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Paso Robles Subbasin
Groundwater Sustainability Plan
Chapter 8 Sustainable Management Criteria

Prepared for the Paso Robles Subbasin Cooperative Committee and the Groundwater Sustainability Agencies

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8 SUSTAINABLE MANAGEMENT CRITERIA

This chapter defines the conditions that constitute sustainable groundwater management, discusses the process by which the four GSAs in the Subbasin will characterize undesirable results, and establishes minimum thresholds and measurable objectives for each sustainability indicator.

This is the fundamental chapter that defines sustainability in the Subbasin, and it addresses significant regulatory requirements. The measurable objectives, minimum thresholds, and undesirable results presented in this chapter define the future sustainable conditions in the Subbasin and commit the GSAs to actions that will achieve these future conditions.

Defining Sustainable Management Criteria (SMC) requires significant analysis and scrutiny. This chapter presents the data and methods used to develop Sustainable Management Criteria and demonstrate how they influence beneficial uses and users. The Sustainable Management Criteria presented in this chapter are based on currently available data and application of the best available science. As noted in this GSP, data gaps exist in the hydrogeologic conceptual model. Uncertainty caused by these data gaps was considered when developing the Sustainability Management Criteria. Due to uncertainty in the hydrogeologic conceptual model, the Sustainable Management Criteria presented herein are considered initial criteria and will be reevaluated and potentially modified in the future as new data become available.

This chapter is organized to address all of the SGMA regulations regarding Sustainable Management Criteria. The SGMA regulations are extensive. To retain an organized approach, this chapter follows the same structure for each sustainability indicator.

The Sustainable Management Criteria are grouped by sustainability indicator. Each section follows a consistent format that contains the information required by Section 354.22 *et. seq* of the SGMA regulations and outlined in the Sustainable Management Criteria BMP (DWR, 2017). Each Sustainable Management Criteria section includes a description of:

- How locally defined significant and unreasonable conditions were developed
- How minimum thresholds were developed, including:
    - The information and methodology used to develop minimum thresholds (§354.28 (b)(1))
    - The relationship between minimum thresholds and the relationship of these minimum thresholds to other sustainability indicators (§354.28 (b)(2))
    - The effect of minimum thresholds on neighboring basins (§354.28 (b)(3))
    - The effect of minimum thresholds on beneficial uses and users (§354.28 (b)(4))

- How minimum thresholds relate to relevant Federal, State, or local standards (§354.28 (b)(5))
- The method for quantitatively measuring minimum thresholds (§354.28 (b)(6))

- How measurable objectives were developed, including:
  - The methodology for setting measurable objectives (§354.30)
  - Interim milestones (§354.30 (a), §354.30 (e), §354.34 (g)(3))
- How undesirable results were developed, including:
  - The criteria defining when and where the effects of the groundwater conditions cause undesirable results based on a quantitative description of the combination of minimum threshold exceedances (§354.26 (b)(2))
  - The potential causes of undesirable results (§354.26 (b)(1))
  - The effects of these undesirable results on the beneficial users and uses (§354.26 (b)(3))

8.1 Definitions

The SGMA legislation and SGMA regulations contain a number of new terms relevant to the Sustainable Management Criteria. These terms are defined below using the definitions included in the SGMA regulations (§ 351, Article 2). Where appropriate, additional explanatory text is added in italics. This explanatory text is not part of the official definitions of these terms. To the extent possible, plain language, including limited use of overly technical terms and acronyms, was used so that a broad audience will understand the development process and implications of the Sustainable Management Criteria.

- **Interconnected surface water** refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water.

Interconnected surface waters are parts of streams, lakes, or wetlands where the groundwater table is at or near the ground surface and there is water in the lakes, streams, or wetlands.

- **Interim milestone** refers to a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan.

Interim milestones are targets such as groundwater elevations that will be achieved every five years to demonstrate progress towards sustainability.

- **Management area** refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.

- **<u>Measurable objectives</u>** refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin.

Measurable objectives are goals that the GSP is designed to achieve.

- **<u>Minimum thresholds</u>** refer to numeric values for each sustainability indicator used to define undesirable results.

Minimum thresholds are indicators of an unreasonable condition. For example, current groundwater elevations may be a minimum threshold because lower groundwater elevations result in significant and unreasonable costs.

- **<u>Representative monitoring</u>** refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin.
- **<u>Sustainability indicator</u>** refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code Section 10721(x).

The five sustainability indicators relevant to this subbasin include chronic lowering of groundwater levels; reduction of groundwater storage; degraded water quality; land subsidence; and depletion of interconnected surface waters.

- **<u>Uncertainty</u>** refers to a lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.
- **<u>Undesirable Result</u>**

There is no formal definition of undesirable result in the definitions section of the SGMA regulations. However, the description of undesirable result in § 354.26 of the SGMA regulations states that it should be "… a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin." An example undesirable result could be when more than a certain % of the measured groundwater levels in an area of the basin fall below the minimum thresholds. Undesirable results should not be confused with significant and unreasonable conditions. Significant and unreasonable conditions are physical conditions to be avoided; an undesirable result is a quantitative assessment based on minimum thresholds.

8.2 Sustainability Goal

Per Section §354.24 of the SGMA regulations, the sustainability goal for the Subbasin has three parts:

- A description of the sustainability goal;
- A discussion of the measures that will be implemented to ensure the Subbasin will be operated within sustainable yield, and;
- An explanation of how the sustainability goal is likely to be achieved.

The goal of this GSP is to sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, and environmental benefit of residents and business in the Subbasin. This GSP outlines the approach to achieve a sustainable groundwater resource free of undesirable results within 20 years, while maintaining the unique cultural, community, and business aspects of the Subbasin. In adopting this GSP, it is the express goal of the GSAs to balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasin's resources.

The following information will be updated when the GSP is completed.

A number of projects and management actions are included in this GSP. Some combination of these projects and management actions will be implemented to ensure the Subbasin is operated within its sustainable yield and achieves sustainability. These projects and management actions include:

- Tiered groundwater pumping fees.
- Progressive ramp down of the groundwater pumping rates to the sustainable yield.
- Expanded use of recycled water.
- Entering into either long-term or short-term contracts for excess surface water from the Nacimiento Reservoir that can offset groundwater pumping.
- Entering into long-term or short-term subcontracts for State Water Project water from the Coastal Branch Aqueduct.
- Developing storm water infiltration projects in appropriate areas of the Subbasin.
- A project to increase reservoir storage behind the Salinas Dam; and a cost analysis and marketability study of delivered water.
- Implementation of enhanced best management practices for crop irrigation, including irrigation system efficiency.

The projects and management actions are designed to achieve sustainability within 20 years by the following means:

- Tiered groundwater pumping fees will promote conservation and fund water supply projects. The tiered fees will be established to promote pumping within the sustainable yield. Pumping that exceeds the sustainable yield will be subject to the higher tiered fees that will fund projects the GSAs find to be cost effective solutions to sustainable management.
- Diligent adherence to Best Management Practices and increased awareness will result in decreased groundwater use.
- Pumping rates will be ramped down until the cumulative pumping rate is at or below the sustainable yield of the Subbasin. This ensures that the future pumping is within the sustainable yield, which will prevent further lowering of groundwater levels.
- Expanded use of recycled water will offset groundwater pumping in the Subbasin. This will contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Long-term and short-term contracts for excess surface water from the Nacimiento Reservoir will offset groundwater pumping in the Subbasin. This will contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Long-term and short-term contracts for State Water Project water from the Coastal Branch Aqueduct will offset groundwater pumping in the Subbasin. This will contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Storm water infiltration projects will increase basin recharge.
- Increased reservoir storage behind the Salinas Dam could provide additional water for either direct or in-lieu recharge.
- Enhanced best management practices for crop irrigation will minimize water loss from irrigation systems and agricultural reservoirs.

8.3 General Process for Establishing Sustainable Management Criteria

The Sustainable Management Criteria presented in this chapter were developed using information from public surveys, public meetings, hydrogeologic analysis, and meetings with GSA staff and Cooperative Committee members. The process built on the Paso Robles Basin's long history of interested parties - including rural residents, farmers of irrigated properties, local cities, and the County - holding public meetings to work on protecting the groundwater resource.

The general process for establishing Sustainable Management Criteria included:

- Holding a series of public outreach meetings that outlined the GSP development process and introduced stakeholders to Sustainable Management Criteria.
- Surveying the public and gathering input on minimum thresholds and measurable objectives. The survey questions were designed to get public input on all five sustainability indicators applicable to the Subbasin. A summary of the survey results is included in the Communications and Engagement Plan, Appendix F.
- Analyzing survey results to assess preferences and trends relevant to Sustainable Management Criteria. Survey results and public comments from outreach meetings were analyzed to assess if different areas in the Subbasin had different preferences for minimum thresholds and measurable objectives.
- Combining survey results, outreach efforts, and hydrogeologic data to set initial minimum thresholds and measurable objectives. This included analyzing historical and current groundwater levels and estimating current surface water depletion rates using the updated GSP model of the Subbasin.
- Conducting public meetings to present initial minimum thresholds and measurable objectives and receive additional public input. Three meetings on Sustainable Management Criteria were held in the Subbasin.
- Reviewing public input on preliminary Sustainable Management Criteria with GSA staff.
- Modifying minimum thresholds and measurable objectives based on feedback from the public meetings and input from GSA staff.

8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria

8.4.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were determined based on the Sustainable Management Criteria survey, public meetings, available data, and discussions with GSA staff. Significant and unreasonable groundwater levels in the Subbasin are those that:

- Cause significant financial burden to local agricultural interests or others who rely on the groundwater basin

- Impact the ability of existing domestic wells of average depth compared to other domestic wells in the area to produce adequate water for domestic purposes.
- Interfere with other sustainability indicators

8.4.2 Minimum Thresholds

Section §354.28(c)(1) of the SGMA regulations states that "*The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results.*"

8.4.2.1 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

The information used for establishing the chronic lowering of groundwater levels minimum thresholds include:

- Information about public definitions of significant and unreasonable conditions and desired groundwater elevations, gathered from the SMC survey and public outreach meetings.
- Feedback about significant and unreasonable conditions gathered during public meetings.
- Historical groundwater elevation data from wells monitored by the County of San Luis Obispo
- Depths and locations of existing wells
- Maps of current and historical groundwater elevation data

Initial minimum thresholds and measurable objectives were established using the process illustrated in Figure 8-1.

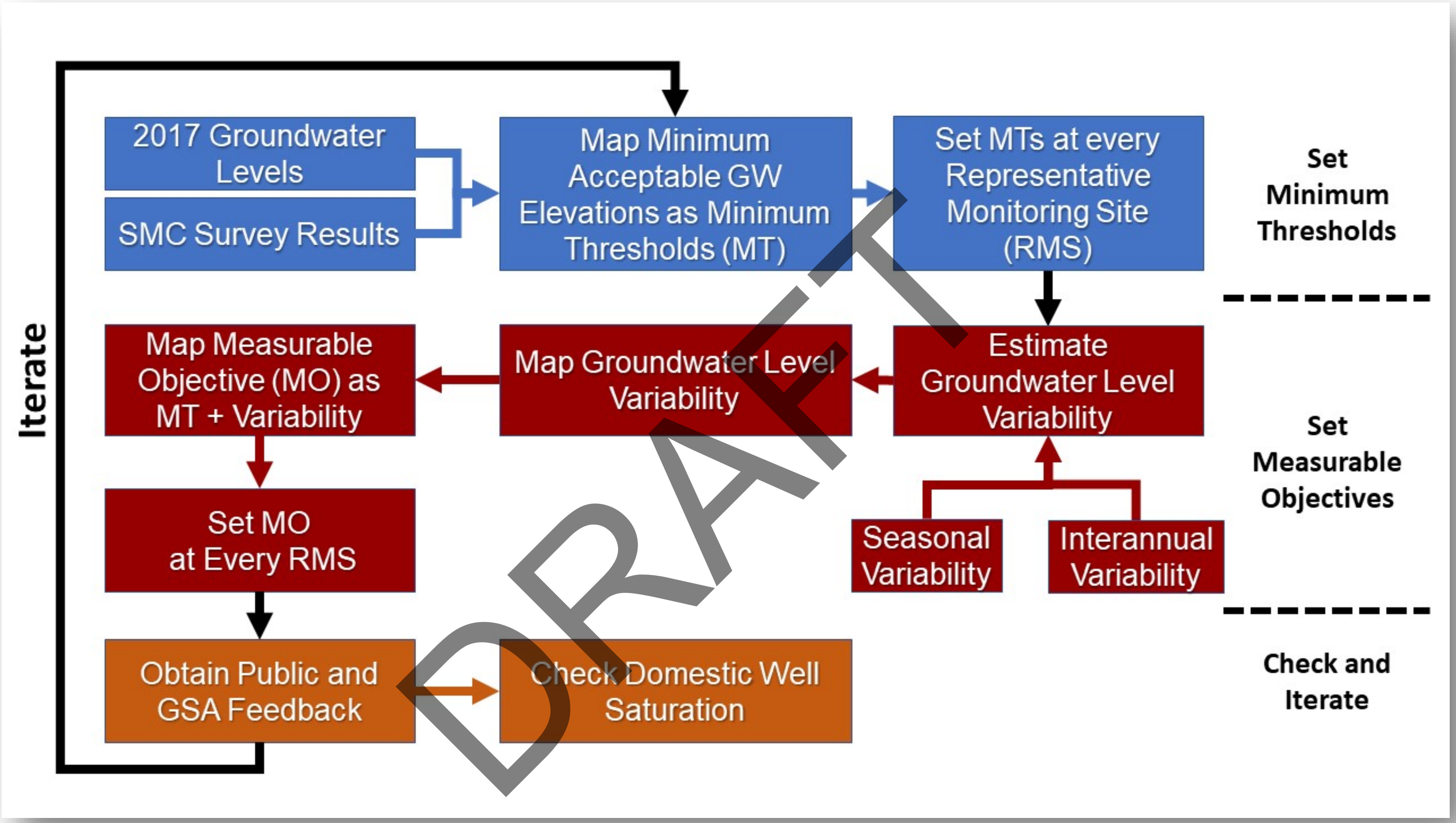

Figure 8-1. Process for Developing Groundwater Elevation Minimum Thresholds and Measurable Objectives

The SMC survey (Appendix F) provided information on stakeholders' preferences for future groundwater levels. The survey results suggested:

- Agricultural stakeholders east of the City of Paso Robles found current groundwater elevations acceptable, but did not want groundwater elevations to drop further.
- Stakeholders near Shandon found current groundwater elevations acceptable.
- Domestic well owners in the areas around Creston, El Pomar, and the Jardin area (east of the Paso Robles Airport) indicated that current groundwater elevations were too low and they preferred higher groundwater elevations similar to those in 2007.

Based on the survey and public outreach results, historical groundwater elevations from monitoring wells that represented desired conditions were identified. These desired conditions were used to establish the initial minimum thresholds in the Subbasin.

Paso Robles Formation Aquifer. Initial minimum thresholds were set using 2017 groundwater elevations from wells east of the City of Paso Robles and in the Shandon area; and 2007 groundwater elevations from wells in the Creston and El Pomar areas. Groundwater elevations from these years were identified as minimum acceptable conditions in the SMC survey results and public meetings.

Alluvial Aquifer. Groundwater level data in the Alluvial Aquifer are limited, and those data that are available have been collected in wells that are subject to confidentiality agreements. Therefore, no groundwater level measurements are used to define the Alluvial Aquifer minimum thresholds at this time.

The data collected from each aquifer were used to develop groundwater elevation maps of the initial minimum thresholds for each aquifer. Figure 8-2 shows a contour map of initial minimum thresholds for the Paso Robles Formation Aquifer. The map was prepared using the 2017 and 2007 groundwater elevation data. Figure 8-3 shows a contour map of initial minimum thresholds for the Alluvial Aquifer. These initial minimum thresholds were established based on 2007 simulated groundwater levels from the GSP model. The 2007 groundwater levels were used to map minimum thresholds because shallow domestic wells are often screened in the alluvial aquifer; and domestic well owners preferred to set minimum thresholds using 2007 groundwater elevations. Figure 8-3 shows the simulated 2007 groundwater elevations in the Alluvial Aquifer, along with the extent of the simulated Alluvial Aquifer and the extent of the mapped Alluvial Aquifer.

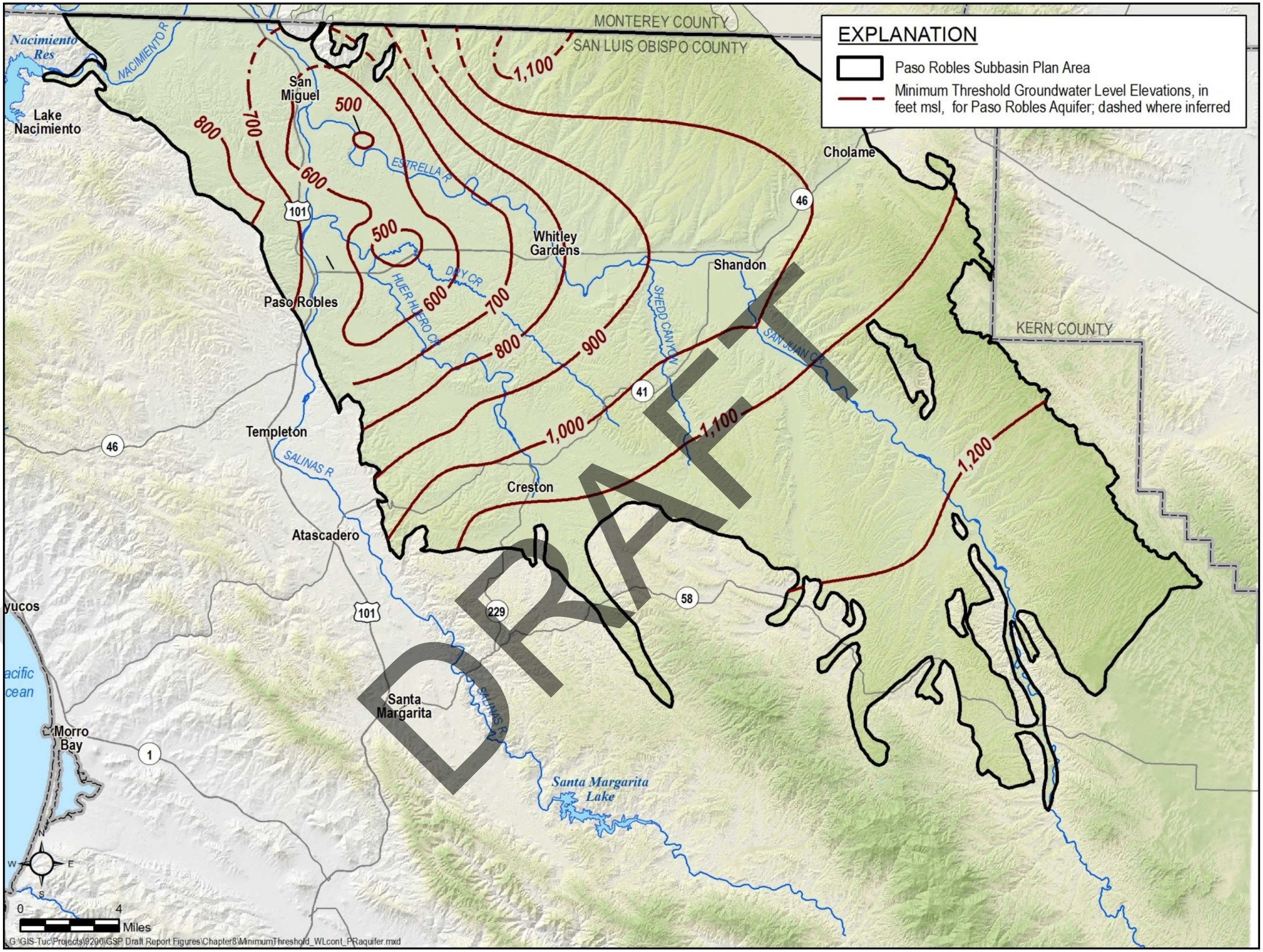

Figure 8-2. Groundwater Elevation Minimum Threshold Surface in the Paso Robles Formation Aquifer

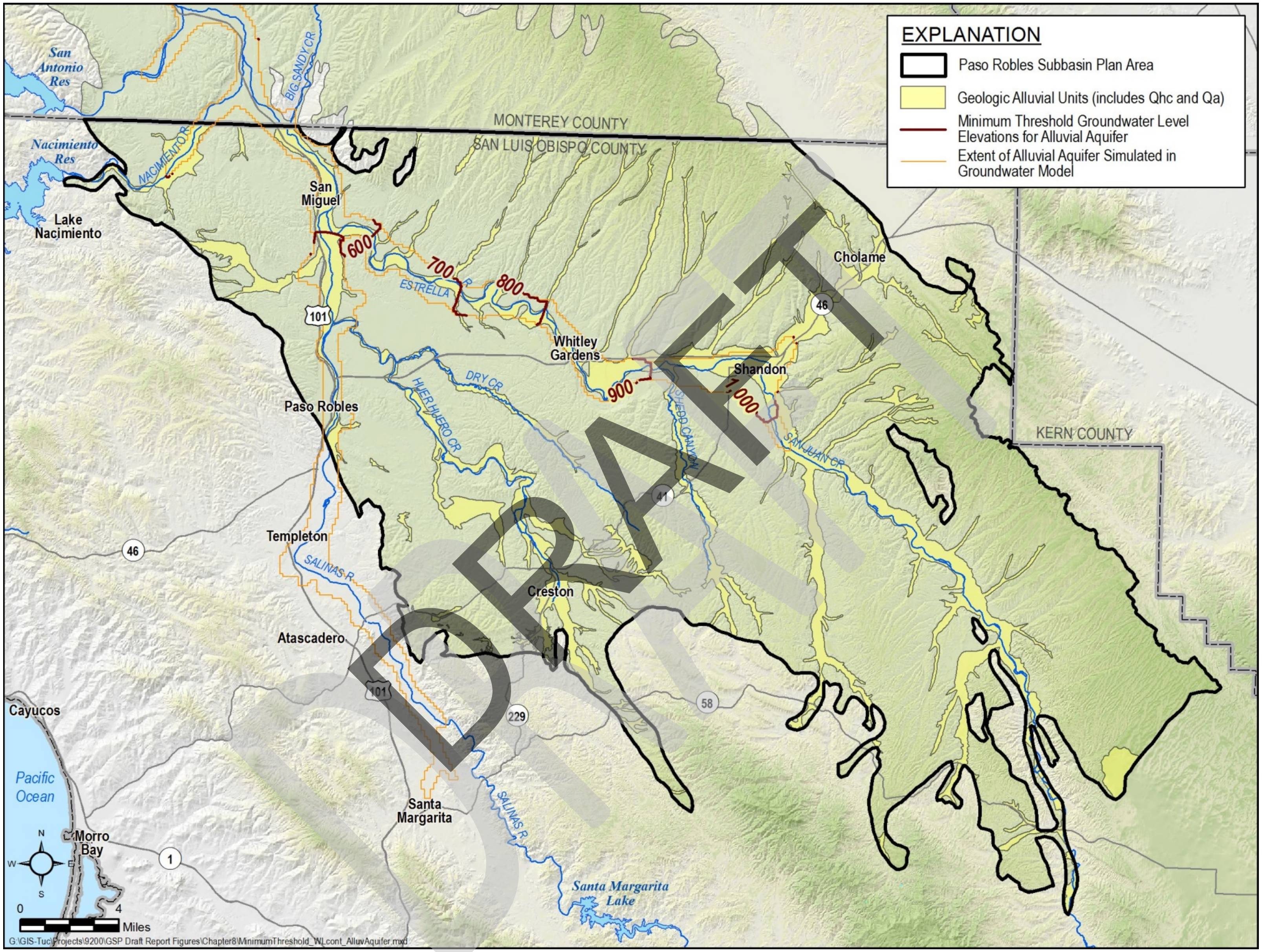

Figure 8-3. Groundwater Elevation Minimum Threshold Surface in the Alluvial Aquifer

Initial minimum thresholds were established for each RMS from the minimum threshold maps shown above. Minimum thresholds for the Paso Robles Formation Aquifer were set using the groundwater elevation contours on Figure 8-2. The mapped groundwater elevation at each RMS location was selected as the initial minimum threshold.

Wells currently being monitored in the Alluvial Aquifer are all subject to confidentiality agreements. Data from these wells cannot be currently reported to a public database. Therefore, minimum thresholds have not been set for any specific RMS in the Alluvial Aquifer. Locating existing wells, or installing new wells, in the Alluvial Aquifer that can be used as an RMS is identified as a data gap in Chapter 7.

When RMSs become available for the Alluvial Aquifer, minimum thresholds will be set at the RMS using the following approach:

1. The minimum threshold for any proposed RMS that has historical groundwater level data will be based on the 2007 groundwater elevation.
2. If the RMS does not have historical data, the minimum threshold will be based on simulated 2007 groundwater elevations. The simulated alluvial aquifer does not cover the entire alluvial aquifer, and therefore the GSP model may need to be refined before minimum thresholds can be developed based on simulated results.

8.4.2.2 Paso Robles Formation Aquifer Minimum Thresholds

Minimum thresholds for each groundwater level RMS in the Paso Robles Formation Aquifer are summarized on Table 8-1. Hydrographs for each RMS with well completion information, and minimum thresholds are included in Appendix G. These minimum thresholds were selected to avoid the locally defined significant and unreasonable conditions.

Table 8-1. Chronic Lowering of Groundwater Levels Minimum Thresholds

Monitoring Site	Aquifer	Minimum Threshold (feet NAVD88)
25S/12E-16K05	Paso Robles	537.0
25S/12E-26L01	Paso Robles	490.2
25S/13E-08L02	Paso Robles	915.6
26S/12E-26E07	Paso Robles	648.5
26S/13E-08M01	Paso Robles	612.8
26S/13E-16N01	Paso Robles	588.1
26S/15E-20B02	Paso Robles	968.6
27S/12E-13N01	Paso Robles	741.2
27S/13E-28F01	Paso Robles	907.7
27S/13E-30N01	Paso Robles	871.1
27S/14E-29G01	Paso Robles	1011.3
28S/13E-01B01	Paso Robles	1058.5

8.4.2.3 Alluvial Aquifer Minimum Thresholds

All wells shown in Table 8-1 are completed in the Paso Robles Formation Aquifer. Monitor wells do not currently exist in the Alluvial Aquifer that can be used for measuring minimum thresholds. This is a data gap identified in Chapter 7. Once this data gap is addressed, minimum thresholds will be set for the Alluvial Aquifer. The methodology that will be used to establish specific minimum thresholds for new wells in the Alluvial Aquifer using the methodology described above.

8.4.2.4 Minimum Thresholds Impact on Domestic Wells

Minimum thresholds for groundwater elevations are compared to the range of domestic well depths in the Subbasin from DWR's Online System for Well Completion Reports (OSWCR) database. This check was done to assure that the minimum thresholds maintain operability in most domestic wells. This check was done for three areas with clusters of domestic wells:

1. Creston and El Pomar areas
2. Estrella area and area of the Paso Robles Airport (Jardin area)
3. Shandon area

The OSWCR database is used to maintain consistency with well data used in the basin setting chapter (Chapter 4). The proposed minimum thresholds for groundwater elevation do not need to protect all domestic wells because it is impractical to manage a basin to the shallowest well. Furthermore, the OSWCR database may include shallow wells that have been abandoned, destroyed, or deepened. Therefore, the analysis discussed below may be overly conservative because the shallowest domestic wells that are not protected by the minimum thresholds may no longer exist.

The comparison showed:

- In the Creston and El Pomar areas, 79% of all domestic wells will have at least 25 feet of water in them as long groundwater levels remain above minimum thresholds; and 86% of all domestic wells will have at least 25 feet of water in them when measurable objectives are achieved.
- In the Estrella and Jardin areas, 80% of all domestic wells will have at least 25 feet of water in them as long groundwater levels remain above minimum thresholds; and 90% of all domestic wells will have at least 25 feet of water in them when measurable objectives are achieved.
- In the Shandon area, 89% of all domestic wells will have at least 25 feet of water in them as long groundwater levels remain above minimum thresholds; and 93% of all domestic wells will have at least 25 feet of water in them when measurable objectives are achieved.

8.4.2.5 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

Section 354.28 of the SGMA regulations requires that the description of all minimum thresholds include a discussion about the relationship between the minimum thresholds for each sustainability indicator. In the SMC BMP (DWR, 2017), DWR has clarified this requirement. First, the GSP must describe the relationship between each sustainability indicator's minimum threshold (e.g., describe why or how a water level minimum threshold set at a particular representative monitoring site is similar to or different to water level thresholds in nearby representative monitoring sites). Second, the GSP must describe the relationship between the selected minimum threshold and minimum thresholds for other sustainability indicators (e.g., describe how a water level minimum threshold would not trigger an undesirable result for land subsidence).

The groundwater elevation minimum thresholds are derived from smoothly interpolated groundwater elevation maps of the entire Subbasin, based on our current understanding of the Subbasin hydrogeology. Therefore, the minimum thresholds are unique at every well, but when combined represent a reasonable and potentially realistic groundwater elevation map. Because the individual minimum thresholds at each RMS are derived from this single map, they do not conflict with each other. As more sites are added to the monitoring system, this contour map will be reinterpreted to create a more refined representation of the minimum thresholds.

Groundwater elevation minimum thresholds can influence other sustainability indicators. The groundwater elevation minimum thresholds are selected to avoid undesirable results for other sustainability indicators.

- **Change in groundwater storage**. A significant and unreasonable condition for change in groundwater storage is pumping in excess of the sustainable yield for an extended period of years. Pumping at or less than the sustainable yield will maintain or raise average groundwater elevations in the Subbasin. The groundwater elevation minimum thresholds are set at or above existing groundwater elevations, consistent with the practice of pumping at or less than the sustainable yield. Therefore, the groundwater elevation minimum thresholds will not result in long term significant or unreasonable change in groundwater storage.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin
- **Degraded water quality**. Protecting groundwater quality is critically important to all who depend upon the groundwater resource, particularly for drinking water and agricultural uses. A significant and unreasonable condition for degraded water quality is exceeding regulatory limits for constituents of concern in supply wells due to actions proposed in the GSP. Water quality could be affected through two processes:
    1. Low groundwater elevations in an area could cause deeper, poor-quality groundwater to flow upward into existing supply wells. Groundwater elevation minimum thresholds are set at or above current levels, avoiding upward flow of deep, poor-quality groundwater that would not otherwise occur. The groundwater elevation minimum thresholds will avoid poor-quality water from impacting existing supply wells.
    2. Changes in groundwater elevation due to actions implemented to achieve sustainability could change groundwater gradients, which could cause poor quality groundwater to flow towards supply wells that would not have otherwise been impacted. These groundwater gradients, however, are only dependent on differences between groundwater elevations, not on the groundwater elevations themselves. Therefore, the minimum threshold groundwater elevations do not directly lead to a significant and unreasonable degradation of groundwater quality in production wells.
- **Subsidence**. A significant and unreasonable condition for subsidence is any measurable permanent subsidence that damages existing infrastructure. Subsidence is caused by dewatering and compaction of clay-rich sediments in response to lowering groundwater levels. Very small amounts of land surface elevation fluctuations have been reported across the Basin. The groundwater elevation minimum thresholds are set at or above existing groundwater elevations and will not induce additional subsidence that has not already started.

- **Depletion of interconnected surface waters.** The assessment of local groundwater experts is that there are not interconnected surface waters in the Subbasin. Therefore, there are no current minimum thresholds or undesirable results that could be affected by the groundwater elevation minimum thresholds. Changes in groundwater elevations, however, could reconnect surface waters. If this occurs, minimum thresholds will be established for depletion of interconnected surface waters and the relationship between those new minimum thresholds and all other sustainability indicators will be reassessed.

8.4.2.6 Effect of Minimum Thresholds on Neighboring Basins

One neighboring groundwater basin is required to develop a GSP: the Upper Valley Subbasin of the Salinas Valley Basin. Additionally, the adjoining Atascadero Subbasin is currently developing a GSP under SGMA. The anticipated effect of the groundwater elevation minimum thresholds on each of the two subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. The Upper Valley Subbasin is required to develop a GSP by 2022. The Upper Valley Subbasin is hydrogeologically downgradient of the Paso Robles Subbasin: groundwater generally flows from the Paso Robles Subbasin into the Upper Valley Subbasin. Lower groundwater levels in the Paso Robles Subbasin as a result of GSP actions could reduce the amount of groundwater flowing into the Upper Valley Subbasin, affecting that Subbasin's ability to achieve sustainability. The groundwater elevation minimum thresholds are set at sustainable levels that are at or above current elevations, therefore the minimum thresholds will not reduce groundwater flow into the adjacent Upper Valley Subbasin.

The Paso Robles Subbasin GSAs have developed a cooperative working relationship with the Salinas Valley Basin GSA who will be developing the GSP for the Upper Valley Subbasin. The two GSAs will monitor and work together to ensure that minimum thresholds do not significantly reduce groundwater flow into the Upper Valley Subbasin to the degree that would prevent that subbasin from achieving sustainability.

Atascadero Subbasin. The Paso Robles Subbasin is hydrogeologically separated from the Atascadero Subbasin by the Rinconada Fault. The fault acts as a barrier to groundwater flow as presented in Chapter 4. Because minimum thresholds are set at or above current groundwater levels, there will be negligible impact on groundwater elevations in the Atascadero Subbasin. The Paso Robles Subbasin GSAs have a cooperative working relationship with the Agencies managing the Atascadero Subbasin and will continue to work together to ensure that minimum thresholds do not significantly affect each Subbasin's ability to achieve sustainability.

8.4.2.7 Effects on Beneficial Users and Land Uses

The groundwater elevation minimum thresholds may have several effects on beneficial users and land uses in the Subbasin.

Agricultural land uses and users. The groundwater elevation minimum thresholds limit lowering of groundwater levels in the Subbasin. This has the effect of limiting the amount of groundwater pumping in the Subbasin. Limiting the amount of groundwater pumping will limit the amount and type of crops that can be grown in the Subbasin, which could result in a proportional reduction in the economic viability of some properties. The groundwater elevation minimum thresholds could therefore limit expansion of the Subbasin's agricultural economy. This could have various effects on beneficial users and land uses:

- Agricultural land with pumping allowances may become more valuable as bringing new lands into irrigation becomes more difficult and expensive.
- Agricultural land that does not have a pumping allowance may become less valuable because it may be too difficult and expensive to irrigate.
- There will be an economic impact to employees and suppliers of production products and materials. Many parts of the local economy rely on a vibrant agricultural industry and they too will be hurt proportional to the losses imparted to agricultural businesses.
- Growth of city, county and state tax rolls could be slowed or reduced due to the limitations imposed on agricultural growth.

Urban land uses and users. The groundwater elevation minimum thresholds effectively limit the amount of groundwater pumping in the Subbasin. This may limit urban growth, or result in urban areas obtaining alternative sources of water. This may result in higher water costs for municipal water users.

Domestic land uses and users. The groundwater elevation minimum thresholds protect most domestic wells. Therefore, the minimum thresholds will likely have an overall beneficial effect on existing domestic land uses by protecting the ability to pump from domestic wells. However, limited water ins some of the shallowest domestic wells may require owners to drill deeper wells. Additionally, the groundwater elevation minimum thresholds may limit the number of new domestic wells that can be drilled in order to limit future declines in groundwater levels caused by more domestic pumping. Policies allowing offsets of existing use to allow new construction or bringing in new sources of water can mitigate against this effect.

Ecological land uses and users. Groundwater elevation minimum thresholds effectively protect the groundwater resource including those existing ecological habitats that rely upon it. As noted above, groundwater level minimum thresholds may limit both agricultural and rural residential growth. Ecological land uses and users may benefit by this reduction in agricultural and rural residential growth.

8.4.2.8 Relevant Federal, State, or Local Standards

No Federal, State, or local standards exist for chronic lowering of groundwater elevations.

8.4.2.9 Method for Quantitative Measurement of Minimum Thresholds

Groundwater elevation minimum thresholds will be directly measured from existing or new monitoring wells. The groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Chapter 7. Furthermore, the groundwater level monitoring will meet the requirements of the technical and reporting standards included in the SGMA regulations.

As noted in Chapter 7, the current groundwater monitoring network in the Paso Robles Formation Aquifer currently only includes 12 wells. For the Alluvial Aquifer, a groundwater level monitoring network cannot be established for the GSP because monitoring wells where data can be reported do not exist. The GSAs will expand the monitoring network in both aquifers during GSP implementation.

8.4.3 Measurable Objectives

The measurable objectives for chronic lowering of groundwater levels represent target groundwater elevations that are higher than the minimum thresholds. These measurable objectives provide operational flexibility to ensure that the Subbasin can be managed sustainably over a reasonable range of hydrologic variability.

8.4.3.1 Methodology for Setting Measurable Objectives

The methodology for establishing measurable objectives is described on Figure 8-1 and summarized below.

Measurable Objectives for groundwater levels were established by analyzing measured groundwater level hydrographs and estimating the well-by-well historical groundwater level variability. This analysis provides estimates of the expected groundwater level variability due to climatic variability. Both inter-annual (i.e., the variability from year to year) and seasonal variability were considered. Figure 8-4 shows an example of how groundwater level variability was estimated at each well.

<u>Paso Robles Formation Aquifer.</u> The magnitude of inter-annual variability was estimated for specific monitoring sites by reviewing changes in average groundwater levels over periods with variable precipitation, but without substantial changes in cropping patterns. This approach is illustrated using an example hydrograph as shown on Figure 8-4. The blue bands identify wet periods with little change in cropping. The gray band identifies a dry period with little change in cropping. The horizontal blue lines identify the average fall groundwater elevations during the wet periods. The horizontal red line identifies the average fall groundwater elevations during the dry period. The difference between the horizontal blue lines in the horizontal red line is an expected change in average, inter-annual groundwater levels due to climatic variability. The inter-annual variability for this well for this period is approximately 20 feet. The dashed orange lines on Figure 8-4 project the inter-annual variability to the minimum threshold, showing how the inter-annual variability is part of the difference between the minimum threshold and measurable objective.

Seasonal variability is quantified as the maximum annual change between measured spring and fall groundwater levels. The hydrograph shown on Figure 8-4 has a maximum seasonal change of 61 feet. Assuming half of the 61 feet represents a groundwater level drop from average conditions and half of the 61 feet represents a rise in groundwater levels from average conditions, the seasonal drop in groundwater elevations may be up to 30.5 feet.

The sum of the inter-annual variability and one-half of the seasonal variability defines the total variability expected at each well based on historical data. For the well represented by the hydrograph on Figure 8-4, the total variability is 50.5 feet. Therefore, the measurable objective is set 50.5 feet above the minimum threshold. The measurable objective and minimum threshold for this well are shown on Figure 8-4, with the minimum threshold being the lower red line and the measurable objective being the upper black line of the box on the right side of the figure. Each measurable objective and minimum threshold are adjusted, if needed to match the hydrograph of that well.

Alluvial Aquifer. The wells used in this analysis for the Alluvial Aquifer are currently confidential, and so the locations of those wells and their associated hydrographs cannot be shown in the GSP. Based on analysis of the Alluvial Aquifer wells, the typical range of seasonal variability is about 10 feet. Typical inter-annual variability associated with successive dry years is about 10 feet along the Estrella River. Wells completed in the Alluvial Aquifer along the Salinas River show little or no response to periods of successive dry years. The relatively stable conditions in the Alluvial Aquifer along the Salinas River are likely due to a combination of regulated flows from the operation of Santa Margarita reservoir and percolation of treated wastewater. Based on the results of this analysis, the measurable objective groundwater levels were set 10 feet above the minimum threshold surface along the Salinas River, and 20 feet above the minimum threshold surface along the Estrella River.

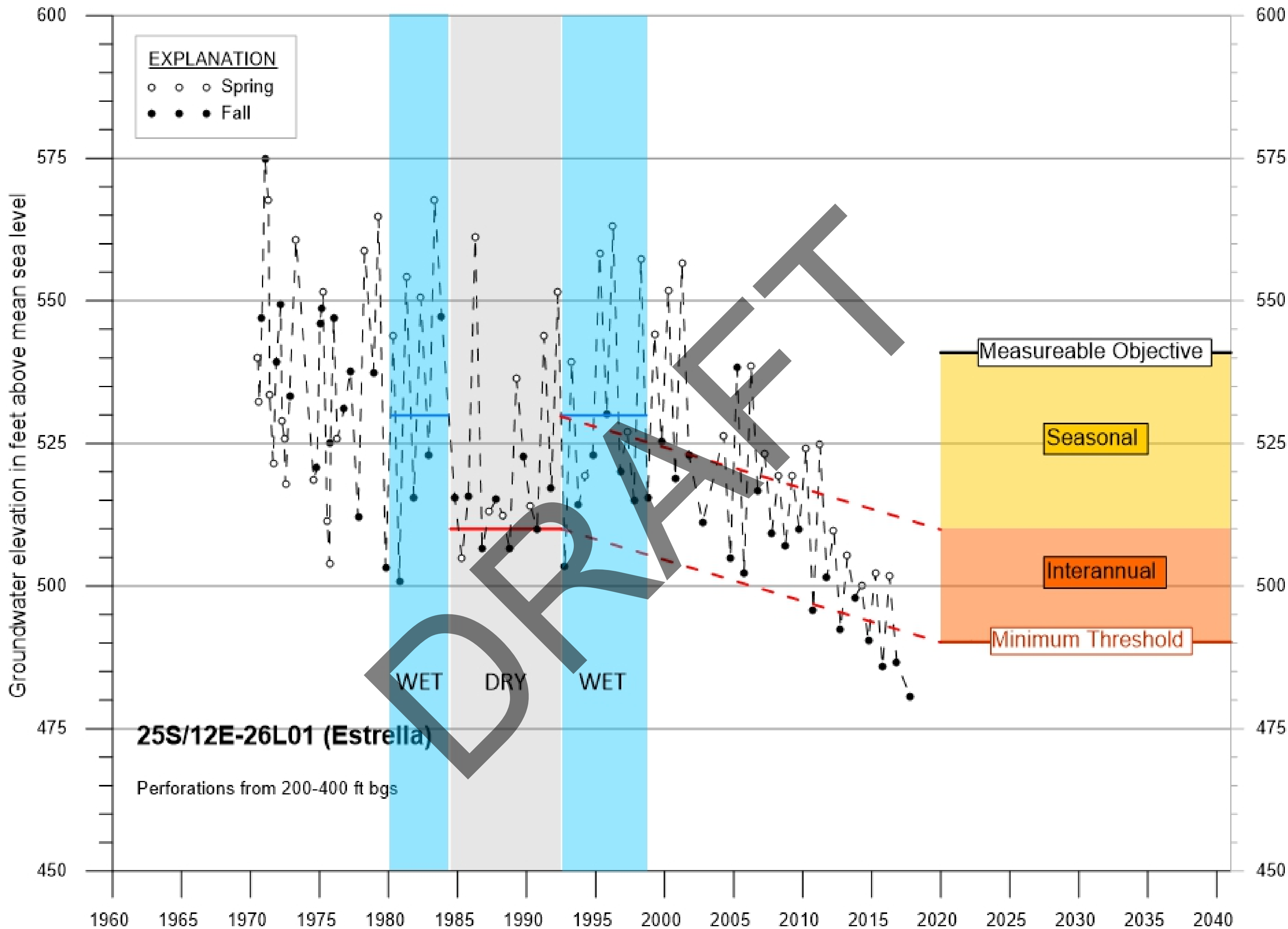

Figure 8-4. Method for Estimating Minimum Thresholds from Groundwater Level Variability

The elevation differences between minimum thresholds and measurable objectives established at individual monitoring sites are contoured across the basin. These contours are then added to the minimum threshold groundwater level map to develop a measurable objective contour map. The measurable objective map for the Paso Robles Formation Aquifer is shown on Figure 8-5. The measurable objective map for the Alluvial Aquifer is shown on Figure 8-6.

The measurable objective map is used to establish measurable objectives at each RMS. The RMS location is compared to the measurable objective contours, and a measurable objective is selected from the map contours. This process will be repeated in the future as more RMSs are added.

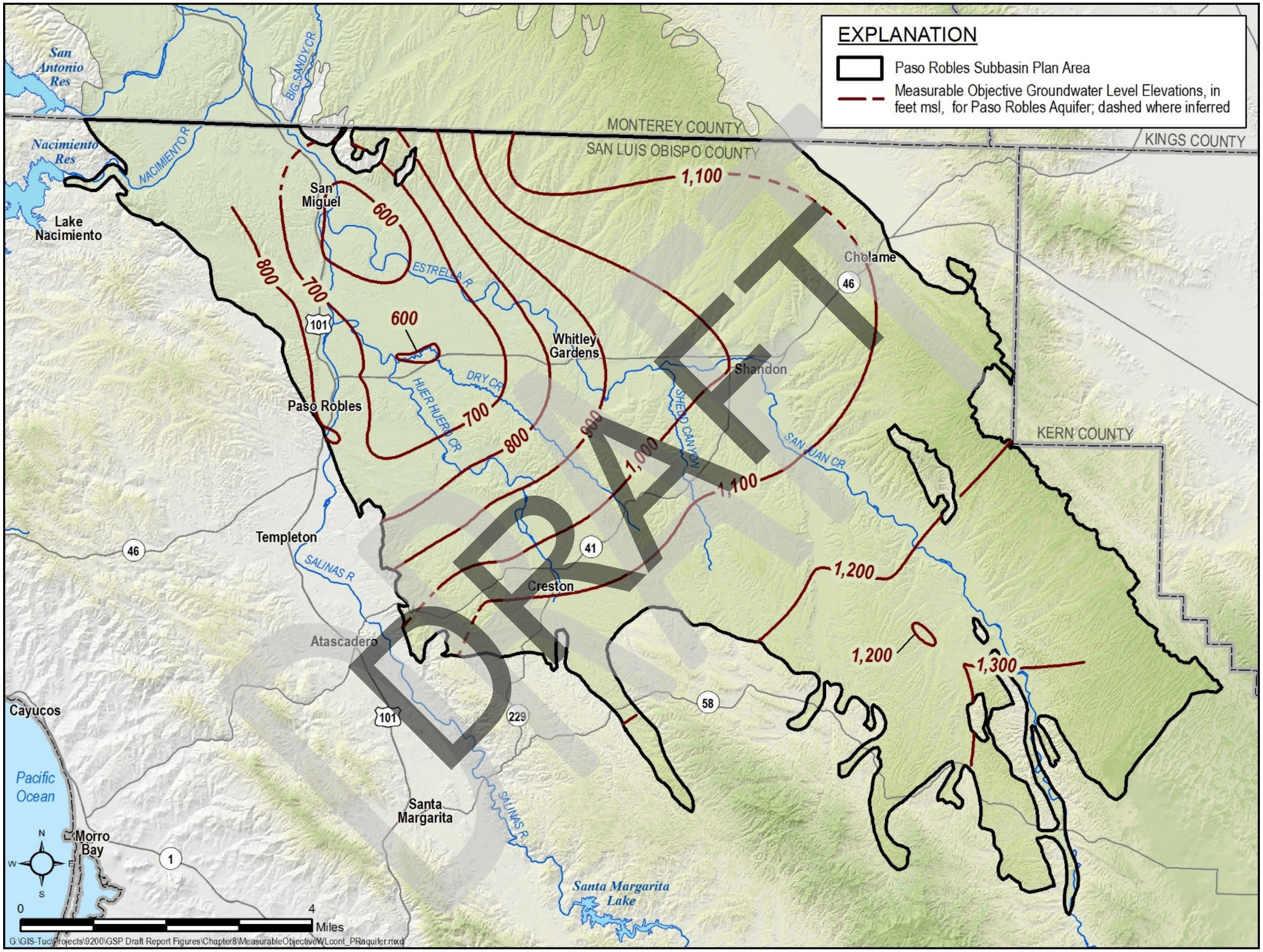

Figure 8-5. Groundwater Elevation Measurable Objective Surface in the Paso Robles Formation Aquifer

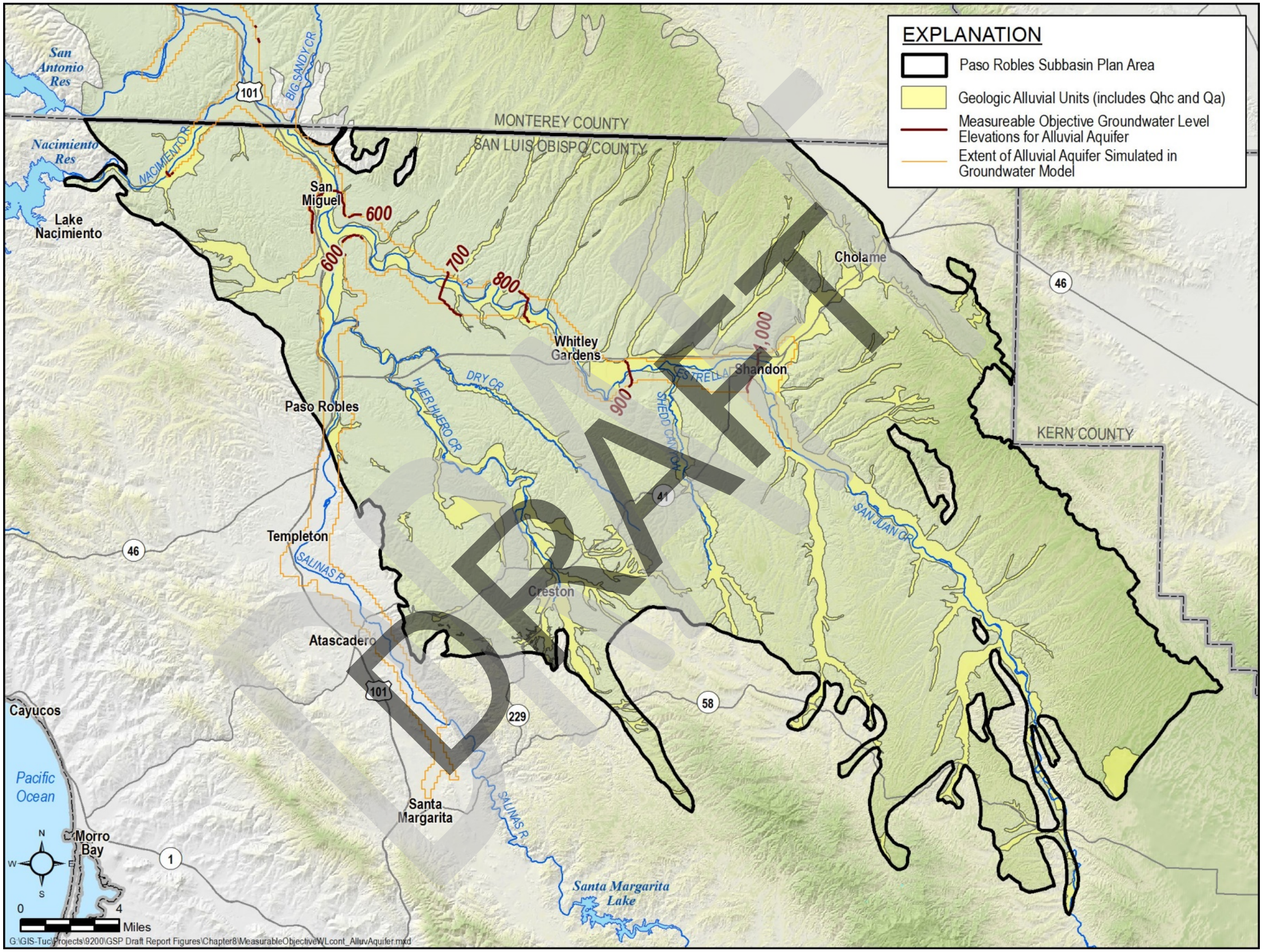

Figure 8-6. Groundwater Elevation Measurable Objective Surface in the Alluvial Aquifer

8.4.3.2 Paso Robles Formation Aquifer Measurable Objectives

Measurable objectives for each groundwater level RMS in the Paso Robles Formation Aquifer are summarized on Figure 8-5. Hydrographs for each RMS with well completion information, and measurable objectives are included in Appendix G.

Table 8-2. Chronic Lowering of Groundwater Levels Measurable Objectives

Monitoring Site	Aquifer	Measurable Objective (feet NAVD88)
25S/12E-16K05	Paso Robles	574.4
25S/12E-26L01	Paso Robles	540.9
25S/13E-08L02	Paso Robles	929.4
26S/12E-26E07	Paso Robles	692.3
26S/13E-08M01	Paso Robles	643.6
26S/13E-16N01	Paso Robles	615.0
26S/15E-20B02	Paso Robles	1023.5
27S/12E-13N01	Paso Robles	760.4
27S/13E-28F01	Paso Robles	933.0
27S/13E-30N01	Paso Robles	892.1
27S/14E-29G01	Paso Robles	1039.0
28S/13E-01B01	Paso Robles	1076.2

8.4.3.3 Alluvial Aquifer

All wells shown in Table 8-1 are completed in the Paso Robles Formation Aquifer. Monitor wells do not currently exist in the Alluvial Aquifer that can be used for establishing measurable objectives. This is a data gap identified in Chapter 7. Once this data gap is addressed, measurable objectives will be set for the Alluvial Aquifer.

8.4.3.4 Interim Milestones

To be developed after projects and implementation schedule are developed.

8.4.4 Undesirable Results

8.4.4.1 Criteria for Defining Undesirable Results

The chronic lowering of groundwater elevation undesirable result is a quantitative combinations of groundwater elevation minimum threshold exceedances. For the Paso Robles Subbasin, the groundwater elevation undesirable result is:

Over the course of any one year, no more than 15% of the groundwater elevation minimum thresholds shall be exceeded in any single aquifer.

Undesirable results provide flexibility in defining sustainability. Increasing the percentage of allowed minimum threshold exceedances provides more flexibility, but may lead to significant and unreasonable conditions for a number of beneficial users. Reducing the percentage of allowed minimum threshold exceedances ensures strict adherence to minimum thresholds, but reduces flexibility due to unanticipated hydrogeologic conditions. The undesirable result was set at 15% to balance the interests of beneficial users with the practical aspects of groundwater management under uncertainty.

The 15% limit on minimum threshold exceedances in the chronic lowering of groundwater level undesirable result allows for two exceedances in the 12 existing monitoring wells. As the monitoring system grows, additional exceedances will be allowed. One additional exceedance will be allowed for approximately every seven new monitoring wells. This was considered a reasonable number of exceedances given the hydrogeologic uncertainty of the basin. Close monitoring of groundwater data over the following years will allow that percentage to be refined based on observable data. Management of the Basin will adapt to specific conditions and to a growing understanding of basin conditions and processes to adopt appropriate responses.

8.4.4.2 Potential Causes of Undesirable Results

An undesirable result for chronic lowering of groundwater levels does not currently exist. Conditions that may lead to an undesirable result include the following:

- **Localized pumping clusters**. Even if regional pumping is maintained within the sustainable yield, clusters of high-capacity wells may cause excessive localized drawdowns that lead to undesirable results in specific areas.
- **Expansion of *de-minimis* pumping**. Individual *de-minimis* pumpers do not have a significant impact on Subbasin-wide groundwater elevations. However, many *de-minimis* pumpers are often clustered in specific residential areas. Pumping by these *de-minimis* users is not currently regulated under this GSP. Adding additional domestic *de-minimis* pumpers in specific areas may result in excessive localized drawdowns and undesirable results.
- **Extensive, unanticipated drought**. Minimum thresholds were established based on historical groundwater elevations and reasonable estimates of future groundwater elevations. Extensive, unanticipated droughts may lead to excessively low groundwater elevations and undesirable results.

8.4.4.3 Effects on Beneficial Users and Land Uses

The primary detrimental effect on beneficial users from allowing multiple exceedances occurs if more than one exceedance occurs in a small geographic area. Allowing 15% exceedances is reasonable as long as the exceedances are spread out across the Subbasin. If the exceedances are clustered in a small area, it will indicate that significant and unreasonable effects are being born by a localized group of landowners.

8.5 Reduction in Groundwater Storage Sustainable Management Criteria

8.5.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were assessed based on the Sustainable Management Criteria survey, public meetings, available data, and discussions with GSA staff. Significant and unreasonable changes in groundwater storage in the Subbasin are those that:

- Lead to long-term reduction in groundwater storage
- Interfere with other sustainability indicators

Responses to the Sustainable Management Criteria survey and public input suggest that most areas of the basin would like to see more groundwater in storage to help with droughts, and some areas of the basin would like to see significantly more groundwater in storage. Public input on which concessions would be acceptable to increase the amount of groundwater in storage revealed two highly ranked concessions:

1. New pumping be offset with new recharge or reduced pumping
2. Pumping be reduced in dry years

However, the concession that agricultural pumping be reduced in all years ranked relatively low. This suggests that, while stakeholders would prefer more groundwater in storage, they also would not prefer to reduce existing agricultural pumping during average years. Stakeholders also prefer that groundwater storage be increased by retaining wet year flows for local recharge and/or importing water.

8.5.2 Minimum Thresholds

Section §354.28(c)(2) of the SGMA regulations states that "*The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.*"

The reduction of groundwater in storage minimum threshold is established for the Subbasin as a whole, not for individual aquifers. Therefore, one minimum threshold is established for the entire Subbasin.

In accordance with the SGMA regulation cited above, the minimum threshold metric is a volume of pumping per year, or an annual pumping rate. Conceptually, the total volume of groundwater that can be pumped annually from the Subbasin without leading to undesirable results is equal to the estimated sustainable yield of the Subbasin. As discussed in Chapter 6, the future estimated long-term sustainable yield of the Subbasin under reasonable climate change assumptions is 61,100 AFY. This estimated sustainable yield will change in the future as additional data become available.

This GSP adopts changes in groundwater elevation as a proxy for the change in groundwater storage metric. As allowed in § 354.36(b)(1) of the SGMA regulations, groundwater elevation data at the RMSs will be reported annually as a proxy to track changes in the amount of groundwater in storage.

The minimum threshold for change in groundwater storage is *no long-term change in groundwater storage*. Based on well-established hydrogeologic principles, no change in groundwater storage can be equated to stable groundwater elevations. Therefore, the minimum threshold using groundwater elevations as a proxy is that the groundwater elevation averaged across all the wells in the groundwater level monitoring network will remain stable.

8.5.2.1 Information Used and Methodology for Establishing Reduction in Storage Minimum Thresholds

The monitoring network and protocols used to measure groundwater elevations at the RMS are presented in Chapter 7, Monitoring Networks. These data will be used to monitor groundwater elevations and assess changes in groundwater storage.

8.5.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The minimum threshold for reduction in groundwater storage is a single value of average groundwater elevation over the entire Subbasin. Therefore, the concept of potential conflict between minimum thresholds at different locations in the Subbasin is not applicable.

The reduction in groundwater storage minimum threshold could influence other sustainability indicators. The reduction in groundwater storage minimum threshold was selected to avoid undesirable results for other sustainability indicators, as outlined below.

- **Chronic lowering of groundwater levels**. Because groundwater elevations will be used as a proxy for estimating groundwater pumping and changes in groundwater storage, the reduction in groundwater storage would not cause undesirable results for this sustainability indicator.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin.

- **Degraded water quality**. The minimum threshold proxy of stable groundwater levels will not directly lead to a degradation of groundwater quality.
- **Subsidence**. Because future average groundwater levels will be stable, they will not induce any additional subsidence.
- **Depletion of interconnected surface waters.** Minimum thresholds and undesirable results for interconnected surface water were not developed because interconnected surface water is not believed to exist currently in the Subbasin. Therefore, the reduction in groundwater storage minimum thresholds is unrelated to interconnected surface water at this time. If surface water interconnection is identified in the future, minimum thresholds will be established for depletion of interconnected surface waters and the relationship between those new minimum thresholds and all other sustainability indicators will be reassessed.

8.5.2.3 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the groundwater storage minimum thresholds on each of the two neighboring subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. Removing groundwater from storage in the Paso Robles Subbasin would reduce flow into the Upper Valley Subbasin, potentially affecting the ability of that Subbasin to achieve sustainability. The reduction in storage minimum threshold is set to prevent reduction in storage and therefore maintain flow into the Upper Valley Subbasin. This minimum threshold will not prevent the Upper Valley Subbasin from achieving sustainability.

Atascadero Subbasin. The Paso Robles Subbasin is hydrogeologically separated from the Atascadero Subbasin by the Rinconada Fault. The fault acts as a partial barrier to groundwater flow as presented in Chapter 4. Removing groundwater from storage in the Paso Robles Subbasin could induce additional groundwater flow from the Atascadero Subbasin into the Paso Robles Subbasin, affecting the ability to achieve sustainability in the Atascadero Subbasin. The reduction in storage minimum threshold is set to prevent reduction in storage and will be monitored using groundwater elevation proxies, therefore will not induce lowering of groundwater elevations that could cause additional groundwater flows from the Atascadero Subbasin. The minimum threshold will therefore not prevent the Atascadero Subbasin from achieving sustainability.

8.5.2.4 Effect on Beneficial Uses and Users

The reduction in groundwater storage minimum threshold of maintaining stable average groundwater elevations and, by proxy, having no change in storage will potentially require a reduction in the amount of groundwater pumping in the Subbasin. Reducing pumping may impact the beneficial uses and users of groundwater in the Subbasin.

Agricultural land uses and users. Reducing the amount of groundwater pumping may limit or reduce agricultural production in the Subbasin by reducing the amount of available water. Owners of agricultural lands that are currently not irrigated may be particularly impacted because the additional groundwater pumping needed to irrigate these lands could increase the Subbasin pumping beyond the sustainable yield, violating the minimum threshold.

Urban land uses and users. Reducing the amount of groundwater pumping may increase the cost of water for municipal users in the Subbasin because municipalities may need to find other, more expensive water sources.

Domestic land uses and users. Existing domestic groundwater users may generally benefit from this minimum threshold. Many domestic groundwater users are *de-minimis* users whose pumping may not be restricted by the projects and management actions adopted in this GSP. By restricting the amount of groundwater that is pumped from the Subbasin, the *de-minimis* users would be protected from overdraft that could impact their ability to pump groundwater.

Ecological land uses and users. Groundwater dependent ecosystems would generally benefit from this minimum threshold. Maintaining groundwater levels close to current levels maintains groundwater supplies similar to present levels which will continue to support groundwater dependent ecosystems.

8.5.2.5 Relation to State, Federal, or Local Standards

No federal, state, or local standards exist for reductions in groundwater storage.

8.5.2.6 Methods for Quantitative Measurement of Minimum Threshold

The quantitative metric for assessing compliance with the reduction in groundwater storage minimum threshold is monitoring groundwater elevations. The approach for quantitatively evaluating compliance with the minimum threshold for reduction in groundwater storage will be based on evaluating groundwater elevations annually. All groundwater elevations collected from the groundwater level monitoring network will be analyzed and averaged.

8.5.3 Measurable Objectives

The measurable objective for reduction in groundwater storage is the same as the minimum threshold. The measurable objective, using the groundwater level proxy, is stable average groundwater levels.

8.5.3.1 Method for Setting Measurable Objectives

As discussed in Section 8.5.1, input from stakeholders suggested that they would prefer more groundwater in storage. However, stakeholders also suggested that they would prefer not to attain this increase in groundwater storage by reducing existing pumping during years with average climate conditions. Instead, they prefer to increase groundwater storage through increasing local recharge or importing water for recharge. Therefore, the conservative approach of simply maintaining stable groundwater levels was adopted for the measurable objective.

8.5.3.2 Interim Milestones

To be developed after projects and management actions are developed.

8.5.4 Undesirable Results

8.5.4.1 Criteria for Defining Undesirable Results

The reduction in groundwater storage undesirable result is a quantitative combination of reduction in groundwater storage minimum threshold exceedances. However, there is only one reduction in groundwater storage minimum threshold. Therefore, no minimum threshold exceedances are allowed to occur and the reduction in groundwater storage undesirable result is:

During average hydrogeologic conditions, and as a long-term average over all hydrogeologic conditions, there shall be no exceedances of the groundwater level proxy minimum threshold for change in groundwater storage.

8.5.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result for the reduction in groundwater storage sustainability indicator include the following:

- **Expansion of agricultural or municipal pumping.** Additional agricultural or municipal pumping may result in continued decline in groundwater elevations and exceedance of the proxy minimum threshold.
- **Expansion of *de-minimis* pumping**. Pumping by *de-minimis* users is not regulated under this GSP. Adding domestic *de-minimis* pumpers in the Subbasin may result in lower groundwater elevations, and an exceedance of the proxy minimum threshold.
- **Extensive, unanticipated drought**. Minimum thresholds are established based on reasonable anticipated future climatic conditions. Extensive, unanticipated droughts may lead to excessively low groundwater recharge and unanticipated high pumping rates that could cause lower groundwater elevations and an exceedance of the proxy minimum threshold.

8.5.4.3 Effects on Beneficial Users and Land Use

The practical effect of the reduction in groundwater storage undesirable result is that it encourages no net change in groundwater elevations and storage during average hydrologic conditions and over the long-term. Therefore, during average hydrologic conditions and over the long-term, beneficial uses and users will have access to the same amount of groundwater in storage that currently exists, and the undesirable result will not have a negative effect on the beneficial users and uses of groundwater. However, pumping at the long-term sustainable yield during dry years will temporarily lower groundwater elevations and reduce the amount of groundwater in storage. Therefore, if this occurs, there could be short-term impacts from a reduction in groundwater in storage on all beneficial users and uses of groundwater. In particular, groundwater pumpers that rely on water from shallower wells may be temporarily impacted as the amount of groundwater in storage drops and water levels in their wells decline.

8.6 Seawater Intrusion Sustainable Management Criteria

The seawater intrusion sustainability indicator is not applicable to this Subbasin.

8.7 Degraded Water Quality Sustainable Management Criteria

8.7.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were assessed based on federal and state mandated drinking water and groundwater quality regulations, the Sustainable Management Criteria survey, public meetings, and discussions with GSA staff. Significant and unreasonable changes in groundwater quality in the Subbasin are increases in a chemical constituent that either:

- Result in groundwater concentrations in a public supply well above an established primary or secondary MCL, or
- Lead to reduced crop production.

8.7.2 Minimum Thresholds

Section §354.28(c)(2)of the SGMA regulations states that "*The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin*."

As stated above, the SGMA regulations allow three options for setting degraded water quality minimum thresholds. In the Subbasin, degraded water quality minimum thresholds are based on a number of supply wells that exceed concentrations of constituents determined to be of concern for the Subbasin. The purpose of the minimum thresholds for constituents of concern with a primary or secondary MCL is to avoid furthering the migration of these constituents towards municipal or other drinking water wells. Therefore, the definition of supply wells for constituents of concern that have a primary or secondary MCL are public supply wells.

The purpose of the minimum thresholds for constituents of concern that may reduce crop productivity is to avoid furthering the migration of these constituents towards agricultural supply wells. Therefore, the definition of supply wells for constituents of concern that may lead to reduced crop production are agricultural supply wells.

As noted in Section 354.28 (c)(4) of the SGMA regulations, minimum thresholds are based on a degradation of groundwater quality, not an improvement of groundwater quality. Therefore, this GSP was developed to avoid taking actions that may inadvertently move groundwater constituents that have already been identified in the Subbasin in such a way that they have a significant and unreasonable impact that would not otherwise occur. Constituents of concern must meet two criteria:

1. They must have an established level of concern such as a primary or secondary MCL or a concentration that reduces crop production
2. They must have previously been found in the Subbasin at levels above the level of concern

Based on the review of groundwater quality in Chapter 5, different constituents of concern exist for both agricultural wells and public supply wells. The constituents of concern for agricultural wells are:

- Chloride
- Boron

The constituents of concern for public supply wells are:

- Total Dissolved Solids
- Chloride
- Sulfate
- Nitrate
- Gross Alpha Radiation

As noted in Section 5.6.3, based on available information there are no mapped groundwater contamination plumes in the Subbasin. Therefore, only potential impacts of diffuse or naturally occurring constituents listed above are addressed in this GSP.

The bases for establishing minimum thresholds for each constituent of concern in the Paso Robles Formation Aquifer and Alluvial Aquifer are listed in Table 8-3. This table does not identify the number of supply wells that will exceed the level of concern, but rather identifies how many additional wells will be allowed to exceed the level of concern. Wells that already exceed this limit are not counted against the minimum thresholds.

Table 8-3. Groundwater Quality Minimum Thresholds Bases

Constituent of Concern	Minimum Threshold Based on Number of Production Wells
Agricultural Wells in Monitoring Program	
Chloride	Zero additional agricultural production wells that are in the GSP monitoring program shall exceed 350 milligrams per liter (mg/L).
Boron	Zero additional agricultural production wells that are in the GSP monitoring program shall exceed 0.5 mg/L.
Municipal Wells in Monitoring Program	
Total Dissolved Solids	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the TDS secondary MCL of 500 mg/L.
Chloride	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the chloride secondary MCL of 250 mg/L.
Sulfate	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the sulfate secondary MCL of 250 mg/L.
Nitrate	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the nitrate MCL of 45 mg/L, measured as nitrate.
Gross Alpha Radiation	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the gross alpha radiation MCL of 15 pCi/L.

8.7.2.1 Paso Robles Formation Aquifer

The minimum thresholds for degraded water quality in the Paso Robles Formation Aquifer are based on the goal of zero additional exceedances as shown in Table 8-3. However, some exceedances already exist in Paso Robles Formation Aquifer wells, and these exceedances will likely continue into the future. The minimum threshold for the number of allowed exceedances is therefore equal to the current number of exceedances. Based on the number of agricultural and municipal supply wells in the existing water quality monitoring network that is described in Chapter 7, the number of existing exceedances for each constituent is shown in Table 8-4. The exceedance numbers in this table are the minimum thresholds. This table additionally includes the percentage of existing wells that exceed the minimum thresholds for each constituent. The percentage defines the upper bound of wells that can exceed the minimum thresholds as additional wells are added to the monitoring program.

Table 8-4. Minimum Thresholds for Degraded Groundwater Quality in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Agricultural Wells			
Chloride	28	3	11%
Boron	28	9	32%
Municipal Wells			
Total Dissolved Solids	34	11	32%
Chloride	34	1	3%
Sulfate	34	1	3%
Nitrate	34	1	3%
Gross Alpha Radiation	32	0	0%

8.7.2.2 Alluvial Aquifer

The minimum thresholds for degraded water quality in the Alluvial Aquifer are similarly based on the goal of zero additional exceedances shown in Table 8-3. Following the same process as the Paso Robles Formation Aquifer, the minimum thresholds for degraded water quality in the Alluvial Aquifer are shown in Table 8-5. All agricultural supply wells are assumed to pump from the Paso Robles Formation Aquifer, and therefore there are no agricultural well minimum thresholds set in the Alluvial Aquifer. As with the Paso Robles Formation Aquifer, as additional wells are added to the monitoring program, the percentage of wells exceeding the minimum threshold will not increase.

Table 8-5. Minimum Thresholds for Degraded Groundwater Quality in Alluvial Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Public Supply Wells			
Total Dissolved Solids	8	4	50%
Chloride	8	2	25%
Sulfate	8	2	25%
Nitrate	9	0	0%
Gross Alpha Radiation	7	0	0%

8.7.2.3 Information Used and Methodology for Establishing Water Quality Minimum Thresholds

The information used for establishing the degraded groundwater quality minimum thresholds included:

- Historical groundwater quality data from production wells in the Subbasin
- Federal and state drinking water quality standards
- Feedback about significant and unreasonable conditions from GSA staff members and the public

The historical groundwater quality data used to establish groundwater quality minimum thresholds are presented in Chapter 5.

Based on the review of historical and current groundwater quality data, federal and state drinking water standards, and irrigation water quality needs, GSAs agreed that these standards are appropriate to define degraded groundwater quality minimum thresholds.

8.7.2.4 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The groundwater quality minimum thresholds were set for each of six constituents that are currently found in the Subbasin above water quality standards or irrigation guidance levels. These minimum thresholds were derived from existing data measured at individual wells. There are no conflicts between the existing groundwater quality data; and therefore, the minimum thresholds represent a reasonable and realistic distribution of groundwater quality. Because the underlying groundwater quality distribution is reasonable and realistic, there is no conflict that prevents the Subbasin from simultaneously achieving all six minimum thresholds.

Because SGMA regulations do not require projects or actions to improve groundwater quality, there will be no direct actions under the GSP associated with the groundwater quality minimum thresholds. Therefore, there are no actions that directly influence other sustainability indicators. However, preventing migration of poor groundwater quality may limit activities needed to achieve minimum thresholds for other sustainability indicators.

- **Change in groundwater levels.** Groundwater quality minimum thresholds could influence groundwater level minimum thresholds by limiting the types of water that can be used for recharge to raise groundwater levels. Water used for recharge cannot exceed any of the groundwater quality minimum thresholds.
- **Change in groundwater storage**. Nothing in the groundwater quality minimum thresholds promotes pumping in excess of the sustainable yield. Therefore, the groundwater quality minimum thresholds will not result in an exceedance of the groundwater storage minimum threshold.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin
- **Subsidence**. Nothing in the groundwater quality minimum thresholds promotes a condition that will lead to additional subsidence and therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable level of subsidence.
- **Depletion of interconnected surface waters.** Nothing in the groundwater quality minimum thresholds promotes additional pumping or lower groundwater elevations adjacent to interconnected surface waters. Therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable depletion of interconnected surface waters.

8.7.2.5 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the degraded groundwater quality minimum thresholds on each of the two neighboring subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. The Upper Valley Subbasin is hydrogeologically down gradient of the Paso Robles Subbasin, thus groundwater generally flows from the Paso Robles Subbasin into the Upper Valley Subbasin. Poor groundwater quality in the Paso Robles Subbasin could flow into the Upper Valley Subbasin, affecting the ability to achieve sustainability in that Subbasin. The degraded groundwater quality minimum threshold is set to prevent unreasonable movement of poor-quality groundwater that could impact overall beneficial uses of groundwater. Therefore, it is unlikely that the groundwater quality minimum thresholds established for the Paso Robles Subbasin will prevent the Upper Valley Subbasin from achieving sustainability.

Atascadero Subbasin. Groundwater generally flows from the Atascadero Subbasin into the Paso Robles Subbasin. Therefore, poor quality groundwater in the Paso Robles Subbasin is not expected flow into the Atascadero Subbasin in the future, thus the Paso Robles Subbasin groundwater quality minimum thresholds will not likely prevent the Atascadero Subbasin from achieving sustainability.

8.7.2.6 Effect on Beneficial Uses and Users

Agricultural land uses and users. The degraded groundwater quality minimum thresholds generally benefit the agricultural water users in the Subbasin. For example, preventing additional agricultural supply wells from exceeding constituent of concern concentrations that could reduce crop production ensures that a supply of usable groundwater will exist for beneficial agricultural use.

Urban land uses and users. The degraded groundwater quality minimum thresholds generally benefit the urban water users in the Subbasin. Preventing constituents of concern in additional drinking water supply wells from exceeding primary or secondary MCLs ensures an adequate supply of groundwater for municipal use.

Domestic land uses and users. The degraded groundwater quality minimum thresholds generally benefit the domestic water users in the Subbasin. Preventing constituents of concern in additional drinking water supply wells from exceeding primary or secondary MCLs ensures an adequate supply of groundwater for domestic use.

Ecological land uses and users. Although the groundwater quality minimum thresholds do not directly benefit ecological uses, it can be inferred that the degraded groundwater quality minimum thresholds generally benefit the ecological water uses in the Subbasin. Preventing constituents of concern from migrating will prevent unwanted contaminants from impacting ecological groundwater supply.

8.7.2.7 Relation to State, Federal, or Local Standards

The degraded groundwater quality minimum thresholds specifically incorporate federal and state drinking water standards.

8.7.2.8 Method for Quantitative Measurement of Minimum Thresholds

Degraded groundwater quality minimum thresholds will be directly measured from existing or new municipal or agricultural supply wells. Groundwater quality will initially be measured using existing monitoring programs.

- Exceedances of primary or secondary MCLs will be monitored by reviewing annual water quality reports submitted to the California Division of Drinking water by municipalities and small water systems.
- Exceedances of crop production minimum thresholds will be monitored as part of the ILRP as presented in Chapter 7.

8.7.3 Measurable Objectives

The measurable objectives for degraded groundwater quality represent target groundwater quality distributions in the Subbasin. Because improving groundwater quality is not a goal under SGMA, the measurable objectives were set to identical to the minimum thresholds.

8.7.3.1 Paso Robles Formation Aquifer

Based on the existing monitoring network, the measurable objectives for degraded groundwater quality in the Paso Robles Formation Aquifer are shown in Table 8-6.

Table 8-6. Measurable Objectives for Degraded Groundwater Quality in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Agricultural Wells			
Chloride	28	3	11%
Boron	28	9	32%
Municipal Wells			
Total Dissolved Solids	34	11	32%
Chloride	34	1	3%
Sulfate	34	1	3%
Nitrate	34	1	3%
Gross Alpha Radiation	32	0	0%

8.7.3.2 Alluvial Aquifer

Based on the existing monitoring network, the measurable objectives for degraded groundwater quality in the Paso Robles Formation Aquifer are shown in Table 8-7.

Table 8-7. Measurable Objectives for Degraded Groundwater Quality in Alluvial Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Public Supply Wells			
Total Dissolved Solids	8	4	50%
Chloride	8	2	25%
Sulfate	8	2	25%
Nitrate	9	0	0%
Gross Alpha Radiation	7	0	0%

8.7.3.3 Method for Setting Measurable Objectives

Because improving groundwater quality is not a goal under SGMA, the measurable objectives were set to identical to the minimum thresholds.

8.7.3.4 Interim Milestones

Interim milestones show how the GSAs anticipate moving from current conditions to meeting the measurable objectives. Interim milestones are set for each five-year interval following GSP adoption.

The measurable objectives for degraded groundwater quality were set at current conditions. Therefore, the expected interim milestones are identical to current conditions. The interim milestones for the constituents in the Paso Robles Formation Aquifer are shown in Table 8-8.

Table 8-8. Interim Milestone Groundwater Quality Exceedances in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Five Year Number of Groundwater Quality Exceedances	Ten Year Number of Groundwater Quality Exceedances	Fifteen Year Number of Groundwater Quality Exceedances
Agricultural Supply Wells			
Chloride	3	3	3
Boron	9	9	9
Public supply wells			
Total Dissolved Solids	16	16	16
Chloride	3	3	3
Sulfate	3	3	3
Nitrate	1	1	1
Gross Alpha Radiation	0	0	0

The interim milestones for the constituents in the Alluvial Aquifer are shown in Table 8-9.

Table 8-9. Interim Milestone Groundwater Quality Exceedances in Alluvial Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	5-Year Number of Groundwater Quality Exceedances	10-Year Number of Groundwater Quality Exceedances	15-Year Number of Groundwater Quality Exceedances
Public supply wells			
Total Dissolved Solids	4	4	4
Chloride	2	2	2
Sulfate	2	2	2
Nitrate	0	0	0
Gross Alpha Radiation	0	0	0

8.7.4 Undesirable Results

8.7.4.1 Criteria for Defining Undesirable Results

By SGMA regulations, the degraded groundwater quality undesirable result is a quantitative combination of groundwater quality minimum threshold exceedances. For the Subbasin, groundwater quality degradation is unacceptable only as a direct result of actions taken as part of GSP implementation. Therefore, the degraded groundwater quality undesirable result is:

On average during any one year, no groundwater quality minimum threshold shall be exceeded in any aquifer as a direct result of projects or management actions taken as part of GSP implementation.

8.7.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include the following:

- **Required Changes to Subbasin Pumping**. If the location and rates of groundwater pumping change as a result of projects implemented under the GSP, these changes could cause movement of one of the constituents of concern towards a supply well at concentrations that exceed relevant water quality standards.
- **Groundwater Recharge.** Active recharge of imported water or captured runoff could cause movement of one of the constituents of concern towards a supply well in concentrations that exceed relevant water quality standards.
- **Recharge of Poor-Quality Water.** Recharging the Subbasin with water that exceeds a primary or secondary MCL or concentration that reduces crop production will lead to an undesirable result.

8.7.4.3 Effects on Beneficial Users and Land Use

The practical effect of the degraded groundwater quality undesirable result is that it deters any significant changes to groundwater quality. Therefore, the undesirable result will not impact the use of groundwater and will not have a negative effect on the beneficial users and uses of groundwater.

8.8 Land Subsidence Sustainable Management Criteria

8.8.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions for land subsidence were assessed based on public meetings and discussions with GSA staff. Significant and unreasonable rates of land subsidence in the Subbasin are those that lead to a permanent subsidence of land surface elevations that impact infrastructure. For clarity, this Sustainable Management Criterion adopts two related concepts:

- **Land Subsidence** is a gradual settling of the land surface caused by compaction of subsurface materials due to lowering of groundwater elevations from groundwater pumping. Land subsidence in an inelastic process, and the decline in land surface is permanent.
- **Land Surface Fluctuation** is the periodic or annual measurement of the ground surface elevation. Land surface may rise or fall in any one year. Declining land surface fluctuation may or may not indicate long-term permanent subsidence.

8.8.2 Minimum Thresholds

Section 354.28(c)(5) of the SGMA regulations states that "*The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.*"

8.8.2.1 Information Used and Methodology for Establishing Subsidence Minimum Thresholds

The information used for establishing the land subsidence minimum thresholds included:

- Historical land surface elevation data from continuous GSP locations in the Subbasin
- Feedback about significant and unreasonable conditions gathered from GSA staff members and stakeholders

Land surface elevation is measured by the University NAVSTAR Consortium (UNAVCO) at five continuous global positioning system (GPS) sites in and around the Subbasin (Figure 7-5). Minimum thresholds for subsidence are set at these five locations. The basis for the subsidence minimum threshold is zero long term subsidence. The five GPS sites in the monitoring network have displayed multi-year land surface fluctuations, but generally do not display a long-term decline in land elevation that indicate subsidence is occurring in the Subbasin. The historical land surface fluctuations at these five sites demonstrate that a decline in land surface observed in one year may be compensated for by a similar rise in land surface the following year.

Discussions with GSA staff and the public indicated that, while people were generally in agreement with the goal of zero subsidence, there was concern about being held accountable for small amounts of subsidence that would not harm infrastructure.

Rate of Subsidence. Any rate of subsidence, if maintained over a long period of time, could lead to significant and unreasonable conditions. Therefore, the acceptable rate of subsidence is zero at all five continuous GPS sites. However, there may be annual land surface fluctuations that are acceptable because they would not be expected to indicate long-term subsidence.

As shown on Figure 7-6, most of the continuous GPS stations show some years with an annual rise in land surface elevation. This rise is often part of a longer-term trend, and does not appear to be related to seasonal elastic subsidence. The maximum measured rate of rise for each of the five continuous GPS sites is tabulated in Table 8-10.

Table 8-10. Maximum Measured Rate of Ground Surface Rise

Continuous GPS Site	Maximum Annual Rise (inches)	Maximum Annual Rise (feet)	Time Period
Hillm Ranch CS2005	0.51	0.04	June 2010 to June 2011
Ranchita Cn CS2006	0.43	0.04	May 2017 to May 2018
CRBT SCGN CN2001	0.42	0.04	August 2017 to August 2018
Hog Canyon CS2007	0.50	0.04	May 2017 to May 2018
Camatta Cyn CS2006	0.90	0.04	June 2010 to June 2011

The values in Table 8-10 are used to determine acceptable rates of measured land surface decline that could result in zero long-term subsidence. For example, if 0.5 inch of land surface drop is measured during a year at site P-531, Table 8-10 shows that this site has a capacity for, and demonstrated history of, rising 0.5 inch in a subsequent year, yielding a net zero subsidence rate. Therefore, minimum thresholds are set to the maximum observed annual land surface rise in ground surface at each continuous GPS site.

Extent of Subsidence. Because it is difficult to identify areas of the Subbasin where permanent subsidence has no impact on infrastructure, subsidence in any portion of the Subbasin is significant and unreasonable. Therefore, minimum thresholds are set for all five of the existing continuous GPS sites.

8.8.2.2 Land Subsidence Minimum Thresholds

Based on an analysis of historical land elevation fluctuations at these five sites, the minimum thresholds for annual land surface fluctuation at the five continuous GPS sites are shown in Table 8-11.

Table 8-11. Subsidence Minimum Thresholds

Continuous GPS Site	Rate of Land Surface Decline (inches per year)
Hillm Ranch CS2005	0.51
Ranchita Cn CS2006	0.43
CRBT SCGN CN2001	0.42
Hog Canyon CS2007	0.50
Camatta Cyn CS2006	0.90

8.8.2.3 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The subsidence minimum thresholds are derived from measurements at individual continuous GPS sites. Therefore, the minimum thresholds are unique at every GPS site, but together they represent a reasonable and realistic rate of simultaneous land surface movement across the Subbasin. Because the underlying data are reasonably achievable simultaneously, the different minimum thresholds at the GPS sites do not conflict with each other.

The subsidence minimum thresholds have little or no impact on other minimum thresholds, as described below.

- **Chronic lowering of groundwater elevations.** Maintaining groundwater levels to avoid subsidence will not result in a significant or unreasonable lowering of groundwater levels.
- **Change in groundwater storage**. The subsidence minimum thresholds will not change the amount of pumping, and will not result in a significant or unreasonable change in groundwater storage.

- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin
- **Degraded water quality**. The subsidence minimum thresholds will not change the groundwater flow directions or rates, and therefore and will not result in a significant or unreasonable change in groundwater quality.
- **Depletion of interconnected surface waters.** The ground level subsidence minimum thresholds will not change groundwater levels near streams and will not result in a significant or unreasonable depletion of interconnected surface waters.

8.8.2.4 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the subsidence minimum thresholds on each of the two neighboring subbasins is addressed below.

- **Upper Valley Subbasin of the Salinas Valley Basin**. The ground surface subsidence minimum thresholds are set to prevent any long-term subsidence that could harm infrastructure. Therefore, the subsidence minimum thresholds will not prevent the Upper Valley Subbasin from achieving sustainability.
- **Atascadero Subbasin**. The subsidence minimum thresholds are set to prevent any long-term subsidence that could harm infrastructure. Therefore, the subsidence minimum thresholds will not prevent the Atascadero Subbasin from achieving sustainability.

8.8.2.5 Effects on Beneficial Uses and Users

The subsidence minimum thresholds are set to prevent subsidence that could harm infrastructure. Available data indicate that there is currently no subsidence occurring in the Subbasin that affects infrastructure, and reductions in pumping are already required by the reduction in groundwater storage sustainability indicator. Therefore, the subsidence minimum thresholds do not require any additional reductions in pumping and there is no negative impact on any beneficial user.

8.8.2.6 Relation to State, Federal, or Local Standards

There are no federal, state, or local regulations related to subsidence.

8.8.2.7 Method for Quantitative Measurement of Minimum Threshold

Continues GPS data from the five identified sites will be downloaded annually from the UNAVSCO internet site. Daily GPS data will be converted to average monthly data and plotted on graphs similar to those shown on Figure 7-6. Both quantitative and qualitative assessments of the data will be performed to assess if any trends are apparent, and if the annual subsidence is greater than the minimum thresholds.

8.8.3 Measurable Objectives

The measurable objectives for subsidence represent target subsidence rates in the Subbasin.

8.8.3.1 Method for Setting Measurable Objectives

The measurable objectives were set to the land surface declines that result in zero long-term subsidence. As discussed in Section 8.8.2, some annual land surface elevation fluctuation is measured at the five GPS sites, but these annual fluctuations do not translate into long-term subsidence. Therefore, some annual land surface elevation fluctuation is allowable as long as it is not part of long-term subsidence.

8.8.3.2 Measurable Objectives

Because the minimum thresholds of zero subsidence are the best achievable outcome, the measurable objectives were set to the minimum thresholds. Based on the existing monitoring system, the subsidence measurable objectives are shown in Table 8-12.

Table 8-12. Subsidence Measurable Objectives

Continuous GPS Site	Rate of Land Surface Decline (inches per year)
Hillm Ranch CS2005	0.51
Ranchita Cn CS2006	0.43
CRBT SCGN CN2001	0.42
Hog Canyon CS2007	0.50
Camatta Cyn CS2006	0.90

8.8.3.3 Interim Milestones

Interim milestones show how the GSAs anticipate moving from current conditions to meeting the measurable objectives. Interim milestones are set for each five-year interval following GSP adoption.

Subsidence measurable objectives are set equal to minimum thresholds, which reflect the current condition, of no subsidence. The interim milestones for each of the six minimum thresholds are shown in Table 8-13. Interim milestones are long-term subsidence rates, not the annual measured land surface fluctuation rates. Therefore, the interim milestones are not numerically equivalent to the minimum thresholds and measurable objectives.

Table 8-13. Subsidence Interim Milestones

Continuous GPS Site	5-Year Long-Term Subsidence Rate (inches per year)	10-Year Long-Term Subsidence Rate (inches per year)	15-Year Long-Term Subsidence Rate (inches per year)
Hillm Ranch CS2005	0	0	0
Ranchita Cn CS2006	0	0	0
CRBT SCGN CN2001	0	0	0
Hog Canyon CS2007	0	0	0
Camatta Cyn CS2006	0	0	0

8.8.4 Undesirable Results

8.8.4.1 Criteria for Defining Undesirable Results

The SGMA regulations state that the subsidence undesirable result is a quantitative combination of subsidence minimum threshold exceedances. For the Subbasin, significant subsidence that impacts infrastructure is unacceptable. However, available continuous GPS data show annual land surface fluctuations that do not necessarily indicate long-term subsidence is occurring. Future GPS data could suggest that subsidence is occurring when annual ground level declines are part of a long-term trend. To address the inherent data uncertainty, one minimum threshold exceedance is allowed each year. Therefore, the subsidence undesirable result is:

During any one year, only one subsidence minimum threshold shall be exceeded. An Individual continuous GPS sites may not exceed its minimum threshold for more than two consecutive years.

8.8.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include a shift in pumping locations, which could lead to a substantial decline in groundwater levels. Shifting a significant amount of pumping and causing groundwater levels to fall in an area that is susceptible to subsidence could trigger subsidence in excess of the minimum thresholds.

8.8.4.3 Effects on Beneficial Users and Land Use

The undesirable result for subsidence allows one exceedance of a minimum threshold to account for measurement error and uncertainty. If the exceedance is due to actual subsidence and not measurement error, then localized subsidence could impact beneficial users by impacting infrastructure.

8.9 Depletion of Interconnected Surface Water SMC

8.9.1 Locally Defined Significant and Unreasonable Conditions

As described in Chapter 4, Hydrogeologic Conceptual Model and Chapter 5, Groundwater Conditions, the prevailing belief of local residents and experts in the Subbasin based on observation and some hydrologic data, is that interconnected surface water and groundwater does not currently exist in the Subbasin. As described in Chapter 7, Monitoring Networks, a more expansive monitoring network will be developed during GSP implementation to improve understanding of interconnection between surface water and groundwater in the Subbasin. If in the future, data indicate that surface water and groundwater are interconnected, locally defined significant and unreasonable conditions will be assessed for those interconnected areas.

8.9.2 Minimum Thresholds

Section 354.28(c)(6) of the SGMA regulations states that "*The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results*."

Surface water and groundwater in the Subbasin do not appear to be interconnected at this time. Therefore, minimum thresholds were not developed for the GSP. If in the future, data from a more comprehensive monitoring program indicate that surface water and groundwater are interconnected, minimum thresholds will be developed for areas of interconnection. Since minimum thresholds were not developed for the GSP, information about the methods used to develop minimum thresholds, the quantitative metrics to track compliance with minimum thresholds, and their impact on other sustainability indicators, other Subbasins, and beneficial use and users of groundwater is not presented in this section like it was for the other sustainability indicators.

8.9.3 Measurable Objectives

Similar to minimum thresholds, measurable objectives were not developed for the GSP. If in the future, data from a more comprehensive monitoring program indicate that surface water and groundwater are interconnected, measurable objectives will be developed for areas of interconnection. Since measureable objectives were not developed for the GSP, information about the methods used to develop measurable objectives and interim milestones is not presented in this section like it was for the other sustainability indicators.

8.9.4 Undesirable Results

Because there does not appear to be an interconnection between surface water and groundwater in the Subbasin at this time, undesirable results, including impacts to beneficial uses and users of groundwater, related to interconnected surface water and groundwater are not expected to occur. If in the future, data from a more comprehensive monitoring program indicate that surface water and groundwater are interconnected, undesirable results related to interconnected surface water and groundwater will be assessed.

8.10 Management Areas

Management areas have not been established in the Subbasin. For planning purposes, the concepts for future management areas are provided below.

8.10.1 Future Management Area Concept

Management areas may be developed in the future based on the existence of a geologic and geographic divide in the Subbasin. The Subbasin is dominated by two main watersheds and many smaller watersheds that drain into and recharge the Subbasin. The western portion of the Subbasin is fed by the Salinas watershed, including the Huer Huero watershed. The eastern portion of the Subbasin is fed by the Estrella River watershed, including Cholame Creek and San Juan Creek watersheds. These two watersheds have different geologic and climatic conditions. Both watersheds drain to the confluence of the Estrella and Salinas Rivers near San Miguel in the northern end of the Subbasin. A distinct geologic ridge divides the Huer Huero portion of the Salinas River watershed from the Shed Canyon portion of the Estrella River watershed. This uplifted ridge bisects the Subbasin and the Estrella River cuts through this ridge near Whitley Gardens. The Subbasin may be divided into western and eastern management areas along the uplifted ridge in the future.

The nature of this divide and the underlying geology within the Subbasin needs to be better understood before the GSAs can delineate and justify any management area. The GSAs will initiate and support electromagnetic resonance surveys to help delineate local geology. Reports from well owners throughout the Subbasin suggest that some areas of the Subbasin are distinctly isolated from neighboring areas. Analysis of static groundwater levels from as many wells as possible will help to define areas where groundwater conditions appear to be hydrologically connected and areas where these conditions seem to be hydrologically isolated. This will help form the basis of defining the management area. This effort will also assist in defining where future monitoring wells should be located. The GSAs in the proposed management areas may undertake distinct management approaches which would be appropriately designed to protect the local groundwater resource without adversely impacting other areas of the Subbasin or neighboring Subbasins.

Each area of the Subbasin will be managed in conjunction with all other areas using the same set of undesirable results and minimum thresholds, tied to specific RMSs as described in this chapter. The Subbasin wide monitoring networks will be used to assure compliance with the GSP. Using management areas to assure long-term sustainability protects all beneficial uses and users in all parts of the Subbasin.

8.10.2 Minimum Thresholds and Measurable Objectives

The minimum thresholds that will be established in potential management areas will use the same process and criteria described above in this chapter. The minimum thresholds and measurable objectives will be developed to ensure groundwater levels remain above historical water levels in each management area, and to maintain historical groundwater flow conditions to downstream portions of the Subbasin and other downstream basins. By managing groundwater sustainably in each management area, the groundwater resource remains available for beneficial uses and users. Groundwater quality will not be degraded due to poor quality water moving into productive aquifers.

8.10.3 Monitoring

Because of the large size and distinctly separate drainages of the watersheds draining into each of management area, there is a need for a robust network of monitoring wells that provide data representative of specific portions of each management area. Initially, existing wells with known depths and known perforated intervals will be selected and used. Where needed dedicated new monitoring wells may be added to improve the monitoring network.

8.10.4 How Management Areas Will Avoid Undesirable Results

The undesirable results described in the sections above are applicable in each management area. As long as minimum thresholds and measurable objectives continue to be met within each management area, beneficial uses and users of the groundwater resource will be assured of continued access to a sustainable groundwater resource. The projects and management actions in each management area will be proportional to the need to maintain those minimum thresholds and measurable objectives.

8.10.5 Management

The establishment and implementation of Management Areas would follow the agreement among the four GSAs (see GSP Chapter 12).