

State of California
Department of Water Resources
Sustainable Groundwater Management Program
Alternative Assessment Staff Report

Groundwater Basin Name: Big Valley (Basin No. 5-015)
Submitting Agency: Lake County Watershed Protection District
Recommendation: Do Not Approve
Date Issued: July 17, 2019

I. Summary

The Lake County Watershed Protection District (District) submitted an alternative (Big Valley Basin Alternative or Alternative) to the Department of Water Resources (Department) for evaluation and assessment as provided by the Sustainable Groundwater Management Act (SGMA).¹ The District submitted an existing plan,² and relies primarily on the 2006 Lake County Groundwater Management Plan (Groundwater Management Plan or Plan). After a review of the Plan, other related documents, and consideration of public comments, Department staff find that the Big Valley Basin Alternative does not satisfy the objectives of SGMA for the Big Valley Basin and does not recommend approval of the Alternative.

The District developed the Groundwater Management Plan in response to AB 3030 and SB 1938 and includes many of the components for a groundwater management plan, as prescribed in those pieces of legislation. The Plan represents an initial step towards managing groundwater in the Big Valley Basin, however for the purposes of SGMA it does not contain sufficient information and data that the Department could rely on to assess whether the Plan has resulted in, or would result in, sustainable groundwater management. Thirteen groundwater basins are described and managed under the Groundwater Management Plan. As a consequence, minimal details specific to the Big Valley Basin are included and key components of a groundwater sustainability plan, such as a water budget, are not at the appropriate scale (i.e., at the basin level as opposed to county level). More importantly, the District has not developed a quantitative estimate of sustainable yield or established criteria related to the undesirable results defined in SGMA. It appears the District has not managed the Basin to any objective standard, but instead claims that stable groundwater levels over time demonstrate that undesirable

¹ Water Code § 10720 *et seq.*

² Water Code § 10733.6(b)(1)

results associated with groundwater levels, groundwater storage, land subsidence, degradation of groundwater quality, and depletion of interconnected surface water are not present and are not likely to occur.

However, the Plan contains no detailed analysis that would justify exempting the District from developing criteria for undesirable results that are essential to SGMA's definition of sustainable groundwater management. In fact, the Plan itself states that the Basin may be overdrafted during periods of drought and that potential impacts of that overdraft might include water shortages, dry wells, deterioration of groundwater quality and ground subsidence.³ The Plan does not determine when those potential impacts might be an undesirable result, or how the District might avoid those potential impacts moving forward. Furthermore, the District has little or no information with regard to other groundwater conditions such as groundwater quality and depletions of interconnected surface water. The Department staff cannot assume undesirable results have not occurred, or will not occur, in the absence of a compelling argument and sufficient and credible supporting data. Because of the limited understanding of current and historical basin conditions and insufficient information and data demonstrating the absence of undesirable results, the Department staff are unable to determine whether the Groundwater Management Plan implementation would lead to sustainable groundwater management for the Big Valley Basin and, therefore, recommends not approving the Alternative.

The remainder of this assessment is organized as follows:

- **Section II. Review Principles** describes legal and other considerations regarding Department staff's assessment and evaluation of alternatives.
- **Section III. Alternative Materials** describes materials (i.e., plans, reports, data, and other information) submitted by the District that, collectively, the Department staff considered as the Alternative.
- **Section IV. Required Conditions** describes whether the Alternative satisfies each of the four conditions required for the Department to review an alternative.
- **Section V. Alternative Contents** describes the information contained in the Alternative submittal.
- **Section VI. Assessment** describes Department staff's evaluation of the Alternative, whether it satisfies the objectives of SGMA, and, if applicable, describes recommended actions proposed for the first five-year update.

II. Review Principles

The District submitted an alternative based on a groundwater management plan to the Department for evaluation and assessment to determine whether it satisfies the

³ Groundwater Management Plan, p. 2-20

objectives of SGMA for the Big Valley Basin. To satisfy the objectives of SGMA, an alternative based on a groundwater management plan prepared pursuant to Part 2.75 of Division 6 of the Water Code⁴ or a plan developed pursuant to another law authorizing groundwater management must demonstrate that implementation of the plan has led to, or will lead to, sustainable groundwater management, which means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.⁵ Undesirable results are defined quantitatively by the managing agency.⁶

An alternative, to be evaluated by the Department, must be submitted by the statutory deadline and be within a basin that complies with Part 2.11 of Division 6 of the Water Code.⁷ The submitted alternative must also be complete and must cover the entire basin.⁸ The Groundwater Sustainability Plan (GSP) Regulations⁹ require the Department to evaluate an Alternative “in accordance with Sections 355.2, 355.4(b), and Section 355.6, *as applicable*, to determine whether the Alternative complies with the objectives of the Act”.¹⁰ The elements of the cited sections are not all applicable to alternatives. Some provisions apply to GSPs and alternatives alike, to alternatives only prospectively, or do not apply to alternatives at all.¹¹ Ultimately, the purpose of the evaluation is to determine whether an alternative satisfies the objectives of SGMA.¹² The agency must explain how the elements of an alternative are “functionally equivalent” to the elements of a GSP required by Articles 5 and 7 of the GSP Regulations and are sufficient to demonstrate the ability of an alternative to achieve the objectives of SGMA.¹³ The explanation by the agency that elements of an alternative are functionally equivalent to elements of a GSP furthers the objective of demonstrating that an alternative satisfies the objectives of

⁴ Water Code § 10750 *et seq.*

⁵ Water Code § 10721(v)

⁶ 23 CCR § 354.26

⁷ Water Code § 10733.6(c)-(d)

⁸ 23 CCR § 358.4(a)

⁹ 23 CCR § 350 *et seq.*

¹⁰ 23 CCR § 358.4(b) (emphasis added)

¹¹ Procedural requirements, including submissions by the agency, posting by the Department, and the public comment period, apply equally to plans and alternatives (23 CCR § 355.2(a)-(c)). The periodic review of Plans (23 CCR § 355.6(a)) applies to alternatives prospectively but does not apply to initial submissions. Other regulatory provisions are inapplicable to alternatives, including the two-year review period (23 CCR § 355.2(e)), which is based on the statutory time-frame that applies to Plans but not alternatives (Water Code § 10733.4(d)); the “incomplete” status that allows the agency to address “one or more deficiencies that preclude approval, but which may be capable of being corrected by the Agency in a timely manner” (23 CCR § 355.2(e)(2)), which applies to plans undergoing development, but not alternatives that purportedly satisfy the objectives of SGMA at the time of their submission (Water Code § 10733.6(a)); and, for the same reason, corrective actions to address deficiencies in plans (23 CCR § 355.4(a)(4)), which applies to plans developed after the adoption of SGMA, but is inapplicable to alternatives that predate SGMA.

¹² 23 CCR § 358.2(d), based on the statutory threshold of “whether the alternative satisfies the objectives of [SGMA] for the basin” (Water Code § 10733.6(a)).

¹³ 23 CCR § 358.2(d)

SGMA. Alternatives based on groundwater management plans or historical basin management practices that predate the passage of SGMA or adoption of GSP Regulations, although required to satisfy the objectives of SGMA, are not necessarily expected to conform to the precise format and content of a GSP. The Department's assessment is thus focused on the ability of an alternative to satisfy the objectives of SGMA as demonstrated by information provided by the agency; it is not a determination of the degree to which an alternative matched the specific requirements of the GSP Regulations.

When evaluating whether an alternative satisfies the objectives of SGMA and thus is likely to achieve the sustainability goal for the basin, staff review the information provided by and relied upon by the agency for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice.¹⁴ The Department's review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the agency, whether sustainable management criteria and projects and management actions described in an alternative are commensurate with the level of understanding of the basin setting, and whether those projects and management actions are feasible and likely to prevent undesirable results.¹⁵ Staff will recommend that an alternative be approved if staff believe, in light of these factors, that alternative has achieved or is likely to achieve the sustainability goal for the basin.¹⁶

An alternative that relies on an existing plan may be approved based on information that demonstrates the basin is being or will be managed sustainably based on groundwater management pursuant to that plan, including any related projects and management actions, as necessary. Even when staff review indicates that an alternative will satisfy the objective of SGMA, the Department may recommend actions to facilitate future evaluation of that alternative and to allow the Department to better evaluate whether an alternative adversely affects adjacent basins. The Department proposes that recommended actions be addressed by the submission date for the first periodic evaluation.

Staff assessment of an alternative involves the review of information presented by the agency, including models and assumptions, and an evaluation of that information based on scientific reasonableness. The assessment does not require Department staff to recalculate or reevaluate technical information provided in an alternative or to perform its own geologic or engineering analysis of that information. The staff recommendation to approve an alternative does not signify that Department staff, were they to exercise the professional judgment required to develop a plan for the basin, would make the same

¹⁴ 23 CCR § 351(h)

¹⁵ 23 CCR § 355.4(b)(1), (3), and (5).

¹⁶ 23 CCR § 355.4(b)

assumptions and interpretations as those contained in an alternative, but simply that Department staff have determined that the assumptions and interpretations relied upon by the submitting agency are supported by adequate, credible evidence, and are scientifically reasonable.

III. Alternative Materials

The District submitted an alternative based on a groundwater management plan pursuant to Water Code Section 10733.6(b)(1). The Alternative thus relied primarily upon the following document:

- Lake County Watershed Protection District – Lake County Groundwater Management Plan, March 31, 2006 (Groundwater Management Plan *or* Plan)

The District submitted the following additional plans, reports, and other documents that the Department has determined to be sufficiently related to the Groundwater Management Plan to warrant their consideration as part of the Alternative:

- Lake County Water Inventory and Analysis, CDM, 2006 (Water Inventory Analysis)
- Lake County Water Demand Forecast, CDM, 2006 (Water Demand Forecast)
- Big Valley Ground Water Recharge Investigation Update, Christensen Associates Inc., 2003 (Recharge Investigation)

In addition, two documents prepared in 2016 were submitted to the Department:

- Alternative to GSP, Big Valley Groundwater Basin to Satisfy the Sustainable Groundwater Management Act, Lake County Watershed Protection District (Bridge Document)
- Lake County Groundwater Use and Storage Technical Memorandum, CDM Smith (Technical Memorandum)

The District also submitted an Alternative Elements Guide (Elements Guide), a description of how the Alternative covers the entire basin, and an initial Annual Report.¹⁷ Other material submitted by the District, including reports and data not referenced in this assessment, public comments, other documents submitted by third parties, correspondence, and other information provided to or relied upon by the Department have been posted on the Department's web site.¹⁸

¹⁷ The Annual Report is not part of the Alternative and was not reviewed by the Department for the purpose of approving the Alternative.

¹⁸ <https://sgma.water.ca.gov/portal/alternative/print/9>

IV. Required Conditions

An alternative, to be evaluated by the Department, must be submitted by the statutory deadline and be within a basin that complies with Part 2.11 of Division 6 of the Water Code.¹⁹ The submitted alternative must also be complete and must cover the entire basin.²⁰

A. Submission Deadline

SGMA requires that an alternative for a basin categorized as high- or medium-priority as of January 31, 2015, be submitted no later than January 1, 2017.²¹

The District submitted its Alternative on December 30, 2016, before the statutory deadline.

B. Part 2.11 (CASGEM) Compliance

SGMA requires that the Department assess whether an alternative is within a basin that is in compliance with Part 2.11 of Division 6 of the Water Code,²² which requires that groundwater elevations in all groundwater basins be regularly and systematically monitored and that groundwater elevation reports be submitted to the Department.²³ To manage its obligations under this law, the Department established the California Statewide Groundwater Elevation Monitoring (CASGEM) Program. The acronym CASGEM is used in this document to denote both the program and the groundwater monitoring law.²⁴

SGMA specifies that an alternative does not satisfy the objectives of SGMA if the basin is not in compliance with the requirements of CASGEM.²⁵ The Department confirmed that the Big Valley Basin was in compliance with the requirements of CASGEM prior to evaluating the Alternative and confirmed that the Basin remained in compliance with CASGEM through the last reporting deadline prior to issuing this assessment.

C. Completeness

GSP Regulations specify that the Department shall evaluate an alternative if that alternative is complete and includes the information required by SGMA and the GSP

¹⁹ Water Code § 10733.6(c)-(d)

²⁰ 23 CCR § 358.4(a)

²¹ Water Code § 10733.6(c). Pursuant to Water Code § 10722.4(d), a different deadline applies to a basin that has been elevated from low- or very low-priority to high- or medium-priority after January 31, 2015.

²² Water Code § 10733.6(d)

²³ Water Code § 10920 *et seq.*

²⁴ Stats.2009-2010, 7th Ex.Sess., c. 1 (S.B.6), § 1

²⁵ Water Code § 10733.6(d)

Regulations.²⁶ An alternative submitted pursuant to Water Code Section 10733.6(b)(1) must include a copy of the groundwater management plan and an explanation of how the elements of the Alternative are functionally equivalent to the elements of a GSP required by Articles 5 and 7 of the GSP Regulations and are sufficient to demonstrate the ability of the Alternative to achieve the objectives of SGMA.²⁷

The District submitted a completed and final Groundwater Management Plan for the Big Valley Basin and several complementary documents, as indicated above, along with the Bridge Document and Alternative Elements Guide, which includes the District's explanation of how the elements of the Alternative are functionally equivalent to the elements of a GSP. Department staff found the Alternative to be complete and containing the required information, sufficient to warrant an evaluation by the Department.

D. Basin Coverage

An alternative is required to cover the entire basin.²⁸ An alternative is presumed to cover the entire basin if the basin is contained within the jurisdictional boundaries of the submitting agency.

The District stated that the Alternative covers the entire Big Valley Basin because the Basin is entirely within Lake County and under the jurisdiction of the District.²⁹ Because the entire Basin is contained within the jurisdictional boundaries of the District the Department staff consider the Alternative to cover the entire Basin.

V. Alternative Contents

GSP Regulations require the submitting agency to explain how the elements of an alternative are functionally equivalent to the elements of a GSP as required by Article 5 of the GSP regulations³⁰ and are sufficient to demonstrate the ability of an alternative to achieve the objectives of SGMA.³¹

As stated previously, alternatives based on historical basin management practices that predate the passage of SGMA or adoption of GSP Regulations, although required to satisfy the objectives of SGMA, are not necessarily expected to conform to the precise format and content of a GSP, and the criteria for adequacy of an alternative is whether the Department is able to determine that an alternative satisfies the objectives of SGMA.

²⁶ 23 CCR § 358.4(a)(3)

²⁷ 23 CCR § 358.2(c)-(d)

²⁸ 23 CCR § 358.4(a)(4)

²⁹ Question B3 on Portal

³⁰ 23 CCR § 354-354.44

³¹ 23 CCR § 358.2(d). The requirements pertaining to Article 7 of the GSP Regulations (23 CCR § 356-356.4) relate to annual reports and periodic evaluation and are not applicable to review of the initial alternative.

Department staff rely on the submitting agency's determination of functional equivalence of alternative elements to facilitate its evaluation and assessment of an alternative (see Assessment, below). Although the exact components of a GSP are not required for an alternative, for organizational purposes the discussion of information contained in the Basin Management Plan and related documents provided by the Agency generally follows the elements of a GSP provided in Article 5 of the GSP Regulations. The reference to requirements of the GSP Regulations at the beginning of each section is to provide context regarding the nature of the element discussed but is not meant to define a strict standard applicable to alternatives.

A. Administrative Information

GSP Regulations require information identifying the submitting agency, describing the plan area, and demonstrating the legal authority and ability of the submitting agency to develop and implement a plan for that area.³²

The Groundwater Management Plan, along with the Bridge Document, describe the authority and governance structure for the District.³³ The District has the authority to manage the Basin according to its authorizing legislation³⁴ and as a groundwater management agency as defined by California Water Code (CWC) § 10753 (a) and (b). The District is part of Lake County and reports to the County Board of Supervisors. The District's responsibilities include water resources planning, flood control, operations and maintenance, and prevention of environmental damage.

The Groundwater Management Plan describes that the plan area includes 12 groundwater basins and one groundwater source area within Lake County. The Plan provides a high-level discussion for each Basin with limited information and data specific to the Big Valley Basin.

B. Basin Setting

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model, a description of historical and current groundwater conditions, and an assessment of the water budget.³⁵

³² 23 CCR § 354.2 et seq.

³³ Groundwater Management Plan, Section 1.1

³⁴ SB 1136, Chapter 108 of the Cal. Water Code

³⁵ 23 CCR § 354.12 et seq.

1. Hydrogeologic Conceptual Model

The GSP Regulations require a descriptive hydrogeologic conceptual model of the basin that includes a written description supported by cross sections and maps.³⁶

The Alternative describes the hydrogeologic conceptual model in the Groundwater Management Plan and the Recharge Investigation. The Plan lists the Recharge Investigation as an available source of information on the Basin prior to the Plan's development. The Recharge Investigation describes the geologic and tectonic setting of the Basin and surrounding region, including the four principle aquifers.³⁷ These descriptions included each aquifer's estimated thickness, general lithology, whether the unit is unconfined, semi-confined, or confined, and the primary source of recharge. The general direction of groundwater flow for each aquifer was towards Clear Lake. However, the Plan and associated documents did not discuss or consider the Basin's soil characteristics, the delineation of discharge areas, each principle aquifer's hydrologic properties (i.e. hydraulic conductivity and storativity), and the specific primary use or uses of each aquifer.

2. Groundwater Conditions

The GSP Regulations require a description of historical and current groundwater conditions in the basin that includes information related to groundwater elevations, groundwater storage, seawater intrusion, groundwater quality, subsidence, and interconnected surface water, as applicable. The GSP Regulations also require an identification of groundwater dependent ecosystems.³⁸

The Plan and Recharge Investigation characterize groundwater conditions in the Basin, and the Bridge Document and Technical Memorandum provide updated quantitative data for some conditions. The Plan describes groundwater elevation conditions as varying between the northern and southern ends of the Basin, with groundwater throughout the Basin exhibiting seasonal fluctuation and being subject to overdraft during periods of drought.³⁹ The Plan provides groundwater level data through hydrographs from wells that have been monitored consistently from 1960 to 2005, static groundwater elevation contour maps, and contour maps illustrating groundwater level variability from spring to summer. The Plan states that spring groundwater levels have remained generally constant over the last 40 years except in drought periods.⁴⁰ The Bridge Document and Technical Memorandum provide more current information regarding groundwater levels. Of note, the Bridge Document provides information that, as of 2014, seven unidentified

³⁶ 23 CCR § 354.14(a)

³⁷ Recharge Investigation, Section 5

³⁸ 23 CCR § 354.16

³⁹ Groundwater Management Plan, Section 2.4.4, Groundwater Hydrogeology, p 2-17

⁴⁰ Groundwater Management Plan, Section 2.4.4, Groundwater Hydrogeology, p. 2-17

wells were at or below historical low, which constituted 11 percent of wells with long-term records.⁴¹

With regard to groundwater storage, the Plan states that in 1960 the Department estimated that the total volume of groundwater in storage was 105,000 acre-feet and in 2004 estimated that the volume of useable groundwater in storage was 60,000-acre feet. The Recharge Investigation calculated the total amount of groundwater in storage recharged from December 1, 1949 and March 31, 1950 using groundwater level data and an approximate specific yield value.⁴² The Technical Memorandum, written in 2016 by CDM Smith to provide background information on groundwater use within the Basin, included a cumulative change in storage figure based on generalized change in groundwater levels from between 0 and 45 wells annually.⁴³ CDM Smith states these values do not account for the spatial distribution of wells, does not provide the number of wells measured annually, and believes the generalized approach appears appropriate.⁴⁴

For groundwater quality, the Plan states that geothermal water intrusion was identified as a groundwater issue of concern.⁴⁵ Maintaining high groundwater levels to prevent geothermal water intrusion is identified as a Basin Management Objective, however, no quantitative data on what level is needed to prevent such intrusion is provided.⁴⁶ The constituents of concern include iron, manganese, boron, and nitrate due to high concentrations being reported as a result of geothermal intrusion and agricultural practices.⁴⁷ The Recharge Investigation stated groundwater quality data was collected by the County (data from 1985 through 2000) and the Department (data from 1944 to 1991).⁴⁸ Available groundwater quality data demonstrated that drinking water standards were not exceeded for any constituents through 2000, which was when the most recent data was available.⁴⁹

Land subsidence is not currently monitored within the Basin. However, the Groundwater Management Plan, within the Plan Area Setting section, states that overdraft conditions could result in subsidence.⁵⁰ At a public meeting conducted during Plan development, a statement that the Basin has experienced 6 to 8 inches of subsidence during to 1976-1977 drought and 6 to 8 inches during the 1987 to 1992 drought was provided, though the specific source of the data was not provided.⁵¹ The Bridge Document, states that

⁴¹ Bridge Document, p. 15

⁴² Recharge Investigation, p. 6-37

⁴³ Lake County Groundwater Use and Storage, Page 14

⁴⁴ Lake County Groundwater Use and Storage, Page 12

⁴⁵ Groundwater Management Plan, p. 3-6

⁴⁶ Groundwater Management Plan, p. C-7

⁴⁷ Groundwater Management Plan, Section 4.1.2 and Bridge Document, p. 22

⁴⁸ Recharge Investigation, Section 7

⁴⁹ Recharge Investigation, Section 7, p. 7-1

⁵⁰ Groundwater Management Plan, p. 2-20

⁵¹ Groundwater Management Plan, pp. C-7 to C-8

groundwater levels in most wells are above their historical lows and the Basin has a low estimated potential for subsidence. The document also states that there is old anecdotal evidence for 3.6 to 5.8 inches of subsidence near Finley, located in the north central portion of the Basin.⁵²

The Plan states that the Adobe and Kelsey Creeks flow through the Basin and are responsible for a majority of recharge the shallow aquifers receive⁵³ and that the beds of these creeks must be protected to optimize recharge.⁵⁴ The Recharge Investigation indicates that these creeks are hydraulically connected to groundwater in portions of the Basin and further states that groundwater overdraft has been recognized as a problem within the Basin and overdraft conditions may have a negative impact to fish, wildlife, and riparian vegetation due to reduced streamflow and earlier drying of creeks caused by declining groundwater levels.⁵⁵ The Plan and associated documents did not discuss or consider the locations of interconnected surface water systems, an estimate of the quantity and timing of surface water depletions for these systems, or identify groundwater dependent ecosystems.

3. Water Budget

GSP Regulations require a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored, as applicable.⁵⁶

The Plan does not include a groundwater or surface water budget for the Big Valley Basin but refers to the Water Inventory Analysis, Water Demand Forecast, and Recharge Investigation reports as sources of information on components of a water budget. The Plan states that the Water Inventory Analysis and Water Demand Forecast reports were written concurrently with the Plan to improve the understanding of water resources in Lake County.⁵⁷

The Water Inventory Analysis supply and demand calculations were prepared for spatially-defined inventory units, which was the term used for the separation of the countywide water budget into ten smaller sub-areas.⁵⁸ The sub-areas do not align with the Basin's boundaries. The Big Valley Inventory Unit described in the analysis includes the Big Valley Basin but also includes large areas outside of the Basin extending to the

⁵² Bridge Document, pp. 14 - 15

⁵³ Groundwater Management Plan, Section 2.4.4

⁵⁴ Groundwater Management Plan, p. C-9

⁵⁵ Recharge Investigation, Section 3.3

⁵⁶ 23 CCR § 354.18

⁵⁷ Groundwater Management Plan, p. 1-1

⁵⁸ Water Inventory Analysis, Section 3

south and east.⁵⁹ The Water Inventory Analysis describes that water budget calculations were conducted using the applied water methodology which calculates the managed and measured elements of a water budget. Agricultural demands were determined based on evapotranspiration, water use per acre of crop type, and irrigated acreage by crop type. Urban demands were calculated based on water use per capita, water use per acre of turf, and total irrigated acreage. The Water Inventory Analysis explains that environmental water demands were not considered because the County did not have any managed wetlands or surface water bodies with required minimum flows.⁶⁰ The Water Inventory Analysis was able to calculate estimates of total water use (sum of agricultural, municipal and industrial, and conveyance losses), water supply (sum of local surface, net groundwater, surface water reuse, and deep percolation reuse), and net groundwater extractions (total groundwater use minus surface water deep percolation and groundwater deep percolation) for representative average, dry, and wet years.⁶¹

The District does not indicate how these water budgets affected the development of the Plan. Additionally, the District did not discuss or consider total surface water entering and leaving the Big Valley Basin, groundwater discharging to surface water, annual change of groundwater in storage (except as noted in the Technical Memorandum with no mention within the Groundwater Management Plan)⁶², or an estimated sustainable yield for the Basin.

4. Management Areas

GSP Regulations authorizes, but does not require, an agency to define one or more management areas within a basin if the agency has determined that creation of management areas will facilitate implementation of the GSP.⁶³

The District has not identified management areas within the Big Valley Basin.

C. Sustainable Management Criteria

GSP Regulations require a sustainability goal that defines conditions that constitute sustainable groundwater management for the basin, the characterization of undesirable results, and establishment of minimum thresholds and measurable objectives for each applicable sustainability indicator, as appropriate.⁶⁴

⁵⁹ Water Inventory Analysis; based on comparison of Figures 1-2 (inventory units) and 2-14 (groundwater basins)

⁶⁰ Water Inventory Analysis, p. 4-5

⁶¹ Water Inventory Analysis, Section 4.3 through 4.5, pp. 4-8 to 4-19

⁶² Technical Memorandum, Page 13

⁶³ 23 CCR § 354.20

⁶⁴ 23 CCR § 354.22

1. Sustainability Goal

GSP Regulations require that sustainable management criteria include a sustainability goal that culminates in the absence of undesirable results within the appropriate timeframe, and includes a description of the sustainability goal, describes information used to establish the goal for the basin, describes measures that will be implemented to ensure the basin operates within its sustainable yield, and contains an explanation of how the sustainability goal will be met.⁶⁵

The Plan contains several qualitative basin management objectives that are intended to support the long-term maintenance of high quality groundwater resources within the County's thirteen groundwater basins. These countywide management objectives included, among others: 1) maintain a sustainable, high quality water supply for agricultural, environmental, and urban uses; 2) minimize the long-term drawdown of groundwater levels; 3) protect groundwater quality; 4) minimize the effect of groundwater pumping on surface water flows and quality; and 5) prevent inelastic land surface subsidence from occurring as a result of groundwater pumping.⁶⁶ The Plan additionally included Basin specific management objectives which included, among others: 1) maintain high groundwater levels to prevent geothermal water intrusion, 2) determine and maintain a safe yield of groundwater use within the Basin, 3) identify and monitor the relationship between basin groundwater extraction and impacts on groundwater supplies within and adjacent to the Basin, and 4) establish mitigation measures to offset identified adverse impacts of groundwater extraction.⁶⁷

2. Sustainability Indicators

GSP Regulations specify that an agency define conditions that constitute sustainable groundwater management for a basin, including the characterization of undesirable results and the establishment of minimum thresholds and measurable objectives for each applicable sustainability indicator.⁶⁸

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, *when significant and unreasonable*, cause undesirable results.⁶⁹ Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a depletion of supply if continued over the planning and implementation horizon, reduction of groundwater storage, seawater intrusion, degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially

⁶⁵ 23 CCR § 354.24

⁶⁶ Groundwater Management Plan, p. 1-3

⁶⁷ Groundwater Management Plan, p. 3-6

⁶⁸ 23 CCR § 354.22

⁶⁹ 23 CCR § 351(ah)

interferes with surface land uses, and depletions of interconnected surface water that have adverse impacts on beneficial uses of the surface water⁷⁰ – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result.

This section thus consolidates three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information pertaining to the processes and criteria relied upon to define undesirable results applicable to the basin, as quantified through the establishment of minimum thresholds, are addressed for each sustainability indicator. However, a submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a basin.⁷¹

The Bridge Document states that none of the sustainability indicators are applicable to the Basin. The District's sustainability goal, as described above, includes several qualitative basin management objectives related to all sustainability indicators except seawater intrusion. The District does state that these management objectives are equivalent to measurable objectives and are intended to be flexible guidelines for management of the Basin. The District further indicates that management objectives can be quantitative or qualitative and that these qualitative goals specify Basin goals.⁷²

a. Chronic Lowering of Groundwater Levels

GSP Regulations specify that the minimum threshold for chronic lowering of groundwater levels be based on groundwater elevations indicating a depletion of supply that may lead to undesirable results.⁷³

The District did not provide quantitative minimum threshold values for the chronic lowering of groundwater levels. The District did state that the qualitative management objectives related to the chronic lowering of groundwater levels (minimizing long-term drawdown of groundwater levels and to maintain high groundwater-levels to prevent geothermal water intrusion) are functionally equivalent to SGMA defined measurable objectives.⁷⁴ However, the District did not discuss how these qualitative values correlate to quantitative Basin conditions (i.e., depth to groundwater throughout the Basin).

⁷⁰ Water Code § 10721(x)

⁷¹ 23 CCR § 354.26(d)

⁷² Bridge Document, p. 23 - 24

⁷³ 23 CCR § 354.28(c)(1)

⁷⁴ Bridge Document, Measurable Objectives Section

b. Reduction of Groundwater Storage

GSP Regulations specify 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.⁷⁵

The District did not provide quantitative minimum threshold values for the reduction of groundwater in storage. The District did state that the qualitative management objectives related to the reduction of groundwater in storage (identify and monitor the relationship between Basin groundwater extraction and impacts on groundwater supplies within the Basin and maintain a sustainable high-quality water supply) are functionally equivalent to SGMA defined measurable objectives.⁷⁶ However, the District did not discuss how these qualitative values correlate to quantitative Basin conditions (i.e., annual reduction of groundwater in storage in acre feet per year).

c. Seawater Intrusion

GSP Regulations specify that the minimum threshold for seawater intrusion be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results.⁷⁷

The Bridge Document states that significant and unreasonable seawater intrusion is very unlikely to occur in the Big Valley Basin.⁷⁸

d. Degraded Water Quality

GSP Regulations specify that the minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the agency that may lead to undesirable results.⁷⁹

The District did not provide quantitative minimum threshold values for degraded water quality. The District did state that the qualitative management objectives related to degraded water quality (protect groundwater quality and maintain high groundwater levels to prevent geothermal water intrusion) are functionally equivalent to SGMA defined measurable objectives. However, the District did not discuss how these qualitative objectives would be met or how they correlate to quantitative Basin conditions (i.e., the number of supply wells, a volume of water, or a location of an isocontour that exceeds desired constituent concentrations).

⁷⁵ 23 CCR § 354.28(c)(2)

⁷⁶ Bridge Document, Measurable Objectives Section

⁷⁷ 23 CCR § 354.28(c)(3)

⁷⁸ Bridge Document, p. 22

⁷⁹ 23 CCR § 354.28(c)(4)

e. Land Subsidence

GSP Regulations specify 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.⁸⁰

The District did not provide quantitative minimum threshold values for land subsidence. The District did state that the qualitative management objective related to land subsidence (prevent inelastic land surface subsidence from occurring as a result of groundwater pumping) is functionally equivalent to SGMA defined measurable objectives. However, the District did not discuss how this qualitative objective would be met or how it would correlate to quantitative Basin conditions (i.e., extent and rate of land subsidence in feet).

f. Depletion of Interconnected Surface Water

GSP Regulations specify 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.⁸¹

The District did not provide quantitative minimum threshold values for the depletion of interconnected surface water. The District did state that the qualitative management objective related to the depletion of interconnected surface water (minimize the effect of groundwater pumping on surface water flows and quality) is functionally equivalent to SGMA defined measurable objectives. However, the District did not detail the quantitative Basin conditions (i.e., the rate, timing or volume of surface water depletions) that would be sufficient to avoid adverse impacts on beneficial uses of the surface water.

D. Monitoring Networks

GSP Regulations require that each basin be monitored, and that a monitoring network include monitoring objectives, monitoring protocols, and data reporting requirements be developed that shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions.⁸²

The Plan contains general information concerning countywide groundwater level and quality monitoring, including the total number of wells monitored. The only monitoring information specific to the Big Valley Basin are maps illustrating groundwater level and water quality monitoring sites in the Basin.⁸³ The Plan acknowledges the insufficient

⁸⁰ 23 CCR § 354.28(c)(5)

⁸¹ 23 CCR § 354.28(c)(6)

⁸² 23 CCR § 354.32

⁸³ Groundwater Management Plan, Figures 3-1 and 4-1

monitoring network within the Basin and states that the District should implement a basin management objective driven groundwater monitoring program.⁸⁴ The Plan states that this monitoring network should cover groundwater levels, groundwater quality, and subsidence.⁸⁵ The implementation of a monitoring network would provide the District the data required to document current conditions, assess long-term trends, and to support the implementation of basin management objectives.⁸⁶

The Bridge Document provides an update on the state of the monitoring network, stating that monitoring within the Basin includes: 1) groundwater level monitoring from 38 wells for CASGEM compliance purposes, 2) that limited groundwater quality monitoring has been conducted since the Department stopped in 2007, 3) the USGS has two stream gauges on Kelsey Creek, and 4) that observational monitoring is conducted on Adobe and Kelsey Creeks by environmental groups looking for fish stranded due to portions of these creeks going dry.⁸⁷ The document continues to discuss the assessment and improvement of the monitoring network in the terms of groundwater levels but no assessment is provided for the other sustainability indicators.⁸⁸

The District did not discuss or consider the distribution of monitoring relative to the four principal aquifers identified (see Hydrogeologic Conceptual Model, above), the constituents analyzed for in recent, sporadic groundwater quality monitoring, or current and historical monitoring for land subsidence.

E. Projects and Management Actions

GSP Regulations require a description of the projects and management actions the submitting agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.⁸⁹

The Plan describes operation of the Kelsey Creek Detention Structure as means to increase groundwater recharge along Kelsey Creek.⁹⁰ The Plan also notes that the District supports the Adobe Creek Conjunctive Use Project, which is described as a project to improve groundwater management in Big Valley through reoperation of the Highland Springs Reservoir.⁹¹ The Bridge Document describes that several unsuccessful attempts have been made to obtain grant funding for this project. The Plan discusses

⁸⁴ Groundwater Management Plan, p. 4-1

⁸⁵ Groundwater Management Plan, p. 4-1

⁸⁶ Groundwater Management Plan, p. 4-1

⁸⁷ Bridge Document, p. 27 - 30

⁸⁸ Bridge Document, p. 30 - 31

⁸⁹ 23 CCR § 354.44

⁹⁰ Groundwater Management Plan, p. 4-9

⁹¹ Groundwater Management Plan, p. 4-9

countywide programs including a well construction ordinance and permitting system, a groundwater protection program that inventoried contamination sources in a Geographic Information System (GIS), a groundwater export ordinance, and an aggregate management plan that, among other objectives, includes measures to limit adverse impacts to groundwater from in-channel aggregate mining and the associated downcutting of creek beds.⁹²

VI. Assessment

The following describes the evaluation and assessment of the Alternative for the Big Valley Basin as determined by Department staff. In undertaking this assessment, Department staff did not conduct geologic or engineering studies, although Department staff may have relied on publicly available geologic or engineering or other technical information to verify claims or assumptions presented in the Alternative.⁹³ As discussed above, Department staff have determined that the Big Valley Basin Alternative satisfied the conditions for submission of an alternative.⁹⁴ The Alternative was submitted within the statutory period, the Big Valley Basin was found to be in compliance with the reporting requirements of CASGEM, and staff find the Alternative to be complete and to cover the entire basin (see Required Conditions, above). Based on its evaluation and assessment of the Big Valley Basin Alternative, as discussed below, Department staff find that the Alternative does not satisfy the objectives of SGMA.⁹⁵

A. Evaluation of Alternative Contents

In adopting the Plan, the District took steps towards managing groundwater within the Big Valley Basin. However, the Plan and related documents do not contain sufficient information, data and analyses for the Department staff to conclude implementation of the Plan would result in sustainable groundwater management for the Basin. The following discussion assesses the merits of the Alternative.

The water budget information provided in the Alternative is not sufficiently detailed to quantify the historical, current, and future water budget in the Big Valley Basin. While the Water Inventory Analysis and Water Demand Forecast provided some data related to groundwater pumping and surface water use in representative dry, average, and wet years for areas of the County, the water budget information provided is not at the appropriate spatial scale (i.e., specific for the Basin) and lacks quantification of important

⁹² Groundwater Management Plan, Section 4

⁹³ Instances where the Department review relied upon publicly available data that was not part of the Alternative are specifically noted in the assessment.

⁹⁴ 23 CCR § 358.4(a)

⁹⁵ Water Code § 10733.6(a); 23 CCR § 358.4(b)

components including flows between streams and groundwater, changes in groundwater storage, and flows between adjacent basins.

The District did not provide evidence for adequate monitoring related to all sustainability indicators. The groundwater monitoring discussion in the Plan was focused on the need to develop additional monitoring in the future. The Bridge Document provides monitoring network information that could be considered a progress update on the implementation of their monitoring network. The Bridge Document indicates that 38 wells are monitored for groundwater levels, and that minimal groundwater quality data has been collected since the Department stopped in 2007. In addition, two stream gauges are monitored by the USGS.⁹⁶ The document, however, does not include the location of any of these sites. Department staff's assessment of the current monitoring within the Basin is that groundwater level monitoring may potentially be adequate but that monitoring for groundwater quality, subsidence, and interconnected surface waters are inadequate.

The District did not define undesirable results or establish minimum thresholds for any of the sustainability indicators for the Basin. The core concept of sustainable groundwater management is the establishment of a sustainability goal which culminates in the absence of the undesirable results defined in SGMA. The District stated within the Bridge Document that sustainable management criteria for all sustainability indicators were not applicable due to the absence of undesirable results within the Basin. However, information and analysis of current and historical Basin conditions was simply not sufficient for Department staff to conclude there are no undesirable results being experienced in the Basin and, more importantly, that sustainable management criteria for all sustainability indicators is not warranted.

While the Plan describes groundwater level conditions in the Basin as generally stable, it does state that during periods of drought overdraft within the Basin can occur. This overdraft could result in dry wells and land subsidence. Furthermore, up to 11 percent of the wells with sufficient historical records were at or below historical lows in 2014. The District may not deem current groundwater levels and storage conditions as constituting undesirable results; but given the possibility for overdraft in the Basin and the fact that some wells in the Basin have recently been at or below historical lows, simply stating that it is not necessary to establish sustainable management criteria is not sufficient. The District needs to establish groundwater level thresholds that are supported by sufficient and credible information and data and which correlate to the groundwater levels the District believe are necessary to avoid undesirable results in the Basin.

The Plan provides minimal information with regard to groundwater quality conditions in the Basin, with only sporadic data being collected since 2007. The Plan states that

⁹⁶ Bridge Document, pp. 27- 30

groundwater quality in the Basin is degraded by geothermal water intrusion and the Bridge Document states that nitrate levels have been rising within the Basin since the late 1950s, suggesting nitrate loading from fertilizer or animal/human waste.⁹⁷ This demonstrates that there is the potential for the continued or future degradation of groundwater quality in the Basin. The District did not provide sufficient information or a compelling argument as to why sustainable management criteria are not necessary to avoid undesirable results with regard to groundwater quality.

The Bridge Document states that the Basin has a low estimated potential for subsidence while also stating that there is “old, anecdotal evidence” of 3.6 to 5.8 inches of subsidence documented for a well near Finley.⁹⁸ The Plan states that overdraft within the Basin may result in subsidence and that 6 to 8 inches of subsidence were observed during the 1976 and 1989 droughts.⁹⁹ While the Basin may not be currently experiencing significant and unreasonable subsidence, as stated by the Plan itself, subsidence is possible and has potentially occurred in the past. As such, it is inappropriate to state that sustainable management criteria for subsidence is not needed.

Depletions of interconnected surface water conditions are mentioned by both the Plan, which states that the Adobe and Kelsey Creeks are a major source of recharge for shallow aquifers within the Basin, and the Recharge Investigation, which indicates that the creeks are hydraulically connected to groundwater in some portions of the Basins.¹⁰⁰ However, the Plan does not identify the portions of the Basin with interconnected surface waters or provide the location, quantity, and timing of depletions of these surface waters. Furthermore, the Recharge Investigation states that a current groundwater issue is already having negative impacts to fish, wildlife, and riparian vegetation due to reduced streamflow and earlier drying up of creeks due to a lowered water table.¹⁰¹ The District also considered the observational monitoring conducted by environmental groups searching for a state threatened species, *Lavinia exilicauda chi* - which is stranded by the drying of the creeks likely associated with groundwater use, along the Adobe Creek and Kelsey Creek as an accurate form of monitoring.¹⁰² The Department staff are not able to determine from the information provided whether current or future depletions of interconnected surface water represents an undesirable result. More importantly, the District did not provide sufficient data and evidence to conclude that sustainable management criteria for the depletion of interconnected surface water is not applicable to the Basin.

⁹⁷ Bridge Document, p. 22

⁹⁸ Bridge Document, p. 14

⁹⁹ Groundwater Management Plan, p. C-8

¹⁰⁰ Recharge Investigation, Section 3.3

¹⁰¹ Recharge Investigation, Section 3.3

¹⁰² Bridge Document, pp. 28- 29

For the reasons described above, the Department staff have determined that the District's assertion that undesirable results for of the sustainability indicators are not present and are not likely to occur in the Big Valley Basin is not based on sufficiently thorough and reasonable analysis. The District did not demonstrate an adequate understanding of current or historical conditions sufficient to illustrate the historical, current and future absence of undesirable results. The Plan's qualitative Basin Management Objectives are aspirational statements but do not have objective, quantitative thresholds to measure them by. Therefore, the pathway to sustainable groundwater management cannot be confirmed and Department staff recommend against approving the Alternative.