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VIA ELECTRONIC MAIL

Board of Directors
Fox Canyon Groundwater Management Agency
c/o Mr. Jeff Pratt - Executive Officer
800 S. Victoria Avenue
Ventura, CA 93009-1610
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Re: Groundwater Sustainability Plans for the Oxnard Subbasin and Pleasant Valley Basin

Dear Chair West and Members of the Board:

The OPV Coalition and Oxnard/PV Ag Owners, Inc. (together, "OPV") have engaged O'Melveny & Myers LLP to provide comments on the Fox Canyon Groundwater Management Agency's ("GMA") Groundwater Sustainability Plan for the Oxnard Subbasin and Groundwater Sustainability Plan for the Pleasant Valley Basin released in July 2019 (individually, "Oxnard Plan" and "Pleasant Valley Plan"; together, "Plans"). Please accept this consolidated comment letter for both Plans.

OPV has two fundamental concerns respecting the Plans. The first is that the sustainable management criteria set forth in Section 3 of both Plans improperly and unnecessarily limits the sustainable yield of the Oxnard Subbasin and Pleasant Valley Basin (together, "the Basins"), and as a consequence, will unnecessarily restrict the cumulative quantity of groundwater available to support local water users and the regional economy. OPV's second concern pertains to how the pumping allocations and demand management (rampdown) criteria will be determined. The Plans, of course, do not establish the allocations or the rampdown criteria. We understand the GMA staff intend to present an allocation ordinance to the Board at its October meeting applying substantially the same approach applied in the draft ordinance discussed at its June 26, 2019 board meeting. As discussed further below, we respectfully urge the GMA to postpone such determination and instead embrace a stakeholder-driven process to address these critical issues. Specifically, we recommend that the Plans expressly describe a structured and facilitated process to seek stakeholder consensus on allocations and rampdown before the GMA revisits the issues by ordinance. When convenient, we request a meeting with the GMA's counsel to discuss opportunities to collaboratively resolve the issues presented herein.

I. OPV Represents Growers Committed to Collaborative Solutions in the Basins

The OPV Coalition is an association formed by some of the largest and most long-standing agricultural entities and landowners in the Basins. These include Duda Farm Fresh Foods, Inc.; Gladstone Land; AMS Craig, LLC; Arnold Ranch; and Reiter Affiliated Companies. Oxnard/PV Ag Owners, Inc. is a mutual benefit corporation whose members farm 23,000 acres in the Basins, close to 75 percent of the Basins' irrigable farmland. Together, OPV is responsible for a significant portion of the nation's food production.

OPV and its growers have participated in good faith in the GMA's groundwater management efforts for years. Rather than recounting this history in full, we direct you to the following correspondence to the GMA, incorporated herein by reference:

- David B. Cosgrove of Rutan and Tucker, LLP to GMA Board of Directors and its referenced correspondence (June 26, 2019) ("Cosgrove Letter")
- Craig Parton of Price, Postel & Parma LLP to GMA Board of Directors (March 30, 2018) ("Parton Letter")

OPV representatives have attended stakeholder workshops and GMA board meetings, provided comments on previous drafts of the Plans, and employed Dr. Steven Bachman to participate in the GMA's Technical Advisory Group. Further, at the GMA's request, OPV organized stakeholders to negotiate an allocation and replenishment plan for the Basin, which culminated in a whitepaper issued in February 2018. *See* Groundwater Pumping Allocation and Replenishment Plan Recommendations for the Oxnard Plain and Pleasant Valley Basins, Version 2 (February 7, 2018) ("OPV Allocation Proposal"). The effort took three years, but OPV's program obtained support from approximately 85 percent of the agricultural community as well as the cities of Oxnard and Port Hueneme; the Channel Islands Beach Community District; United Water Conservation District; Pleasant Valley County Water District; the U.S. Navy; and The Nature Conservancy. Notwithstanding these substantial efforts and broad coalition of support, the GMA's allocation proposal, as presented in its June 26, 2019 draft ordinance, starkly deviate from the OPV Allocation Proposal with respect to several critical issues, including how allocations are set.

II. The Plans Improperly Constrain the Sustainable Yield of the Basins and as a Result Are Vulnerable to Legal Challenge

As Dr. Bachman explains in his report ("Bachman Report"), which is attached hereto and incorporated herein by reference, the GMA has selected an improper basis for establishing sustainable management criteria and sustainable yield in the Basins. All agree that seawater intrusion is the primary undesirable result that must be avoided. The GMA, however, has used modeling of its favored strategies to define the scope of the problem rather than using a proper diagnosis of the problem to guide the appropriate strategies. This approach is backward and cannot survive scrutiny.

A rational approach to sustainability criteria for seawater intrusion would start with a determination of groundwater elevations at coastal monitoring wells necessary to prevent seawater intrusion, thereby establishing hydraulic equilibrium (on average) between fresh water

and seawater. *See* Bachman Report at 1-3. From that determination, the GMA could establish minimum thresholds and measurable objectives based on those elevations. With such criteria determined, the GMA could then run model simulations to determine which projects and management actions best (and most cost-effectively) achieve those minimum thresholds and measurable objectives.[1] *Id.* Such an approach is consistent with the logical progression of basin activities set forth in the SGMA Best Management Practices, which order planning ahead of identification of management actions. *See* Sustainable Management Criteria BMP, Modeling BMP 10 fig. 1 (2016).

Rather than follow this logical approach, the GMA just simulated how groundwater levels responded to its favored projects and set criteria based on that simulation.[2] Oxnard Plan at 3-13, 3-14. The GMA skipped the planning step and went directly to the project selection step.

This approach produces two critical problems. First, the Plans' strategies, as modeled, fail to stop seawater intrusion within the lower aquifer by 2040. Oxnard Plan at 2-247. Second, the modeled scenarios show a potential annual loss (waste) of more than 4,000 AFY of freshwater into the ocean in the upper aquifer. *Id*. Had the Plans proceeded logically, and first established groundwater levels that would produce necessary hydraulic head at coastal monitoring wells, the Plans could then select projects and management actions that would avoid further seawater intrusion through maintenance of coastal groundwater elevations without wasting thousands of acre-feet from the upper aquifer system. *See* Bachman Report at 1, 3-4.

As an additional error, the Plans set minimum thresholds for seawater intrusion at *inland* wells rather than at existing monitoring wells adjacent to the coast that are the proper locations for monitoring groundwater elevations adequate to prevent seawater intrusion. *Id.* at 3, 6.

Because of this error:

- Minimum thresholds are set at the wrong location and at considerably higher groundwater elevation levels than if they were calculated based on the groundwater elevations at coastal monitoring wells necessary to prevent seawater intrusion. *See id.* Such minimum thresholds set higher than necessary to avoid undesirable results violate the SGMA guidelines. 23 C.C.R. § 354.28(a).

- Measurable objectives are not set to the Plans' own criterion: the "water level at which there is neither seawater flow into nor freshwater flow out of the [aquifers]." Oxnard Plan at 3-20. None of the simulations produce that equilibrium. *Id.* at 2-247. Consequently, if

[1] The GMA has proposed several groundwater management projects that should have been included in the modeling: installing barrier wells, injecting treated river water into overdrafted basins, increasing diversions from the Santa Clara River, and shifting pumping to the Northwest Oxnard Plain. *See* GMA's 2007 Update to the Fox Canyon Groundwater Management Plan at iv (2007). The City of Oxnard proposed that desalination might become a viable future supply. *See* City of Oxnard Urban Water Management Plan at 41 (2015).

[2] The Plans' modeled projects are demand reductions and recharge and delivery from the City of Oxnard's Groundwater Recovery Enhancement and Treatment program.

the Basins operate as modeled in the Plans, there will be a significant and unreasonable waste of groundwater in contravention of the constitutional requirement that water be put to maximum beneficial use and not wasted. (Cal. Const. Art. X, § 2; *Erickson v. Queen Valley Ranch Co*., 99 Cal. Rptr. 446, 450 (Ct. App. 1971); (Constitutional provision "declares the state's policy to achieve maximum beneficial use of water and prevention of waste, unreasonable use and unreasonable method of use.").

- Sustainable yield cannot be determined from the Plans. The simulations either flush fresh water into the ocean or cause seawater intrusion, whereas sustainable yield requires optimization. Oxnard Plan at 2-247; Bachman Report at 8. In addition, the Plans never articulate or provide supporting documentation as to how the sustainable yield estimate in each Plan is derived from the model simulations, meaning that there is no way for reviewing experts like Dr. Bachman (or a reviewing court) to determine that those estimates are factually supported.

The Plans also fail to comport with other modeling requirements. DWR requires GSP models to "be responsive to changes in agricultural practices" in agricultural basins. Modeling BMP 23 (2016). In addition, models must be capable of capturing groundwater dynamics and must include inputs relevant to aquifer systems. *Id*. at 4, 13. This should logically include capturing reasonable variations in pumping due to precipitation or other factors. The GMA model, however, uses average pumping from 2015 to 2017 to model a static pumping rate of 68,000 acre-feet for both aquifers.[3] Oxnard Plan at 2-62. Consequently, the Plans' minimum thresholds do not reflect actual pumping behavior because the pumping variability is masked by an average number. By failing to account for pumping variability, the Plans' approach introduces the risk that groundwater elevations could drop below minimum thresholds in drought cycles—triggering cutbacks and other management actions—even where those levels are not actually permitting seawater intrusion. Bachman Report at 8-9.

Both TAG and Dr. Bachman previously raised these concerns with the GMA and its consultants. *See* Parton Letter at 4-7 (explaining history of TAG's comments and criticisms of the Plans and their development process); Memorandum from Dr. Steven Bachman to the GMA at 1, 3-4 (February 4, 2019). If left uncorrected, the Plans will be vulnerable to legal challenge pursuant to Water Code section 10726.6(e). *See Cal. Ass'n for Health Servs. at Home v. State Dep't of Health Care*, 138 Cal. Rptr. 3d 889, 899 (Ct. App. 2012) (court must invalidate agency action that is arbitrary or capricious, or where the agency fails to demonstrate a rational connection between evidence and the action chosen). To avoid the prospect of successful legal challenge, the GMA should amend the Plans in accordance with Dr. Bachman's recommendations.

III. The Plans Should Commit the GMA to a Specified Settlement Process for Resolving the Critical Allocation and Rampdown Issues

[3] Although the GMA specifies the 2015-17 time frame, the Plans do not provide actual pumping data. To support the conclusions concerning the sustainable yield and sustainability criteria, this data must be set forth in the Plans.

Both Plans provide that the "primary management action . . . is a Reduction in Groundwater Production." Oxnard Plan at 5-14; Pleasant Valley Plan at 5-4. Although demand management should not be the exclusive tool applied to address seawater intrusion in the Oxnard Basin,[4] OPV agrees that assignment of allocations and rampdown are necessary.[5] The GMA surely appreciates the controversy that these issues entail. It would benefit all parties to settle the allocation/rampdown issue through compromise rather than a comprehensive groundwater adjudication (Code of Civ. Proc. § 830 *et seq*.) like that underway in the neighboring Las Posas Basin.[6] Such a settlement will only occur if the various stakeholders, holding diverse interests and opinions, reach substantial agreement on an allocation plan. For this reason, OPV respectfully urges the GMA to initiate a comprehensive, structured, and facilitated settlement process shortly after adoption of the Plans. We further recommend that the GMA amend the Plans to commit to such a process, specifically including a description of the process, defined scope, and schedule for completion of negotiations.

The retention of a professional facilitator with experience guiding multi-party negotiations over natural resource conflicts could greatly enhance the potential for success. Organizations such as the Consensus Building Institute and Kearnes & West employ facilitators with such requisite expertise. Such a process could build from the substantial consensus reflected in the OPV Allocation Proposal. Emergency Ordinance E would remain in effect throughout negotiations, continuing the demand reduction it has realized year over year since its inception.

IV. The Approach Taken in the GMA Draft Ordinance Is Inconsistent with the Common Law and Is Unacceptable to OPV Members

We are mindful that there remains significant disagreement concerning allocation approaches. Although some support the GMA's prior draft allocation ordinance, its approach—as OPV has already explained, *see* Cosgrove Letter at 1—fails to follow the common law, is unacceptable to OPV members, and risks litigation. We now understand the GMA staff intends to present an allocation ordinance to the Board for consideration at its October meeting, presumptively applying a similar approach to that set forth in the earlier draft ordinance. We respectfully urge the GMA to postpone that ordinance in favor of the facilitated approach described above. If the GMA intends to adopt an allocation ordinance similar to the prior draft, several legal and equitable infirmities will result, which are briefly discussed below.

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[4] GMA, *supra* note 1.

[5] Allocations facilitate demand reduction, groundwater markets, and the assignment of financial burdens for developing new sources of supply.

[6] Although the GMA's enabling act authorizes it to restrict pumping and SGMA authorizes the GMA (as a groundwater sustainability agency) to develop groundwater allocations, allocations and correlated pumping restrictions must adhere to common law water rights principles. *See* Wat. Code §§ 10720.5, 10726.4(a)(2), 10726.8(b); *City of Barstow v. Mojave Water Agency*, 99 Cal. Rptr. 2d 294, 306 (Cal. 2000). Thus, an allocation scheme that does not adhere to common law water-rights principles is likely to be challenged.

The prior draft allocation ordinance's use of a distant historical base period of 2005-2014 produces dramatic windfalls for some users at the expense of others. It particularly disfavors long-time growers of lower-water-demand crops and pumpers who assisted in groundwater management by voluntarily using surface supplies during the base period. In some circumstances, those who have maintained low-use crops, such as citrus, are destined to receive less than half the amount per acre than those with high-use crops, such as turf farms, would receive. Surface-water recipients may receive even less—with no assurance that such supplies will be available in future years, and despite the fact that they paid for those supplies. In addition, surface water recipients still retain common law groundwater rights. *See* Wat. Code § 1005.1 *et seq.* (preserving groundwater rights when an alternative supply is substituted).

Those with windfalls under the regime may even reduce use through conservation or transition to lower-demand crops and sell their surplus water back to those with inadequate supplies. Thus, the allocation approach set forth in the earlier ordinance is, in essence, an unjustified wealth transfer among users.

Such radically disparate, outdated allocations are inequitable and, ultimately, legally infirm. Equity is an important element of any allocation regime—particularly so with respect to allocations among landowners holding correlative overlying rights. Achieving equity requires consideration of a number of factors, including current need; historical use cannot be the sole proxy for allocation. *Tehachapi-Cummings Cty. Water Dist. v. Armstrong*, 122 Cal. Rptr. 918, 924-25 (Ct. App. 1975) (each owner's proportionate share is not predicated on past use over a specified time period); *see also Prather v. Hobe*rg, 24 Cal. 2d 549, 560 (Cal. 1944) (when allocating limited supplies among holders of correlative rights [riparian and overlying rights], "[t]he apportionment should be measured in the 'manner best calculated to a reasonable result,' and the court may adopt any standard of measurement 'that is reasonable on the facts to secure equality'").[7] The exclusive reliance on a historical base period stretching back almost 15 years, which rewards those with historically higher use and prejudices those that conserved water over this period, is also inconsistent with fundamental aspects of water policy that encourage reasonable and beneficial use of water, avoidance of waste, and the preservation of groundwater rights for those that have undertaken efforts to conserve water. (Cal. Const. Art. X, § 2; Wat. Code § 1005.1.).

The OPV Allocation Proposal would be far more equitable and legally supportable. It initially allocates water by each user's relative percentage of recent use. Proposal at B9. The burden of reduction would be shared among all water users and starts from a position of current need. The OPV approach reflects an equitable compromise between the interests of growers of higher- and lower-demand crops, and more accurately reflects current irrigation practices.

While OPV favors the proposal that it developed with broad user support, it appreciates that some disagree with that proposal. In the interest of facilitating dialogue and avoiding premature litigation, OPV urges a return to negotiations with the assistance of a professional facilitator.

[7] SAMUEL C. WIEL, WATER RIGHTS IN THE WESTERN STATES, Vol. 1 § 751 (3d ed. 1979).

The equitable principles reflected in the OPV proposal are important issues for discussion, but OPV remains willing to discuss additional ideas for a fair resolution of this important issue.

V. Conclusion

OPV has several significant technical, legal, and equitable concerns with the approach taken in the draft Plans and the anticipated allocation ordinance, but wishes to remain a collaborative partner with the GMA and other water users in transitioning the Basins to a more sustainable future. All Basin stakeholders should have the opportunity to work together to achieve that result.

Sincerely,

Russell McGlothlin

O'MELVENY & MYERS LLP

Technical Analysis of Groundwater Sustainability Plans for the Oxnard Plain and Pleasant Valley Subbasins, July 2019

Steven Bachman, PhD
September, 2019

INTRODUCTION

The primary goal of the GSPs for the Oxnard Plain and Pleasant Valley subbasins is that seawater intrusion be contained to 2015 areas. I agree that prevention of further seawater intrusion is the appropriate goal. The priority of basin pumpers is that this goal be achieved in the most efficient manner and with the least disruption to the agricultural economy of Ventura County. This technical analysis addresses concerns about whether actions considered in the current GSPs actually prevent all seawater intrusion and whether projects and sustainability criteria are appropriate means to efficiently do this.

EXECUTIVE SUMMARY

The GSPs for the Oxnard Plain and Pleasant Valley subbasins are fundamentally flawed in the approach taken to set sustainability criteria and in the management strategies to prevent seawater intrusion. Instead of a typical method of determining conditions that would prevent seawater intrusion, then testing strategies in a groundwater model that would satisfy these conditions, the GSPs have done this backwards. Instead, the GSPs use a small set of management strategies in a groundwater model to determine the conditions necessary to prevent seawater intrusion. These are not the method that have been used historically in the Oxnard Plain, Santa Maria, and Seaside basins. Of additional concern is that the modeled management strategies do not prevent seawater intrusion in all aquifers, a primary goal of the GSPs, but at the same time allow thousands of acre-feet per year of discharge of fresh water to the ocean from other aquifers.

The first significant problem with the backwards approach used in the GSPs is that the sustainability criteria (Minimum Thresholds and Measurable Objectives) are determined by the modeling results from the small number of solutions tested, rather than on well-known criteria to prevent seawater intrusion. The second significant problem is that the solutions used in the modeling are not the same ones that were shown to be the most effective in previous work by United Water Conservation District. The third significant problem is that the solutions do not prevent all seawater intrusion.

The GSP sustainability criteria require high groundwater elevations in interior areas, with an offshore gradient. At the coastline, it is appropriate to require groundwater elevations that prevent further seawater intrusion, but other areas of the State have solved seawater intrusion

in other ways than a strong offshore gradient in inland area (Orange and LA counties have solved the problem with barrier projects that do not require offshore gradients in inland areas). If the Measurable Objectives and Minimum Thresholds are set in inland areas rather than at the coast, future projects may be precluded from consideration. The GSP needs this flexibility of meeting coastal standards without precluding other approaches in management.

TECHNICAL ANALYSIS

The Oxnard Plain and Pleasant Valley GSPs are flawed in a number of ways. These flaws are not cosmetic – they result in sustainable yields that are too low and Measurable Objectives and Minimum Thresholds that will be difficult to meet in the future. The added costs and restrictions caused by implementation of the GSPs will be significant and disruptive. The main flaws are outlined below, with a further discussion following.

1. Sustainability criteria should be based on 1) groundwater elevations at the coastline that prevent seawater intrusion and 2) water quality standards near the front edge of the current location of seawater intrusion;
2. The current method of determining sustainability is based on modeling simulations rather than on measured conditions that would prevent undesirable results;
3. Model simulations to determine sustainability have not been optimized, with GSP simulations indicating an average of thousands of acre-feet per year of discharge of fresh water into the ocean;
4. Projects considered in model simulations in the GSPs did not include projects considered by United Water Conservation District in their simulations that resulted in higher sustainable yield and less discharge of fresh water to the ocean;
5. Sustainable yield is based on simulations with these large discharges of fresh water to the ocean in the Upper Aquifer and continued seawater intrusion in the Lower Aquifer;
6. Measurable Objectives are not set according to criteria delineated in GSPs;
7. Model simulations used a single pumping rate for wells, rather than the documented pumping patterns that vary considerably between wet and dry years. This resulted in Minimum Thresholds determined from the model that were unrealistically high in elevation;
8. The recommended ramp-down in pumping over the first five years is based on the flawed sustainable yield discussed above.

1. <u>Sustainability criteria should be based on 1) groundwater elevations at the coastline that prevent seawater intrusion and 2) water quality standards at the front of the current location of seawater intrusion</u>: The common criteria to prevent seawater intrusion is that groundwater elevations at the coastline be at sufficient height to prevent seawater moving from offshore areas on to the land. These groundwater elevations are several feet above sea level, depending

upon the aquifer. These groundwater elevations provide a gradient between the coastal wells and the offshore outcrops of the aquifers that prevent landward movement of seawater. It is when the coastal groundwater elevations drop below these required elevations that seawater intrusion occurs. The Fox Canyon GMA previously used such coastal criteria on the Oxnard Plain[1] as criteria to prevent seawater intrusion.

To ensure that seawater that is already in some coastal areas does not progress farther inland, criteria based on water quality are the most straight-forward approach. In fact, the guidance for seawater intrusion criteria include, "The minimum threshold metric for **seawater intrusion** shall be the location of a chloride isocontour."[2] Thus, we are suggesting that coastal groundwater elevations be paired with water quality criteria to properly assess future sustainability.

2. Method of determining sustainability is based on modeling simulations rather than measured conditions that would prevent undesirable results: The main undesirable result in Oxnard Plain and Pleasant Valley is seawater intrusion. There is a series of nested USGS monitoring wells along the coast that have provided groundwater elevation data since the early 1990s. Historically, the metric to prevent seawater intrusion was to maintain high enough coastal groundwater elevations on average through wet and dry cycles[3]. In the GSP Technical Advisory Group, of which I am a member, there was significant discussion of whether to use groundwater elevations just at coastal wells or instead a coastal groundwater gradient. There was no discussion by TAG members of using modeled groundwater elevations as sustainability criteria. There was never a satisfactory explanation to TAG about why the GSP criteria were based on model results rather than coastal groundwater elevation criteria.

Monitoring wells at the coastline have been used on the Oxnard Plain for years to determine whether conditions exist for seawater intrusion. It is inexplicable that the GSPs do not use this method to set sustainability goals for seawater intrusion. Inland wells are simply not in the appropriate location.

Instead of using groundwater elevations in coastal USGS monitoring wells as sustainability metrics, the GSPs use a more convoluted method. Model simulations were constructed using United Water Conservation District's regional groundwater model, with a small set of projects and pumping reductions implemented. These model simulations were then subjected to second-order processing (particle tracking) to approximate how particles at the landward edge of the current seawater intrusion would move through time. This use of particle tracking assumes that seawater moves only according to groundwater gradients. This assumption is not correct, because other processes, such as dilution, dispersion, and sedimentary patterns, also affect seawater movement. It is not clear what error this assumption introduces into the

[1] Fox Canyon GMA, 2007, Update to Groundwater Management Plan.
[2] California Department of Water Resources, 2017, Best Management Practices for the Sustainable Management of Groundwater, p. 10.
[3] E.g., Fox Canyon GMA, 2007, Update to Groundwater Management Plan.

sustainability criteria and sustainable yield.

3. Model simulations to determine sustainability have not been optimized, with GSP simulations indicating an average of thousands of acre-feet per year of discharge of fresh water into the ocean: The GSPs considered a few solutions with varying selected projects and pumping reductions. These include use of recycled water and fallowing of agricultural fields. However, there apparently was not an attempt to optimize these projects and pumping reductions that would result in both no net seawater intrusion and no net fresh groundwater lost to the ocean. In fact, as illustrated below (Figure 1), the solutions resulted in continued seawater intrusion in the Lower Aquifer at the same time that there were thousands of acre-feet per year of fresh water discharged into the ocean. Seawater intrusion is not solved for the Lower Aquifer.

The solutions on which GSP results and sustainability criteria are based do not solve the seawater problem, as long as there continues to be seawater intrusion in the Lower Aquifer. These solutions are not sustainable because undesirable results continue to occur in the subbasins. It is thus not possible to determine the sustainable yield of the subbasins when none of the model runs prevent seawater intrusion.

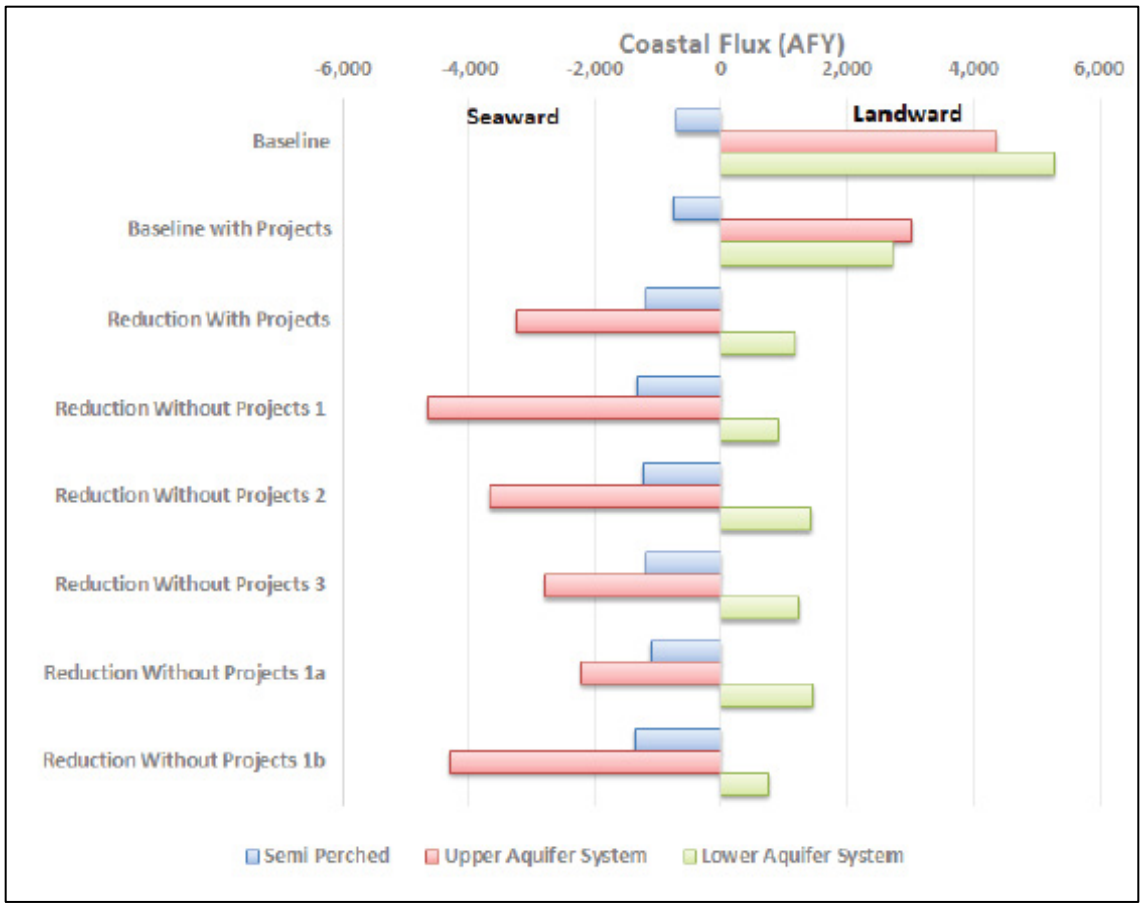

Figure 1. Coastal flux with different projects and pumping reductions (Oxnard Plain GSP, Figure 2-63). Seaward intrusion is towards the right, fresh water to the ocean is towards the left. The red columns are for the Upper Aquifer, indicating discharge of fresh water to the ocean under all solutions with pumping reductions. The green columns are for the Lower Aquifer, indicating continued seawater intrusion under all modeled solutions.

4. <u>Projects considered in model simulations in the GSPs did not include projects considered by United Water Conservation District in their simulations that resulted in higher sustainable yield and less discharge of fresh water to the ocean</u>: With the objective of eliminating seawater intrusion in the most efficient and cost-effective method, it is important that solutions be considered that meet this objective. The solutions used in the GSP modeling require severe pumping reductions, yet do not eliminate the undesirable result of continued seawater intrusion. During the GSP process, United Water Conservation District independently used their groundwater model to perform a number of model simulations to determine the types of projects that could help prevent seawater intrusion[4]. Projects such as a seawater barrier or in-lieu deliveries to pumpers near the coast are not only logical projects used in Ventura County

[4] United Water Conservation District, 2017, Preliminary Evaluation of Impacts of Potential Groundwater Sustainability Indicators on Future Groundwater Extraction Rates – Oxnard Plain and Pleasant Valley Groundwater Basins, Open File Report 2017-2, 68 p.

and elsewhere, but they were more successful in reducing seawater intrusion than the projects included in the GSPs[5].

These United Water model simulations included: 1) Uniform pumping reductions in Oxnard Plain and Pleasant Valley subbasins, 2) pumping reductions largely in the Lower Aquifer, 3) management area at coast with no pumping, 4) no coastal pumping and reduced Pleasant Valley pumping, and 5) no coastal pumping and increased inland pumping. Replacement water for the area with no pumping would come from new wells and infrastructure to move water to where it is needed, a strategy that has been in place on the Oxnard Plain and Pleasant Valley for decades. United Water has also modeled separately a seawater barrier pumping and desalting project[6], which functions similarly to an injection barrier. It is inexplicable why United Water's projects weren't used, especially since the GSP scenarios didn't prevent seawater intrusion and United's did.

An unintended consequence of excluding important projects from the GSP modeling may be the inability to get timely grant funding for these projects in the future.

Other good examples of successful strategies to prevent seawater intrusion are in Orange and LA counties. Injection barriers in those coastal locations prevent seawater intrusion and meet the criteria of coastal groundwater elevations somewhat above sea level. However, interior areas landward of the coast may have groundwater elevations below sea level, as long as coastal groundwater elevations are maintained. Both Figure 2 and Figure 3 are in inland areas of the Oxnard Plain, where groundwater elevations could potentially be much lower with the right projects. Thus, these inland areas are not the correct location to have sustainability criteria for seawater intrusion.

[5] United Water Conservation District, 2017, ibid.
[6] United Water Conservation District, 2014, South Oxnard Plain Brackish Water Treatment Feasibility Study, 66p.

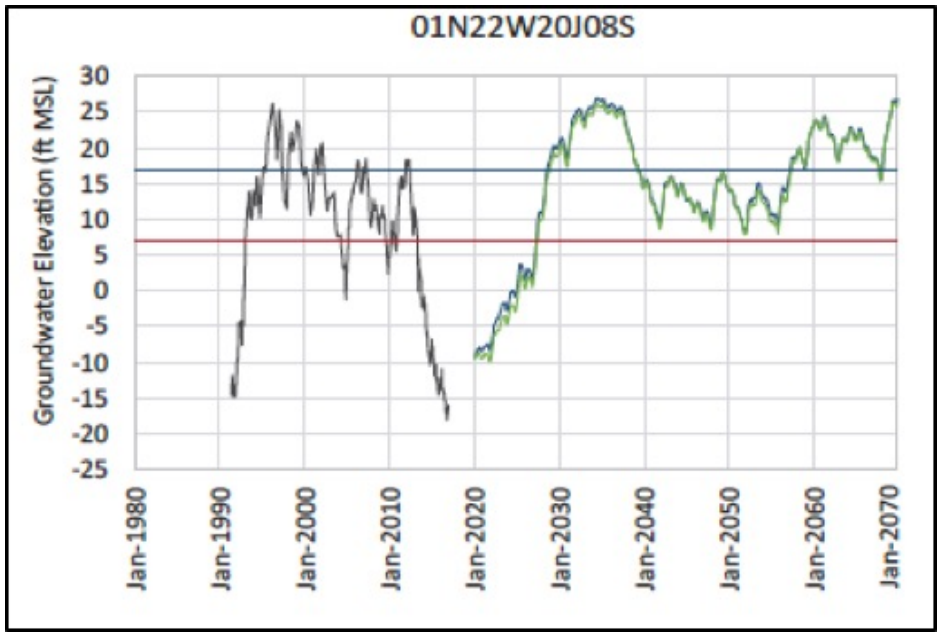

Figure 2. GSP sustainability criteria shown at USGS inland well 20J8 (Oxnard Plain GSP, Figure 3-6a). The left of the chart are measured data, the right indicates modeled data. The lower horizontal line is the Minimum Threshold, the upper horizontal line is the Measurable Objective.

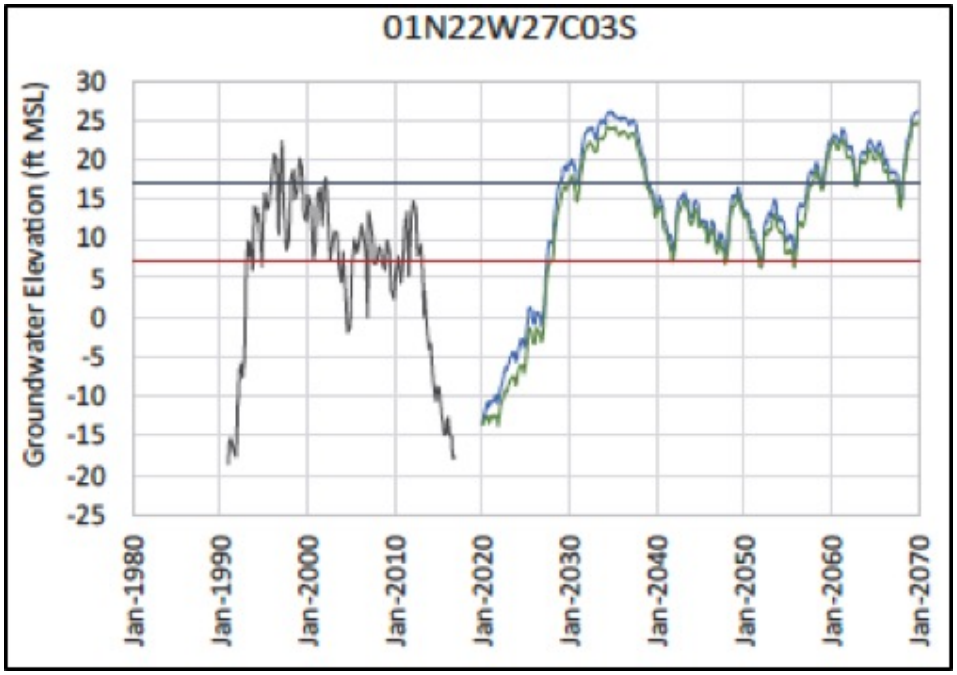

Figure 3. GSP sustainability criteria shown at USGS inland well 27C3 (Oxnard Plain GSP, Figure 3-6b). The left of the chart are measured data, the right indicates modeled data. The lower horizontal line is the Minimum Threshold, the upper horizontal line is the Measurable Objective.

5. Sustainable yield is based on simulations with these large discharges of fresh water to the ocean in the Upper Aquifer and continued seawater intrusion in the Lower Aquifer: The sustainable yield was calculated based on modeling of a small set of solutions involving projects and pumping reductions. As discussed in #3 above, none of these solutions resulted in sustainability because there continued to be seawater intrusion in the Lower Aquifer and large discharges of fresh water to the ocean in the Upper Aquifer.

Calculating a sustainable yield based on solutions that do not meet sustainability criteria is not possible – it just can't be done that way. The GSP appears to extrapolate the unsuccessful strategies to determine sustainable yield. No graph or further explanation of the technique used in the GSP were presented. Because groundwater modeling gives non-linear results from one set of projects/pumping reductions to another, it is not clear how this extrapolation could be accurately accomplished.

As discussed in item #4 above, there is a larger set of projects and management strategies that optimize sustainability against costs and economic disruption. These optimized projects and strategies result in elimination of undesirable results, at the same time increasing the sustainable yield over that proposed by the GSPs. This can be done by focusing on projects and reductions near the coast, where the undesirable results are occurring.

6. Measurable Objectives are not set according to criteria delineated in GSPs: The Oxnard Plain GSP states that "the measurable objective is the water level at which there is neither seawater flow into nor freshwater flow out of the UAS or LAS"[7]. As discussed in #3 above, there were no model simulations that met the criteria so stated. Because none of the modeled solutions met the objectives of preventing seawater intrusion, modeled groundwater elevations cannot then be used to set Measurable Objectives – if those Measurable Objectives were met, there would continue to be seawater intrusion.

7. Model simulations used a single pumping rate for wells, rather than the documented pumping patterns that vary considerably between wet and dry years. This resulted in Minimum Thresholds determined from the model that were unrealistically high in elevation: The previous USGS groundwater model on the Oxnard Plain and Pleasant Valley and the United Water modeling of sustainable strategies discussed in #4 above, varied pumping for wet, average, and dry years. In contrast, the GSP model simulations used to determine sustainability had the same average pumping for all modeled years[8], whether they were wet or dry.

Fox Canyon GMA pumping records indicate that, logically, there is more pumping in dry years and less pumping in wet years. For example, during the period 1990 to 2017, Oxnard Plain pumping totals ranged from a low of 61,400 AFY to a high of 104,800 AFY. The effect of this improper assumption is that there is less of a year-by-year change in modeled groundwater

[7] Oxnard Plain GSP, p. 3-20.
[8] Oxnard Plain GSP, p. 2-63.

elevations than in actual groundwater elevations (the highs and lows are more subdued with no change in pumping).

Because Minimum Thresholds were developed from these subdued model results, these thresholds are set at a higher elevation than they would be if pumping followed climatic cycles and groundwater elevations had more annual swings in amplitude. In practice, future groundwater elevations would be at risk of regularly going below the Minimum Thresholds during dry years even if Measurable Objectives were met. Such violating of Minimum Thresholds would cause unnecessary alarm even though there are no undesirable results, and may lead to further unnecessary reductions in the sustainable yield of the basins. If the pumping is adjusted each year for wet and dry conditions, there would be more-appropriate (and lower elevation) Minimum Thresholds.

It is not clear if the 2015-17 pumping numbers used in the GSP and the modeling runs are correct. The FCGMA provided pumping records by well to the OPV Ag Owners Assoc. for the entire history of reported pumping. Those numbers averaged 74,000 AFY for the Oxnard Plain during 2015-17, rather than the 68,000 AFY used in the GSP.[9] Those numbers also average 16,660 AFY for Pleasant Valley, rather than the 14,000 AFY used in the GSP.[10]

8. <u>The recommended ramp-down in pumping over the first five years is based on the flawed sustainable yield discussed above</u>: The GSPs stated that "the exact reductions that will be implemented in the Subbasin over the next 5 years will be determined by the FCGMA Board based on the data collected and analyzed for this GSP"[11]. The GSP analysis indicated a sustainable yield that is likely to be the basis of calculated the pumping ramp-down for the first 5 years. However, this number is based on an incomplete analysis, with model simulations not optimized to incorporate viable projects, and with significant fresh water flowing to the ocean. Thus, the GSPs may result in an immediate, unnecessary effect on basin pumpers if the ramp-down is calculated from the flawed sustainable yield calculation.

RECOMMENDATIONS

The GSPs should be modified to substitute coastal groundwater elevations that prevent landward movement of seawater for Measurable Objectives and eliminate those inland Objectives that are currently based on incomplete modeling results that did not solve future seawater intrusion. Pumping should be varied by wet, normal, and dry years and Minimum Thresholds should be set accordingly. As required in the DWR BMPs, a chloride isochore should be the Minimum Threshold near the front of the current seawater intrusion. Modeling should only be used to examine the effectiveness of future management strategies in meeting sustainability criteria, and a larger list of management strategies should be used (including those modeled by United Water). Pumping should be varied by wet, average, and dry years

[9] Oxnard Plain GSP, p. 2-63.
[10] Ibid.
[11] Oxnard Plain GSP, p. 5-15.

rather than using the same pumping each year. The sustainable yield should be based on the optimized management strategies from the longer list discussed above. The optimized management strategies should prevent the continued undesirable result of seawater intrusion.