



Memorandum - **DRAFT** Undesirable Results Statements

Subject: Undesirable Results Statements

Prepared For: Cuyama Valley Basin Groundwater Sustainability Plan

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This memorandum presents a draft version of the Undesirable Results section of the Cuyama Valley Groundwater Basin (basin) Groundwater Sustainability Plan (GSP). The Undesirable Results statements in this section are a key component of the GSP, as other GSP components must be developed to set quantitative thresholds on monitoring points that indicate where Undesirable Results would occur on the monitoring network, and to shape the monitoring network to detect the Undesirable Results.

This memorandum has two sections: The first section is the draft Undesirable Results section, and the second section contains guidance from relevant portions of the GSP regulations about Undesirable Results and guidance about Undesirable Results from the Sustainable Management Criteria Best Management Practices (BMP).

A public workshop was held on June 6th, 2018 where sustainability and undesirable outcomes were discussed. Input from that meeting was tallied in a table where the inputs were tied to the most relevant GSP component. The sorted results were used to guide creation of the Undesirable Results statements and are included in Attachment A.

Draft Undesirable Results Statements

Undesirable results are defined for use in SGMA as one or more of the following effects caused by groundwater conditions occurring throughout the basin:

- (1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.
- (2) Significant and unreasonable reduction of groundwater storage.
- (3) Significant and unreasonable seawater intrusion.
- (4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
- (5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.
- (6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

Undesirable results related to seawater intrusion are not present in the basin and are not likely to occur in the basin.

Information is provided below for each effect, as it applies to the basin. For the sustainability indicators relevant to the basin, the discussion includes a description of the undesirable result, identification of undesirable results, potential causes of undesirable results, and potential effects of undesirable results on beneficial uses. For the indicator not present, justification for not establishing undesirable results is provided. The information was developed based on the water code, regulations, BMP, and stakeholder input.

Chronic Lowering of Groundwater Levels

Description of Undesirable Results

The Undesirable Result for the chronic lowering of groundwater levels is a result that causes significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is considered to occur during GSP implementation when XX% of representative monitoring wells (XX of XX) for levels fall below their minimum groundwater elevation thresholds for (two to four) consecutive years.

Potential Causes of Undesirable Results

Potential causes of Undesirable Results for the chronic lowering of groundwater levels are groundwater pumping that exceeds the average sustainable yield in the basin, and changes in precipitation in the Cuyama Watershed in the future.

Potential Effects of Undesirable Results

If groundwater levels were to reach Undesirable Results, the Undesirable Results could cause potential dewatering of existing groundwater infrastructure, starting with the shallowest wells, could potentially adversely affect groundwater dependent ecosystems, and potentially cause changes in irrigation practices, crops grown, and adverse effects to property values. Additionally, reaching Undesirable Results for groundwater levels could adversely affect domestic and municipal uses, which rely on groundwater in the subbasin.

Reduction of Groundwater Storage

Description of Undesirable Results

The undesirable result for the reduction in groundwater storage is a result that causes significant and unreasonable reduction in the viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is considered to occur during GSP implementation when XX% of proxy monitoring wells (XX of XX) for levels (and quality) fall below the proxy for groundwater storage minimum thresholds for (two to four) consecutive years.

Potential Causes of Undesirable Results

Potential causes of Undesirable Results for the reduction in groundwater storage are groundwater pumping that exceeds the average sustainable yield in the basin, and decreases in precipitation in the Cuyama Watershed in the future.

Potential Effects of Undesirable Results

If reduction of groundwater in storage were to reach Undesirable Results, the Undesirable Results could cause potential de-watering of existing groundwater infrastructure, starting with the shallowest wells, could potentially adversely affect groundwater dependent ecosystems, and potentially cause changes in irrigation practices, crops grown, and adverse effects to property values. Additionally, reaching Undesirable Results for reduction of groundwater in storage could adversely affect domestic and municipal uses, which rely on groundwater in the subbasin.

Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator, because seawater intrusion is not present and is not likely to occur due to the distance between the basin and the Pacific Ocean, bays, deltas, or inlets.

Degraded Water Quality

Description of Undesirable Results

The Undesirable Result for degraded water quality is a result stemming from a causal nexus between SGMA-related groundwater quantity management activities and groundwater quality that causes significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is considered to occur during GSP implementation when XX% of representative monitoring points (XX of XX sites) exceed the minimum threshold for a constituent for two consecutive years.

Potential Causes of Undesirable Results

Potential causes of Undesirable Results for the degraded water quality are conditions where groundwater pumping degrades the groundwater quality.

Potential Effects of Undesirable Results

If groundwater quality were degraded to reach Undesirable Results, the Undesirable Results could potentially cause a shortage in supply to groundwater users, with domestic wells being most vulnerable as treatment costs or access to alternate supplies can be high for small users. Some water quality issues could potentially cause more impact on agricultural uses than municipal or domestic uses, depending on the impact of the contaminant to these water use sectors. Water quality degradation could cause potential changes in irrigation practices, crops grown, and adverse effects to property values. Additionally, reaching

Undesirable Results for groundwater quality could adversely affect municipal uses, which could have to install treatment systems.

Land Subsidence

Description of Undesirable Results

The Undesirable Result for land subsidence is a result that causes significant and unreasonable reduction in the viability of the use of infrastructure over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is detected to occur during GSP implementation when XX% of representative subsidence monitoring sites (XX of XX sites) exceed the minimum threshold for subsidence over five years.

Potential Causes of Undesirable Results

Potential causes of future Undesirable Results for land subsidence are likely tied to groundwater pumping resulting in dewatering of compressible clays in the subsurface.

Potential Effects of Undesirable Results

If land subsidence conditions were to reach Undesirable Results, the Undesirable Results could potentially cause damage to infrastructure, including water conveyance facilities and flood control facilities roads, utilities, buildings, and pipelines.

Depletions of Interconnected Surface Water

Description of Undesirable Results

The Undesirable Result for depletions of interconnected surface water is a result that causes significant and unreasonable reductions in the viability of agriculture or riparian habitat within the basin over the planning and implementation horizon of this GSP.

Identification of Undesirable Results

This result is considered to occur during GSP implementation when XX% of representative monitoring wells on the groundwater level monitoring network (XX of XX sites) exceed the proxy minimum thresholds for depletions of interconnected surface water.

Justification of Groundwater Elevations as a Proxy

Use of groundwater elevation as a proxy metric for Undesirable Results is necessary given the difficulty and cost of direct monitoring of depletions of interconnected surface water. The depletion of interconnected surface water is driven by a gradient between water surface elevation in the surface water body and groundwater elevations in the connected, shallow groundwater system. By setting minimum thresholds on shallow groundwater wells near surface water, this gradient is managed, and, in turn, depletions of interconnected surface water are managed.

Potential Causes of Undesirable Results

Potential causes of future Undesirable Results for depletions of interconnected surface water are likely tied to groundwater production, particularly in the shallowest zones, where surface water and groundwater are connected. Increased depletions could result in lowering of groundwater elevations in shallow aquifers near surface water courses, which changes the hydraulic gradient between the water surface elevation in the surface water course and the groundwater elevation, resulting in an increase in depletion.

Potential Effects of Undesirable Results

If depletions of interconnected surface water were to reach Undesirable Results, groundwater dependent ecosystems could be affected.

Related Regulations and Best Management Practices

Undesirable Results Regulations § 354.26:

The regulations have seven entries about Undesirable Results:

"(a) Each Agency shall describe in its Plan the processes and criteria relied upon to define Undesirable Results applicable to the basin. Undesirable Results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin."

"(b) The description of Undesirable Results shall include the following:"

"(1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to Undesirable Results based on information described in the basin setting, and other data or models as appropriate."

"(2) The criteria used to define when and where the effects of the groundwater conditions cause Undesirable Results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin."

"(3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from Undesirable Results."

"(c) The Agency may need to evaluate multiple minimum thresholds to determine whether an Undesirable Result is occurring in the basin. The determination that Undesirable Results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site."

"(d) An Agency that is able to demonstrate that Undesirable Results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for Undesirable Results related to those sustainability indicators."

Sustainable Management Criteria Best Management Practices

The BMP describes sustainability indicators and their relationship to Undesirable Results.

Sustainability Indicators

Sustainability indicators are the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, become Undesirable Results. Undesirable Results are one or more of the following effects:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of

drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods

- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

The significant and unreasonable occurrence of any of the six sustainability indicators constitutes an Undesirable Result.

The default position for GSAs should be that all six sustainability indicators apply to their basin. If a GSA believes a sustainability indicator is not applicable for their basin, they must provide evidence that the indicator does not exist and could not occur. For example, GSAs in basins not adjacent to the Pacific Ocean, bays, deltas, or inlets may determine that seawater intrusion is not an applicable sustainability indicator, because seawater intrusion does not exist and could not occur. In contrast, simply demonstrating that groundwater levels have been stable in recent years is not sufficient to determine that land subsidence is not an applicable sustainability indicator. As part of the GSP evaluation process, the Department will evaluate the GSA's determination that a sustainability indicator does not apply for reasonableness.

Significant and Unreasonable Conditions

GSAs must consider and document the conditions at which each of the six sustainability indicators become significant and unreasonable in their basin, including the reasons for justifying each particular threshold selected. A GSA may decide, for example, that localized inelastic land subsidence near critical infrastructure (e.g., a canal) and basinwide loss of domestic well pumping capacity due to lowering of groundwater levels are both significant and unreasonable conditions. These general descriptions of significant and unreasonable conditions are later translated into quantitative Undesirable Results, as described in this document. The evaluation of significant and unreasonable conditions should identify the geographic area over which the conditions need to be evaluated so the GSA can choose appropriate representative monitoring sites.