LandWatch
monterey county

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Steve McIntyre, Chair
Salinas Valley Basin Groundwater Sustainability Agency
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Via email peterseng@svbgsa.org, camela@svbgsa.org

Subject: Comments on Groundwater Sustainability Plan (GSP) 180/400 foot
Chapter 6 Water Budget

Dear Chair McIntyre and members of the Board of Directors:

LandWatch appreciates the opportunity to comment on the GSP 180/400-foot Subbasin Chapter 6 Water Budgets.

As noted in the introduction to Chapter 6, many data gaps exist. These gaps include the unavailability of the USGS Historic Groundwater Model, double counting of annual groundwater and surface water pumping, lack of verifiable groundwater pumping data as addressed in our letter on GSP Chapter 7, and lack of data from the deep aquifer. Moreover, assumptions about climate change and average annual rainfall appear especially problematic in light of apparent discrepancies with California's Fourth Climate Change Assessment.

Given these uncertainties, to achieve sustainable yield—whatever that yield turns out to be—it may be necessary to significantly reduce groundwater pumping more than the 7% reduction contemplated in Chapter 6. It is therefore incumbent on the Agency to adopt a robust adaptive management strategy that establishes a conservative baseline reduction in pumping and adjusts pumping limits as data become available.

We offer these further comments:

Substantial uncertainty mandates a conservative estimate of sustainable yield.

The regulations provide that "uncertainty refers to a lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed." (23 CCR § 351(ai).) We are concerned that the extensive data gaps and high level of uncertainty are inconsistent with the general principle that "groundwater conditions must be adequately defined and monitored to demonstrate that a Plan is achieving the sustainability goal for the basin." (23 CCR § 350.4(a).)

In light of the uncertainty and data gaps, we urge that the GSA adopt a conservative estimate of the sustainable yield in developing sustainable management criteria, projects, and management actions. For example, as between the two different and currently unreconciled sustainable yield calculations in Chapter 6, one based on the historic water budget (95,700 AFY) and one based on the projected water budget (107,200 AFY in 2030), we recommend that the GSA use the lower estimate of sustainable yield, at least until the historic and projected sustainable yields have been reconciled with a historic groundwater model.

We also recommend that the GSA further reduce that lower estimate with reference to some quantification of its uncertainty. For example, until the effect of double counting has been resolved, the 95,700 AFY historical budget sustainable yield should be reduced by the best estimate of this double counting error.

A conservative estimate of sustainable yield here is mandated by the requirement that "sustainable management criteria and projects and management actions shall be commensurate with the level of understanding of the basin setting, based on the level of uncertainty and data gaps." (23 CCR § 350.4(d).) We note that the minimum thresholds for sustainability indicators must be "qualified by uncertainty in the understanding of the basin setting." (23 CCR § 354.28(b)(1).) Measurable objectives must also "be commensurate with levels of uncertainty." (23 CCR § 354.30(c).) The SVGBGSA must "take into account the level of uncertainty associated with the basin setting when developing projects or management actions." (23 CCR § 354.44(d).) And in deciding whether to approve the Plan, DWR must consider "whether sustainable management criteria and projects and management actions are commensurate with the level of understanding of the basin setting, based on the level of uncertainty, as reflected in the Plan." (23 CCR § 354.4(b)(3).)

Uncertainty must be quantified.

As drafted, Chapter 6 discusses the uncertainty of the historic and current water budgets in section 6.9 and then separately discusses the uncertainty of the projected future water budget in section 6.10.8.

The quantitative discussion of the uncertainty of the historic and current water budgets in section 6.9 only assesses "net uncertainty." The "net uncertainty" concept is in effect limited to a comparison of calculated versus estimated change in storage. The discussion acknowledges that there has been no effort to determine the uncertainty of each historic water budget component. It is not clear that the "net uncertainty" concept adequately reflects the uncertainty that may be caused by data gaps.

For example, Chapter 6 now acknowledges as a data gap some amount of unresolved double counting of extractions caused by the practice of reporting extractions as both groundwater pumping and as surface water diversion. Such duplicate reporting would clearly bias the calculated change in storage, tending to minimize it. If this error also biases the estimated change in storage, then the "net uncertainty" concept is an insufficiently robust assessment of uncertainty because it would not account for the duplicate reporting error.[1] Alternatively, if the

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[1] Estimated change in storage is based on groundwater levels and the storage coefficient. (Chap. 6, p. 17.) If the storage coefficient is determined with reference to the historic extraction data, then the double counting would infect both estimated and calculated change in storage.

estimated change in storage is independent of historic extraction data, then the relatively small reported "net uncertainty" of the historic budget masks the fact that the calculated storage change actually differs from the estimated storage. Similar considerations would apply to any water budget components for which there are data gaps, depending on whether and how they bias the change in storage determinations.

In sum, the "net uncertainty" concept in section 6.9 used to evaluate the historical water budge is an inadequate quantitative measure of uncertainty. Accordingly, it is not clear that the "net uncertainty" calculations actually support the conclusion that the historical budget is "reasonably reliable." (Chap. 6, p. 28.)

There is no quantitative assessment of the uncertainty of the projected water budget in Chapter 6. Section 6.10.8 merely offers the truism that models inherently contain some uncertainty.

The projected future water budget cannot be used to manage the basin without some quantitative assessment of its uncertainty. That assessment of uncertainty requires calibration of the model for the projected future water budget based on the historic water budget. In particular, the regulations require that the historical water budget include information that is "sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon." (23 CCR § 354.18(c)(2)(B).) However, we understand that because the USGS has not yet completed the historic model, the modeling of a future water budget has not yet been calibrated with reference to historic data.

Chapter 6 acknowledges this fundamental source of uncertainty by explaining that the projected water budget and the historical water budget are not "comparable" because they were developed using different approaches. (Chap. 6, p. 1.) The historical budget is based on compilation of past reports and the projected budget is based on the USGS model. The USGS model is not complete because it still lacks the historic model component. As Table 6-31 shows, there is a substantial variance in the sustainable yield determined with reference to the historical budget (95,700 AFY) and the sustainable yield determined through the projected future water budget (107,200). The difference may be increased to the extent that the historical budget overstates sustainable yield on the basis of double counting.

In sum, the major source of uncertainty is the substantial and unexplained variance between the sustainable yield derived from historical budget and the sustainable yield derived from the future budget. The mere acknowledgement that the historical and future water budgets are not "comparable" is not sufficient to justify any reliance on the projected future water budget. If the basin is to be managed on the basis of any consideration of a projected future water budget, then it is critical that there be some quantitative estimate of the uncertainty of the modeling of that projected water budget.

Assumptions regarding efficacy of future projects and management actions to address seawater intrusion in projected future sustainable yield should be spelled out.

We concur with Thomas Virsik's concerns about the projected future sustainable yield (June 4, 2019 letter from Thomas Virsik to the Planning Committee). In particular, Chapter 6 does not explain its assumption that seawater intrusion will be reduced from 10,500 AFY to 3,500 AFY by 2030, despite an increase in pumping and an increase in the change in storage. If this assumption is based on the assumed efficacy of existing or future management actions and projects, then Chapter 6 should identify them and the basis for their assumed efficacy.

Future operations of existing projects may in fact be subject to substantial changes. For example, Chapter 6 states that the modeling of the projected future water budget assumes “the current approach to reservoir management taken by MCWRA.” (Chap. 6, p. 30.) However, it is not clear that this assumption is warranted in light of the withdrawal of NOAA’s Biological Opinion for the SVWP on February 20, 2019. Or for example, it is not clear whether and how the projected future water budget reflected the recent actions by the County to restrict pumping in the Area of Impact within the 180/400 Subbasin. The fact that the model projects that net pumping in 2030 and 2070 will be substantially greater than historical pumping suggests that the model assumes that the County’s recent well moratorium in portions of the 180/400 Subbasin will not have any lasting effect on pumping amounts.

The purpose of the water budget is to inform decisions about what projects and management actions the SVGBGSA should implement to control undesirable effects, including seawater intrusion. Assuming a partial solution in the projected future water budget is unjustified unless the projects or management actions responsible for that partial solution are (1) outside the control of the SVGBGSA and (2) certain to be implemented by other parties. If projects or management actions responsible for that partial solution are within the control of the SVGBGSA, then they should be weighed against SVGBGSA’s other options rather than being hard-wired into the water budget. If projects or management actions responsible for that partial solution are uncertain, then their uncertainty should be disclosed.

The increased reduction in groundwater levels in the projected future budget, compared to historic conditions, appears inconsistent with the projected lower levels of seawater intrusion.

Chapter 6 explains that “change in groundwater storage has two components in the Subbasin: change in groundwater elevation and seawater intrusion.” (Chapter 6, section 6.2.3.) The historic water budget’s 12,600 AFY change in storage consists of 2,100 AFY due to falling groundwater levels and 10,500 AFY due to seawater intrusion. (Table 6-20.) The 2030 projected future water budget’s 8,100 AFY change in storage consists of 4,600 AFY due to falling groundwater levels and 3,500 AFY due to seawater intrusion. (Tables 6-30 and 6-31.)

Falling groundwater levels cause seawater intrusion.[2] Accordingly, it is difficult to understand how, compared to historic conditions, the future water budget can project reduced seawater intrusion at the same time that it projects greater decreases in groundwater levels. This anomalous result should be explained.

The concept of “net pumping” is unexplained, and the Chapter includes inconsistent statements of historical pumping.

Chapter 6 uses the term “net pumping” in its discussion of the projected future water budget. (Chapter 6, p. 29; p. 30, Table 6-31.) By contrast, the discussion of historical and current pumping uses the term “total pumping.” (Chapter 6, pp. 15-16, Table 6-11 and 6-12.) What is being netted out in the discussion of future pumping?

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[2] Geoscience, *Protective Elevations to Control Seawater Intrusion in the Salinas Valley*, 2013, available at https://www.co.monterey.ca.us/home/showdocument?id=19642.

What is the reference intended by the asterisk after “Total Pumping” in Table 6-11 for historical pumping?

We note that despite Mr. Virsik’s June 4, 2019 letter, Chapter 6 still inexplicably reports total pumping for the historic period inconsistently. In the comparison of historic and future pumping assumptions used in sustained yield determination, Chapter 6 reports total pumping used to historical sustained yield as 86,500 AFY. (Chap. 6, p. 37). However, in its actual determination of historical sustained yield, Chapter 6 reports historic pumping as 108,300 AFY. (Chap. 6, Tables 6-11, 6-18, and 6-20.)

Transport of water out of subbasin is unaccounted.

Section 6.2.2 identifies groundwater pumping and subsurface outflows to adjacent subbasins as elements of the groundwater budget outflows. Chapter 6 does not appear to address the transport of water out of the subbasin by overlying landowners. We have seen documentation that suggests very substantial pumping of groundwater for irrigation outside the groundwater basin. If such pumping is occurring, it should be accounted for separately. It should also be determined if pumping groundwater for use that is not on overlying land is consistent with the Agency Act and with principles of groundwater law, and the GSP updated on whether and how to accommodate this pumping in the future.

Surface water inflows from Toro Creek is unaccounted.

No separate inflow is determined from El Toro Creek. Is this because El Tor Creek joins the Salinas River in the Monterey Subbasin? If so, then the model needs to reflect that the Salinas River exits the 180/400 Subbasin north of Highway 68, receives some augmentation from El Toro Creek, and then reenters 180/400 Subbasin. Otherwise there is no accounting for the El Toro Creek inflow.

Double counting of water withdrawals is unresolved.

In a June 18, 2019 letter, Thomas Virsik proposed a relatively straightforward method to identify or at least estimate double counting by identifying identical extraction numbers in the eWRIMS data and the MCWRA groundwater pumping submissions. Resolution of double counting may materially affect the sustainable yield calculation in the historic water budget, and can only tend to reduce it. Conservative management under uncertainty requires that, before the GSA relies on the historic sustainable yield calculation, it at least estimates this potential error and reduce the historic sustainable yield calculation by that estimate.

We note that Chapter 6 states that the modeling of the future water budget does not double count extractions. (Chap. 6, p. 27.) This means that only the historical water budget’s determination of sustainable yield has been overstated by double counting. This is not reassuring because it follows that the actual variance between the projected future sustainable yield determined by the USGS model (107,200 AFY in 2020 per Table 6-31) and the sustainable yield determined historically (95,700 AFY per Table 6-20) is even greater than disclosed by Chapter 6.

Climate change assumptions appear inconsistent with California's Fourth Climate Change Assessment.

Chapter 6 notes that "projections are based on the available climate change data provided by DWR (2018)." (pg. 29). Table 6-1 estimates the average historical (1995-2014) water budget from precipitation at 100,400 AFY (pg. 6). Table 6-23 shows a projected water budget from precipitation of 135,700 AFY in 2030 and 141,200 AFY in 2070, increases of 35% and 41% respectively from historic averages (pg. 33).

The Chapter doesn't explain how DWR's projections reconcile with those in California's Fourth Climate Change Assessment Central Coast Region Report. Table 6 in the Fourth Assessment shows historical average annual precipitation (1961-1990) of 19.3" increasing to 21.1-21.4" or ~20% by 2070 – much less than what DWR projects (pg. 16).

More importantly, the Fourth Assessment also notes:

- Average precipitation is expected to increase by a relatively small amount, but the <u>annual variability increases substantially</u> by the end of the century. (pg. 17)
- Projected future droughts are likely to be a serious challenge to the region's already stressed water supplies. (pg. 6)
- Water supply shortages, already common during drought, will be exacerbated. Higher temperatures may result in increases in water demand for agriculture and landscaping. Reduced surface water will lead to increases in groundwater extractions that may result in increased saltwater intrusion. Lower surface flows will lead to higher pollutant concentrations and will impact aquatic species. (pg. 7)
- Climate change projections of future extreme and prolonged droughts will exacerbate the region's water supply challenges. (pg. 21)

Chapter 6 should reconcile the apparent data discrepancies with the Fourth Assessment and also discuss how uncertainties in future precipitation patterns will impact groundwater budgets.

Finally, it is not clear that climate variability effects have been modeled. Increased peak precipitation years may not proportionately benefit the groundwater basin as much as increased drought years harm the basin. Peak precipitation may occur in large storm events discharged down the river and out to sea without resulting in proportionately higher basin recharge. However, it is clear that drought years do result in falling groundwater levels.

Future updates

Finally, we support updating the water budgets as soon as possible after data become available. Updating this Chapter is critically important to the overall planning effort to achieve groundwater sustainability in the 180/400-foot subbasin.

Thank you for your consideration of our comments.

Sincerely,

Michael DeLapa
Executive Director