Merced Groundwater Sustainability Agencies (Merced)

Comments and Recommendations Prepared by Self-Help Enterprises (SHE)

August 19, 2019

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1. GSP Section: Plan Area

Detailed information regarding the location and depths of domestic wells and existing monitoring networks is currently lacking in the GSP. Please consider including a map that to the extent possible provides the location and depth of domestic and public drinking water supply wells. Also, on Figure 1-4, please include the community "The Grove".

1.1 Notice and Communication

Public Engagement, when done well, goes far beyond the usual participants to include those members of the community whose voices have traditionally been left out of political and policy debates[1]. It invites citizens to get involved in deliberation, dialogue, and action on public issues that are important to them. More importantly, it helps leaders and decision-makers have a better understanding of the perspectives, opinions, and concerns of citizens and stakeholders, especially the underrepresented ones. Please consider the following recommendations to ensure effective public engagement:

- To ensure that the three Groundwater Sustainability Agencies (GSAs) within the Merced Subbasin are taking into consideration diverse social, cultural, and economic elements of the population and developing specific outreach strategies tailored to these populations' unique characteristics, as required by the Sustainable Groundwater Management Act (SGMA), we recommend including more information about who these groups are and what specific strategies will be used to engage them.
- For Groundwater Sustainability Plan (GSP) development, SHE and Leadership Counsel for Justice and Accountability (LCJA) received grant funding from the Department of Water Resources (DWR) to assist Severely Disadvantaged Communities (SDACs) in participating in the development of local Groundwater Sustainability Plans. Through this grant-funded effort, SHE and LJCA have assisted the Merced GSAs' consultants (Woodard and Curran and the Catalyst Group) conduct public workshops by offering interpreting services and supporting community outreach efforts. SHE and LJCA conducted additional community outreach and capacity building activities in SDACS, attended several Merced Groundwater Sustainability Plan Stakeholder Committee (SC) meetings and conducted a focused technical review of the July 2019 Draft Merced GSP. However, relying on ongoing support from SHE and LCJA, who currently lack a long-term funding mechanism to support community participation, is not a sustainable approach to sustain community participation for the next 20 years of GSP implementation. In order to ensure proper engagement of underrepresented groundwater users, (Disadvantaged Communities, residents relying on domestic wells and other Spanish speaking users), each GSA should account for SDAC outreach, engagement and translation services when applying for state funding, establishing and approving operating budgets and enacting groundwater fees. GSAs should hire qualified consultants who have a record of proven demonstrated success in and clear qualifications for working with these stakeholders. Effective community outreach and engagement includes but is not limited to conducting direct community outreach, hosting local community meetings, providing information in Spanish and making interpreting services available at meetings and workshops.
- The current draft GSP provides limited information regarding how communication and updates related Plan implementation will take place and how this will be accomplished. Upon release of the draft GSP, SHE staff held two (2) community GSP review sessions within the Merced subbasin (Planada and Le Grand and El Nido). At these workshops, participants were provided information about SGMA, their local GSA and presented general information about the draft GSP. The workshops also included small and large group discussions. During these groups discussions, participants were asked to identify effective community outreach and engagement strategies for the Merced GSAs to include in the Notice and Communication section of the GSP. Participants were also asked to identify when, how often and how they would like to be notified and engaged during GSP implementation. Based on participants feedback, we offer following recommendations:
    - All GSAs should continue to strive for ongoing and equitable representation and participation of underrepresented groundwater users during GSP development and implementation. Most that attended the community GSP review workshops expressed interest in obtaining information during key GSP milestones and prior to the approval of

[1] DWR. (2018) Stakeholder Communication and Engagement.

important decisions, e.g. during public comment periods, plan updates and during the development and approval of the Merced Groundwater Allocation Framework and Merced Groundwater Reduction Plan.

- Utilize existing community venues for community meetings, workshops and events to provide information. For example, consider conducting short presentations during water board and school district board meetings. Venues should be carefully selected in order to meet the needs of the targeted audience. For example, when selecting a location for the Le Grand and Planada community GSP review workshop, water leaders opted to have the meeting in Planada because it would increase public attendance.
- Identify community social media (Facebook, Instagram, etc.) groups, pages and websites and post information. Continue to develop media advisories, press releases and work with local media outlets, such as local radio stations, television stations, and local newspapers (Livingston Chronicle, Merced Sun-Star Newspaper, Merced County Times Newspaper, etc.) to captivate a broader audience that are not being reached via the electronic-based outreach currently listed in the draft GSP.
- Residents in rural communities tend to have less or no access to the internet, which creates participation barriers to the various beneficial users in the subbasin. In order to mitigate these challenges, conduct site visits, door-to-door outreach, identify, and work with key community leaders /trusted messengers to distribute information and encourage community participation.
- Provide bilingual (English and Spanish) information and materials on the website, via email and consider inserting short notices (notices must include key messages, visuals and information that is relevant to the average water user) in water bills and/or community newsletters. At a minimum, this information should be provided during plan updates, and prior to critical decisions. For example, such critical decision points can include the adoption of groundwater fees, development and adoption of Merced Groundwater Allocation Framework and Merced Groundwater Reduction Plan.
- Partner with other educational programs to leverage resources and explore opportunities to educate different generational groups. For example, UC Merced has students that are seeking opportunities to learn and contribute on water policies issues in California and could be good partners for short-term projects.
- Consider posting e-newsletter articles provided to the Farm Bureau, East Merced Resource Conservation District, etc. on the Merced SGMA webpage.

2. GSP Section: Basin Setting

2.1. Hydrogeological Conceptual Model

We were pleased with the revised Hydrogeological Conceptual Model (HCM) section, which now incorporates most of the recommendations provided in our November 20, 2019 comment letter. We particularly appreciate the information provided regarding domestic well density, Figure 2-39, Table 2-7, general groundwater quality for each principal aquifer, and overall structure of this section, which allows a comprehensive understanding of key messages. The only additional recommendation we have is to feature DACs and SDACs on Figure 2-8. This additional information will allow stakeholders to assess which of these communities could benefit from future recharge projects.

2.2. Current and Historical Groundwater Conditions

SHE believes that the proposed Groundwater Conditions section can be improved in order to better achieve the objectives assumed in the GSP regulations and be more aligned with the guidance provided in DWR's GSP Emergency Regulations Guide. The current section lacks important information regarding the water issues affecting the groundwater sources of DACs and households relying on domestic wells.

As part of GSP Regulations Section 355.4, DWR is required to evaluate whether the interests of the beneficial uses and users of groundwater in the basin, as well as the land uses and property interests potentially affected by the use of groundwater in the

basin, have been considered[2]. DACs, SDACs, and rural families relying on shallow domestic wells are the most vulnerable to changes in groundwater conditions. As such, impacts to their drinking water sources caused by changes in groundwater levels, plume migration, increase of groundwater quality degradation, and subsidence should not be overlooked and deserve a more in-depth evaluation and description. A description of the current issues affecting these vulnerable users is key to demonstrating that the GSAs are taking proactive actions to protect their human right to water. Specific recommendations on how this section can be improved are provided in the forthcoming sections.

2.2.1. Groundwater Elevation

- Include a description of the groundwater level conditions in and around DACs and SDACs and show whether groundwater levels in these communities have led to dry wells or decrease in water production, in particular:
    - **Identify communities burdened by or susceptible to changes in groundwater levels.** As previously mentioned DACs, particularly SDACs and domestic well owners relying on shallow wells, are the most vulnerable to changes in groundwater levels. Therefore, it is imperative that the GSP properly identify vulnerable communities that have a higher risk of being affected by changes in groundwater levels. Doing so will help ensure that the human right to water of these communities is properly considered and protected.
    - **Include a description of the impacts experienced during the 2012-2016 drought.** Please consider summarizing successes and challenges experienced by local agencies and stakeholders when addressing those impacts (i.e.: interim household water tank program, grants/loan programs for replacement wells, an estimated number of wells still without a water source, etc.). For example, Section 3 Sustainable Management Criteria of the GSP, page 3-5, includes a map that identifies the location of the 130 beneficiaries of the interim household water tank program that ended in 2018. We believe that this type of information should be presented and discussed in the Basin Setting chapter, under Historical and Current Groundwater Conditions. A good understanding of what happened, including what worked well and what could be improved, can aide the Merced subbasin GSAs with the development of management actions that adequately prepares groundwater users to prevent and mitigate potential impacts of future droughts. This is important for wells that supply drinking water to vulnerable populations that have limited capacity and resources to respond to extreme weather events.
- It is critical that Merced GSAs provide maps (Figures 2-41, 42, 43, 44, 45, 46, 47, 48, and 49) overlaid with location of DACs, domestic wells, public water systems, and any other sensitive beneficial users to allow the reader to evaluate how groundwater issues correlate with drinking water supply areas.
- In page 2-63, please consider providing a description of potential impacts caused by changes to groundwater movement associated with heavy municipal and irrigation pumping. We are particularly concerned with water quality impacts that may occur due to plume contamination migration. We recommend clarifying the concerns associated with changes on groundwater movement and if the GSAs plan to address these patterns.
- In page 2-70, please consider adding a description of the potential impacts caused by changes on vertical gradients due to heavy municipal and irrigation pumping and the lack of proper well construction practices. We are particularly concerned with water quality impacts caused by upwelling (i.e. upward vertical migration) of saline water that increases salinity in the freshwater aquifer or other natural occurring contaminants such as Uranium and Arsenic. We recommend clarifying the concerns associated with changes on vertical gradient and if the GSAs plan to address these patterns.

2.2.3. Groundwater Quality

For the reasons identified below, the water quality analysis presented in the draft GSP appears to be inadequate, and does not appear to fully consider the groundwater quality issues that may affect the supply and beneficial uses of groundwater, particularly to what pertains to domestic well users and community drinking water systems, as required by GSP Regulations Section 354.16. Please consider the following recommendations:

[2] DWR. January 2018. Guidance Document for Groundwater Sustainability Plan Stakeholder Communication and Engagement.

- Include a description of the groundwater level conditions in and around DACs and SDACs and show whether groundwater levels in these communities have led to dry wells or decreases in water production, in particular:
    - Present information regarding drinking water wells that are not compliant with drinking water standards or are at risk of being non-compliant in a map or table so that stakeholders can easily understand and visualize how groundwater issues correlate with drinking water needs and challenges. We also recommend identifying communities burdened by or susceptible to multiple sources of pollution.
    - Add community, domestic water district and city boundaries to all figures in this section so that stakeholders can easily understand and visualize how groundwater issues correlate with drinking water supply areas.
- Improve groundwater quality analysis or clarify why certain data have not been included, in particular:
    - **Include the analysis of Uranium:** The draft GSP states that "The primary naturally-occurring water quality constituents are arsenic and uranium." However, despite being a primary water quality contaminant, uranium data are not reviewed and included in the document. Based on data listed as available in Data Management System (DMS; described in Appendix E), uranium data are available to the GSAs for review and analysis. In order to characterize the water quality conditions in the subbasin, uranium concentrations, including temporal and spatial trends, should be analyzed, in particular with respect to the use of groundwater by drinking water users.[3,4]
    - **Improve or clarify the analysis of Arsenic:** Arsenic is also identified in the draft GSP as a primary water quality contaminant. The draft GSP presents a five-year average of arsenic concentrations (2007-2012) as a contoured map, with no explanation as to the methodology used to contour the map. This methodology of presenting the data has the potential to obscure "hot spots" and localized trends. Appendix E presents time plots of arsenic concentrations from 1984 – 2012, and based on the data presented, areas of higher arsenic concentrations are present in the subbasin. The draft GSP also does not present any analysis comparing the change in arsenic concentrations to the change in water levels. Further, the draft GSP does not include any arsenic data post 2012, which is an omission of the evaluation of possible change in water quality as a result of the lowered water levels experienced during the recent drought and as required by GSP regulations. In addition, arsenic concentrations have been shown in some areas to have a relationship to the dewatering of the Corcoran Clay.[5] This spatial trend should also be evaluated, with data presented clearly with respect to the presence of the clay. The analysis of arsenic concentrations in groundwater are therefore incomplete with respect to 1) recent data, 2) correlation to changing water levels, and 3) relationship to the presence of the Corcoran Clay.[3,4] In order to properly characterize the water quality conditions in the subbasin, arsenic concentrations should be analyzed, in particular with respect to the use of groundwater by drinking water users.[6,7]
- Water quality spatial analysis techniques can be highly variable based off the approaches and assumptions used in the technical tool adopted. The current draft made available to the public does not thoroughly explain the methodologies used to develop the maps and could greatly benefit by providing some assurance that the analysis is accurate and reliable. In particular:
    - The draft GSP presents a five-year average of arsenic concentrations (2007-2012) as a contoured map, with no explanation as to the methodology used to contour the map. We recommend providing some assurance that the analysis is accurate and reliable.
    - Because the number and distribution of control points greatly influence the accuracy of spatial interpolation, we question if the methodology used to develop maps for some of the water quality contaminants is appropriate. There are several interpolation techniques, and each has a variety parameters that can produce different output

[3] DWR, 2017. *Best Management Practices for the Sustainable Management of Groundwater, Sustainable Management Criteria (BMP #6),* Draft November 2017.
[4] Stanford, 2019. *A Guide to Water Quality Requirements Under the Sustainable Groundwater Management Act,* Spring 2019.
[5] Smith, Ryan et al. "Overpumping leads to California groundwater arsenic threat." *Nature communications* vol. 9,1 2089. 5 Jun. 2018, doi:10.1038/s41467-018-04475-3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5988660/
[6] DWR, 2017. *Best Management Practices for the Sustainable Management of Groundwater, Sustainable Management Criteria (BMP #6),* Draft November 2017.
[7] Stanford, 2019. *A Guide to Water Quality Requirements Under the Sustainable Groundwater Management Act,* Spring 2019.

surfaces from the same input data. We recommend providing some assurance that the analysis is accurate and reliable. For the contaminants with a small number and distribution of control points (e.g. Figures 2-59 and 60), we recommend mapping that information through a more accurate colored point scheme to represent data for groundwater quality. In such a scheme, each well can be color categorized as green if the level is less than ½ MCL, yellow if it is ½ MCL to MCL, or red if greater than MCL. An example of these types of maps can be found in Eastern San Joaquin Groundwater Authority GSP, Chapter 2, Basin Setting.

- For Figures 2-61 and 62, we recommend clarifying the type of spatial interpolation adopted. Additionally, we recommend a different set of ranges so that it is possible to differentiate areas with nitrate levels safely below the MCL from areas where levels are approaching the MCL. A potential range to be adopted could be: <2.5, 2.5 – 5, 8 – 10 , 10 – 15 , 15 – 20 , 20 – 30 , 30 – 40 , 40 – 50, > 50. This type of information can support ensuring the protection of areas near DACS/SDACs where groundwater quality is below the MCLs and, thus, have good groundwater quality for drinking water use.

- For Figures 2-66, 67, 68, 69, 70, 71, 72, 74, 75, 76, 77, and 78, we recommend adding the location of the wells that provided water quality data to develop the maps (control points). Similarly, as described previously, if the number and distribution of wells is scarce to the point it can negatively affect the accuracy of mapping technique adopted, please consider using a different methodology to feature the groundwater quality data.

- It is critical that Merced GSAs provide all maps/figures overlaid with location of DACs, domestic wells, community water systems, and any other sensitive beneficial users to allow the reader to evaluate how groundwater issues correlate with drinking water supply areas.

- Some important units are missing from the narrative: On Table 2-10, we recommend clarifying that the 'Average Well Nitrate Concentration (mg/L as N with MCL equal to 10mg/L) Statistics (Merced Subbasin)'. On page 2-79, we recommend clarifying that 'the primary MCL for nitrate is 45 mg/L as NO_3'.

2.2.3. Subsidence

We recommend adding community, domestic water district, city boundaries, and canal infrastructure to all figures/maps in this section. Additionally, according to the Merced GSP Figures 2-79, 80, and 81, as well as the National Geodetic Survey vertical control bench mark H1235 RESET in Merced County, a large subsidence bowl is centered near the town of El Nido[8]. It is therefore recommended clarifying if subsidence is an issue that has caused impacts to land uses, property interests, roads, and water infrastructure for the community. If data and information is not currently available, consider adding as a data gap and further clarifying the GSAs' intention to monitor this particular matter.

2.3. Water Budget

The GSP water budget requirements are intended to quantify the water budget in sufficient detail in order to build local understanding of how historical changes have affected the six sustainability indicators in the basin, and ultimately use this information to predict how these same variables may affect or guide future management actions[9]. Another important reason to properly document water budget information is to ensure that DWR and the public are provided with sufficient information to demonstrate that the GSP conforms to all SGMA and GSP regulation requirements and demonstrate the ability to achieve the sustainability goal within 20 years and maintain sustainability over the 50 year planning and implementation horizon.

The focused technical review of the July 2019 Draft Merced GSP conducted by SHE and LCJA regarding the Water Budget (Appendix 1) concluded that the draft GSP made available to the public is incomplete, and a full evaluation of the model and assumptions cannot be made at this time. Without a complete GSP draft that thoroughly explains the assumptions and methods used for the development of the Water Budget, the public is unable to provide meaningful comments and recommendations. In particular:

- The draft GSP presents only a brief listing of the data sources used to specify conditions for the model periods used to develop the water budgets. There is very little discussion on how the model input relative to the water budget was

[8] https://www.usgs.gov/media/images/land-subsidence-near-el-nido-ca
[9] DWR, 2016. Best Management Practices for the Sustainable Management of Groundwater, Modeling (BMP #5), December 2016.

developed from the listed sources. The draft mentions that additional data used for model development is included in Appendix D (MercedWRM Model Documentation), but Appendix D is still under development and was not included in the draft GSP. Therefore, any additional data related to the water budget could not be reviewed at this time.

- According to the draft GSP, urban water demand is based on the 2015 Urban Water Management Plan (UWMP)[10] and municipal pumping records. However, no information is provided on the magnitude of the urban demand, population information, or per capita water use specified in the model. The draft GSP does not identify which municipal water providers provided data and which required estimation of water demand. Nor does it discuss how estimated water use from rural domestic water users or small community water systems was represented in the model or the magnitude of these values. Therefore, based on the limited data provided in the draft GSP, the public cannot review the drinking water demand estimates for domestic users, community water systems, or large urban water suppliers and make an assessment as to the appropriateness of the demands considered in the historical, current, or future water budgets.
- There is no specific information included in the draft GSP on how historical land use was determined from available data or how it varies over the historical water budget period. According to the draft GSP, the current water budget uses 2013 CropScape data and the projected water budget uses the 2013 CropScape data, 2015 agricultural water management plan projections, and information from local agencies and farmers. No summary of acreages by land use type is provided so the accuracy of the representation of urban and agricultural areas cannot be assessed by the public. Without this information the public cannot assess how domestic well users and small community water systems are represented in the land use data.
- The majority of the draft GSP section discussing the water budget focuses on the results of the water budget. These results are presented as average annual values for the entire subbasin, which limits the public's ability to evaluate and understand the impacts to DACs and small community water systems. Time series graphs of the water budget results are needed to evaluate if the water budget adequately represents the temporal variability and trends in drinking water demand. By presenting only subbasin-level water budget results and only as average annual values, the presented results are difficult to interpret with respect to drinking water use by DACs, as well as demands by other types of beneficial users.
- The draft GSP does not include any discussion of the uncertainty in the data used for the model and its potential effects on the water budget results. The GSP should include an uncertainty analysis to identify the plausible range in water budget results and an indication of the magnitude of the effects these inherent uncertainties may have on the water budget results.[11]
- The estimate of sustainable yield for the subbasin was determined using the Projected Conditions Baseline scenario. According to the draft GSP, in this scenario, agricultural and urban demand is reduced across the model domain to achieve a net storage change of zero. Agricultural demand was reduced by reducing agricultural land use. Urban demand was reduced by reducing the per capita water use. However, the draft GSP does not present information on how per capita water use reductions were determined or if they were applied equally to all drinking water users (municipal users, rural domestic users, small community waters systems, etc.). The document also does not include a discussion of how these reductions would affect domestic water users or small community water systems. Therefore, based on this, it is not clear how demands by drinking water users were considered in the sustainable yield calculation.

3. GSP Section: Sustainable Management Criteria

3.1. Sustainability Goal

We are concerned that degradation of groundwater quality has not been incorporated into the Merced Subbasin Sustainability Goal. This is particularly concerning given that the protection of water quality for drinking and for agricultural uses has been identified as a priority for users in the basin as mentioned in subsection 3.6, and documented in several

[10] The water budget section of the GSP refers to a singular UWMP, but does not specify if the UWMP used was for the City of Merced, City of Livingston, or both.
[11] DWR, 2016. Best Management Practices for the Sustainable Management of Groundwater, Modeling (BMP #5), December 2016.

meeting minutes of the Merced GSP Stakeholder Advisory Committee[12] [13] [14] [15]. Moreover, the impact of groundwater quality degradation is a critical problem experienced by many groundwater users within the Subbasin as described and identified in the Merced GSP subsection 2.2.4., in specific Table 2-8, page 2-77, where Merced County Department of Public Health identified adverse groundwater quality by region. Additionally, the 2019 Draft DAC Needs Assessment conducted as part of the Integrated Regional Water Management Disadvantaged Community Involvement Program for the San Joaquin River Funding Area, has identified communities that are currently out of compliance. Lastly, based on SGMA's inclusion of undesirable result No 4, it is clear that water quality degradation must be addressed in a GSP[16] and, thus, Merced GSAs should not exclude this important sustainability indicator from its sustainability goal.

- During the previously mentioned community GSP review workshops, participants were asked to share their vision for sustainability/provide recommendations for what should be included in the Subbasin's sustainability goal. Feedback provided at these workshops included preserving drinking water supplies, promoting water conservation, addressing groundwater quality, and identifying equitable solutions for all groundwater users. Based on participants' feedback, we recommend considering the revision of the current sustainability goal in order to fully integrate stakeholders' vision for groundwater management. For example, add language describing stakeholder's interest in preserving drinking water supplies for small communities, schools and households relying on domestic wells. The goal should also promote collaboration between groundwater users and uses. Below is an example of what other subbasins have considered.
    - "*Through implementation of projects and management actions tailored to each GSA that leverages resources and collaboration between groundwater users and uses, the broadly-stated Sustainability Goal for the _____Subbasin is to ensure that groundwater production and quality will preserve the viability of cities and existing agricultural enterprises as well as the viability of school districts, smaller communities, and households relying on shallow domestic wells. The Goal will also strive to fulfill the water needs of existing populations that commit to continued economic and population growth within the Subbasin boundaries.*"

3.2. Management Areas

Please clarify where information regarding the potential 'informal zones' will be described in more detail. If management areas (or informal zones) are defined in the future, please consider establishing management areas near drinking water systems and communities relying on private wells given their vulnerability to groundwater changes and impacts. For these areas, we recommend setting more protective water quality thresholds that are tied to Maximum Contaminant Levels (MCLs) for contaminants of concern, and groundwater level thresholds capable of responding to localized overdraft if the water table in these management areas drops beyond a very conservative level.

3.3. Groundwater Levels

The draft GSP sets the minimum thresholds (MTs) for groundwater levels as the shallower of: (1) the construction depth of the shallowest well in a two-mile radius of each representative monitoring well (RMW), or (2) the minimum pre-January 2015 elevation. The GSP further defines the undesirable result (UR) as being when greater than 25% of the representative monitoring wells (RMWs) are below their respective MT for two consecutive years. While the proposed MT may appear to be protective of shallow domestic wells, the focused technical review of the July 2019 Draft Merced GSP conducted by SHE and LCJA identified several data gaps and potential significant impacts to public water systems and domestic wells within and outside of the two-mile radius.

The current GSP does not adequately consider the groundwater impacts that may affect the supply and beneficial uses of groundwater as required by GSP Regulations Section 354.16. To avoid the risk of having DWR deem the Plan insufficient, please consider the following concerns and recommendations:

→ Concerns:

[12] http://mercedsgma.org/assets/pdf/meeting-materials/2019-04-22-SC-Meeting-Minutes.pdf
[13] http://mercedsgma.org/assets/pdf/meeting-materials/2019-05-29-SC-Merced-Meeting-Minutes.pdf
[14] http://mercedsgma.org/assets/pdf/meeting-materials/2019-06-24-SC-Meeting-Minutes-final.pdf
[15] http://mercedsgma.org/assets/pdf/meeting-materials/2019-02-25-SC-Meeting-Minutes.pdf
[16] Moran, T. and Belin A. (2019) A guide to Water Quality Requirements Under the sustainable Groundwater Management Act. Stanford Digital Repository. Available at: hhtps://purl.stanford.edu/dw122nb4780.

- **The water level MTs are set relative to the bottom of the total well construction depth.** A water supply well becomes unusable or subject to decreased performance and longevity as water levels fall within the screened interval, which will occur before water levels reach the bottom of the well. Therefore, many domestic wells within the two-mile radius may be impacted before this MT is exceeded or URs are triggered.
- **Limited spatial distribution of representative monitoring well (RMW).** Given the limited spatial distribution of the RMW network, a substantial proportion of domestic wells and community water supply systems within the subbasin have not been considered in the establishment of the sustainable management criteria for water levels, in specific MTs. Specifically, the technical assessment conducted by SHE and LCJA, determined that approximately 1,100 out of approximately 3,600 domestic wells in the subbasin are located outside of the two-mile radius areas used to establish these MTs. Nearly one-third of all domestic wells in the subbasin were therefore not considered in the establishment of MTs. For additional details please refer to Appendix 1, Figure 1. The RMW network also does not provide adequate coverage for the Planada Community Services District (CSD), Planada Elementary School, or Le Grand CSD; combined, these systems serve a population of over 6,800 people. Consequently, by not considering these key beneficial users in the Subbasin to setting groundwater level MTs, we are concerned that the proposed approach leaves them vulnerable to impacts.
- **The technical assessment conducted by SHE and LCJA, determined that many domestic wells are completed to shallower depths than the proximate water level MTs.** For additional details please refer to Figure 2 in Appendix 1. Figure 2 shows the approximate elevations of the domestic well depths (as estimated elevations) with an inset of Figure 3-3 from the draft GSP, which presents the groundwater levels at the proposed MTs for the RMW network. Domestic well depths are shown using the same color scheme as in the GSP figure, with red representing the shallowest wells and blue representing the deepest wells. Based on this assessment, it appears that many domestic wells are completed to shallower depths than the proximate water level MTs. We acknowledge that this assessment is a "quick and dirty" assessment of well elevations; however, the GSP does not clearly and transparently present the domestic well data used for the establishment of these MTs, nor does it present an assessment of how many and which domestic wells are expected to go dry if the MTs are reached. Per 23 CCR § 354.28, these assessments should be included in the GSP in order for the public and DWR to able to fully evaluate the ability of the proposed sustainable management criteria and monitoring program to protect beneficial users within the Subbasin.
- GSP regulations require a description on how the sustainable management criteria proposal may affect the interests of beneficial uses and users. Drinking water usage is an important groundwater beneficial use however the current draft fails to fully account for how this beneficial use may be impacted by the proposed MT approach.

→ Recommendations:

- SHE is eager to work with the Merced GSAs to ensure that the sustainable management criteria for groundwater levels is protective of drinking water sources. We believe the two major gaps in within the Merced sustainable management criteria for groundwater levels is the seemingly limited RMW network that does not provide adequate coverage in the vicinity of important drinking water users and the lack of a drinking water well impact analysis. Given the urgent need for a more protective minimum threshold SHE would like to offer the following recommendations:
    - Reconsider the proposed approach to setting water level MTs that leaves key beneficial users in the subbasin, specifically domestic well users and in particular members of disadvantaged communities (DACs), potentially vulnerable to impacts.
    - Expand current RMW network to include additional representative monitoring wells, particularity near vulnerable communities and groundwater stakeholders. Incorporate the new wells planned for El Nido and Planada as RMWs with established water level and water quality minimum thresholds, as quantifiable measurements of sustainability, as soon as they are constructed.
    - Conduct an assessment of how many and which domestic wells are expected to go dry if the MTs are reached and the number of wells that could go dry outside of the 2-mile radius of the proposed RMW. The analysis should also provide an estimate of how many well could go dry with the undesirable result definition proposal of when greater than 25% of the RMWs are below their respective MT for two consecutive years. Per 23 CCR § 354.28, these

assessments should be included in the GSP in order for the public and DWR to able to fully evaluate the ability of the proposed sustainable management criteria and monitoring program to protect beneficial users.

- On page 3-5, include a brief explanation regarding what happened with the 130 users after the interim water tank program ended in 2018. Please consider including this type of significant information in the Basin Setting chapter, under Historical and Current Groundwater Conditions.
- Please provide maps of the monitoring network (Figure 3-3) overlaid with location of DACs, domestic wells, community water systems, and any other sensitive beneficial users as it will allow the reader to evaluate the adequacy of the network to monitor conditions near these beneficial users
- On page 3-7, please clarify which year was used to project the average groundwater level to define the measurable objectives.
- For the hydrographs representing declining groundwater levels (Appendix F), we recommend adding a small side map featuring the location of the representative well and any nearby community relying on drinking water well.

3.4. Groundwater Quality

The current proposal of only defining sustainable management criteria for salinity is not protective of the human right to safe and affordable water, does not properly reflects Merced stakeholders' input, and is dissonant with the groundwater quality conditions presented in the GSP Basin Setting Chapter.

The draft GSP includes limited analysis of water quality constituents and defines URs for water quality as a "reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP." For the reasons identified below, the sustainable management criteria do not appear to be sufficient to ensure that the stated water quality UR of impacting the long-term viability of the groundwater resource, particularly for domestic water users including DACs, will be avoided.

We strongly believe that the proposed approach will not be allowed under SGMA and could lead DWR to deem the Plan incomplete or inadequate. We understand the complexity of setting sustainable management criteria for groundwater quality, particularly considering that, unlike most other undesirable results, groundwater quality is the subject of robust federal, state and local regulatory regimes carried out by a number of different entities. Nonetheless, the current proposal has significant gaps and has not properly described the facts and reasoning underlying the proposed minimum threshold. We ask Merced GSAs to consider our concerns and recommendations carefully:

→ Concerns:

- As per GSP Regulations Section 354.26, the description of undesirable results shall include the cause of groundwater conditions that would lead to or has led to undesirable results based on information described in the basin setting as well as stakeholders' input. The current proposal is discordant with what has been presented in the Basin Setting chapter and, more importantly, it does not reflect what stakeholders have identified as priority for groundwater management. It is unclear why key contaminants of concern presented in the Merced Basin Setting and highlighted as concerning by Merced stakeholders, particularly for drinking water use, have not been considered when defining the sustainable management criteria. The protection of water quality for drinking and for agricultural use was identified as a priority for users in the subbasin as documented in the Merced Stakeholder Advisory Committee meeting minute[17] [18]. Moreover, the GSP section Basin Setting, specifically Table 2-8, page 2-77, where the Merced County Department of Public Health identified adverse groundwater quality by region, and IRWM Draft DAC Needs Assessment (2019) which identified communities currently out of compliance, have identified a set of key contaminants of concern for the area other than salinity. It is imperative that Merced GSAs assume a more proactive role in groundwater quality and reassess the sustainable management criteria for water quality. **All drinking water contaminants of concern as identified in the GSP Basin Setting section should be considered (e.g. nitrate, hexavalent chromium, arsenic, uranium, perchlorate, petroleum hydrocarbons, pesticides, solvents, and emerging contaminants).**

[17] http://mercedsgma.org/assets/pdf/meeting-materials/2018-06-25-SC-Meeting-Minutes.pdf
[18] http://mercedsgma.org/assets/pdf/meeting-materials/2018-08-27-SC-Meeting-Minutes.pdf

- The draft GSP sets MTs for groundwater quality for only five representative monitoring wells within the subbasin.[19] This represents only one well for over 153 square miles of groundwater subbasin, or 0.65 wells per 100 square miles. This monitoring well density is just barely within the established DWR guidance for monitoring well densities of between 0.2 and 10 wells per 100 square miles.[20] Further, the DWR guidance provides a range of recommended monitoring density and notes that the frequency of monitoring wells depends on local geology, extent of groundwater use, and how the GSP defines undesirable results. Given the complexity of this subbasin and the geographic distribution of sensitive beneficial users, this proposed network of water quality RMWs appears to be insufficient to monitor impacts to groundwater for drinking water beneficial users, particularly domestic well users and DACs.
- Figure 3, Appendix 1, shows the location of domestic wells within the subbasin. Each dot is scaled to represent the number of wells located within a given PLSS Section (i.e., approximately a 1-square mile grid cell). Figure 3 also shows the location of the five water quality RMWs. Over 2,600 out of 3,600 domestic wells in the subbasin are located outside of a two-mile radius of these RMWs. Over 70% of all domestic wells in the subbasin are therefore located more than two miles from RMW locations where water quality sustainability will be evaluated against MTs.
- As shown in Figure 3, Appendix 1, nearly 70 community water systems are located in the subbasin, most of which are located far from the water quality RMWs, including the Planada CSD, Le Grand CSD, and many systems supplying schools in the area. The proposed water quality representative monitoring network appears to be inadequate for measuring and quantifying the sustainability of the groundwater resource for these systems. The GSP explains that community water systems are required to conduct periodic water quality monitoring on their systems; however, this does not prevent the systems from being impacted by degraded water quality resulting from groundwater use and management actions in the subbasin. **At a minimum, the draft GSP should explain how the data from the community water systems will be incorporated into subsequent GSP evaluations and decisions. Further, the draft GSP should describe how the proposed RMWs will ensure that the groundwater used by these community water systems will be managed to avoid significant and unreasonable negative water quality impacts to these beneficial users.**
- **The draft GSP makes a key conclusion relevant to the long term management of water quality in the subbasin based on a conclusion that is unsupported by the analysis presented in the draft GSP.** The draft GSP provides the following justification for only establishing MTs for salinity: "Thresholds are not set for these constituents as there is no demonstrated local correlation between fluctuations in groundwater elevations and/or flow direction and concentrations of these constituents at wells."; "This GSP focuses on salinity as the constituent with the strongest causal nexus between water quality and SGMA groundwater management activities while including coordination with other water quality programs and agencies in the Subbasin"; and "Establishing minimum thresholds for constituents that cannot be managed by increasing or decreasing pumping was deemed inappropriate by the GSAs." (Section 3.6.2). The draft GSP makes the conclusion that there is no demonstrated correlation between water quality and water elevations, but does not present the data or analysis to support this claim. Merced GSP subsection 2.2.4 and Appendix E did not provide any grounded information that identifies which contaminants have the strongest causal nexus between water quality and SGMA groundwater management activities, nor a local correlation analysis between fluctuations in groundwater elevations and/or flow direction and concentrations of these constituents at wells. In particular, the draft GSP omits all water quality data collected after 2012 for arsenic. The water quality trend data presented in Appendix E only provides data through 2012 for selected water quality constituents (TDS, arsenic, nitrate, hexavalent chromium, DBCP, 1,2,3-TCP, etc.) and therefore does not present temporal trend data that would be associated with the lowered groundwater levels during the drought. This is an incomplete analysis of groundwater conditions that could have a significant impact to sustainability and the usability of the groundwater resource by drinking water users.[3,4] Additionally, there are a few studies that demonstrate considerable changes in water quality due to human-induced alteration of groundwater flow through groundwater pumping and groundwater recharge that has the potential to

[19] It is noted that the GSP acknowledges that water quality data from additional wells will be included for annual reporting purposes, but not compliance purposes under SGMA.

[20] DWR, 2016. *Best Management Practices for the Sustainable Management of Groundwater, Monitoring Networks and Identification of Data Gaps (BMP #2),* December 2018.

mobilize naturally occurring constituents[21] [22] [23] [24] and/or to mobilize or expand contaminant plumes[25] [26]. (Note: these studies were conducted in different geological and hydrogeological formations. Nonetheless, they support the statement that other constituents besides salinity may have important causal nexus between water quality and SGMA groundwater management type of activities such as pumping patterns and recharge projects). Moreover, any relatively high contamination plume in the basin has the potential for migration, which could be induced by groundwater extraction, lowering of groundwater levels, and cone of depression, and thus, can be managed by increasing or decreasing pumping.

- Lastly, the draft GSP also states that "The primary water quality constituents of concern related to human activity include salinity, nitrate, hexavalent chromium, petroleum hydrocarbons (such as benzene and MTBE), pesticides (such as DBCP, EDB, 1,2,3 TCP), solvents (such as PCE, TCE), and emerging contaminants (such as PFOA, PFOS). *Of these issues, nitrate is the most widespread issue with a direct impact on public health.* [Emphasis added.] Salinity is also an issue due to the widespread nature of the problem and difficulty of management given increases in salinity as a result of both urban and agricultural use." Table 2-8 indicates that the Merced County Department of Public Health considers nitrate to be an adverse groundwater quality parameter for most regions in the subbasin. Despite its widespread importance and impacts to drinking water the GSP does not set MTs for nitrate, or for any water quality constituent other than TDS. The justification given for this is that "Thresholds are not set for these constituents as the GSAs have no authority to limit the loading of nutrients or agrochemicals." **Per 23 CCR § 354.28, the draft GSP should provide a detailed explanation as to how this approach will result in protection of groundwater for DACs and other drinking water beneficial users in the subbasin.**

→ Recommendations:

- Without a scientific rationale that supports the statement that salinity is the constituent with the strongest causal nexus between water quality and SGMA groundwater management type of activities, we strongly recommend a revision of the current proposal for the groundwater quality sustainable management criteria. It is our understanding that GSAs have direct responsibility for complying with groundwater quality requirements where their GSPs call for groundwater recharge, water banking, significant changes in pumping patterns, conjunctive management or any other form of active aquifer management to achieve and maintain sustainability[27].
- SHE is eager to work with the Merced GSAs to ensure that groundwater management does not increase groundwater contamination, especially where groundwater is being used as a drinking water source. Given the need for a concrete minimum threshold that strongly protects the human right to drinking water, we recommend the following as a minimum threshold:
    - Consider all drinking water contaminants of concern as identified in the GSP Basin Setting section: nitrate, hexavalent chromium, arsenic, uranium, perchlorate, petroleum hydrocarbons, pesticides, solvents, salinity, and emerging contaminants.
    - For contaminants that are currently measuring under the MCL near drinking water systems, the GSA should set the minimum threshold for that contaminant at 80% of the MCL to protect drinking water sources. If that is not feasible, the GSAs could set the minimum threshold at the MCL and develop a warning system that informs when

[21] Vanderzalm, J.L., P.J. Dillon, K.E. Barry, K. Miotlinkski, J.K. Kirby, and C. Le Gal La Salle. (2011). Arsenic mobility and impact on recovered water quality during aquifer storage and recovery using water in a carbonate aquifer. Applied Geochemistry, (26):1946-1955.
[22] Fakhreddine, S., J. Dittmar, D. Phipps, J. Dadakis, and S. Fendorf. (2015). Geochemical triggers of arsenic mobilization during managed aquifer recharge. Environ.Sci. Technol., (49):7802-7809. doi:10.1021/acs.est.5b01140.
[23] nIzbicki, J, M.T. Wright, W.A. Seymour, R. B. McCleskey, M.S. Fram, K. Belitz, and B.K. Esser. (2015). Cr(VI) occurrence and geochemistry in water from public supply wells in California. Applied Geochemistry, 63:203-217. doi: https://doi.org/10.1016/j.apgeochem.2015.08.007.
[24] Ayotte J.D., Szabo Z., Focazio M.J., Eberts S.M. (2011), Effects of human-induced alteration of groundwater flow on concentrations of naturally-occuring trace elements at water-supply wells. Applied Geochemistry, doi:10.1016/j.apgeochem.2011.01.033
[25] DWR, Flood-MAR – Using Flood Water for Managed Aquifer Recharge to Support Sustainable Water Resources (June 2018 White Paper), pp. 26-27. See https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Flood-MAR/DWR_FloodMAR-White-Paper_06_2018_updated.pdf?la=en&hash=350DBD68452230C5CF1706C3E8EB1E3E3E613C25.
[26] Burow K.R., Dubrovsky N.M, Shelton J.L. (2007). Temporal trends in concentration of DBCP and nitrate in groundwater in the eastern San Joaquin Valley, CA, USA. Artivle in Hydrogeology Journal. Doi: 10.1007/s10040-006-0148-7
[27] Moran, T. and Belin A. (2019) A guide to Water Quality Requirements Under the sustainable Groundwater Management Act. Stanford Digital Repository. Available at: hhtps://purl.stanford.edu/dw122nb4780.

the contaminant reaches 80% of the MCL due to groundwater management activities. For contaminant levels approaching the MCL, the GSAs could consider taking the following actions: notify nearby domestic well owners and community water systems, undertake an analysis to pinpoint the cause, provide information to groundwater users, reassess pumping allocation, and/or if the contaminant is clearly under the purview of another agency, confer with that agency and seek to confirm a plan to address the groundwater quality problem.

- For contaminants that are currently measuring above the MCL, the minimum threshold should be triggered when the GSA detects any consistent increase in the contaminant, caused by groundwater management activities. This will go a long way towards keeping any water quality contaminants from becoming worse.

- Additionally, for contaminant levels approaching the MCL and groundwater quality problems that either arose or were exacerbated after January 1, 2015, please consider the following approaches recommended by the Stanford report28:

  - Where there is a significant groundwater quality problem that is clearly under the purview of another agency, confer with that agency and seek to confirm a plan to address the groundwater quality problem. If such a plan exists, the water quality problem and the plan should be referenced in the GSP reviews.

  - Where a significant groundwater quality problem is not clearly under the purview of another agency, or the responsible agency is unable to confirm a reasonable plan to address the problem, confer with Regional or State Board staff, and perhaps affected parties, to identify a reasonable plan to address the problem. If no reasonable plan is identified, and remediating the problem is impractical, excessively wasteful of resources or otherwise infeasible, the GSA should include in the Plan an explanation of the problem and the reasons why remediation is impractical or infeasible.

- Lastly, we urge the GSAs to ensure that groundwater management does not cause further degradation of groundwater quality and take a precautionary role to protect communities' right to safe and affordable water. The strategic governance structure of GSAs can uniquely leverage resources, provide local empowerment, centralize information, and help define a regional approach to groundwater quality management unlike any other regional organization. Engaged effectively, GSAs could be instrumental in reducing levels of contaminants in their regions, thus reducing the cost of providing safe drinking water to residents. Understanding the challenge groundwater quality management poses, SHE believes that GSAs could assume a key role in groundwater quality coordination within their jurisdiction. GSAs are the only local agency that can be effective in comprehensively monitoring and minimizing negative impacts on water levels and contamination for rural domestic well users in their jurisdictions.

3.5. Subsidence

- Please consider adding El Nido community infrastructure as another example that have the potential to be damaged due to subsidence.

4. GSP Section: Monitoring Network

4.1. Groundwater Level Monitoring Network

For the reasons discussed previously, the groundwater level representative monitoring wells (RMW) do not appear to be sufficient to ensure that the stated lowering of groundwater levels are protecting the long-term viability of the groundwater resource, particularly for domestic water users including DACs, will be avoided. To understand these interactions, it is critical that GSAs develop sufficient monitoring networks, capable of detecting changes in groundwater level conditions related to active management. Please consider the following recommendations:

- Expand current RMW network to include additional representative monitoring wells, particularity near vulnerable communities and groundwater stakeholders. Incorporate the new wells planned for El Nido and Planada as RMWs with

[28] Moran, T. and Belin A. (2019) A guide to Water Quality Requirements Under the sustainable Groundwater Management Act. Stanford Digital Repository. Available at: hhtps://purl.stanford.edu/dw122nb4780.

established water level and water quality minimum thresholds, as quantifiable measurements of sustainability, as soon as they are constructed.

- Please provide maps of the monitoring network (Figure 4-1 and 6) overlaid with location of DACs, domestic wells, community water systems, and any other sensitive beneficial users as it will allow the reader to evaluate the adequacy of the network to monitor conditions near these beneficial users.
- Per 23 CCR § 354.28, DWR will evaluate the ability of the proposed monitoring program to properly assess impacts to beneficial users of groundwater and to protect beneficial users within the subbasin. As such, we recommend identifying which monitoring wells will be used to assess impacts to drinking water wells caused by changes in groundwater levels and clarifying how that assessment will be conducted. In particular, it is important to determine how the GSAs plan to monitor and assess drinking water wells at risk of dewatering.
- Table 4-5, consider identifying which groundwater beneficial use each monitoring well will be providing data for. If feasible, we recommend identifying the wells that will provide information to help assess groundwater level conditions for the cities, DACs and SDACs.

4.2. Groundwater Quality Monitoring Network

For the reasons identified below, the water quality representative monitoring wells (RMW) appears to be inadequate and do not appear to be sufficient to ensure that the stated water quality UR of impacting the long-term viability of the groundwater resource, particularly for domestic water users including DACs, will be avoided. GSAs undertaking recharge, significant changes in pumping volume or location, conjunctive management or other forms of active management as part of GSP implementation should consider developing a sufficient understanding of the interaction between subsurface geology, geochemistry and GSP projects in their basin [12]. To understand these interactions, it is critical that GSAs develop sufficient monitoring networks, capable of detecting changes in groundwater quality conditions related to active management.

- We would like to caution against Merced GSAs' approach that simply references other water quality programs for addressing water quality parameters, as shared by DWR staff during Merced GSP Stakeholder Committee meeting on May 29, 2019 meeting [29].
- The draft GSP sets MTs for groundwater quality for only five representative monitoring wells within the subbasin[30].This represents only one well for over 153 square miles of groundwater subbasin, or 0.65 wells per 100 square miles. This monitoring well density is just barely within the established DWR guidance for monitoring well densities of between 0.2 and 10 wells per 100 square miles.[31] Further, the DWR guidance provides a range of recommended monitoring density and notes that the frequency of monitoring wells depends on local geology, extent of groundwater use, and how the GSP defines undesirable results. Given the complexity of this subbasin and the geographic distribution of sensitive beneficial users, this proposed network of water quality RMWs appears to be insufficient to monitor impacts to groundwater for drinking water beneficial users, particularly domestic well users and DACs.
- We urge Merced GSAs to consider the recommendations identified below developed based on the Stanford report [18] to improve the groundwater quality monitoring network:
  - Develop supplemental or expand local groundwater quality monitoring networks where there are significant water quality data gaps. Decisions should be informed by: (1) the extent and quality of existing groundwater quality in the region, (2) the level of groundwater development, (3) the severity of existing groundwater quality issues and their proximity to domestic or irrigation wells, public water supply sources or other vulnerable users, (4) current or proposed groundwater management actions or projects, (5) local resources, and (6) the hydrogeologic complexity of the basin.

[29] http://mercedsgma.org/assets/pdf/meeting-materials/2019-05-29-SC-Merced-Meeting-Minutes.pdf
[30] It is noted that the GSP acknowledges that water quality data from additional wells will be included for annual reporting purposes, but not compliance purposes under SGMA.
[31] DWR, 2016. *Best Management Practices for the Sustainable Management of Groundwater, Monitoring Networks and Identification of Data Gaps (BMP #2),* December 2018.

- Consider including a description on how the GSAs plan to work with the Regional Water Quality Control Board to address groundwater quality issues and remain aware of programs in the Central Valley that are continuing to evolve and of any changing regulatory requirements.
- Consider clarifying how the GSAs plan to align groundwater monitoring efforts with any new groundwater quality monitoring efforts that might become available in the region (e.g. CV-SALTS).

- Please provide maps of the monitoring network (Figure 4-7) overlaid with location of DACs, domestic wells, community water systems, and any other sensitive beneficial users as it will allow the reader to evaluate the adequacy of the network to monitor conditions near these beneficial users.

6. GSP Section: Projects and Management Actions

6.1. Management Actions

6.1.1. Groundwater Allocation Framework

The foundation of a well-designed groundwater allocation framework requires a fair and adequate allocation of groundwater for drinking water uses, an additional margin for future growth, and rules that avoid or mitigate potential impacts to communities dependent on groundwater supplies. If these components are missing, the allocation framework can have significant negative impacts upon a community's drinking water supply. When developing a groundwater allocation framework, Merced GSAs should consider appropriate measurements to ensure that the framework is protective of the Human Right to Water (AB 685). SHE recommends the following:

- **Sustainable yield allocation:** Allocations for drinking water users and existing community water needs, which are responsible for a small percentage of overall GW pumping, should be allocated based on historic use plus an additional 10% margin for future growth prior to allocating to agricultural, commercial, and industrial users. We also suggest accounting for unaddressed water demand of DACs, SDACs, and underrepresented communities. Many of these communities rely on a single well (e.g. El Nido) or their current wells are not sufficient to meet the water demand and, thus, still need to secure an additional source in order to meet current demands and be less vulnerable. Additionally, some communities still rely on bottled water to address their water needs. We also recommend providing security considerations to support access to safe drinking water for DACs, SDACs, and underrepresented communities within GSA boundaries.
- **Allocation decisions time-frame:** In the context of extreme weather events and given the unique set of factors that play a role in the recharge of the aquifers within the GSAs area, we recommend that allocation decisions are not tied to a time frame but to an adaptive management methodology that can respond timely to undesirable results and adjust allocations accordingly. The adaptive management methodology could guide allocation decisions and be used as a corrective tool to avoid localized drawdown impacts on communities and ecosystems, such as dewatering of shallower wells and streams. Particular attention should be placed on protecting groundwater levels for drinking water beneficial uses in the vicinity of Drinking Water Systems of all kinds (municipal and unincorporated) and communities of households relying on private wells.
- **Banking allocation of groundwater:** Please consider that susceptibility to experiencing undesirable results from a given amount of pumping depends on hydrogeologic, climatological, biological, and other factors that can vary significantly within short and long periods. We recommend a short period for banking allocation. We are particularly concerned that allowing allocations to be bankable for more than 1 year could result in significant negative externalities. We also recommend that any allocation period be strictly tied to an adaptive management methodology that can respond timely to undesirable results and adjust allocations accordingly. This is particularly important in the context of changing climate and data uncertainties.
- **Transitional allocations and period:** We suggest the following protective measures in case excessive pumping is allowed or even if additional buffer allocations are made available to eligible GW users:
    - Develop an adaptive management methodology based on SGMA monitoring requirements to guide any allocation decisions and be used as a corrective tool to avoid localized drawdown impacts on communities and ecosystems.

- Restrict transitional pumping in excess of Sustainable Yield in the vicinity of drinking water systems and households relying on private wells if negative impacts are observed through monitoring, or if protective thresholds are exceeded.
- Develop mitigation measures that support communities, schools, and drinking water well owners in case negative impacts are observed/experienced.

- Prolonged droughts: When developing the Merced Groundwater Allocation Framework, please consider clarifying how the program will respond during long-term drought. We are particularly concerned with the significant impacts that domestic well users, DACs, and SDACs face during these extreme weather events. Please consider the following:
  - Recognize and appropriately account for negative externalities especially during prolonged droughts by designing allocation rules that support progress toward sustainability and sufficiently address negative impacts.
  - Provide security considerations to support access to safe drinking water for DACs, SDACs, and underrepresented communities within GSA boundaries during prolonged drought periods.
  - Provide security considerations to ensure that allocations during prolonged drought periods do not individually or cumulatively hinders communities and domestic well owners' rights to water access.
  - Develop an adaptive management methodology to be used as a corrective tool to avoid any localized drawdown impacts on communities and ecosystems, such as dewatering of shallower wells and streams.
  - Develop a drought drinking water prevention/mitigation plan that is capable to timely respond to families at risk or impacted by prolonged droughts.

- Transferability of allocations / Groundwater Markets: While relying on markets may sound like a straightforward and politically palatable solution to local groundwater management challenges, we suggest Merced GSAs approach them with a cautious, analytical eye. Changing where and when groundwater is pumped or the place, method, timing, or purpose of its use can change the impacts experienced by people and ecosystems. This is particularly important in the context of changing climate, lowering of groundwater levels, and water quality degradation. Please consider that local groundwater markets may not be a viable option where the potential impacts of trading are not well understood, where trading rules cannot sufficiently address negative externalities, or where the expected benefits of a market do not outweigh the burdens and uncertainties associated with designing and implementing it[32]. If implementing a Groundwater Market Framework, please consider the following:
  - Set aside an allocation for drinking water supply and existing community water uses based on historic use.
  - Provide security considerations for population growth and new community uses. We recommend an additional 10% margin for future growth.
  - Recognize and appropriately account for negative externalities by designing trading rules that support progress toward sustainability and sufficiently address negative impacts.
  - Provide security considerations to support access to safe drinking water for DACs, SDACs, and underrepresented communities within GSA boundaries.
  - Provide security considerations to ensure that transfers do not individually or cumulatively cause or contribute to violations of water quality standards.
  - Develop an adaptive management methodology to be used as a corrective tool to avoid any localized drawdown impacts on communities and ecosystems, such as dewatering of shallower wells and streams.
  - Devise ways to help engage, communicate and translate technical information to stakeholders, particularly to rural communities and private well owners.

6.1.2. Groundwater Demand Reduction Management Action

With the passing of SGMA and now the imminent GSP submission to DWR, groundwater has been a recurrent topic of discussion in water meetings, workshops, public events and has even received wide media coverage. With this increased public awareness of the challenges ahead, the Merced GSAs should carefully consider potential impacts of postponing the discussion of tough yet necessary groundwater demand reduction actions. We believe that now is the time to collaborate, discuss, require stakeholder input, and define policies that are hard yet inevitable to properly mitigate for the overdraft condition in Merced as required by

[32] Green Nylen, Nell, Michael Kiparsky, Kelly Archer, Kurt Schnier, and Holly Doremus. 2017. Trading Sustainably: Critical Considerations for Local Groundwater Markets Under the Sustainable Groundwater Management Act. Center for Law, Energy & the Environment, UC Berkeley School of Law, Berkeley, CA. 90 pp1

SGMA. Stakeholders that could be affected by groundwater demand reduction actions would greatly benefit from the knowledge and understanding of these new policies now and not later so that they can begin to plan accordingly for the future and viability of their activities. The current draft lacks detailed information, guidance and clarification of what may be approved and what stakeholders can expect of a Groundwater Demand Reduction Management Action. Merced GSAs should clarify that the proposed analysis and program development will be of high priority and conducted within the first year of GSP implementation.

Additionally, when developing a groundwater demand reduction program, Merced GSAs should consider appropriate measurements to ensure that the framework is protective of the Human Right to Water statute. SHE recommends the following:

- Groundwater Demand Reduction Exception to SDACs and DACs: Due to their small role on overall groundwater pumping percentage, drinking water systems, particularly systems supplying water to DACs and SDACs, should be except from any groundwater demand reduction action to protect their efforts on providing affordable safe water.
- Localized overdraft near DACs and SDACs: Particular attention should be placed on protecting groundwater levels and quality for drinking water beneficial uses near drinking water systems of all kinds (municipal and unincorporated) and households relying on private wells. We recommend that groundwater demand reduction actions be also used as a corrective tool to avoid localized drawdown impacts on communities, such as dewatering of shallower wells or plume movement. Drinking water wells at risk of dewatering or contamination due to nearby groundwater pumping should trigger groundwater demand reduction actions or other types of prevention/mitigation actions. Therefore, it is imperative that the Merced monitoring network and strategies assess impacts on drinking water wells due to lowering of groundwater levels and water quality degradation.
- Prolonged droughts: When developing the Merced Groundwater Demand Reduction Program, please consider clarifying how the program will respond during long-term drought. We are particularly concerned with the significant impacts that domestic well users, DACs, and SDACs face during these extreme weather events. Please see previous comments regarding prolonged droughts.
- Fees: When developing a groundwater user fee structure, please consider that small communities have fewer economic resources. Additional fees increase families' water bills that are normally already above the California water affordability threshold of 1.5% of MHI. During one of the community GSP review sessions, a resident from the El Nido mobile home park of about 60 homes, reported that to meet her domestic water needs she purchases bottled water as she does not trust the quality of the water supplied by the system. As a result, she pays around 77 dollars per month (27 dollars for the water provided by the system and an additional 50 dollars for bottled water). Moreover, it is important to recognize and value other ways DACs and low-income residents contribute to the implementation of SGMA. For example, the Merced Subbasin like many others around the State was granted a DAC waiver and as such qualified for $1.5 million in grant funds to offset the costs of developing the GSP. The DAC waiver was granted by simply demonstrating the number of DACs that are located within the subbasin. Additional grants were obtained to construct monitoring wells and a recharge basin. For these reasons, we recommend exempting small drinking water systems managed by DACs and De Minimis Extractors from any GSAs fees (use permits and penalty fees) to support their efforts on providing affordable safe water.
- Financial penalties: Penalties for DAC water providers with limited technical, managerial, and financial capacity have often been found by the SWRCB to be counter-productive. If Merced GSAs consider implementing a sort of penalty for over-use, at a minimum consider 1) creating a more flexible warning and appeal process with these users, 2) proactively assisting SDWS that may be at risk of over-extraction, and 3) conditional forgiveness and reduction of penalties should be considered. This would encourage transparency and working collaboratively with Merced GSAs to take corrective actions addressing the underlying causes of overuse. Ideally, we recommend that Merced GSAs consider exempting SDWS serving DACs from financial penalties for over-use.
- Transferability of allocations / Groundwater Markets: Please see previous comments regarding Groundwater Markets.

6.2. Projects

We are pleased that projects that address the water needs of DACs and SDACs are listed as a priority for project selection. We are also glad about the inclusion of the Planada Groundwater Recharge Basin Pilot Project and the El Nido Groundwater Monitoring Well. However, the GSP makes no mention that these new wells will become representative monitoring wells or that

MTs will be established for these wells. **To ensure that these new wells will provide a benefit to the communities of El Nido and Planada, these wells should be established as RMWs with established water level and water quality minimum thresholds, as quantifiable measurements of sustainability.** Setting these as RMWs will better support the GSAs to manage groundwater sustainably in this area and thus protect these beneficial users.

Lastly, we applaud Merced GSAs for collaborating with other programs and Agencies to implement projects targeted to enhance data availability for the entire Merced Subbasin area, such as the Merced IRWM Region Climate Change Modeling and Merced Groundwater Subbasin LIDAR.

For all projects pertaining to recharge and storage (Project 4 and 10) as well as future projects, SHE has the following comments and recommendations:

- Carefully designed and implemented recharge & storage projects can simultaneously provide benefits to communities, farmers, and ecosystems. Because of their multiple benefits, SHE supports the development of such projects. However, from the perspective of ramping up recharge efforts, it is also important to minimize the extent of any degradation of native ground water quality, as well as to minimize the need for and extent of additional treatment at the point of extraction. In some cases, groundwater recharge projects may do both – causing a near term worsening of legacy loading but longer term water quality improvement [13] [14].
- Currently, it is unclear if Project 4 and 10 include precautions to water quality and if groundwater quality is included in the monitoring plan of these projects. **We recommend providing security considerations to ensure that all recharge and storage projects do not cause nor increase groundwater contamination.** Attention should be placed on monitoring water quality, avoiding the use of contaminated soils through which water will percolate or use of surface water that is contaminated, and proposing strategies that can avoid/prevent/mitigate for any potential short and/or long term impact to drinking water wells, including domestic wells.

6.3. Important projects and management actions currently missing in the Merced GSP

Important projects and management actions are currently missing in the Merced GSP. Please see details below.

6.3.1. Drinking Water Wells at Risk of Dewatering Prevention/Mitigation Program

Based on our assessment of the water levels (Appendix 1), a significant proportion of domestic wells have the potential to be partially or fully dewatered if water levels reach the proposed minimum thresholds levels. However, the draft GSP does not include a well impact mitigation program. The GSAs only mention that they will evaluate during the first five years if a mitigation for shallow domestic wells that might be dewatered by declining water levels during the GSP implementation should be established. Considering the significant gaps in the groundwater levels sustainable management criteria and the proposal of postponing to after 2025 the implementation of any actions regarding groundwater allocation and pumping reduction, Merced GSAs should not postpone this evaluation and should be proactive in protecting important drinking water sources. That is particularly important if the regions faces another drought.

Merced GSAs should clarify how they plan to address wells that can be impacted from the GSAs policies and actions. As stated previously, it is imperative that Merced GSAs conduct a drinking water well impact analysis to evaluate how many wells can go dry and set clear monitoring strategies that can provide yearly information of drinking water wells at risk of dewatering.

A Drinking Water Well at Risk of Dewatering Prevention/Mitigation Program could include a combination of replacing impacted wells with new, deeper wells and/or connecting domestic users to a public water system. A plan to reestablish the emergency tanked water program paired with bottle water delivery may be an appropriate short-term solution, but would not be a good long-term solution for community members. Key considerations for establishing such a program could include:

- It is important to note that prevention, not mitigation, is the only way to effectively protect drinking water resources. As part of the program, we recommend developing a protective warning system that can alert groundwater managers when groundwater levels are dropping, or if the groundwater quality is worsening to a level that negatively affects drinking water users. Such triggers are essential for groundwater management, but can be adjusted to fit the needs of different management actions as well as the basin as a whole. The table below provides an example of what a warning system might look like, using green, yellow, and red light indicators or “triggers”, and some potential corrective actions

groundwater managers can undertake to remedy the problem. Ultimately, this approach allows for evaluating what is happening and reacting accordingly to prevent or mitigate negative impacts. Groundwater should be managed to avoid reaching a 'red-light' trigger. However, if negative impacts do occur, interim and long-term solutions are crucial to prevent further lowering of groundwater to protect drinking water users. While a permanent solution is pursued, interim solutions serve to address the immediate impacts and ensure access to safe drinking water.

Triggers	Groundwater Status	Potential Corrective Actions
Green-light	Groundwater levels & quality are stable.	No action required
Yellow-light	Groundwater levels/quality are approaching concerning levels and impacts may occur or are occurring at a low rate. Some corrective actions are needed.	- Undertake an analysis to pinpoint the cause - Provide support to groundwater users experiencing impacts - Reassess pumping allocation and pumping patterns and consider restricting or limiting groundwater extraction near the triggered area.
Red-light	Time to stop and mitigate as significant impacts are imminent or are occurring.	- Reassess pumping allocation and pumping patterns and consider further restricting or limiting groundwater extraction near the triggered area. - Provide interim emergency solution while pursuing a permanent solution to impacted groundwater users.

- Develop a tool/model tied to the monitoring network and the adaptive management framework (trigger system) to evaluate groundwater levels and predict potential groundwater impacts to drinking water wells. Update model regularly and develop prediction on potential groundwater impacts to drinking water wells annually.
- Groundwater should be managed to avoid reaching a 'red light' trigger and the implementation of a mitigation program should be implemented before wells begin to become unusable. This will allow communities working with the GSAs to access funding, and the planning and contracting will be completed such that the necessary construction will be implemented without unnecessarily leaving community members without access to drinking water. Thus, the program should be designed to be proactive, rather than reactive.
- When mechanical failure or other operational problems are reasonably likely to occurs, or have occurred, due to declining water levels, mitigation should be provided as described below:
  - Short-term water supply while a permanent solution is pursued. Short-interim solutions serve to address the immediate impacts and ensure access to safe drinking water. Short-term emergency supplies shall be provided as soon as reasonably possible and can include bottled water, bottled water paired with water tank, or other;
  - Long-term water supply can include: Funding to lower a well pump; Financial and technical support to complete a connection to an M&I water provider; Provide an equivalent water supply from an alternate source; Funding to replace an affected well with a deeper well that meets County well ordinance standards; Reduce or adjust pumping near impacted drinking water well as necessary to avoid the impact, and/or; Provide other acceptable mitigation as collaborated with affected drinking water well responsible.
- A secure and reliable funding source and mechanism for implementation of such a mitigation program needs to be identified. While grant or emergency funding could potentially be available for such a program when needed, the availability of these funds is not certain. A more secure funding mechanism is one that is developed and implemented at the local level. This can be accomplished and could be established via the adoption of future groundwater fees. Groundwater users that pump large amounts of groundwater should be the primary ratepayer for this fund. The fee should be charged on an annual basis.
- The implementation of a mitigation program should occur as soon as possible and prior to wells going dry. GSAs must be proactive rather than reactive. By implementing this program early on, funding will be available within the few years following GSP adoption and the GSAs will be better prepared to respond to the needs of vulnerable groundwater users that may be impacted while the GSAs work to reach sustainability.
- A well mitigation program should not be established after impacts are realized, as was the case with, the household water tank program during the last drought. Droughts are expected to occur more frequently and become more severe, and therefore such a mitigation program should be included as one of the management actions in order to ensure sustainable management for the subbasin.

6.3.2. Well permitting

With approximately 7,000 to 15,000 new wells constructed each year in California[33], GSAs have the difficult task to manage groundwater and mitigate for overdraft conditions[34]. From our understanding, well permitting is a key component to support addressing the groundwater challenges and overdraft conditions. As such, we recommend discussing and coordinating with the County feasible permitting criteria options that can be included in the County permitting process and support the successful implementation of the GSP. Suggestions include:

- Improve the well permitting record by adding and keeping track of well construction permits according to groundwater beneficial use for each new permitted well (e.g. agricultural, domestic, industrial, and municipal), identifying the reason for constructing a new well or well replacement, and well depth for monitoring purposes of potentially vulnerable well user communities.
- For construction of new wells with high production capacity, we suggest the addition of a well permitting criteria that includes an assessment of potential adverse impacts to drinking water supplies, such as the analysis of pumping influences in long-term level fluctuations, and the identification of the zone of influence of the pumping well.
- We also ask Merced GSAs and the County to acknowledge the unique constraints and small role in overall groundwater pumping and consider exempting Small Drinking Water Systems (SDWS) from additional costly and time-consuming permitting criteria and registration processes imposed by new policies. We suggest a draft GSP that assumes that SDWS extraction managed by DACs using a reasonable methodology, potentially similar to what would be proposed for De Minimis Users.

7. GSP Section: Plan Implementation

7.1. GSP Implementation Program Management

- As mentioned in the GSP, the Merced GSP Stakeholder Advisory Committee (SC) plays a key role by providing input and a broad range of perspectives that are essential during decision-making and project implementation. As an active member of the SC we would like to offer the following recommendations:
  - Consider recruiting and appointing additional vulnerable groundwater users, e.g. rural residents relying on shallow domestic wells, representatives from public water systems serving disadvantaged communities.
  - Address participation challenges for vulnerable groundwater users/DAC representatives by changing time of meetings and offering travel stipends.
  - Empower the SC to act as a formal advisory committee. For example, allow the SC to elect a Chair and Vice Chair. Staff and consultant can provide administrative support but should not lead the meetings or be responsible for interpreting the preferences or recommendations of the committee. The SC should also have a formal voting process, which can include a combination of consensus and majority voting. This will be extremely important when developing important polices and discussing key decisions. For example, groundwater allocation frameworks and groundwater demand reduction plans.
  - Joint meetings of the SC and Coordinating Committee should not be held unless there are clear decision-making structures that enables the SC to act independent of the Coordinating Committee.
  - Each GSA should consider establishing a voting seat for DACs and private domestic well users.
  - Alternates for each SC member should be formally appointed. Voting powers should be granted to all SC member alternates.

7.2. Reconsideration of GSP Elements

GSP regulations Section 356.4., states that 'each Agency shall evaluate its Plan *at least* every five years and whenever the Plan is amended, and provide a written assessment to the Department' [Emphasis added]. Thus, Agencies are allowed to reconsider GSP elements whenever necessary. Important reconsiderations of GSP elements should not be tied to a time frame but to an

[33] California Department of Water Resources. Available at: https://water.ca.gov/Programs/Groundwater-Management/Wells
[34] As per GSP Regulations Section 355.4 Criteria for Plan Evaluation.

adaptive management methodology that can respond timely to undesirable results and adjust GSP elements accordingly. Reconsiderations of GSP elements should be used as a corrective tool to avoid localized drawdown impacts on communities and ecosystems, such as dewatering of shallower wells and streams.