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Via email
Members of the 180/400-Foot Aquifer Subbsasin Committee
Salinas Valley Basin Groundwater Sustainability Agency
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Re: 180/400-Foot Aquifer GSP Update – Chapters 5-6 re Groundwater Conditions and Water Budget

Dear Committee Members:

I write on behalf of LandWatch Monterey County regarding Chapters 5 and 6 of the 2022 180/400-Foot Aquifer GSP Update. Chapter 5 describes groundwater conditions and Chapter 6 provides historical and future water budgets.

The water budget chapter purports to provide the historical water budget in Table 6-8 based on the Salinas Valley Integrated Hydrologic Model (SVIHM) and to provide the future water budget in Table 6-13 based on the Salinas Valley Operational Model (SVOM). However, the water budget chapter rejects the modeled results for critical parameters, including groundwater pumping, seawater intrusion, and storage loss, and substitutes "adjusted" figures instead. It remains unclear how the calibration of the model's other parameters could possibly remain valid after these adjustments. The bottom line results for loss of storage in Tables 6-8 and 6-13 based on these adjusted values are simply inconsistent with the other values in these tables. The tables do not add up; and the water balances are not balanced.

Furthermore, Chapter 6 ultimately does not even use its modeled results to determine either historic or future sustainable yields. All of the values used in determining sustainable yields are based on estimates made outside of the modeling process.

In effect, the modeled results are meaningless.

Finally, Chapter 6 fails to provide a clear statement of the overdraft condition. SGMA requires that the water budget provide a clear statement of the magnitude of the overdraft. (23 CCR, § 354.18(b)(5).) The overdraft figure must be clearly stated because SGMA requires that the GSP include a "quantification of demand reduction or other methods for the mitigation of overdraft." (23 CCR, § 354.44(b)(2).) Chapter 6 repeatedly implies that the overdraft is only 600 AFY. This implication is inconsistent with the estimate in

Chapter 5 that the overdraft includes both that 600 AFY storage loss that is estimated based on groundwater elevation changes south of the seawater intruded area and an additional 12,600 AFY storage loss that is estimated based on the average annual volumes of seawater intrusion. The water budget must include this total overdraft, as defined by Bulletin 118.

Detailed comments follow.

1. **Historical budget**

"ADJUSTED" PUMPING DATA ARE INTERNALLY INCONSISTENT: The historical water budget discussion states that somehow the SVIHM "estimates only approximately 71% of the pumping reported in the GEMS database." (Section 6.3.2.) Since Table 6-2 identifies the source of the SVIHM input data for groundwater pumping as "reported data for historical, municipal, and agricultural pumping," it is difficult to understand how model only "estimates" 71% of these reported data.

It is also difficult to understand how any of the modeled results, particularly the bottom line net storage gain or loss in the Table 6-8 historical budget, could remain accurate after the SVIHM's estimated 94,300 AFY of pumping is simply adjusted to 132,800 AFY in the tables purporting to reflect the modeled results. (Tables 6-5, 6-6, 6-8.) Presumably the SVIHM model should be calibrated so that its modeled results are consistent with reported data. It is difficult to understand how any of the SVIHM's results that cannot be directly correlated to measured data can be taken seriously when there is apparently a 38,500 AFY error in its "estimated" groundwater pumping. For example, both percolation of irrigation water and evapotranspiration would presumably increase substantially if pumping were increased by 38,500 AFY. However, the tabulated results for evapotranspiration was not changed after the "adjustment" for actual pumping was made (Table 6-5), and there is no indication that percolation of irrigation water was adjusted either (Table 6-4).

SEAWATER INTRUSION IS INCONSISTENT WITH THE LEVEL ADOPTED BY THE GSP: The historic budget presented in Table 6-8 uses the "preliminary" SVIHM estimate of seawater intrusion of 2,900 AFY. (Section 6.3.2.) However, based on the change in the mapped seawater intruded area analyzed in Chapter 5, "this GSP considers 12,600 AF/yr. to be the annual rate of storage loss due to seawater intrusion."[1] (Section

[1] Chapter 5 separately estimates storage loss for areas south of the seawater intruded area based on groundwater level declines, arriving at an average annual storage loss for this area of 560 AFY (rounded to 600 AFY in Chapter 6). (Chapter 5, p. 5-27.) It is clear that Chapter 5 treats both the 12,550 AFY volume of seawater intrusion and the 600 AFY based on groundwater level declines as forms of storage declines: the "total annual average change in groundwater storage is the sum of the changes in groundwater storage due to groundwater elevation changes and seawater intrusion." (Chapter 5, p. 5-

6.3.2.) The 12,600 AFY figure is the rounded seawater intrusion value taken from Chapter 5:

> This analysis considers the average historic change in storage due to seawater intrusion to be -12,550 AF/yr., which is the total of the 180- Foot and 400-Foot Aquifers storage changes. <u>This storage loss is in addition to the change in groundwater storage due to changes in groundwater elevations</u>.

(Chapter 5, p. 5-37.) It is difficult to understand why the Table 6-8 historical water budget relies on the SVIHM's preliminary estimate of 2,900 AFY of seawater intrusion instead of the 12,600 AFY seawater intrusion figure that "this GSP considers . . . to be the annual rate of storage loss due to seawater intrusion." (Section 6.3.2.)

And again, it appears that the SVIHM model was not calibrated to the data that can be measured.

STORAGE LOSS IS INTERNALLY INCONSISTENT: The bottom line storage loss in the historic budget presented in Table 6-8 is 600 AFY. This number apparently represents the "decline in groundwater storage <u>based on measured groundwater elevations</u> from 1944 through 2019 . . . estimated to be 600 AF/yr. in the Subbasin, as described in Section 5.2.2." (Section 6.3.2.) Again, this number excludes the loss of storage due to seawater intrusion, which Chapter 5 estimates to represent 12,550 AFY. (Chapter 5, p. 5-37.)

Equally problematically, like the groundwater pumping figure, the 600 AFY loss of storage number is <u>not</u> derived from the SVIHM, purportedly because the model "contains significant variability and uncertainty." (Section 6.3.2.) The variability is not unexpected in a subbasin that experiences wet and dry years. The uncertainty is not explained. It should be.

Since the 600 AFY figure is simply plugged into Table 6-8, it is not consistent with the rest of the data in Table 6-8. But the point of a water budget analysis is to present set of inflows and outflows that <u>balance</u>. Accordingly, the net storage loss in Table 6-8 ought to represent the sum of the positive signed inflow values and the negative signed outflow values. The fact that the 600 AFY storage loss figure is inconsistent with the rest of the data is evident from the fact that the summation of the rest of the data would indicate a storage loss of 53,100 AFY, not 600 AFY. The 600 AFY value simply bears no consistent relation to the other reported values.

As discussed further below, the 600 AFY figure also dramatically understates overdraft, notwithstanding the implications in Chapter 6 that the overdraft is only 600 AFY.

37.) As discussed below, this total storage loss is a measure of overdraft ad defined by Bulletin 118.

2. Future budget

"ADJUSTED" VALUES ARE INTERNALLY INCONSISTENT: The future water budget summarized in Table 6-13 is presented as a "simulated" version and an "adjusted" version. Again, the "adjusted" version uses historical average pumping instead of the model's estimate of pumping, a 36,100 AFY difference. (Table 6-13 [compare results for adjusted and simulated future year 2030].) Again, the "adjusted" version's net storage loss of 600 AFY is simply inconsistent with the rest of the "adjusted" values, which if summed up would indicate storage loss of 46,300 AFY.

As with the historical budget, the future budgets, both simulated and adjusted, use a value for seawater intrusion that is inconsistent with the value derived in Chapter 5 by actually measuring the area subject to intrusion.

So neither the simulated nor the adjusted versions are calibrated to either the groundwater pumping measurement or the seawater intrusion estimate.

The apparent rationale for presenting the adjusted version is that the adjusted future water budget's estimate of change in storage is somehow "more reasonable" than the simulated version's:

> As described for the historical water budget, data indicate that the Subbasin has historically been in overdraft (on the order of 600 AF/yr. decline), as described in Section 5.2.2. Even though the SVOM anticipates -10,500 and -11,300 AF/yr. change in storage for 2030 and 2070, respectively, the adjusted historical decline in storage is used with the adjusted pumping estimates to provide a likely more reasonable estimate for projected sustainable yield.

(Section 6.4.3.) Chapter 6 does not explain <u>why</u> the lower 600 AFY estimate of change in storage is more reasonable. It should.

In effect, Chapter 6 presents some modeled values and some measured values and makes no effort to use them consistently in a balanced water budget for either historical or future conditions. It appears that the modeled results in Tables 6-8 and 6-13 have little if any informational value.

3. Sustainable yield

Chapter 6 determines sustainable yield without using any of the values estimated or simulated by the SVIHM or SVOM. Table 6-9 determines historical sustainable yield based on

- GEMS reported pumping values of 114,800 AFY to 136,600 AFY, not the SVIHM's estimate of 94,500 AFY;

- the 600 AFY storage loss estimated by analysis of groundwater elevation changes, not the SVIHM's estimate of 14,800 AFY; and
- the 12,600 AFY seawater intrusion estimated based on the change in the mapped seawater intruded area analyzed in Chapter 5, not the SVIHM's estimate of 2,900 AFY.

Similarly, Table 6-15's estimate of future sustainable yield uses the same data sources and takes nothing from the SVOM.

The purported rationale for ignoring the modeled values is to maintain consistency with the sustainable yield for historic conditions:

> To retain consistency with the historical sustainable yield, projected sustainable yield can be estimated by summing all the average groundwater extractions, subtracting the average loss in storage, and subtracting the average seawater intrusion. This represents the change in pumping that results in no change in storage of useable groundwater, assuming no other projects or management actions are implemented

Again, although Chapter 6 presents modeled values for some water budget components, it makes no effort to use these values to determine sustainable yield. And it fails to provide any explanation for rejecting the modeled results.

4. Overdraft

SGMA requires an express quantification of overdraft. (23 CCR, § 354.18(b)(5).) The purpose of this requirement is to ensure that the GSP actually mitigates that overdraft:

> If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.

(23 CCR, § 354.44(b)(2).)

Nowhere does Chapter 6 provide an unequivocal quantification of overdraft for either historical or future conditions. Instead, Chapter 6 repeatedly implies that the 600 AFY loss of storage, calculated based on groundwater elevation changes for the areas not yet subject to seawater intrusion, represents the entire overdraft. This approach is misleading because it omits the loss of storage due to seawater intrusion, which Chapter 5 estimates to be 12,600 AFY.

First, chapter 6 rejects the modeled estimates of overdraft, even though these estimates at least appear to be in the same neighborhood as an overdraft figure that includes both forms of storage loss: the loss represented by groundwater level declines south of the intrusion area and the loss represented by the seawater intrusion itself. Chapter 6 states that "Averaged over the historical period, the preliminary SVIHM estimates that the 180/400- Foot Aquifer Subbasin is in overdraft by 14,800AF/yr." However, the discussion immediately characterizes this number as suspect because “this simulated overdraft contains significant variability and uncertainty.” Chapter 6 does not mention the number again. Chapter 6 also claims that the future model overestimates overdraft:

> As discussed earlier, the current, preliminary version of the SVIHM, and by inference the SVOM, appears to overestimate the historical overdraft in the Subbasin and therefore underestimate the historical sustainable yield.

(Section 6.4.4.) However, Chapter 6 fails to explain why the model may be inaccurate or to provide a clear alternative statement of the magnitude of the overdraft.

Instead, Chapter 6 misleadingly implies in its note to the Table 6-8 historical budget that only the net storage change of 600 AFY estimated for the areas south of the seawater intruded areas counts as overdraft: “The net storage value is the estimated historical overdraft based on observed groundwater levels, as described in Sections 5.2.2 and 6.3.2."

And in its discussion of future conditions, Chapter 6 again implies that the overdraft is only 600 AFY:

> As described for the historical water budget, <u>data indicate that the Subbasin has historically been in overdraft (on the order of 600 AF/yr. decline)</u>, as described in Section 5.2.2. Even though the SVOM anticipates -10,500 and -11,300 AF/yr. change in storage for 2030 and 2070, respectively, the adjusted historical decline in storage is used with the adjusted pumping estimates to provide a likely more reasonable estimate for projected sustainable yield.

(Section 6.4.3, emphasis added.) Again, this discussion implies that the only portion of the overdraft that needs to be considered is the 600 AFY storage loss in areas south of the intruded area and that the portion of the overdraft that causes seawater intrusion somehow does not count.

But pumping that causes seawater intrusion <u>is</u> part of the overdraft. Bulletin 118 defines overdraft as follows:

> Overdraft is “the condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years.

> Moreover, groundwater overdraft can cause adverse effects including chronic decline of groundwater levels, loss of stored groundwater, intrusion of seawater into coastal basins, land subsidence, degradation of water quality, stream flow depletion, degradation of groundwater-dependent ecosystems, and increased pumping costs.

(DWR, Bulletin 118, California's Groundwater Update 2020, p. 4-24.) SGMA expressly adopts the Bulletin 118 definition of overdraft. (23 CCR, § 354.18(b)(5) [If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions].)

Clearly, the magnitude of the overdraft is not even approximated by the 600 AFY figure. At a minimum, Chapter 6 should acknowledge an overdraft condition based on the difference between its sustainable yield estimates and groundwater pumping since that is the amount by which pumping exceeds average long term recharge, an approach consistent with the definition of overdraft in Bulletin 118. Based on the sustainable yield data in Table 6-15, the difference between sustainable yield and pumping, i.e., the apparent overdraft, is 13,200 AFY under 2030 conditions. This is an order of magnitude higher than the 600 AFY overdraft reported for the non-seawater intruded area.

5. Intersubbasin flows

The Monterey Subbasin GSP reports subsurface flows of 9,393 to the 180/400. (Monterey GSP, p. 6-23.) Unaccountably, the 180/400 GSP reports only 1,900 AFY. (Table 6-7.) This discrepancy should be resolved.

Yours sincerely,

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