simply made the choice to rely on a summary of projections and has chosen the summary of projections of the BRP area's future water demand, which does not include demand outside of the Ord Community. (FSEIR p. 11.4-1024.) However, the fact that CEQA may permit an agency to use a summary of projections to identify relevant cumulative impact sources cannot justify the arbitrary choice of a summary of projections for a geographic area that is too limited to support a meaningful cumulative analysis.

Although the DSEIR lacks any SVGB baseline data, the FSEIR provides a belated estimate of total current pumping in the SVGB. (FSEIR p. 11-4-1023 to 1024.) However, the FSEIR does not use this baseline data in any way, e.g., by relating it to an analysis of groundwater impacts or to the modeling for the Salinas Valley Water Project that was uncritically cited by the 2010 MCWD UWMP and the Diamond West WSA Supplement.[64] Nor do the FSEIR or DSEIR provide any assessment of future total pumping in the SVGB, despite LandWatch's objection that this data is needed for an adequate analysis.

Instead, the FSEIR argues that the DSEIR relied on the MCWD 2010 UWMP analysis of seawater intrusion, and that its "impact analysis is based on the 2010 UWMP, which encompasses the MCWD service area." (FSEIR pp. 11.4-1023, 11.4-1025.) The FSEIR then recites a section of the UWMP that relies on the future efficacy of the Salinas Valley Water Project to control seawater intrusion and maintain groundwater elevations, including the out-of-date and incorrect claim that the SVWP will result in a 6,000 afy surplus in the SVGB. (FSEIR p. 11.4-1025, quoting MCWD 2010 UWMP, p. 53.) The FEIR's response fails to provide the requested information regarding existing and future groundwater pumping in the SVGB and fails to relate that information to a sustainable level of pumping that does not cause depletion or seawater intrusion. The response also fails to explain why limiting the scope of the cumulative analysis to the BRP area is justified in light of the hydraulic connection of the SVGB as a whole to the BRP area.

Most significantly, the FSEIR's responses fail to disclose the fact that there is an existing significant cumulative impact that is not projected to be mitigated by existing groundwater

64 See MCWD, 2010 UWMP, pp. 31, 41; Diamond West, WSA Supplement, 2014, p. 13.

management projects and that any additional pumping, including the pumping of the unallocated portion of the 6,600 afy entitlement, will aggravate this condition.

The FSEIR claims that its response to LandWatch's comment PO 208-5 explains why the geographic scope of the cumulative analysis is limited to the BRP area. (FSEIR pp. 11.4-1020, response to PO 208-4, and p. 11.4-1023, response to PO 208-15.) The response to PO 208-5 does not justify the limitation of the geographic scope to the Fort Ord area. That response purports to address LandWatch's objections that the DSEIR inadequately identifies and characterizes the pumping source aquifer(s) within Fort Ord, fails to identify other wells and cumulative pumping in the 900-foot aquifer, and fails to discuss recharge, saline contamination and sustained yield of the 900-foot aquifer. (FSEIR, pp. 11.4-1020 to 11.4-1022.) To the extent that the response addresses the SRGB outside the Fort Ord area at all, it is only to repeat the DSEIR's claims that its analysis is based on the UWMP and that the UWMP discusses seawater intrusion in the SVGB. Like the DSEIR, the FSEIR does not actually report or evaluate the 2010 UWMP's conclusions about the SVGB or address the post-2010 information indicating that seawater intrusion is not under control.

The FSEIR argues that agricultural water use consumes the majority of SVGB water and that the MCWD pumping is only 1% of total SVGB pumping. (FSEIR p. 11.4-1024.) This argument fails to recognize that coastal pumping like MCWD's particularly aggravates seawater intrusion, that this coastal pumping must be reduced and replaced now to halt seawater intrusion.[65] It also fails to recognize that it is simply irrelevant how the pumped groundwater is used:

> . . . the ability to halt seawater intrusion, now and in the future, is not based on whether it is delivered to agricultural uses or urban uses. Both of these uses draw the same water from the same groundwater basin. Reducing withdrawal of groundwater in the northern Salinas Valley, whether through replacement of agricultural or urban pumping, has the same effect.[66]

If the implication of the FSEIR's claim that MCWD pumping amounts to only 1% of total SVGB pumping is that this pumping, or the increased pumping for the Monterey Downs project, does not constitute a considerable contribution to seawater intrusion, neither the FSEIR nor the DSEIR actually state this as the basis of the cumulative impact analysis. However, if the claim were made, it would not be accurate. CEQA does not permit an agency simply to dismiss a project's impact as less than a considerable contribution because it is relatively small. The potential significance must be evaluated in the context of the severity of the cumulative impact, which the SEIR fails to do.

---

65 MCWRA, SVWP DEIR, p. 3-23; MCWRA, Protective Elevations, pp. 1, 11.

66 MCWRA, SVWP DEIR, p. 7-8.

Here, the magnitude of the annual storage change in the Pressure Subarea that has caused seawater intrusion is from about -200 afy to about -1,600 afy over the period from 1944 to 2013.[67] From 1959 to 2013, the average change in storage was from -50 afy to -500 afy.[68] The estimated safe or sustainable yield for the Pressure Subarea, i.e., the level of pumping that could be sustained without seawater intrusion, is from 110,000 to 117,000 afy, but groundwater pumping exceeds this yield by about 12,000 to 19,000 afy.[69] The significance of the proposed increase in pumping to support Phases 1-3 of the project, which would be at least 250.6 afy, and which may come to 396.3 afy if the currently unavailable recycled water does not materialize (DSEIR, p. 4.19-23), should be assessed in relation to these figures, not in relation to the entire 500,000+ afy pumping from the SVGB, because seawater intrusion is caused by marginal effects, i.e., storage changes (aquifer depletion) and pumping in excess of sustainable yield, not by total pumping. The SEIR does not provide this comparison. In view of the recognition that coastal pumping must be reduced to address seawater intrusion,[70] there is no longer any cushion for increased pumping and any additional pumping at the margin should be deemed a considerable contribution.

---

67 MCWRA, State of the Salinas Valley Groundwater Basin, p. 4-12 (average storage change, depending on the storage coefficient value).

68 MCWRA, State of the Salinas Valley Groundwater Basin, p. 4-25.

69 MCWRA, State of the Salinas Valley Groundwater Basin, p. 4-25.

70 MCWRA, Protective Elevations, pp. 1, 11; MCWRA, State of the Salinas Valley Groundwater Basin, p. 6-3.

Attachment 1 – Modeling assumptions and outcomes for the SVWP; MCWRA's acknowledgment that the SVWP will not halt seawater intrusion

1. **The SVWP EIR did not project that the SVWP would halt long-term seawater intrusion.**

MCWRA prepared and certified an EIR for the SVWP in 2001 and 2002. (MCWRA, SVWP EIR, 2002.) Based on specific assumptions about future demand and safe yield (discussed below), the SVWP EIR projected that the proposed SVWP "would reverse the annual reduction in groundwater storage to an approximately 2,500 AFY increase in groundwater storage." (SVWP FEIR 3-30.) Thus, it projected that seawater intrusion could be halted. However, the SVWP EIR qualified this conclusion in two critical respects.

First, the SVWP EIR cautioned that "any additional water needs within an intruded groundwater basin would exacerbate seawater intrusion." (SVWP EIR, p. 7-7.) So the conclusion was tied to specific assumptions regarding water use. As discussed below, future water use is projected to exceed the levels projected in the SVWP EIR. Indeed, MCWRA's Rob Johnson acknowledged to the Monterey County Planning Commission that the SVWP EIR demand projections were not accurate and that pumping was more than projected. (Transcript of Monterey County Planning Commission, Oct. 29, 2014, p. AR005187; available in video file at http://monterey.granicus.com/MediaPlayer.php?view_id=14&clip_id=2745.)

Second, the SVWP EIR acknowledged that the proposed project would only halt seawater intrusion based on <u>1995 levels of demand</u>:

> While the SVIGSM indicates that seawater intrusion will be halted by the project (in conjunction with the CSIP deliveries) based on current (1995) demands, with a projected increase in water demands (primarily associated with urban development) in the north valley area in the future, seawater intrusion may not be fully halted based on year 2030 projections. For the year 2030, modeling indicates seawater intrusion may be 2,200 AFY with surface water deliveries only to the CSIP area. (SVWP DEIR, p. 3-23.)

The Department of the Interior pointed out that the SVWP EIR contradicts itself in stating that "the proposed action would halt seawater intrusion" and also that "hydrologic modeling shows that the project may not halt seawater intrusion in the long-term future" and asked for clarification. (SVWP FEIR, p. 2-82, comment 2-12.) In response, the SVWP FEIR again acknowledged that its modeling only showed that the SVWP would "halt seawater intrusion in the near term" based on 1995 water demand. (SVWP FEIR, p. 2-91.) However, with anticipated 2030 demand, that modeling showed that "seawater intrusion with implementation of the proposed project may total 2,200 acre-feet per year (AFY) (10,500 AFY of intrusion is anticipated to occur without the project). For this reason, the Draft EIR/EIS reports that the SVWP may not halt seawater intrusion in the long term." (SVWP FEIR, p. 2-91.) The 2010 Monterey County General Plan EIR itself acknowledges that the SVWP may only halt seawater intrusion in the short term. (2010 General Plan EIR, p. 4.3-38.)

Questioned about this at the October 29, 2014 Monterey County Planning Commission hearing, MCWRA's Rob Johnson acknowledged that the SVWP would only halt seawater intrusion based on 1995 land use. (Transcript of Monterey County Planning Commission Hearing, Oct. 29, 2014, p. AR005188.) As discussed below, Mr. Johnson also acknowledged that groundwater pumping is higher than anticipated by the SVWP EIR and that an additional 58,000 af/y of groundwater, beyond that provided by the current suite of water supply projects, is still needed to halt seawater intrusion. (*Id.*, pp. AR005178-005179, 005189-005190.)

2. As MCWRA acknowledges, groundwater pumping has exceeded the level assumed in the SVWP EIR, and this vitiates its analysis, which was expressly based on the assumption that groundwater pumping would decline over time.

MCWRA reports show that pumping is much higher than predicted by the SVWP EIR. To determine the extent of overdrafting and seawater intrusion, the SVWP EIR relied on modeling provided by the Salinas Valley Integrated Ground and Surface Water Model ("SVGISM'), which in turn was based on assumptions regarding land use, population, and water use. (SVWP EIR, pp. 5-1 (identifying baseline and future conditions), 5.3-10 to 5.3-11 (overview of SVGISM), 7-4 to 7-5 (detailing major assumptions used in the SVGISM regarding population and irrigated acreage).)

As set out in the table below, the SVWP EIR reported its assumptions and modeling results for two scenarios: 1995 baseline conditions and 2030 future conditions:

SVWP EIR: population and land use assumptions with baseline and projected water use	1995	2030
Population	188,949 persons	355,829 persons
Urban water pumping	45,000 afy	85,000 afy
Farmland	196,357 acres	194,508 acres
Agricultural water pumping	418,000 afy	358,000 afy

Source: SVWP EIR, pp. 1-7 (Table 1-2, "Estimated Existing and Future Water Conditions"); pp. 5-1, 6-3, 7-3, 7-10 (identifying baseline and future conditions).

The SVWP EIR assumed that agricultural water use would decline by 60,000 afy from 1995 to 2030 due to a 5% increase in water conservation, changes in crop uses, and a 1,849 acre decrease in irrigated agricultural acreage. (SVWP EIR pp. 1-7, 7-5, 7-10.) The SVWP EIR assumed that urban water use would increase by 40,000 afy between 1995 and 2030 based on population growth and an assumed 5% per capita reduction in water demand due to conservation. (SVWP EIR, pp. 1-7, 7-5.)

In sum, the SVWP EIR assumed that groundwater pumping in Zone 2C would decline 20,000 afy over a 35 year period, from a total of 463,000 afy in 1995 to 443,000 afy in 2030.

In fact, in the first 20 years since 1995 pumping has greatly exceeded the SVWP EIR projection. Reported groundwater pumping in Zones 2, 2A, and 2B has averaged 502,161 afy. Adjusted to include an estimate for non-reporting wells in these zones, the average is 529,024. These data are based on the annual Ground Water Summary Reports published by MCWRA in 1995-2014, available at http://www.mcwra.co.monterey.ca.us/groundwater_extraction_summary/groundwater_extraction_summary.php. The data are summarized in the table below.

Year	Ag	Urban	Total	Percent of wells not reporting	Total divided by percent of wells reporting to adjust for non-reporting wells
1995	462,268	41,884	504,512	2%	514,808
1996	520,804	42,634	563,438	4%	586,915
1997	551,900	46,238	598,139	7%	643,160
1998	399,521	41,527	441,048	7%	474,245
1999	464,008	40,559	504,567	9%	554,469
2000	442,061	42,293	484,354	11%	544,218
2001	403,583	37,693	441,276	18%	538,141
2002	473,246	46,956	520,202	7%	559,357
2003	450,864	50,472	501,336	3%	516,841
2004	471,052	53,062	524,114	3%	540,324
2005	443,567	50,479	494,046	2%	504,129
2006	421,634	49,606	471,240	4%	490,875
2007	475,155	50,440	525,595	3%	541,851
2008	477,124	50,047	527,171	3%	543,475
2009	465,707	45,517	511,224	3%	527,035

2010	416,421	44,022	460,443	3%	474,684
2011	404,110	44,474	448,584	3%	462,458
2012	446,620	42,621	489,241	3%	504,372
2013	462,873	45,332	508,205	3%	523,923
2014	480,160	44,327	524,487	2%	535,191
20 year average			502,161 afy		529,024 afy

Source: Ground Water Summary Reports published by MCWRA, 1995-2014, available at http://www.mcwra.co.monterey.ca.us/groundwater_extraction_summary/groundwater_extraction_summary.php.

The reported pumping data does not include any pumping from the portion of Zone 2C that is located outside of Zones 2, 2A, and 2B. (See Monterey County 2010 General Plan FEIR, pp. S-13, S-127.) The County estimated that this pumping amounted to at least 4,574 afy in 2005. (Monterey County 2010 General Plan FEIR, p. S-136.) Adding this to the adjusted average pumping total for Zones 2, 2A, and 2B, average pumping has been 533,598. This is 70,598 afy higher than the SVWP EIR's 1995 baseline and 90,598 afy higher than its projected 2030 demand.

As noted, the SVWP EIR analysis was based on specific assumptions about future water demand, and it cautioned that "any additional water needs within an intruded groundwater basin would exacerbate seawater intrusion." (SVWP DEIR, p. 7-7.)

In sum, for more than half of the planning period covered by the SVWP EIR's 1995-2030 projections, groundwater pumping has greatly exceeded its assumed demand levels. The amount by which actual demand exceeds assumed demand is two to three times greater than the amount of water that the SVWP was expected to provide.[71]

MCWRA's Rob Johnson acknowledged that actual demand has exceeded the SVWP EIR's projections. (Transcript of Monterey County Planning Commission Hearing, Oct. 29, 2014,

---

71 The SVWP was intended retain up to an additional 30,000 afy of water in dams and then provide about 9,700 afy of that water to the Castroville Seawater Intrusion Project ("CSIP") to replace groundwater pumping, about 10,000 afy to increase basin recharge, and another 10,000 afy for instream flow augmentation. Monterey County 2010 General Plan DEIR, pp. 4.3-36 to 4.3-38; Monterey County 2010 General Plan FEIR 2-68 to 2-71. The Monterey County General Plan DEIR, FEIR Supplemental materials, and FEIR are available at http://co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/planning/resources-documents/2010-general-plan/draft-environmental-impact-report-deir, http://co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/planning/resources-documents/2010-general-plan/supplemental-material-to-final-environmental, http://co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/planning/resources-documents/2010-general-plan/final-environmental-impact-report-feir.

p. AR005187.) Mr. Johnson acknowledged that additional water supply projects delivering at least 58,000 afy will be required to halt seawater intrusion. (*Id.* pp. AR005178-005179, 005189-005190)

The growth in pumping is associated with increases in agricultural land use. As noted, the SVWP EIR assumed that irrigated agricultural acreage would decrease from 196,357 acres in 1995 to 194,508 acres in 2030. (SVWP EIR, p. 7-10.) However, agricultural acreage has actually increased since 1995.

- The SVWP Engineers Report reports that there were 212,003 acres of irrigated farmland in Zone 2C as of 2003. (SVWP Engineers Report, pp. 3-10, 3-15 (Tables 3-5 and 3-9 providing acreage totals for "Irrigated Agriculture"), available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_I/salinas_valley_water_project_I.php.) This is substantially more irrigated acreage than the 196,357 acres that the SVWP EIR reported for 1995. (SVWP EIR, p. 7-10.) The SVWP Engineers Report data were based on "parcel information, including land use, acreage, zone and other data" developed by MCWRA. (Engineers Report, p. 3-10.)

- The 2010 Monterey County General Plan EIR reported Department of Conservation farmland mapping data showing an increase of 8,209 acres of habitat converted to new farmland from 1996-2006 but only 2,837 acres of existing agricultural land lost to urban use. Monterey County 2010 General Plan DEIR, pp. 4.9-46 and 4.2-7 (showing farmland gains and losses 1996-2006 based on FMMP data). This represents a net gain of farmland of 5,372 acres, and does not account for additional water demands from multiple crops (2-4) per acre per season.

Furthermore, there is every reason to believe that the increase in irrigated acreage will continue and that the decrease in irrigated agricultural land between 1995 and 2030 projected in the SVWP EIR will not occur. Based on the past data related to conversion of habitat to farmland, the 2010 Monterey County General Plan DEIR projected that future agricultural acreage would increase from 2008 to 2030, and the General Plan FEIR admitted that the large future net increase in farmland would create additional water demand not anticipated by the SVWP EIR: 17,537 afy of water. (Monterey County 2010 General Plan DEIR, p. 4.9-64 (Table 4.9-8); Monterey County 2010 General Plan FEIR, pp. 2-38, 4-129 (revised table 4.9-8), S-19 to S-20, S-137 to S-138 (revised Table 4.3-9(c), note 7)).

3. **MCWRA also acknowledges that the existing SVWP will not halt seawater intrusion and that additional water supply projects are required.**

The MCWRA has acknowledged that the SVWP will not in fact be sufficient to halt seawater intrusion. In testimony to the Monterey County Planning Commission, MCWRA's Rob Johnson stated that the SVWP is not be the final water project needed to halt seawater intrusion and that it will in fact be necessary to find additional water supplies totaling at least 58,000 afy to achieve this. (Transcript of Monterey County Planning Commission Hearing, Oct. 29, 2014, AR005164, 005178-005179, 005189-005190) The 58,000 afy figure is based on modeling performed by MCWRA in connection with its efforts to secure surface water rights on the Salinas River in order to mitigate seawater intrusion.

The MCWRA now seeks, under a settlement agreement with the State Water Resources Control Board, to perfect surface water rights to 135,000 afy of Salinas River water in order to construct an additional Salinas Valley water project to attempt to halt seawater intrusion. (See MCWRA, Salinas Valley Water Project Phase II, Overview, Background, Status, available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_II/salinas_valley_water_project_II_overview.php.) MCWRA seeks to retain the right to the surface water entitlement by asserting the need for another project to halt seawater intrusion. Modeling undertaken for the MCWRA in 2013, establishes that an additional 135,000 afy of surface water flows will be needed in order to supply the additional 60,000 afy of groundwater that is now projected to be required to maintain groundwater elevations and a protective gradient to prevent further seawater intrusion. (Geoscience, Protective Elevations to Control Seawater Intrusion, Nov. 13, 2013, p. 11, available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_II/salinas_valley_water_project_II_overview.php (link to "Technical Memorandum.")) The MCWRA has not yet conducted environmental review for a new project to supply the needed water. (See MCWRA, Salinas Valley Water Project Phase II, Status, available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_II/salinas_valley_water_project_II_project_status.php.)There is no assured funding source for it.

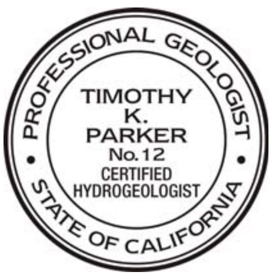
Although the MCWRA website refers to the currently proposed new project as "SVWP Phase II," it is not the same project that was identified as a potential second phase of the SVWP in the 2001/2002 SVWP EIR. The second phase of the SVWP envisioned in the 2001/2002 SVWP EIR would have consisted of only an additional 8,600 afy of Salinas river diversion, increased use of recycled water, supplemental pumping in the CSIP area, and a pipeline and delivery to an area adjacent to the CSIP area. (SVWP EIR, p. 3-23 to 3-24.) The currently proposed project is much larger in scope and would include different and more extensive infrastructure: it would divert an additional 135,000 afy at two new diversion facilities and would deliver that water through injection wells, percolation ponds, direct supply of raw water, or a treatment system. (MCWRA, SVWP Phase II website, Project Description, available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_II/salinas_valley_water_project_II_overview.php)

To my knowledge, neither the SVWP Phase II project identified at the conceptual level in the 2001/2002 SVWP EIR nor the newly proposed SVWP Phase II has been planned at any level of significant detail or environmentally reviewed. The SVWP EIR and the Monterey County 2010 General Plan EIR both acknowledge that impacts related to the initially conceived second phase project have not been evaluated, and the Monterey County 2010 General Plan EIR treated these impacts as significant and unavoidable because they remain largely unknown. (SVWP FEIR, pp. 2-92, 2-243; Monterey County 2010 General Plan, p. 4.3-146.)

The phase two project now being discussed has not had any environmental review, but it would likely result in significant potential environmental impacts, based on MCWRA's determination that an EIR is required. (MCWRA Notice of Preparation of EIR, Salinas Valley Water Project Phase II, June 2014, available at http://www.mcwra.co.monterey.ca.us/salinas_valley_water_project_II/salinas_valley_water_project_II_project_status.php.)

Finally, the 2015 MCWRA State of the Salinas Valley Groundwater Basin report establishes that the SVGB as a whole and the Pressure Subarea are both being pumped unsustainably in excess of safe yield.[72] This overdraft condition has caused, is causing, and will continue to cause seawater intrusion, particularly in the 180-foot and 400-foot aquifers of the Pressure Subarea.[73]

In sum, the water supply provided by the SVWP is well documented to be insufficient to prevent cumulative groundwater pumping from further aggravating seawater intrusion. Major additional water supply projects with currently unknown potential environmental impacts will be required to address this significant cumulative impact.



72 MCWRA, State of the Salinas River Groundwater Basin, pp. 4-25 to 4-26.

73 MCWRA, State of the Salinas River Groundwater Basin, pp. 5-1 to 5-8, 6-1 to 6-4.

RESUME

Timothy K. Parker, PG, CEG, CHG
Principal

WORK EXPERIENCE

2009 – Present: **Parker Groundwater, President/Principal.** Sacramento, California. Privately owned business, specializing in strategic groundwater planning, groundwater monitoring, groundwater modeling, groundwater recharge and aquifer storage recovery projects, program implementation, stakeholder facilitation, groundwater monitoring, policy and regulatory analysis, environmental document review and litigation support. Provides strategic planning, policy consulting and groundwater technical expertise to public and private sector clients to develop effective, sustainable solutions to complex problems in the water and evolving environmental and energy industries.

2005 – 2009: **Schlumberger Water Services, Principal Hydrogeologist.** Sacramento, California. Provided hydrogeologic expertise and project management on groundwater recharge and aquifer storage recovery projects, groundwater monitoring, groundwater resources management, and groundwater contaminant projects for public and private sector clientele. Application of advanced oilfield tools and technologies to groundwater projects. Integration of groundwater quality monitoring and protection on CO2 sequestration projects; liaison to Schlumberger Carbon Services, including planning, scope development, technical implementation, facilitation, and oversight. **Business Development** activities included strategic planning, prospect assessments, sales presentations, targeted workshops, client development and exploitation. Mentored and provided direction to staff; developed, tracked and controlled projects; worked closely with clients and other public and private organizations to implement projects on schedule, on budget with high level of quality.

2001 – 2005: **California Department of Water Resources, Division of Planning and Local Assistance, Conjunctive Water Management Branch, Senior Engineering Geologist.** Provided local technical and economic assistance to Sacramento and San Joaquin Valley groundwater authorities and water districts planning, developing, and implementing conjunctive water projects, groundwater recharge and aquifer storage recovery projects, and local and regional groundwater monitoring programs. Elements include developing technical scope, implementing work, providing geologic and groundwater technical expertise, attending and speaking at public meetings. **Central District, Groundwater Planning Section**, Sacramento, California (early 2001 prior to joining CWMB). **Senior Engineering Geologist, Groundwater Planning Section**. Elements included: Integrated Storage Investigations Program conjunctive use project technical support, coordination, and project management; technical support on local groundwater monitoring and subsidence programs; technical support on Bulletin 118; Proposition 13 groundwater grant applications screening and ranking process for Central District geographic area. Supervised and provided direction to staff; developed, tracked and controlled program budgets; worked closely with other DWR groups, agencies and outside organizations to develop additional local assistance opportunities for DWR.

2000-2001: California Department of Conservation, Division of Mines and Geology, Sacramento, California. **Associate Engineering Geologist**. Responsible for: multi-year aerial photograph review, identification of landslides and potentially unstable areas, field reconnaissance and confirmation, preparation of maps and images using MapInfo, Vertical Mapper, ArcView, Spatial Analyst, Model Builder, and ArcInfo working closely with GIS specialists; assisting in development of GIS methodologies and database for Northern California watersheds assessment/restoration project; review of timber harvest plans and pre-harvest inspections; review of regional CEQA documents as related to engineering geologic issues; watershed assessment; technical presentations at multi-agency meetings and landslide/mass wasting public workshops.

1997-2000: CalEPA Department of Toxic Substances Control, Stringfellow Branch, Sacramento, California. **Hazardous Substances Engineering Geologist**. Responsible for: groundwater monitoring and analysis; developing approach and preparing a work plan for a Stringfellow site revised hydrogeologic conceptual model; researching, providing, and maintaining a comprehensive environmental data management system; assembling and contracting with an expert panel for consultation on the site; evaluating an existing MODFLOW porous media groundwater flow model; providing direction on the strategy and approach for the development of a revised groundwater flow and fate & transport model for the Stringfellow site; providing input on an as needed basis in support of the litigation and community relations elements of the project.

1993 - 1997: Law Engineering & Environmental Services, Inc., Sacramento, California. **Manager Project Management.** Responsible for supervising and providing direction to senior project managers; maintaining appropriate tracking system and controls for assurance of successful execution of scope, schedule and budget of major projects; maintaining quality assurance and controls on projects. Responsibilities included development/implementation of group budget spending plan, establishing performance standards and evaluating program progress and quality, staff recruiting, mentoring, maintaining utilization, business development, proposal preparation, commercial and government project marketing, client maintenance. **Project Manager** and **Senior Hydrogeologist** on hydrogeologic evaluations, site and regional groundwater quality monitoring programs, hazardous substance site investigations and remediation. Responsibilities included technical direction of projects, project scoping, schedule, budget, supervision of field activities, preparation of documents, developing cost-effective strategies for follow-on investigations and removal actions, and negotiating with state regulators on three Beale Air Force projects totaling more than $15 million.

1988 - 1993: Dames & Moore, Sacramento and Los Angeles, California. **Senior Geologist.** Provided hydrogeologic technical support, project management, regulatory compliance, technical/regulatory strategy, and on a variety of commercial and industrial DTSC- and RWQCB-lead hazardous substance sites. Responsibilities included project technical direction, scope implementation, budgetary control, groundwater quality monitoring and analysis, supervision of field investigations, document preparation, client interface, negotiation with regulatory agencies on projects totaling approximately $5 million.

1986 - 1988: California Department of Health Services, Toxic Substances Control Division, Southern California Region, Assessment and Mitigation Unit, Los Angeles, California. **Project Manager** in the Assessment and Mitigation Unit. Responsibilities included development and implementation of work plans and reports for, and regulatory oversight of, State Superfund preliminary site assessments, groundwater quality monitoring and analysis, remedial investigations, feasibility studies, remedial action, and interim remedial measures. **Engineering Geologist**. Provided technical support to Permitting, Enforcement, and Site Mitigation Unit staff, including evaluation of hydrogeologic assessments, groundwater quality monitoring programs, work plans, and reports on federal and state Superfund sites and active facilities; assistance in budget preparation; assistance in zone drilling contract review.

1983-86: Independent Consultant, Sacramento, California. Provided technical assistance on variety of geologic and geophysics projects to other independent consultants in local area.

1982: Gasch & Associates, Sacramento, California. Geologic assistant conducting shallow seismic reflection surveys in the Sierra Nevada for buried gold-bearing stream deposits.

1981 - 1982: Geologic Assistant, Coast Ranges, Avawatz Mountains, White Mountains, and Kinston Peak Range. Geologic Assistant on various geological field studies, including gravity surveys, magnetic surveys, landslide and geologic mapping projects.

PROFESSIONAL REGISTRATION

California Professional Geologist No. 5594
California Certified Engineering Geologist No. 1926
California Certified Hydrogeologist No. 0012

PROFESSIONAL AFFILIATIONS

California Department of Water Resources, Public Advisory Committee, Water Plan Update 2013

*2010-2013**:** Appointed to participate on PAC and to lead new Groundwater Caucus*

Department of Interior, Advisory Committee on Water Information, Subcommittee on Ground Water
2010-Present: Member – Work Group for Pilot Project Implementation, Nationwide Groundwater Monitoring Network
2007-2010: Co-Chair - Work Group on Implementation for development of the Framework for a Nationwide Ground Water Monitoring Network
2007-2010: Member - Work Group on Network Design for development of the Framework for a Nationwide Ground Water Monitoring Network

National Ground Water Association
2014-Present: Director - Scientists and Engineers Division
2007- 2010: Director - Scientists and Engineers Division
2007 - 2009: Member - Government Affairs Committee
2007 - Present: Chair - Groundwater Protection and Management Subcommittee
2005 – Present: Chair - Regional Groundwater Management Task Force, Government Affairs Committee
2004 – 2005, 2007,2009-10: Chair – Theis Conference Committee
2002 – Present: Member – Theis Conference Committee
2002 – Present: Member - Regional Groundwater Management Task Force, Government Affairs Committee
2003 – Present: Member – Groundwater Protection and Management Subcommittee
2009 – Present: Member - ASR Task Force
2009 – Present: Member - Hydraulic Fracturing Task Force
2008 – 2009: Member – CO2 Sequestration Task Force

American Ground Water Trust
2009 – 2012: Chair
2005 - 2013: Director

California Groundwater Coalition
2007-Present: Director

Groundwater Resources Association of California
2000 – Present: Director
2000 – 2001: President State Organization
2001 – Present: Legislative Committee Chair
1998-1999 Vice President
1996-1997 Secretary
1995-1996 President Sacramento Branch
1993-1994 Member-at-Large Sacramento Branch

ACADEMIC BACKGROUND
BS 1983, Geology, University of California, Davis

Graduate studies in hydrogeology, hydrology, engineering geology, waste management engineering

Selected Publications

California Groundwater Management, Second Edition, Groundwater Resources Association of California, co-author and project manager, 2005.

Water Contamination by Low Level Organic Waste Compounds in the Hydrologic System, in *Water Encyclopedia*, Wiley, 2004.

Potential Groundwater Quality Impacts Resulting from Geologic Carbon Sequestration, Water Research Foundation, co-author, 2009.

Aquifer Storage and Recovery in the US, ASR 9, American Ground Water Trust, Orlando Florida, September 2009 – a compilation of key ASR issues on DVD, contributing editor and speaker, 2010.

Sustainability From The Ground Up – Groundwater Management In California – A Framework, Association of California Water Agencies, principal author, 2011.

ISMAR9 Call to Action: Sustainable Groundwater Management Policy Directives, Principal Author, 2016.