

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

Groundwater Basin Name: Corralitos – Pajaro Valley (Basin No. 3-002.01)  
Submitting Agency: Pajaro Valley Water Management Agency  
Recommendation: Approve  
Date Issued: July 17, 2019

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## I. Summary

The Pajaro Valley Water Management Agency (Agency) submitted an alternative (Pajaro Subbasin Alternative *or* Alternative) to the Department of Water Resources (Department) for evaluation and assessment as provided by the Sustainable Groundwater Management Act (SGMA).<sup>1</sup> The Agency submitted an existing plan,<sup>2</sup> which relies primarily on the Pajaro Valley Water Management Agency Basin Management Plan Update, Feb. 2014 (Basin Management Plan *or* Plan).

The Agency was created by the Pajaro Valley Water Management Agency Act (Agency Act) to manage water resources within portions of Santa Cruz, Monterey, and San Benito counties.<sup>3</sup> The Agency developed the Basin Management Plan before SGMA was adopted in response to deteriorating groundwater conditions brought about by seawater intrusion in the western, coastal portion of the Pajaro Valley Subbasin (*or* Subbasin) caused by historical overdraft.<sup>4</sup> The Basin Management Plan and related documents demonstrate that the Agency has a detailed understanding of the geology and hydrology of the Subbasin and of the direct and indirect adverse effects of the past groundwater management practices that led to overdraft conditions, and that the Agency has demonstrated a commitment to eliminating overdraft to stop those adverse effects and to prevent them from occurring in the future. The Plan quantifies criteria for correcting the groundwater problems caused by overdraft and contains a robust set of plans and management actions designed to eliminate overdraft and prevent seawater intrusion. Department staff believe that the Agency's decision to focus on restoring groundwater elevations to a condition that eliminates seawater intrusion is reasonable, and will, in turn,

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<sup>1</sup> Water Code § 10720 *et seq.*

<sup>2</sup> Water Code § 10733.6(b)(1)

<sup>3</sup> Water Code Appendix § 124-1 *et seq.* (Stats.1984, c. 257, § 1)

<sup>4</sup> The Department designated the Pajaro Valley Subbasin as critically overdrafted in Bulletin 118-80, Ground Water Basins in California.

have a salutary effect with regard to other potential adverse effects in the Subbasin, sufficient to avoid other undesirable results.

Based on its review of the Plan, other related documents, and consideration of public comments, Department staff find that the Pajaro Subbasin Alternative satisfies the objectives of SGMA for the Pajaro Valley Subbasin and recommend approval of the Alternative. Staff consider the information provided by the Agency to be sufficient and credible, and that implementation of the Basin Management Plan is reasonably likely to lead to sustainable groundwater management<sup>5</sup> of the Subbasin. In addition, staff have identified recommended actions that are designed to facilitate the Department's ongoing evaluation and assessment of the Plan including implementation and a determination of whether the Plan continues to satisfy the objectives of SGMA or adversely affects an adjacent basin.

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 Agency 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 Agency submitted an alternative based on a groundwater management plan to the Department for evaluation and assessment to determine whether it satisfies the objectives of SGMA for the Pajaro Valley Subbasin. 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 Code<sup>6</sup> 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

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<sup>5</sup> Water Code § 10721(v). See also discussion in Section II. Review Principles. Sustainable groundwater management is achieved by meeting the basin's sustainability goal.

<sup>6</sup> Water Code § 10750 *et seq.*

use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.<sup>7</sup> Undesirable results are defined quantitatively by the managing agency.<sup>8</sup>

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.<sup>9</sup> The submitted alternative must also be complete and must cover the entire basin.<sup>10</sup> The Groundwater Sustainability Plan (GSP) Regulations<sup>11</sup> 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”.<sup>12</sup> 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.<sup>13</sup> Ultimately, the purpose of the evaluation is to determine whether an alternative satisfies the objectives of SGMA.<sup>14</sup> 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.<sup>15</sup> 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 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

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<sup>7</sup> Water Code 10721(v)

<sup>8</sup> 23 CCR § 354.26

<sup>9</sup> Water Code § 10733.6(c)-(d)

<sup>10</sup> 23 CCR § 358.4(a)

<sup>11</sup> 23 CCR § 350 *et seq.*

<sup>12</sup> 23 CCR § 358.4(b) (emphasis added)

<sup>13</sup> 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.

<sup>14</sup> 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)).

<sup>15</sup> 23 CCR § 358.2(d)

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.<sup>16</sup> 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.<sup>17</sup> 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.<sup>18</sup>

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 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.

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<sup>16</sup> 23 CCR § 351(h)

<sup>17</sup> 23 CCR § 355.4(b)(1), (3), and (5).

<sup>18</sup> 23 CCR § 355.4(b)

### III. Alternative Materials

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

- Pajaro Valley Water Management Agency Basin Management Plan Update, Feb. 2014 (Basin Management Plan or Plan)

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

- Pajaro Valley Water Management Agency Salt and Nutrient Management Plan, Oct. 2016 (Salt Management Plan). The Salt Management Plan was prepared in response to the inclusion of recycled water in the Basin Management Plan and provides a comprehensive discussion of water quality and water quality standards for the Subbasin and defines the assimilative capacity of the aquifer for salts and nutrients.
- Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014–5111, 166 p. (PVHM Report). The PVHM Report was prepared at the request of the Agency to develop a numerical hydrologic model for the Subbasin to be utilized in implementation of the Plan.
- Draft Pajaro Valley Water Management Agency Groundwater Monitoring Network Review Technical Memorandum, prepared by Martin B. Feeney, May 8, 2016 (Monitoring Network Review Memo). The Monitoring Network Review Memo was prepared at the request of the Agency to evaluate the monitoring network for groundwater levels and seawater intrusion and make recommendations to improve the monitoring network to meet the objectives of SGMA.
- Hanson, R. T., Lockwood, B., and Schmid, W., July 2014, Journal of Hydrology, Analysis of projected water availability with current basin management plan, Pajaro Valley, California – (Pajaro Projected Water Availability) This article is based on a study that determined that water management practices in place before implementation of the Basin Management Plan would not be sufficient to eliminate overdraft and sea water intrusion. The article was relied upon by the Plan to support development of alternate projects and management actions.

The Agency also submitted an Alternative Elements Guide and a description of how the Alternative covers the entire Subbasin. The Agency has also submitted Annual Reports.<sup>19</sup> Other material submitted by the Agency, 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 website.<sup>20</sup>

Two additional documents submitted by the Agency, the Pajaro Valley Water Management Agency – Proposition 218 Service Charge Report, Jan. 2015, and the Pajaro Valley Water Management Agency – Quality Assurance Project Plan for Pajaro Valley Water Management Agency Groundwater Monitoring Program, Dec. 2016, were also determined by the Department to be sufficiently related to the Basin Management Plan to warrant their consideration as part of the Alternative, but were not utilized in this Assessment.

## 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.<sup>21</sup> The submitted alternative must also be complete and must cover the entire basin.<sup>22</sup>

### 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.<sup>23</sup>

The Agency submitted its Alternative on December 31, 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,<sup>24</sup> which requires that groundwater elevations in all groundwater basins be regularly and systematically monitored and that groundwater elevation reports be submitted to the Department.<sup>25</sup> To

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<sup>19</sup> The Annual Report is not part of the Alternative and was not reviewed by the Department for the purpose of approving the Alternative.

<sup>20</sup> <https://sgma.water.ca.gov/portal/#alt>

<sup>21</sup> Water Code § 10733.6(c)-(d)

<sup>22</sup> 23 CCR § 358.4(a)

<sup>23</sup> 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.

<sup>24</sup> Water Code § 10733.6(d)

<sup>25</sup> Water Code § 10920 *et seq.*

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.<sup>26</sup>

SGMA specifies that an alternative does not satisfy the objectives of SGMA if the basin is not in compliance with the requirements of CASGEM.<sup>27</sup> The Department confirmed that the Pajaro Valley Subbasin was in compliance with the requirements of CASGEM prior to evaluating the Alternative and confirmed that the Subbasin 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 Regulations.<sup>28</sup> 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.<sup>29</sup>

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

### D. Basin Coverage

An alternative is required to cover the entire basin.<sup>30</sup> An alternative that is intended to cover the entire basin may be presumed to do so if the basin is fully contained within the jurisdictional boundaries of the submitting agency. However, an alternative submitted by an agency whose jurisdictional boundaries do not include all areas of the basin may nevertheless be found to effectively cover the entire basin. Because the intent of SGMA is to provide for the sustainable management of groundwater basins,<sup>31</sup> with sustainability defined as the management and use of groundwater that does not cause undesirable

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<sup>26</sup> Stats.2009-2010, 7th Ex.Sess., c. 1 (S.B.6), § 1

<sup>27</sup> Water Code §10733.6(d)

<sup>28</sup> 23 CCR § 358.4(a)(3)

<sup>29</sup> 23 CCR § 358.2(c)-(d)

<sup>30</sup> 23 CCR § 358.4(a)(4)

<sup>31</sup> Water Code § 10720.1(a)

results,<sup>32</sup> an alternative effectively covers the entire basin if it results in groundwater management that avoids undesirable results. An alternative that cannot avoid undesirable results is not sustainably managing the basin even if the entire basin is within the jurisdiction of the managing agency, but an alternative that avoids undesirable results throughout the basin is sustainably managing that basin even if some part of the basin lies outside the jurisdiction of that agency.

The Agency states that the intent of the Pajaro Subbasin Alternative is to bring the entire Subbasin into balance,<sup>33</sup> a condition the Agency characterizes as the elimination of seawater intrusion and overdraft conditions, which are the principal undesirable results in the Pajaro Valley Subbasin (see Sustainable Management Criteria, below). Department staff understand this to mean that the Agency intends to cover the entire Subbasin through implementation of the Pajaro Alternative. The Agency's jurisdictional boundaries, shown in heavy black line on Figure 1 below,<sup>34</sup> includes approximately 90 percent of the area of the Subbasin, outlined in blue. The Agency boundary extends beyond the Subbasin to the east; but excludes an area of the Subbasin to the south-east. Because the jurisdictional boundaries of the Agency do not cover the entire Pajaro Valley Subbasin, the Alternative cannot be presumed to cover the entire Subbasin. Instead, it must be determined whether the Alternative effectively covers the entire Subbasin.

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<sup>32</sup> Water Code § 10721(v)

<sup>33</sup> SGMA Alternative Portal, Attachment B-3 (<https://sgma.water.ca.gov/portal/alternative/print/22>)

<sup>34</sup> Pajaro Valley WMA PVHM Active Grid & Bul.118 Basins (PVWMA\_PVHM\_Pajaro\_Basin\_Map\_20161230.pdf; <https://sgma.water.ca.gov/portal/service/alternativedocument/download/491>)

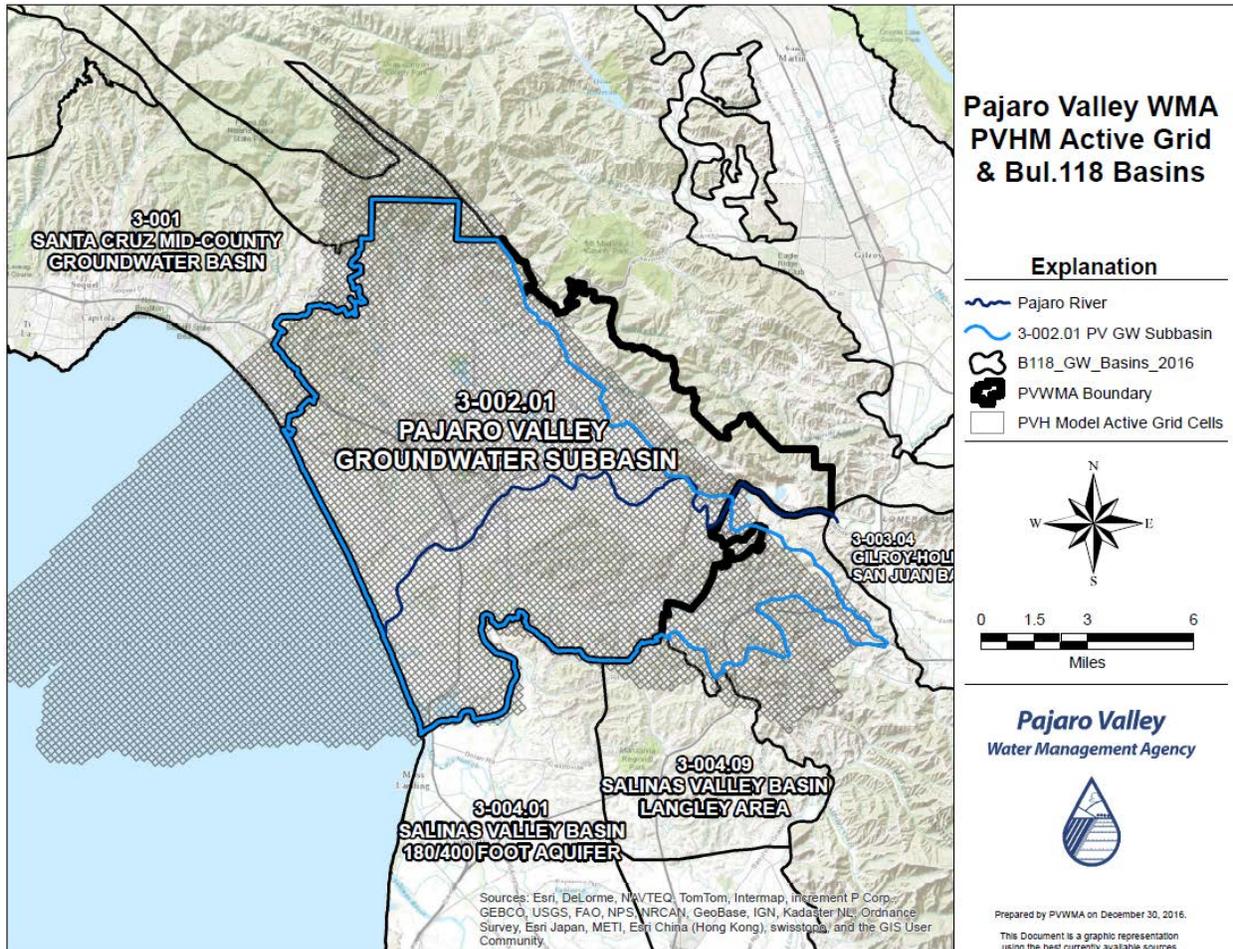


Figure 1. Pajaro Valley Subbasin, PVMA jurisdiction, and PVHM model grid

Although Department staff have determined that the Pajaro Subbasin Alternative satisfies the objectives of SGMA (see Assessment, below), the Pajaro Valley Subbasin is not yet sustainably managed. As a result, the Alternative cannot be said to effectively cover the entire Subbasin based on the current avoidance of undesirable results. Instead, staff considered whether the geology and hydrology of the non-jurisdictional area is adequately understood and whether groundwater usage in that area would or would not adversely affect the jurisdictional portion of the Subbasin, and *vice versa*. Staff also considered whether the non-jurisdictional area is or is not experiencing undesirable results or that implementation of the Alternative would result in the avoidance of undesirable results in the non-jurisdictional area.

The Agency's understanding of hydrologic conditions in the Pajaro Valley Subbasin is demonstrated in the PVHM Report, which presents a hydrogeologic and numerical groundwater model that covers nearly the entire Subbasin and significant areas outside

of the Subbasin, as shown in the map above.<sup>35</sup> The area covered by the model, denoted by the hatched pattern on the map, includes virtually the entire area outside the Agency boundaries to the south. Modeling results presented in the PVHM Report, which simulated groundwater levels from 1987 to 2009, show that groundwater levels in the non-jurisdictional portion of the Subbasin did not exhibit declining groundwater levels.<sup>36</sup> This was in contrast to the overdraft conditions experienced in the main (jurisdictional) part of the Subbasin, which conditions motivated development of the Basin Management Plan.

Department staff also reviewed additional publicly available information, in addition to that provided by the Agency, to determine whether it was likely that the Agency would be able to sustainably manage the entire Subbasin despite some areas being outside the jurisdiction of the Agency. Land use data from 2014 revealed only small amounts of irrigated agriculture (roughly 20 acres of strawberries) within the non-jurisdictional portion of the Subbasin.<sup>37</sup> Well records indicate that only one production well is present in the non-jurisdictional portion of the Subbasin; all remaining wells are designated as being used for domestic supply.<sup>38</sup>

Based on the facts described, Department staff determined that the Pajaro Valley Alternative effectively covers the entire Pajaro Valley Subbasin. Considering the current extent of water use in areas outside the jurisdictional area of the Agency, Department staff do not regard the lack of regulatory control over those areas to pose a threat to successful implementation of the Basin Management Plan; or believe that implementation of the Plan is likely to adversely impact groundwater conditions in the portion of the Subbasin outside the Agency's jurisdictional boundary. As a result, Department staff find that the Subbasin is covered by the Plan for the purposes of achieving sustainable groundwater management. Should conditions in the portion of the Subbasin outside the Agency's jurisdictional boundary experience significant changes related to groundwater use, the Alternative would need to be modified to account for those changes.

## 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

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<sup>35</sup> Map submitted in response to question B.3 on the Department's Alternative Portal (<https://sgma.water.ca.gov/portal/alternative/print/22>)

<sup>36</sup> PVHM Report, pp. 122-125

<sup>37</sup> CADWR Land Use Viewer, <https://gis.water.ca.gov/app/CADWRLandUseViewer/>

<sup>38</sup> Well Completion Report Map Application, <https://dwr.maps.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37>

of the GSP regulations<sup>39</sup> and are sufficient to demonstrate the ability of an alternative to achieve the objectives of SGMA.<sup>40</sup>

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. 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.<sup>41</sup>

The Basin Management Plan contains information describing the Agency. The Agency is a state-chartered water management district formed with the primary goal of preventing long-term overdraft within the Agency's boundaries.<sup>42</sup> Through its charter, the Agency has broad authority to manage existing and supplemental water supplies to achieve its primary goal.<sup>43</sup> The Basin Management Plan is the principal document that has guided all of the major projects and programs the Agency has pursued.<sup>44</sup> The Plan describes the projects and programs the Agency is intending to implement and provides details of the cost to implement the projects described. The Basin Management Plan also describes activities conducted by the Agency during Plan development to engage with representatives of various beneficial uses and users of groundwater in the Pajaro Valley Subbasin. The Plan documents formation of an "Ad Hoc Basin Management Plan

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<sup>39</sup> 23 CCR § 354-354.44

<sup>40</sup> 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.

<sup>41</sup> 23 CCR § 354.2 et seq.

<sup>42</sup> Basin Management Plan, Chapter 1, p 1

<sup>43</sup> See Article 5 of Act 760. Pajaro Valley Water Management Agency (1984 ch 257).

<sup>44</sup> Basin Management Plan, Chapter 1, p. 2

Committee” that included representatives from local government, agricultural interests, landowners, rural residential users, and environmental interests. The Basin Management Plan notes that the Ad Hoc Committee was intended to increase community participation in the Plan development process.

## 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.<sup>45</sup>

### 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.<sup>46</sup>

Information making up the hydrogeologic conceptual model for the Subbasin is contained in both the Basin Management Plan and the PVHM Report.<sup>47</sup> The Basin Management Plan, referencing previous hydrogeologic investigations, describes the general characteristics of the primary aquifers in the Subbasin, including the deeper Purisima Formation, the intermediate Aromas Red Sands, and the uppermost terrace, alluvium, and dune deposits. The Purisima Formation is described as being at considerable depth throughout much of the Subbasin and, as a result, only a few wells in the Subbasin penetrate this formation. The Aromas Red Sands are described as the main producing aquifer in the Subbasin. The uppermost alluvium and terrace deposits are described as highly variable mixtures of gravel, sand, and silt that are used as sources of groundwater where they are present with sufficient thickness. Both the Basin Management Plan and the PVHM Report contain geologic maps and cross sections that further depict the horizontal and vertical extent of those primary aquifer units and that also depict the extent of the Subbasin boundaries.

The PVHM Report further characterizes the hydrogeology of the Subbasin and explains how the descriptive hydrogeologic conceptual model was translated into a numerical hydrologic model of the Subbasin (i.e., the PVHM). It describes specific details of how expert knowledge of the aquifer system was incorporated into the numerical model (e.g., how the Aromas Red Sand formation was split into three layers in the model to account for the fact that the formation, in fact, consists of an upper and lower sand unit separated by a fine-grained confining unit). The PVHM also describes the characteristics of each of

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<sup>45</sup> 23 CCR § 354.12 et seq.

<sup>46</sup> 23 CCR § 354.14(a)

<sup>47</sup> Basin Management Plan, Chapter 2, and PVHM Report, sections titled “Geohydrologic Framework”, “PVHM Model Development”, and “Model Calibration and Sensitivity”

the aquifer units (e.g., hydraulic conductivity and storage parameters), which were determined through calibration of groundwater and surface water conditions simulated by the model with data observed in the field (e.g., measurements of groundwater level or streamflow).

## 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.<sup>48</sup>

Groundwater elevation is discussed in the Basin Management Plan and the PVHM Report.<sup>49</sup> The Plan describes historical groundwater conditions, and notes that pre-development groundwater levels were high enough to support artesian conditions along the coast. The Report describes that, by the 1940s, groundwater development had reduced groundwater levels such that artesian conditions were only present during the winter, and that by the 1970s groundwater levels west of Watsonville were consistently below sea level for portions of the year. Data shown on composite groundwater elevation contour maps from 1947 through 2012 supports the written descriptions and shows that groundwater currently flows towards the troughs (i.e., areas of depressed groundwater levels) created by pumping in the central portion of the Subbasin.<sup>50</sup> The PVHM Report contains additional detail on groundwater level data, including numerous hydrographs depicting timeseries of groundwater levels at discrete monitoring sites that were used to calibrate the numerical model. The PVHM report also contains timeseries of the difference in groundwater elevation between co-located monitoring wells screened at different depths that illustrate the vertical gradients between the primary aquifers.

Groundwater storage changes are presented graphically in the PVHM Report, illustrating the annual change in storage for each layer of the numerical model which, as noted above, represent the principal aquifers of the Subbasin. The figures depict whether the associated year was classified as “dry” or “wet” and show that storage tends to increase during wetter periods and decline during drier periods.

The PVHM Report addresses the potential for subsidence in the Basin by explaining that subsidence is unlikely to occur due to the lowest historical groundwater levels being above the assumed preconsolidation stress threshold for the Basin’s aquifer sediments.<sup>51</sup>

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<sup>48</sup> 23 CCR § 354.16

<sup>49</sup> Basin Management Plan, pp. 16-18 and PVHM Report section titled “Groundwater Observations”

<sup>50</sup> Basin Management Plan, Chapter 2, p. 18

<sup>51</sup> PVHM Report, pp. 92-93

Seawater intrusion is addressed in the Basin Management Plan and PVHM Report. The Plan describes the general conditions that led to seawater intrusion in the Subbasin (i.e., pumping-induced groundwater level declines below sea level in the near-coastal aquifers) and that additional seawater intrusion will cause problems for agricultural irrigation. The Plan describes and maps the position of the seawater intrusion front in the Basin for 1951, 1966, 1998, and 2011, although mapping is not conducted for each principal aquifer and appears to represent a composite of all aquifers.<sup>52</sup> The PVHM Report quantifies the onshore flux of groundwater (which the PVHM Report describes as a surrogate for seawater intrusion) from 1964 to 2009 for each geologic layer used in the numerical model.<sup>53</sup>

Groundwater quality conditions are described in both the Basin Management Plan and the Salt Management Plan, which was developed to support implementation of the Agency's recycled water projects that are incorporated into the Basin Management Plan. The Basin Management Plan notes that the primary water quality standards applicable for the Subbasin are found in the *Basin Plan for the Central Coastal Basin*, prepared by the California Regional Water Quality Control Board, Central Coast Region in 2011. The Basin Management Plan describes that the primary water quality concerns for irrigation of crops are nitrates, salinity, sodium, and toxicity from chloride and sodium. The Salt Management Plan expands on the general descriptions of water quality in the Basin Management Plan with detailed written descriptions and maps depicting groundwater quality conditions between 2002 and 2011. The Salt Management Plan illustrates the distributions of total dissolved solids, chloride, and nitrate (as NO<sub>3</sub>) concentrations over the period of 2002 through 2011 to support an assimilative capacity analysis for the Basin (see the discussion of Water Quality below).<sup>54</sup>

Documents submitted for the Alternative do not specifically identify the points at which surface waters are interconnected with groundwater, but the PVHM Report discusses surface water features in the Subbasin and describes estimates of gaining and losing conditions on various segments of those features based on prior studies.<sup>55</sup> The PVHM Report identifies simulated flows between the groundwater and surface water systems (termed stream leakage in the report) for the historical simulation period but does not specifically identify the quantity and timing of streamflow depletion due to groundwater use.

The Basin Management Plan does not identify groundwater dependent ecosystems, directly, but does map areas of the Subbasin containing native and riparian vegetation.

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<sup>52</sup> Basin Management Plan, Chapter 1, p. 3

<sup>53</sup> PVHM Report, p. 154

<sup>54</sup> Salt Management Plan, pp. 21-29

<sup>55</sup> PVHM Report, pp 25-27

### 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.<sup>56</sup>

The PVHM Report documents the historical and current (at the time of Report preparation) water budget for the Basin.<sup>57</sup> Various components of the water budget are used directly as input to the model (e.g., surface water entering the Subbasin) and other components are simulated by the model (e.g., infiltration of applied water or seepage from streams). The PVHM Report contains detailed descriptions for the development of input datasets and calibration of the model to achieve the best fit between simulation results and observed data. The model simulates the annual change in groundwater storage for the Subbasin, as noted above, and the other components of the water budget required by the GSP Regulations.<sup>58</sup>

The Basin Management Plan and the Pajaro Projected Water Availability scientific paper describes a baseline projected water budget for the Subbasin based on the numerical model described in the PVHM Report. The projected model simulation uses historical hydrology and fixes crop distribution and municipal water demand at their 2009 levels. The projected model simulation incorporates anticipated sea-level rise at the offshore model boundaries, but it does not appear to include the anticipated effects of climate change on hydrologic conditions. The analysis of the projected water budget concluded that existing hydrologic infrastructure (i.e., that which existed prior to implementation of the Plan) and management practices were insufficient to eliminate overdraft and seawater intrusion given existing land and water use and historical climate variability. The Agency relied upon that analysis to develop the suite of projects and management actions that were included in the Basin Management Plan.

### 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.<sup>59</sup>

The Agency did not identify management areas, or define management strategies equivalent to management areas, in the Basin Management Plan. The Salt Management

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<sup>56</sup> 23 CCR § 354.18

<sup>57</sup> PVHM Report, pp. 140-154

<sup>58</sup> 23 CCR § 354.18

<sup>59</sup> 23 CCR § 354.20

Plan subdivides the Subbasin into two zones, Inland and Coastal,<sup>60</sup> for the purposes of defining assimilative capacity thresholds, but that plan does not define different minimum thresholds or measurable objectives for the different zones.

## 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.<sup>61</sup>

### 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.<sup>62</sup>

The Alternative Elements Guide states that the sustainability goal for the Subbasin is expressed by the Pajaro Valley Water Management Agency Charter.<sup>63</sup> The charter establishes the objective of managing local groundwater resources toward the avoidance and eventual prevention of conditions of long-term overdraft, land subsidence, and water quality degradation, and should include reasonable measures to prevent further increases in the amount of long-term overdraft and to accomplish continuing reduction in long-term overdraft, realizing that an immediate reduction in long-term overdraft may cause severe economic loss and hardship, as the sustainability goal for the Pajaro Valley Subbasin.<sup>64</sup> The Agency implements the Agency Charter through the Basin Management Plan.<sup>65</sup>

### 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.<sup>66</sup>

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<sup>60</sup> Salt Management Plan, Section 7.1, p. 90

<sup>61</sup> 23 CCR § 354.22

<sup>62</sup> 23 CCR § 354.24

<sup>63</sup> Pajaro Valley Water Management Agency Act; Water Code, App. §§ 124-1 to 124-1108 (Stats.1984, c. 257, § 1, eff. June 27, 1984)

<sup>64</sup> Water Code, App. §§ 124-102

<sup>65</sup> Basin Management Plan, Chapter 1

<sup>66</sup> 23 CCR § 354.22

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.<sup>67</sup> 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 interferes with surface land uses, and depletions of interconnected surface water that have adverse impacts on beneficial uses of the surface water<sup>68</sup> – 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.<sup>69</sup>

### *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.<sup>70</sup>

The Basin Management Plan's approach to addressing adverse conditions did not include setting specific groundwater level thresholds. Instead, the Plan describes the relationship between declining groundwater levels and other undesirable results such as seawater intrusion as noted above in the discussion of *Groundwater Conditions*, and describes its goal to eliminate seawater intrusion, which will require raising groundwater levels relative to conditions at the time of Plan development.

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<sup>67</sup> 23 CCR § 351(ah)

<sup>68</sup> Water Code § 10721(x)

<sup>69</sup> 23 CCR § 354.26(d)

<sup>70</sup> 23 CCR § 354.28(c)(1)

### *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.<sup>71</sup>

The Basin Management Plan does not provide a minimum threshold for storage in terms of a volume of groundwater that could be withdrawn from the Basin. Rather, the Plan describes the total volume of water needed from projects and management actions to make up for the average annual shortfall in the Subbasin. Eliminating that shortfall, noted to be roughly 12,000 acre-feet per year,<sup>72</sup> would eliminate overdraft and seawater intrusion; developing projects and management actions to achieve that purpose is the reason the Basin Management Plan was developed. The Plan describes interim targets for implementing those projects and management actions, including to achieve an 80 percent reduction in the rate of storage depletion by 2025. The Alternative Elements Guide states that the minimum threshold shall be the pre-SGMA (presumably as of January 1, 2015) rate of storage depletion occurring in the Subbasin.

### *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.<sup>73</sup>

The Basin Management Plan does not provide a chloride isoconcentration contour line that represents the point where undesirable results associated with seawater intrusion would occur. Rather, the Plan describes reduction of the rate seawater intrusion in terms of the volumetric flux of water from offshore to onshore aquifers.<sup>74</sup> A stated goal of the Plan is to eliminate that seawater intrusion through implementation of specific project and management actions. The Plan includes interim targets, including to achieve a 90 percent reduction in the rate of seawater intrusion by 2025. The Alternative Elements Guide states that the pre-SGMA (presumably as of January 1, 2015) rate of seawater intrusion is the minimum threshold for seawater intrusion.

### *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

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<sup>71</sup> 23 CCR § 354.28(c)(2)

<sup>72</sup> Basin Management Plan, Executive Summary, p. ES-3

<sup>73</sup> 23 CCR § 354.28(c)(3)

<sup>74</sup> See e.g., the references to objective of reducing the rate to 200 acre-feet per year on p. ES-7 and p. 41

water supplies or other indicator of water quality as determined by the agency that may lead to undesirable results.<sup>75</sup>

The Basin Management Plan indicates the Salt Management Plan is responsible for identifying at-risk areas for water quality degradation and developing mitigation strategies. The Salt Management Plan describes how groundwater quality will be monitored and assessed as the projects described in the Basin Management Plan are implemented. The Salt Management Plan quantifies the assimilative capacity for total dissolved solids, chloride, and nitrate in two sub-zones (inland and coastal) within the Subbasin. Assimilative capacity represents the capacity for a volume of water to receive inputs of certain constituents without exceeding a determined water quality objective. The Alternative Elements Guide describes that these assimilative capacity thresholds are comparable to minimum thresholds defined by SGMA and that the measurable objective is a “100% reduction of assimilative capacity decreases” (i.e., to not reduce the assimilative capacity further). The Salt Management Plan notes that the Subbasin is currently exceeding the chloride assimilative capacity value within the coastal zone, where seawater intrusion has already occurred.

#### *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.<sup>76</sup>

The Basin Management Plan does not address subsidence directly and has not developed separate minimum thresholds and measurable objectives for subsidence. The Plan does note that the Plan implements the Pajaro Valley Water Management Agency Charter, which specifies that local groundwater resources should be managed toward the avoidance and prevention of conditions of land subsidence.<sup>77</sup> The Agency states that any significant future land subsidence would be preceded by undesirable reduction of groundwater storage and seawater intrusion, which would require action to address under the Basin Management Plan and SGMA.<sup>78</sup>

#### *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

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<sup>75</sup> 23 CCR § 354.28(c)(4)

<sup>76</sup> 23 CCR § 354.28(c)(5)

<sup>77</sup> Water Code, App. §§ 124-102(a). See also Basin Management Plan, p. 1

<sup>78</sup> Alternative Elements Guide, see entry for § 354.26(d), p. 10

groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.<sup>79</sup>

The Agency acknowledges that its Basin Management Plan does not directly address the depletion of interconnected surface water. However, the Agency states that the numerical model for the Subbasin, documented in the PVHM Report, is capable of quantifying the depletion occurring as of January 1, 2015 and that the January 1, 2015 depletion values will be used as a minimum threshold for Plan implementation. The Agency states that additional streamflow depletion in excess of the January 1, 2015 value would constitute an undesirable result.<sup>80</sup>

## 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.<sup>81</sup>

The Basin Management Plan does not explicitly describe the monitoring network and monitoring plan for the Subbasin. However, it is clear from the Plan and related documents, particularly the PVHM Report and the Salt Management Plan, that the Agency collects and has access to extensive monitoring data that it used to develop those technical reports. The Monitoring Network Review Memo documents that the Agency, in mid-2016, commissioned an evaluation of its monitoring network, including an evaluation of how the network compared to the requirements for a SGMA monitoring network. The Monitoring Network Review Memo evaluates the existing groundwater monitoring network and describes the monitoring network's ability to capture responses to groundwater condition changes in the Subbasin.<sup>82</sup> The Monitoring Network Review Memo concluded that the Agency's monitoring network generally has sufficient density of monitoring wells, measured at sufficient intervals, to capture the spatial and temporal variability of groundwater levels and storage changes in the Basin.<sup>83</sup> The Monitoring Network Review Memo also noted that the current monitoring network had some data gaps, including lack of knowledge of the well construction details for some monitoring wells and lack of sufficient data to create maps of seawater intrusion for various depths and aquifers. The Monitoring Network Review Memo also states that surface water monitoring is not a significant component of the monitoring program, however the

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<sup>79</sup> 23 CCR § 354.28(c)(6)

<sup>80</sup> Alternative Elements Guide, entry for § 354.28(c)(6), p. 12

<sup>81</sup> 23 CCR § 354.32

<sup>82</sup> Technical Memo, p. 1

<sup>83</sup> Technical Memo, p. 14

availability of surface water data is indicated by its use for model development and calibration as documented in the PVHM Report.

## 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.<sup>84</sup>

The Basin Management Plan contains extensive descriptions of potential projects and management actions identified by the Agency to eliminate groundwater overdraft and the associated adverse conditions of reduced groundwater storage and seawater intrusion. The Plan identified 44 projects that were screened and ranked based on unit cost per projected yield.<sup>85</sup> The projects were then screened based on cost and potential implementation issues. The screening process resulted in 14 projects that could be implemented within the Plan horizon and, ultimately, seven projects were selected based on an analysis that showed they were expected to balance the Subbasin and stop seawater intrusion.<sup>86</sup> The first phase of implementation, which includes six of the seven projects, is to be completed by 2024. A second phase, including the seventh project, is to be implemented between 2025 and 2034. Subsequent phases, if required, would be implemented beginning in 2035. The Plan describes that the intent of the Phase 1 projects is to achieve an 80 percent reduction in overdraft and a 90 percent reduction in seawater intrusion, and notes that, if those objectives are not achieved, additional projects will be included in Phase 2.<sup>87</sup>

The Phase 1 portfolio includes an expected 5,000 acre-feet per year yield from conservation management actions. The Plan describes the Agency's conservation strategy, which focuses on reducing agricultural water use through more efficient irrigation practices.<sup>88</sup> The Plan notes that previous studies have estimated the potential agricultural water savings as being between 4,600 and 5,100 acre-feet per year. The Plan describes specific tasks necessary to develop and implement the conservation program and also describes that, due to restrictions on the use of augmentation funds in the Agency Act, the Agency will need to either seek outside funds (e.g., grants) or will need to work to modify the Agency Act to allow for funding of conservation programs. The Plan anticipates that one-hundred percent of the conservation goal would be achieved by 2023. The Plan also identifies that if seventy-five percent of the conservation goal is not achieved by 2020

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<sup>84</sup> 23 CCR § 354.44

<sup>85</sup> Basin Management Plan, Chapter 3

<sup>86</sup> Basin Management Plan, Chapter 4

<sup>87</sup> Basin Management Plan, Chapter 7, p. 78

<sup>88</sup> Basin Management Plan, Chapter 6

the Agency will revise the program to increase levels of conservation to meet the 2023 goal.

The remaining Phase 1 projects include increased recycled water deliveries (expected yield of 1,250 acre-feet per year), increased recycled water storage at the recycled water treatment plant (expected yield of 750 acre-feet per year), Harkins Slough recharge facilities upgrades, (expected yield of 1,000 acre-feet per year), the Watsonville Slough with Recharge Basins project (expected yield of 1,200 acre-feet per year), and the College Lake with Inland Pipeline to the Coastal Distribution System project (expected yield of 2,400 acre-feet per year). The Basin Management Plan includes a project description for each of the projects listed above that includes additional details of the estimated yield, implementation issues, and estimated costs.<sup>89</sup> Phase 2 would begin in 2025 and includes the seventh project (Murphy Crossing with Recharge Basins with an estimated yield of 500 acre-feet per year) identified in the initial screening effort. As with the Phase 1 projects, the Basin Management Plan includes a description of the Murphy Crossing with Recharge Basins project that describes potential implementation issues and costs.

## VI. Assessment

The following describes the evaluation and assessment of the Alternative for the Pajaro Valley Subbasin 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.<sup>90</sup> As discussed above, Department staff have determined that the Pajaro Subbasin Alternative satisfied the conditions for submission of an alternative.<sup>91</sup> The Alternative was submitted within the statutory period, the Subbasin 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 Subbasin (see Required Conditions, above). Based on evaluation and assessment of the Pajaro Subbasin Alternative, as discussed below, Department staff find that the Alternative satisfies the objectives of SGMA.<sup>92</sup>

### A. Evaluation of Alternative Contents

The Agency documents its authority to manage groundwater within its statutory boundaries in the Pajaro Valley Subbasin. The Basin Management Plan asserts the

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<sup>89</sup> Basin Management Plan, Chapter 5

<sup>90</sup> Instances where the Department review relied upon publicly available data that was not part of the Alternative are specifically noted in the assessment.

<sup>91</sup> 23 CCR § 358.4(a)

<sup>92</sup> Water Code § 10733.6(a); 23 CCR § 358.4(b)

Agency's legal authority and recounts its ability to finance projects, which demonstrates a reasonable likelihood of undertaking the projects described in the Plan. Additionally, the Basin Management Plan was developed and implemented through a process that included participation from a wide range of interests representing various beneficial uses and users of groundwater, as noted in comments received by the Department. Although the Plan provides adequate administrative information for the area within the Agency's jurisdictional area, which accounts for the overwhelming majority of both surface area and water use (including groundwater use), a small portion of the Subbasin lies outside that jurisdiction. Because Department staff have determined that the Agency's Alternative is likely to achieve the sustainability goal for the entire Subbasin, and that the area outside the Agency's jurisdiction is not likely to adversely affect groundwater conditions in the jurisdictional area, or be adversely affected by groundwater management in the jurisdictional area, Department staff have determined that the Alternative effectively covers the entire Subbasin and so the lack of jurisdiction over this area does not preclude approval of the Alternative. However, to ensure the Department's ability to evaluate future conditions in this area, Department staff recommend that the Agency make changes to its Alternative to facilitate that evaluation (see Recommended Action 1).

The Basin Management Plan and associated technical studies demonstrate a satisfactory understanding of the hydrogeologic and groundwater conditions of the Subbasin. Staff consider the technical studies, including the PVHM Report and the Salt Management Plan, to be based on the best available information and best available science, and that their conclusions are scientifically reasonable. The hydrogeologic conceptual model and numerical model described in the PVHM report incorporate the relevant hydrologic processes in the entire Subbasin and the understanding of hydrogeologic conditions based on previous studies. The numerical model appears to be reasonably well-calibrated to support analysis presented in the Basin Management Plan. The numerical model is used to generate a detailed and thorough water budget that includes many of the components required by the GSP Regulations. The Agency's understanding of the Subbasin setting appears adequate to develop and implement a plan for sustainable groundwater management. However, Department staff recommend that the Agency address the quantity and timing of depletion of interconnected surface waters and an identification of groundwater dependent ecosystems (see Recommended Actions 2-3). Department staff also recommend that the Agency include the proposed projects and management actions in its projected water budget (see Recommended Action 4).

The Agency Charter establishes a sustainability goal for the Subbasin and the Basin Management Plan identifies adverse effects caused by existing groundwater use that are equivalent to undesirable results. Those existing adverse conditions are overdraft of the aquifer system that has resulted in lowering of groundwater levels, reduction of storage, and seawater intrusion. The Plan describes the evolution of these conditions through time

and describes actions taken to date to address them, noting that prior actions were not sufficient to correct the adverse conditions. The Plan proposes a suite of management actions and projects to accomplish the Plan's goal of eliminating the adverse conditions noted above. The Plan includes quantitative targets for interim and final yields of the Phase 1 projects and includes a list of projects that can be considered for implementation in Phase 2, beginning in 2025, if those additional projects are required. The Salt Management Plan identifies quantitative criteria for tracking future water quality undesirable results in the form of assimilative capacity thresholds. The Agency provides a reasonable description of why the undesirable result of land subsidence is not likely to occur in the Subbasin and describes that it will use 2015 rates of depletion of interconnected surface water as its operational criteria for future management. The Agency has functionally addressed the requirements for a sustainability goal and understanding of undesirable results.

The Plan provides reasonable quantifications and standards related to groundwater storage and water quality and explains why subsidence criteria are not warranted. Although the Plan has not established quantitative criteria related to groundwater levels and depletions of interconnected surface water, it did quantify the overdraft that led to storage depletion and seawater intrusion and it is expected that correcting those conditions will improve other groundwater conditions, including groundwater levels and depletions of interconnected surface water. Therefore, staff do not consider the current lack of quantitative criteria related to those indicators sufficient to preclude a finding that the Alternative is likely to achieve the sustainability goal for the Subbasin. However, because SGMA requires the Department to evaluate alternatives and GSPs on an ongoing basis, the Department will rely on specific, quantitative criteria for groundwater levels and depletions of interconnected surface water to objectively determine whether the Alternative is meeting the sustainability goal. Department staff recommend that the Agency establish those criteria to allow for the objective evaluation of the Alternative (see Recommended Action 5). Additionally, it was not certain how the proposed seawater intrusion rate reductions described in the Plan would be quantified (i.e., by a specific contour line or by a reduction in volumetric flux) and the specific rate reduction described by the Plan are, in some cases, not consistent. The Basin Management Plan states that a goal is to "halt seawater intrusion" (implying zero further intrusion) but the projects and management action discussions do not consistently identify a 100 percent rate reduction goal. Rather, at times they identify either a reduction of seawater intrusion to a rate of 200 acre-feet per year or a reduction of 90 percent relative to historical intrusion rates, which is described as being within the accuracy of the model.<sup>93</sup> Staff recommend measures to clarify those items related to seawater intrusion (see Recommended Actions 6 and 7).

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<sup>93</sup> Basin Management Plan, p. ES-7 and p. 41

Technical information presented in the Alternative demonstrates that the Agency has a monitoring network that it used for development of the Basin Management Plan, PVHM Report, and Salt Management Plan, all of which use and describe historical monitoring data for groundwater levels, storage, seawater intrusion, water quality, and surface water flows. The Monitoring Network Review Memo assesses the existing monitoring network and identifies data gaps, although it does not describe the specific frequency at which monitoring will occur and does not identify specific steps and timelines for resolution of the data gaps. Staff determined that the Agency relied upon adequate monitoring information for plan development and initial implementation, however staff recommend that the Agency identify the specific timing and frequency of future monitoring and address the schedule to fill data gaps identified in the Monitoring Network Review Memo associated with lack of well construction information and improvement of seawater intrusion monitoring (see Recommended Action 8). The PVHM Report describes a rationale for not including subsidence in the numerical model and the Agency uses this rationale to explain that land subsidence undesirable results are not likely to occur in the Basin. This assumption is reasonable but has not been confirmed by historical monitoring data. Staff recommend that the Agency incorporate available monitoring data for subsidence into the Basin Management Plan (see Recommended Action 9).

Management actions and projects described in the Basin Management Plan present a feasible approach to achieving the sustainability goal for the Basin; and are generally consistent with the requirements of the GSP Regulations. The management actions and projects are appropriately informed by the understanding of Subbasin conditions documented in the PVHM Report. Specifically, the management actions and projects are designed to eliminate the identified average annual shortfall. The estimate of overdraft for the Subbasin appears reasonable and the management actions and projects are a reasonable means to mitigate that overdraft through a combination of conservation, optimization of recycled water use, and recharge projects. Discussions of funding for projects appears to be reasonable. The Plan describes the rationale for using a phased approach to funding and implementing the projects, and notes that the phasing will allow for flexibility to adapt future projects based on the experience of the Agency in implementing Phase 1. However, the Plan's approach to eliminating the average annual shortfall does not address specific actions to manage groundwater extraction or recharge during periods of drought to ensure that groundwater level and storage declines are offset by increases during other periods (see Recommended Action 10).

The Basin Management Plan for the Pajaro Valley Subbasin aims to reduce overdraft and seawater intrusion, and is consistent with Water Code Section 106.3, which establishes the state policy that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." Department staff consider that the Basin Management Plan, which is expected to reduce

potential depletion of interconnected surface waters, to also be consistent with the public trust doctrine.

## B. Recommended Actions

The following recommended actions include information that the District may wish to include in the first five-year update of the Alternative to facilitate the Department's ongoing evaluation and assessment of the Alternative as well as recommendations for improvements to the Alternative.

### Recommended Action 1.

Staff recommend that the Agency define how it will assess, on an ongoing basis, the non-jurisdictional portion of the Subbasin and demonstrate that activities in that area are not adversely impacting successful implementation of the Plan within the Agency's jurisdictional area, or adversely affected by implementation of the Plan or by groundwater use in the area not subject to that Plan. That assessment may include, but is not limited to, additional monitoring in the non-jurisdictional areas and agreements with other entities.

### Recommended Action 2.

Staff recommend that the Agency quantify depletions of interconnected surface waters occurring as of January 1, 2015, which the Agency intends to use the threshold beyond which undesirable results occur, or other thresholds as defined and justified by the Agency.<sup>94</sup>

### Recommended Action 3.

Staff recommend that the Agency provide an identification of groundwater dependent ecosystems in the Subbasin.

### Recommended Action 4.

Staff recommend that the Agency update the Basin Management Plan to include a projected water budget that demonstrates the anticipated response to Plan implementation (for guidance, see 23 CCR Section 354.18(c)(3)). This recommendation is based on Department staff's understanding that modeling scenarios documented in the Alternative, including those projecting conditions into the future, include infrastructure and projects existing at the time of Alternative submittal, and that the results of those scenarios were used to develop the projects identified in the Basin Management Plan. Staff recommend that the Agency incorporate the proposed projects into the analysis of its

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<sup>94</sup> Alternative Elements Guide, entry for § 354.28(c)(6), p. 12

projected water budget to provide an increased level of confidence that those projects are likely to have the intended effects on the water budget and groundwater conditions.

### Recommended Action 5.

Staff recommend that the Agency define specific, quantitative criteria for groundwater levels and depletion of interconnected surface water that can be used to objectively determine compliance of the Plan with the objectives of SGMA on an ongoing basis. Specific recommended actions related to individual undesirable results are provided below:

- **Groundwater Levels:** Provide groundwater-level criteria, equivalent to the sustainable management criteria in the GSP Regulations, that represent the planned improvements in groundwater conditions to avoid undesirable results within the timelines outlined in the Plan.
- **Depletion of Interconnected Surface Water:** As noted in Recommended Action 2, the Agency should define the depletions of interconnected surface waters occurring as of January 1, 2015 that the Agency intends to use as its operational criteria.

### Recommended Action 6.

Staff recommend that the Agency should define a specific location of an isoconcentration contour or some other equivalent method that can be used on an ongoing basis to assess progress toward eliminating undesirable results associated with seawater intrusion to assess the goal of eliminating seawater intrusion through implementation of projects and management actions as described in the Plan.

### Recommended Action 7.

Staff recommend that the Alternative should be updated to set objective criteria consistent with achieving the stated goal that a 100 percent reduction in annual seawater intrusion rate is the operational goal for the Basin or to provide quantify the extent to which additional seawater intrusion would not be significant and unreasonable.

### Recommended Action 8.

Staff recommend that the Agency finalize information contained in the *Draft* Monitoring Network Review Memo, which is an assessment of the monitoring network in the Subbasin; and incorporate those findings into a monitoring plan for the Pajaro Valley Subbasin that identified the timing and frequency of data collection. The monitoring plan should describe steps that will be taken to fill data gaps identified in the Monitoring Network Review Memo. As new information is acquired, the plan should be updated with the improved understanding, e.g., to provide seawater intrusion conditions for the Basin

in the form of maps and cross-sections illustrating the seawater intrusion front *for each principle aquifer* (see 23 CCR Section 354.16(c)).

### Recommended Action 9.

Staff recommend that the Agency determine a means by which the Subbasin may be assessed to confirm that no significant land subsidence has occurred. This can be accomplished by incorporating subsidence monitoring information from statewide or local studies into the monitoring program for the Basin.

### Recommended Action 10.

Staff recommend that the Agency update its Plan to describe actions the Agency may take in periods of drought to ensure resiliency of the Plan to achieve the sustainability goal for the Subbasin.