CALIFORNIA DEPARTMENT OF WATER RESOURCES
SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE
901 P Street, Room 313-B | Sacramento, CA 95814 | P.O. Box 942836 | Sacramento, CA 94236-0001

June 3, 2021

Sierra Ryan
Santa Cruz Mid-County Groundwater Agency Groundwater Sustainability Agency
5180 Soquel Drive
Soquel, CA 95010

Dear Sierra Ryan,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP) submitted for the Santa Cruz Mid-County Basin and has determined the GSP is approved. The approval is based on recommendations from the Staff Report, included as an exhibit to the attached Statement of Findings, which describes that the Santa Cruz Mid-County Basin GSP satisfies the objectives of the Sustainable Groundwater Management Act (SGMA) and substantially complies with the GSP Regulations. The Staff Report also proposes recommended corrective actions that the Department believes will enhance the GSP and facilitate future evaluation by the Department. The Department strongly encourages the recommended corrective actions be given due consideration and suggests incorporating all resulting changes to the GSP in future updates.

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The Department will initiate the first five-year review of the Santa Cruz Mid-County Basin GSP no later than January 30, 2025.

Please contact Sustainable Groundwater Management staff by emailing sgmps@water.ca.gov if you have any questions related to the Department's assessment or implementation of your GSP.

Thank You,

Craig Altare, P.G.
Supervising Engineering Geologist
Groundwater Sustainability Plan Review Section Chief

Attachment:

1. Statement of Findings Regarding the Approval of the Santa Cruz Mid-County Basin Groundwater Sustainability Plan

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATEMENT OF FINDINGS REGARDING THE APPROVAL OF THE SANTA CRUZ MID-COUNTY BASIN GROUNDWATER SUSTAINABILITY PLAN

The Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the Sustainable Groundwater Management Act (SGMA or Act), is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement their GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) The Department is directed to issue an assessment of the Plan within two years of its submission. (Water Code § 10733.4.) This Statement of Findings explains the Department's decision regarding the Plan submitted by Santa Cruz Mid-County Groundwater Agency (MGA) for the Santa Cruz Mid-County Basin (Basin No. 3-001).

Department management has reviewed the Department Staff Report, entitled Groundwater Sustainability Plan Assessment Staff Report, attached as Exhibit A, recommending approval of the GSP. Based on its review of the Staff Report, Department management is satisfied that staff have conducted a thorough evaluation and assessment of the Plan and concurs with staff's recommendation and all the recommended corrective actions. The Department thus approves the Plan based on the Staff Report and the findings contained herein.

A. The Plan satisfies the required conditions as outlined in § 355.4(a) of the GSP Regulations (23 CCR § 350 *et seq*.):

    1. The Plan was submitted within the statutory deadline of January 31, 2020. (Water Code § 10720.7(a)(1); 23 CCR § 355.4(a)(1).)

    2. The Plan is complete, meaning it appears to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation by the Department. (23 CCR § 355.4(a)(2).)

    3. The Plan covers the entire Subbasin. (23 CCR § 355.4(a)(3).)

B. The Plan conforms with Water Code §§ 10727.2 and 10727.4 in the Act, substantially complies with the GSP Regulations, and is likely to achieve the sustainability goal for the Basin. In making this determination, the Department considered the following:

C. The sustainable management criteria and goal to stop seawater intrusion and maintaining protective groundwater levels are sufficiently justified and explained. The Plan relies on credible information and science to quantify the groundwater conditions that the Plan seeks to avoid and provides an objective way to determine whether the Subbasin is being managed sustainably in accordance with SGMA.

D. The Plan demonstrates a thorough understanding of where data gaps exist and demonstrates a commitment to eliminate those data gaps. In particular, increasing the monitoring network for depletion of interconnected surface water will be critical to obtaining a better understanding of the hydraulic connectivity of surface water and groundwater of the local creeks, such as the Soquel Creek. Addressing the proposed data gaps should also improve the ability to run more accurate model simulations

E. The projects and management actions, as described in the Plan, are reasonable and commensurate with the level of understanding of the basin setting and designed to increase storage and prevent seawater intrusion. The use of conservation efforts as well as projects such as Pure Water Soquel, at this time, appear feasible and reasonably likely to mitigate overdraft. The projects and management actions are expected to reduce net pumping by 1,740 acre-feet per year; thereby, likely bringing the Basin to operate within its sustainable yield.

F. The Plan provides a detailed explanation of how the varied interests of groundwater uses and users in the Basin were considered in developing the sustainable management criteria and how those interests, including domestic wells, would be impacted by the chosen minimum thresholds.

G. At this time, it does not appear that the Plan will adversely affect the ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. There are two high- or medium-priority basins adjacent to the Basin – the Santa Margarita Groundwater Basin to the west and the Pajaro Valley Groundwater Subbasin to the east. The West Santa Cruz Terrace Groundwater Basin and the Purisima Highlands Subbasin, both low- or very low-priority, are also adjacent to the Basin.

H. The member agencies of the MGA, the Central Water District, City of Santa Cruz, County of Santa Cruz, and Soquel Creek Water District, have historically implemented numerous projects and management actions to address problematic groundwater conditions in the Basin. The MGA and its members history of groundwater management provide a reasonable level of confidence

that the Agencies have the legal authority and financial resources necessary to implement the Plan.

I. Through review of the Plan and public comments, the Department determines that the GSA adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may preclude approval of the Plan in those future evaluations.

J. In addition to the grounds listed above, DWR also finds that:

1. Through implementation of the Plan, MGA intends to "[m]anage the groundwater Basin to ensure beneficial uses and users have access to a safe and reliable groundwater supply…". (Santa Cruz Mid-County GSP, p. 3-1) The Plan's compliance with the requirements of SGMA and substantial compliance with the GSP Regulations supports the state policy regarding the human right to water (Water Code § 106.3). The Department developed its GSP Regulations consistent with and intending to further the policy through implementation of SGMA and the Regulations, primarily by achieving sustainable groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water. (23 CCR § 350.4(g).)

2. The Plan identifies interconnected surface waters and priority species supported by those surface waters. MGA, through implementation of the Plan, intends to maintain depletions at or below conditions observed prior to 2015. Based on the above rationale, the Department determines that MGA considered public trust resources in development of the Plan.

3. The California Environmental Quality Act (CEQA) does not apply to the Department's evaluation and assessment of the Plan.

Based on the above, the GSP submitted by the Santa Cruz Mid-County Groundwater Agency for the Santa Cruz Mid-County Basin is approved as being found to satisfy the requirements of SGMA and to be in substantial compliance with the GSP Regulations. Recommended corrective actions identified in the Staff Report will assist the Department's review of the Plan's implementation for consistency with SGMA and are thus recommended to be addressed in the GSP by the time of the Department's five-year review, which is set to begin on January 30, 2025, as required by Water Code § 10733.8.

Signed:

Karla Nemeth, Director

Date: June 3, 2021

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – Santa Cruz Mid-County Basin

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

Groundwater Basin Name:	Santa Cruz Mid-County Basin (No. 3-001)
Submitting Agency:	Santa Cruz Mid-County Groundwater Agency
Recommendation:	Approve
Date:	June 3, 2021

The Santa Cruz Mid-County Groundwater Agency (MGA) submitted the Santa Cruz Mid-County Groundwater Basin (Basin) Groundwater Sustainability Plan (Plan or GSP) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA).[1] The GSP covers the entire Basin for the implementation of SGMA.

After evaluation and assessment, Department staff find the Santa Cruz Mid-County Basin GSP includes the required components of a GSP, demonstrates a thorough understanding of the basin based on best available science and information, sets reasonable sustainable management criteria to prevent undesirable results, and proposes a set of projects and management actions that will likely achieve the sustainability goal defined in the Basin, as required by SGMA and the GSP Regulations.[2] Department staff will continue to monitor and evaluate the Basin's progress toward achieving the sustainability goal through annual reporting and future periodic GSP evaluation. Based on the current evaluation of the Plan, Department staff recommend approval of the Plan with recommended corrective actions described herein.

This assessment includes five sections:

- **Section 1 – Summary:** Provides an overview of the basin setting, GSP contents, and overview of the Department's assessment and recommendations.
- **Section 2 – Evaluation Criteria:** Describes the legislative requirements and the Department's evaluation criteria.
- **Section 3 – Required Conditions:** Describes the submission requirements, plan completeness, and basin coverage required for a GSP to be evaluated by the Department.
- **Section 4 – Plan Evaluation:** Provides a detailed assessment of the contents included in the GSP organized by each subarticle outlined in the GSP Regulations.

[1] Water Code § 10720 *et seq*.
[2] 23 CCR Section § 350 *et seq*.

- **Section 5 – Staff Recommendation:** Includes the staff recommendation for the Plan and any recommended or required corrective actions, as applicable.

1 SUMMARY

The Santa Cruz-Mid-County Basin (Basin) is designated as critically overdrafted and, therefore, a GSP was required to be submitted for the Basin by January 31, 2020. The MGA submitted a GSP to the Department covering the entire Basin on January 30, 2020. The Basin extends from the Santa Cruz Mountains to the Pacific Ocean and from the edge of the City of Santa Cruz near Twin Lakes in the west to La Selva Beach in the east. The Basin includes portions of the City of Santa Cruz, the entire City of Capitola, and Santa Cruz County census designated places such as Live Oak, Soquel, and Aptos. Two high- or medium-priority basins are adjacent to the Basin – Santa Margarita Groundwater Basin to the west and the Pajaro Valley Groundwater Subbasin to the east. The West Santa Cruz Terrace Groundwater Basin and the Purisima Highlands Subbasin, both low- or very low-priority, are also adjacent to the Basin. A vicinity map showing the Basin, MGA boundary, and adjacent basins is provided as Figure 1.

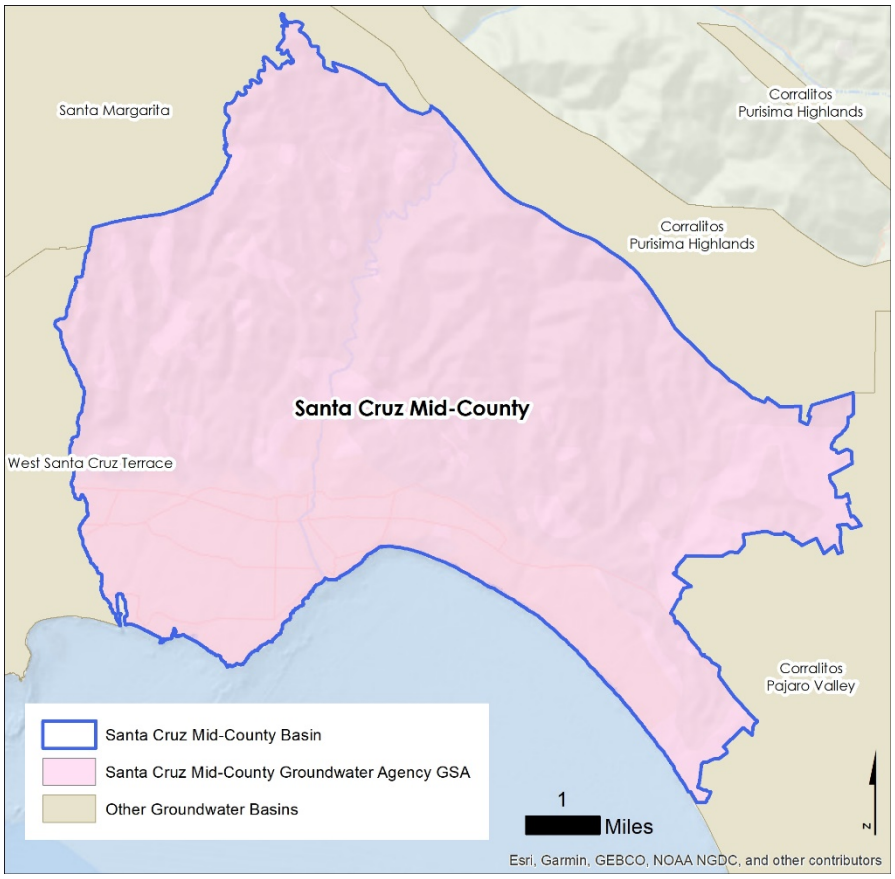

Figure 1: Vicinity Map of the Santa Cruz Mid-County Basin including GSA Boundary and Adjacent Basins.

According to the Plan, residential and associated land uses (i.e., urban, commercial, open space, and parks) make up over 90 percent of the Basin's land area. Agriculture only occupies two percent of the Basin's land area. The primary water use in the Basin is drinking water supply and residential use. To meet residential water demand, two primary water purveyors – The City of Santa Cruz Water Department (SCWD) and Soquel Creek Water District (SqCWD) – supply water to a majority of residents in the Basin. Water supply comes from both surface water and groundwater from within the County of Santa Cruz (i.e., no water is imported from outside the county) and approximately 52 percent of Basin residents rely solely on groundwater as their water supply.

Due to reliance on groundwater pumping and the proximity of residential communities to the Pacific Ocean, seawater intrusion has been a concern in the basin for several decades. The Plan explains that historic groundwater use led to landward encroachment of seawater as documented in two studies conducted by the United States Geological Survey (USGS) in 1968 and 1980. The Plan further states that since the initial observations of seawater intrusion, and prior to the enactment of SGMA, MGA member agencies (i.e., SCWD, SqCWD, and the County) instituted management strategies to slow the encroachment of seawater, including conservation efforts to limit pumping, relocation of municipal groundwater supply wells to more inland locations, and establishing protective groundwater elevations near the coast. The Plan demonstrates that the pre-SGMA management efforts have been effective at limiting the extent of seawater intrusion, but due to ongoing overdraft the threat of seawater intrusion remains.

Currently, chloride concentrations in wells located along the coast in the northern and southern portions of the Basin indicate seawater is still present. The Plan explains, however, that recent data from 2018 indicate the extent of seawater intrusion has generally remained localized to the historically impacted areas (i.e., not moving further inland) with stable or improving chloride concentrations. The Plan further explains that preventing seawater intrusion is the main focus of sustainability planning and that achieving the sustainable management criteria established for seawater intrusion will likely result in the avoidance of the other undesirable results applicable in the basin, such as reduction of groundwater storage, lowering of groundwater levels, and depletions of interconnected surface water.

The Plan defines conditions of significant and unreasonable seawater intrusion in the Basin as seawater moving farther inland than what was observed from 2013 through 2017. To avoid significant and unreasonable seawater intrusion conditions the Plan identifies three categories of minimum thresholds that, if exceeded, would lead to undesirable results – currently intruded monitoring wells, unintruded monitoring and production wells, and protective groundwater elevations. The minimum thresholds for seawater intrusion include both protective groundwater elevations that are used as a proxy for seawater intrusion and chloride isocontours for the two principal aquifers.

In addition to seawater intrusion, the Plan states that surface water depletion by groundwater use is an important aspect of the Basin's management due to the association of the Basin's creeks and streams with groundwater dependent ecosystems (GDEs). The Plan explains that observations from shallow monitoring wells and stream gauges, in conjunction with an integrated surface water-groundwater flow model (referred to as the 'model' in this assessment), were used to determine the extent of hydraulic connectivity between streams and groundwater. The model simulations indicated that many of the streams in the Basin are, at some point, spatially and temporally interconnected to groundwater; however, the Plan also explains that many factors, including evapotranspiration, rainfall, and surface water diversions, affect streamflow. The Plan states that, due to uncertainty with the modeling and the limited data available to assess surface water-groundwater interaction, MGA intends to improve surface water and shallow groundwater monitoring in the Basin.

According to the Plan, "significant and unreasonable depletion of surface water due to groundwater extraction, in interconnected streams supporting priority species, would be undesirable if there is more depletion than experienced since the start of shallow groundwater level monitoring through 2015." The Plan further explains that due to the complexities associated with identifying volumes and rates of depletion, groundwater levels as a proxy are used for interconnected surface water sustainable management criteria. The minimum thresholds are set at the highest seasonal low groundwater level between when shallow groundwater monitoring began and 2015. The Plan states that because 2016 and 2017 were average and very wet years, respectively, that pre-2015 conditions are more representative of below average rainfall years, as defined for the minimum threshold.

The Plan proposes a series of projects and management actions to achieve the sustainability goal for the Basin that are categorized into three groups based on the stage of development and timing of each project or management action. The Plan describes baseline projects, such as conservation efforts and the redistribution of municipal pumping, that are ongoing in the Basin and incorporated into the sustainable management planning. The second group of projects and management actions are those that will be implemented to achieve the sustainability goal and have been thoroughly vetted by the MGA member agencies, including Pure Water Soquel recycled water facilities and City of Santa Cruz aquifer storage and recovery efforts. The Plan describes the third group of projects and management actions as conceptual projects that may be implemented in the future as needed, including recycled water groundwater replenishment and local desalination. According to the Plan, implementation of the projects and management actions outlined to achieve sustainability (i.e., projects and management actions included in Group 2) are expected to reduce net pumping by 1,740 acre-feet per year through the use of supplemental water injected into the Basin.

The Plan further explains the reduction in pumping will increase groundwater outflow to the ocean, which would likely slow or stop potential inland advancement of seawater intrusion. Department staff believe these approaches to mitigate overdraft and seawater intrusion are reasonable and feasible and, once implemented as described in the GSP, are likely to achieve the sustainability goal for the Basin.

Department staff believe that the Plan's assessment and description of historic and current groundwater conditions includes the best available science and information and presents a thorough understanding of the Basin. The understanding of Basin conditions is, in turn, utilized to define and explain reasonable sustainable management criteria and projects and management actions. In particular, the approach to avoid further encroachment of seawater, and the Plan's description of such, appears to be credible and will likely lead to avoiding other undesirable results.

Department staff recommend approval of the Santa Cruz Mid-County Basin GSP. The MGA has identified several areas for Plan improvement (e.g., addressing data gaps, incorporating new information and data into the current model, and expanding monitoring networks). Department staff concur that those items are important and should be addressed. Department staff have also identified an additional recommended corrective action that should be considered by the GSA for the first periodic evaluation of its GSP (see Section 5 Staff Recommendation). Addressing the recommended corrective action will be important to demonstrate, on an ongoing basis, that implementation of the Plan is progressing toward achieving the sustainability goal. The recommended corrective action generally focusses on further explanation as to how the groundwater level minimum thresholds were established.

2 EVALUATION CRITERIA

The MGA submitted a single GSP to the Department to evaluate whether the Plan conforms to SGMA's requirements[3] and is likely to achieve the sustainability goal for the Basin.[4] To achieve the sustainability goal for the Basin, the GSP must demonstrate that implementation of the Plan 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 GSA.[6] The Department is also required to evaluate whether the GSP will adversely affect the ability of an adjacent basin to implement its GSP or achieve its sustainability goal.[7]

For the GSP to be evaluated by the Department, it must first be determined that the Plan was submitted by the statutory deadline,[8] and that it is complete and covers the entire basin.[9] If these conditions are satisfied, the Department evaluates the Plan to determine whether it complies with SGMA and substantially complies with the GSP Regulations.[10] "Substantial compliance means that the supporting information is sufficiently detailed and the analyses sufficiently thorough and reasonable, in the judgment of the Department, to evaluate the Plan, and the Department determines that any discrepancy would not materially affect the ability of the Agency to achieve the sustainability goal for the basin, or the ability of the Department to evaluate the likelihood of the Plan to attain that goal."[11]

When evaluating whether the Plan is likely to achieve the sustainability goal for the Basin, Department staff review the information provided and relied upon in the GSP for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice.[12] The Department's review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the agency, including whether the interests of the beneficial uses and users of groundwater in the basin have been considered; whether sustainable management criteria and projects and management actions described in the Plan 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.[13]

[3] Water Code §§ 10727.2,10727.4.
[4] Water Code § 10733(a).
[5] Water Code § 10721(v).
[6] 23 CCR § 354.26.
[7] Water Code § 10733(c).
[8] 23 CCR § 355.4(a)(1).
[9] 23 CCR §§ 355.4(a)(2), 355.4(a)(3).
[10] 23 CCR § 350 *et seq*.
[11] 23 CCR §355.4(b).
[12] 23 CCR §351(h).
[13] 23 CCR §355.4(b)(1), (3), (4), (5).

The Department also considers whether the agency has the legal authority and financial resources necessary to implement the Plan.[14]

To the extent overdraft is present in a basin, the Department evaluates whether the Plan provides a reasonable assessment of the overdraft and includes reasonable means to mitigate the overdraft.[15] The Department also considers whether the Plan provides reasonable measures and schedules to eliminate identified data gaps.[16] Lastly, the Department's review considers the comments submitted on the Plan and evaluates whether the agency adequately responded to the comments that raise credible technical or policy issues with the Plan.[17]

The Department is required to evaluate the Plan within two years of its submittal date and issue a written assessment of the Plan.[18] The assessment is required to include a determination of the Plan's status.[19] The GSP Regulations provide three options for determining the status of a Plan: Approved,[20] Incomplete,[21] or Inadequate.[22]

Even when staff review finds that the GSP satisfies the requirements of SGMA and is in substantial compliance with the GSP Regulations, the Department may recommend corrective actions.[23] Recommended corrective actions are intended to facilitate progress in achieving the sustainability goal within the basin and the Department's future evaluation, and to allow the Department to better evaluate whether the Plan adversely affects adjacent basins. While the issues addressed by the recommended corrective actions do not, at this time, preclude approval of the Plan, the Department recommends that the deficiencies be addressed to ensure the Plan's implementation is consistent with SGMA and the Department is able to assess progress in achieving the sustainability goal within the Basin.[24] Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first periodic evaluation.

The staff assessment of the GSP 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 the Plan or to perform its own geologic or engineering analysis of that information. The staff recommendation to approve a Plan does not signify that Department staff, were they to exercise the professional judgment required to develop a GSP for the basin, would make the same assumptions

[14] 23 CCR § 355.4(b)(9).
[15] 23 CCR § 355.4(b)(6).
[16] 23 CCR § 355.4(b)(2).
[17] 23 CCR § 355.4(b)(10).
[18] Water Code § 10733.4(d), 23 CCR §355.2(e).
[19] Ibid.
[20] 23 CCR § 355.2(e)(1).
[21] 23 CCR § 355.2(e)(2).
[22] 23 CCR § 355.2(e)(3).
[23] Water Code § 10733.4(d).
[24] Water Code § 10733.8.

and interpretations as those contained in the Plan, 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.

Lastly, the Department's review and approval of the Plan is a continual process. Both SGMA and the GSP Regulations provide DWR with the ongoing authority and duty to review the implementation of the Plan.[25] Also, GSAs have an ongoing duty to reassess their plans, provide reports to the Department, and, when necessary, update or amend their plans.[26] The passage of time or new information may make what is reasonable and feasible at the time of this review to not be so in the future. The emphasis of the Department's periodic reviews will be to assess the progress toward achieving the sustainability goal for the basin and whether Plan implementation adversely affects the ability of adjacent basins to achieve their sustainability goals.

[25] Water Code § 10733.8, 23 CCR § 355.6.
[26] Water Code § 10728, 10728.2.

3 REQUIRED CONDITIONS

A GSP, to be evaluated by the Department, must be submitted within the applicable statutory deadline. The Plan must also be complete and must, either on its own or in coordination with other Plans, cover the entire basin. If corrective actions have been identified by the Department, in the context of an Incomplete assessment, the GSA must also have sufficiently addressed those corrective actions within the period of time provided.

3.1 SUBMISSION DEADLINE

SGMA required basins categorized as high- or medium-priority as of January 1, 2017 and that were subject to critical conditions of overdraft to submit a GSP no later than January 31, 2020.[27]

The MGA submitted its Plan on January 30, 2020, in compliance with the statutory deadline.

3.2 COMPLETENESS

GSP Regulations specify that the Department shall evaluate a GSP if that GSP is complete and includes the information required by SGMA and the GSP Regulations.[28]

The MGA submitted an adopted GSP for the entire subbasin. Department staff found the GSP to be complete and including the required information, sufficient to warrant an evaluation by the Department. The Department posted the GSP to its web site on February 19, 2020.

3.3 BASIN COVERAGE

A GSP, either on its own or in coordination with other GSPs, must cover the entire basin.[29] A GSP that intends to cover the entire basin may be presumed to do so if the basin is fully contained within the jurisdictional boundaries of the submitting GSA(s).

The MGA intends to manage the entire Santa Cruz Mid-County Basin and the jurisdictional boundaries of the submitting GSA covers the entire Santa-Cruz Mid-County Basin.[30]

[27] Water Code § 10720.7(a)(1).
[28] 23 CCR § 355.4(a)(2).
[29] Water Code § 10727(b); 23 CCR § 355.4(a)(3)
[30] Santa Cruz Mid-County GSP, p. 15.

4 PLAN EVALUATION

As stated in Section 355.4 of the GSP Regulations, a basin "shall be sustainably managed within 20 years of the applicable statutory deadline consistent with the objectives of the Act." The Department staff's evaluation of the likelihood of the Plan to attain the sustainability goal for the Subbasin is provided below.

4.1 ADMINISTRATIVE INFORMATION

The GSP Regulations require each Plan to include administrative 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.[31]

4.1.1 Evaluation Summary

Administrative information included in the GSP substantially complies with the requirements outlined in the GSP Regulations. The GSP describes in sufficient detail the GSA's authority to manage groundwater within the Basin. The Plan and the Joint Powers Authority between the local governmental organizations document the organizational structure and legal authority to implement and finance necessary management actions and projects. Historically, MGA member agencies have implemented several projects and management actions, such as developing an extensive monitoring network for their Groundwater Management Plan under the provisions of AB3030 and relocating water supply wells to address problematic groundwater conditions in the Basin.[32] The history of management in the Basin and the approach outlined in the Plan provide a reasonable level of confidence that the MGA has the legal authority and financial resources necessary to implement the Plan.

The Plan contains sufficient detail to understand the beneficial uses and users, types and distribution of land use and water use types, existing water management, and land use management programs in the Basin. The Plan was developed using a thorough stakeholder outreach and communications strategy including a telephone and web-based survey of local groundwater users, multiple public meetings, and public comment periods.[33]

4.1.2 Agency Information

The MGA is comprised of four member agencies: Central Water District, City of Santa Cruz, County of Santa Cruz, and Soquel Creek Water District. The GSA has an 11 member Board of Directors: two from each water provider and the County; and three private well owners appointed by a majority vote of the public agency directors.[34] Through

[31] 23 CCR § 354.2 *et seq*.
[32] Santa Cruz Mid-County GSP, p. 65.
[33] Santa Cruz Mid-County GSP, Appendix 2-A, p. 462.
[34] Santa Cruz Mid-County GSP, p. 34-35.

SGMA and the MGA Joint Powers Authority and Bylaws, MGA has the legal authority and responsibility to manage groundwater sustainably in the Basin.[35]

4.1.3 Description of Plan Area

The Plan provides a thorough description of the plan area, including both general and detailed information of the geographic area covered by the Plan. The Basin extends ten miles from the Santa Cruz Mountains to the Pacific coastline and from the edge of the City of Santa Cruz in the west to La Selva Beach in the east.[36] The Basin land area is under the jurisdiction of the County of Santa Cruz and two municipalities: the City of Santa Cruz and the City of Capitola. Each of the municipalities have general plans, coastal programs, zoning regulations, and development standards to manage regional growth. The County General Plan includes a Conservation and Open Space Element that provides policies, programs, and code requirements to protect and manage groundwater resources.[37]

The Plan explains that there are three water agencies – SCWD, SqCWD, and Central Water District (CWD) – that provide water for most of the population in the Basin (i.e., approximately 88 percent of Basin residents). Water supply comes from both surface water and groundwater in varying amounts depending on the agency; however, groundwater is the primary source of water for residents within the Basin.[38] The Plan states that the MGA member agencies, particularly SCWD and SqCWD, are working to diversify the Basin's water supply to reduce groundwater demand.[39] The Plan estimates that non-municipal domestic groundwater use in the Basin is approximately 12 percent of the Basin's overall groundwater production and occurs mainly in the inland portion of the Basin.[40]

There has been active monitoring and management in the Basin for over 50 years.[41] The Plan provides an overview of the various monitoring and management programs and states that the MGA will leverage current and historic data on groundwater, surface water, and habitat conditions to sustainably manage the Basin, and describes the existing monitoring network that will be used to assess sustainability indicators.[42]

The Plan refers to a study that identified seawater intrusion as the greatest threat to the Basin's groundwater supplies.[43] In response to the threat and occurrence of seawater intrusion, agencies in the Basin identified management strategies to prevent further seawater intrusion, which included: the development of a hydrogeologic conceptual model, develop conservation programs to reduce water demand, implement tiered water

[35] Santa Cruz Mid-County GSP, p. 36.
[36] Santa Cruz Mid-County GSP, p. 53.
[37] Santa Cruz Mid-County GSP, p. 72-73.
[38] Santa Cruz Mid-County GSP, p. 62.
[39] Santa Cruz Mid-County GSP, p. 62.
[40] Santa Cruz Mid-County GSP, p. 63 and 78.
[41] Santa Cruz Mid-County GSP, p. 65.
[42] Santa Cruz Mid-County GSP, p. 69-70.
[43] Santa Cruz Mid-County GSP, p. 81.

pricing structures to incentivize water conservation, manage groundwater pumping to more accurately align groundwater extraction rates with groundwater recharge rates, relocate municipal groundwater pumping inland, establish protective groundwater elevations, and evaluate the effectiveness of the management strategies.[44]

Overall, the Plan relies on and provides decades of information and data regarding historical water use, monitoring and management, land use, and other groundwater management practices in the Basin. Department staff find this part of the Plan substantially complies with the GSP Regulation.

4.1.4 Notice and Communication

As described in the Plan, MGA outreach efforts focused on educating the public about groundwater, the Basin, and the requirements of SGMA. MGA developed a website and used several other media outlets to disseminate information while also organizing community outreach events to provide opportunities for public engagement.[45] The GSP states there are seven disadvantaged communities (DAC), including one severely disadvantaged community, within the Basin. All seven DACs are located within the SCWD's service area. The Plan states that MGA is utilizing resources from a Proposition 1 IRWM DAC Involvement Grant to better understand the needs of the DACs in the Basin.[46]

The Plan includes a Communication and Engagement Plan that describes a phased approach to outreach, engagement, and educational opportunities. The Communication and Engagement Plan states that, as part of a human right to water effort, MGA would like to engage with DACs, environmental justice groups, and human service non-profits to better provide safe and secure groundwater supplies to DACs.[47] The Plan also includes a cost estimate for outreach and education activities during Plan implementation.

The Plan provides a detailed description of the beneficial uses and users in the Basin including a discussion of the GSP Working Group that was formed to engage with all interest groups.[48] The Plan also includes a discussion of the Surface Water Working Group that was formed to help establish management criteria for groundwater dependent ecosystems and interconnected surface water.[49] For the sustainable management criteria, the Plan discusses how minimum thresholds and measurable objectives for each sustainability indicator would affect beneficial uses and users of groundwater in the Basin. In addition, the Plan provides the public comments and responses to public comments received for the draft GSP.[50]

[44] Santa Cruz Mid-County GSP, p. 81-82.
[45] Santa Cruz Mid-County GSP, p. 97.
[46] Santa Cruz Mid-County GSP, p. 102.
[47] Santa Cruz Mid-County GSP, Appendix 2-A, p. 465.
[48] Santa Cruz Mid-County GSP, p. 97-103.
[49] Santa Cruz Mid-County GSP, p. 179.
[50] Santa Cruz Mid-County GSP, Appendix B, p. 438

Department staff find that the Plan substantially complies with the notice and communication requirements in the GSP Regulations.[51] The Plan includes all the required elements, which, in turn, describe an organized and reasonable approach to engaging and informing the different uses and users in the Basin, including soliciting their input and informing them of decisions made.

4.2 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 a water budget accounting for total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions.[52]

4.2.1 Evaluation Summary

The Plan includes a detailed characterization of the physical setting, groundwater conditions, and water budget for the Basin, and it identifies data gaps and areas of uncertainty. The Plan sufficiently demonstrates that the technical information and data used to characterize the basin setting are based on best available information and best available science at the time the Plan was prepared, and that the conclusions are scientifically reasonable. MGA demonstrates a thorough understanding of the Basin setting in the hydrogeologic conceptual model and effectively documents the historic and current groundwater conditions in the Basin, which, in turn, provides an adequate foundation to develop and implement the GSP.

4.2.2 Hydrogeologic Conceptual Model

MGA identifies two principal aquifers in the Basin: the Purisima Formation and the Aromas Red Sands. The Purisima Formation extends throughout the Basin and overlies granitic basement that outcrops in the west of the Basin. The Purisima Formation is interbedded with aquitards which create confined aquifers between some of the layers. In the southeast portion of the Basin, east of Valencia Creek, the Purisima Formation is overlain by the unconfined Aromas Red Sands. The Aromas Red Sands Formation is generally comprised of poorly consolidated material and the formation contains significant heterogeneity. The upper portion of the aquifer may be unsaturated, particularly where the water table is drawn down near sea level.

The Aromas Red Sands and Purisima aquifers are the primary aquifers pumped throughout the Basin by all extractors. Approximately 88 percent of all pumping in the Basin is for drinking water supply. The Plan estimates only 4 percent of groundwater use is attributed to agricultural uses.[53]

[51] 23 CCR § 354.10.
[52] 23 CCR § 354.12 *et seq.*
[53] Santa Cruz Mid-County GSP, p. 130.

The Plan explains there are 10 miles of Pacific Ocean coastline which are hydraulically connected to the principal aquifers in the Basin. Due to the hydraulic connectivity to the Pacific Ocean and localized groundwater production near the coast, both principal aquifers have experienced seawater intrusion. The Plan states that Basin management has and will continue to focus on controlling seawater intrusion.[54]

The GSP also identifies several streams within the Basin that are hydraulically connected to shallow groundwater most of the time during the year. The Plan explains that likely interconnected surface water was identified using groundwater elevation monitoring, stream elevations, stream gauging data, and integrated surface water-groundwater modeling.[55] The Plan identifies GDEs associated with the stream systems in the Basin, attributing priority species (i.e., steelhead trout, coho salmon, and several riparian trees) to the watersheds in the Basin.[56]

The hydrogeologic conceptual model adequately characterizes the physical components and interaction of the surface water and groundwater systems in the Basin. The information presented appears sufficient, consistent with the GSP Regulations, and supported by best available information and science. The Plan does identify data gaps and areas of uncertainty regarding the hydrogeologic conceptual model, such as specific hydrogeologic delineation of aquifer units and the physical characteristics of faulting in the basin.[57] Because the data gaps are mostly associated with defining hydrogeologic properties of the non-principal aquifer in more detail and better understanding regional scale geology (i.e., faulting), Department staff do not find the data gaps and uncertainty associated with the hydrogeologic conceptual model will limit the MGA from achieving the sustainability goal of the Basin.

4.2.3 Groundwater Conditions

The Plan states that long-term overdraft has led to ongoing seawater intrusion and groundwater level declines. In 1984, the greatest recorded groundwater declines of up to 140 feet occurred within the Purisima aquifer. In the early 2000's, groundwater conditions in the Basin had recovered but municipal pumping continued to keep groundwater levels below sea level. The Aromas Red Sands aquifer was similarly impacted in the southern portion of the Basin, but to a lesser degree.[58]

The Plan summarizes that, over the past 30 years, groundwater levels in the Basin have recovered from low levels in the 1980s to the highest measured levels in 2017. However, the data and information also show that portions of the Purisima aquifer are still impacted by municipal groundwater pumping. This pumping primarily occurs inland of the coastal zone but creates cones of depression which can make portions of the aquifer subject to seawater intrusion. Groundwater levels in the Aromas Red Sands aquifer were mostly

[54] Santa Cruz Mid-County GSP, p. 132.
[55] Santa Cruz Mid-County GSP, p. 133.
[56] Santa Cruz Mid-County GSP, p. 179.
[57] Santa Cruz Mid-County GSP, p. 137.
[58] Santa Cruz Mid-County GSP, p. 138.

above sea level but below protective levels for seawater intrusion. Currently, chloride concentrations in wells located along the coast in the northern and southern portions of the Basin indicate seawater is still present. The Plan explains, however, that recent data from 2018 indicates the extent of seawater intrusion has remained localized to the historically impacted areas with generally stable or improving chloride concentrations.[59]

The GSP states that that the physical characteristics of the basin do not represent conditions conducive to inelastic subsidence. The Plan further describes that even during periods of significant groundwater level declines, including historic lows, no subsidence has been documented in the Basin.[60] Additionally, there are no known conditions in the Basin, such as decomposition of organic soils, underground mining or gas extraction, or hydrocompaction, which would cause subsidence. There are no subsidence measuring points in the Basin, however two continuous global positioning systems located just outside of the Basin have shown small amounts of elastic subsidence. The Plan states that the small amounts of elastic subsidence could possibly be related to hydrologic conditions, but the measured subsidence has not been physically observed on the land surface. The GSP concludes that by avoiding undesirable results in other sustainability indicators, subsidence will not occur in the future. The GSP further states that if land subsidence is identified it will trigger the need for dedicated subsidence monitoring.[61]

The GSP states that groundwater supply in the Basin does not regularly exceed primary drinking water standards. Some naturally occurring constituents, mainly iron and manganese in the Purisima Formation aquifer, exceed drinking water standards in parts of the Basin. The GSP covers additional groundwater impacts including chromium VI, nitrates, 1,2,3-trichloropropane, and contaminants of emerging concern, such as pharmaceuticals and personal care products.

The GSP provides an analysis of hydraulically interconnected surface water and groundwater by both direct monitoring of streamflow and groundwater levels but also by simulations using an integrated surface water groundwater model. The Plan states that most of the streams in the Basin are connected to groundwater between 30 to 95 percent of the time. The Plan also indicates that Soquel Creek and Branciforte Creek are most highly interconnected to groundwater at more than 95 percent of the time.[62]

The Plan states that GDEs were assessed and identified where interconnected surface and groundwater exist within the Basin.[63] The assessment indicated several of the perennial streams in the Basin were salmonid bearing streams (i.e., Soquel Creek and Branciforte Creek). The identification of likely interconnected streams and salmonid bearing streams led to development of a priority species list, which includes steelhead trout and coho salmon, that would be considered when establishing the sustainable

[59] Santa Cruz Mid-County GSP, p. 154.
[60] Santa Cruz Mid-County GSP, p. 166.
[61] Santa Cruz Mid-County GSP, p. 167.
[62] Santa Cruz Mid-County GSP, p. 172-173.
[63] Santa Cruz Mid-County GSP, p. 94.

management criteria. The Plan concludes that managing interconnected surface water to protect steelhead trout and coho salmon will also meet the needs of other aquatic species. Additionally, managing streams to conditions related to these priority species will positively impact downstream beneficial uses and users of surface water.[64] Department staff find that the Plan sufficiently explains the evaluation of GDEs and how the proposed management program for surface water will likely limit significant and unreasonable impacts to beneficial uses and users.

4.2.4 Water Budgets

The Plan includes historic, current, and projected water budgets for both the surface water system and the groundwater system. All three of the water budgets were developed using a basin-wide integrated surface water-groundwater flow model that incorporates watershed hydrology, basin hydrogeology, and streamflow. The Plan explains in sufficient detail the data sources, water budget components, and assumptions and uncertainty associated with the model. The Plan further explains the model contains the best available information and data at the time of development and that the current and projected water budgets will be updated and recalibrated as new data is collected during Plan implementation.[65] The Plan's description of the integrated flow model used for the water budgets is commensurate with the level of understanding of the Basin and appears to provide a reasonable accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Basin.

The historical water budget includes the time period between 1985 through 2015. The historical groundwater budget estimates 13,070 acre-feet per year of average annual groundwater inflows. The Plan describes that 40 percent of the inflow is from the adjacent Purisima Highlands Subbasin and 34 percent is recharge from percolation of precipitation and return flow, with the remaining inflow occurring in stream alluvium and terrace deposits. Net outflows are calculated to be approximately 12,590 acre-feet per year, with the majority to pumping (59 percent) and outflow to the Pajaro Valley Subbasin (32 percent). The average annual change in storage was calculated as an increase in storage of 480 acre-feet pear year.[66]

The Plan explains that the current water budget for the Basin covers the period from 2010 to 2015. The current groundwater budget estimates 11,490 acre-feet per year of inflows from recharge and inflows from Purisima Highlands Subbasin. Net outflows are calculated to be approximately 11,650 acre-feet per year. The average annual change in storage is calculated as a decrease of 160 acre-feet per year. The GSP indicates current inflows are about 1,580 acre-feet per year less than during the historical period due to below normal rainfall which occurred over most of this period.[67]

[64] Santa Cruz Mid-County GSP, p. 181.
[65] Santa Cruz Mid-County GSP, p. 190.
[66] Santa Cruz Mid-County GSP, p. 204.
[67] Santa Cruz Mid-County GSP, p. 219.

The projected water budget covers a 54-year period from 2016 through 2069. The projected groundwater budget, without the implementation of the proposed projects, estimates inflows to be 11,290 acre-feet per year and outflows to be 11,220 acre-feet year.

With implementation of the proposed projects and management actions, the projected net pumping is reduced by 1,740 acre-feet per year because groundwater demand is offset by supplemental water injected into the Basin (see Section 4.5). The projected water budget with the implementation of projects and management actions estimates an increase in average groundwater outflow to the ocean (840 acre-feet per year, an increase of 73 percent). The Plan explains that the increased groundwater flow to the ocean will likely help mitigate the landward encroachment of seawater intrusion and could potentially even push seawater intrusion back. It is projected that with projects and management actions, there will be an average annual increase in groundwater in storage of 280 acre-feet, which equates to a cumulative gain of 18,530 acre-feet over 54 years.[68]

The GSP indicates overall projected Basin sustainable yield is 4,870 acre-feet per year, which is just over 1,000 acre-feet less than what was pumped from 2010 to 2015 (6,220). Once the projects are implemented, net Basin pumping is planned to be within the sustainable yield.[69] The sustainable yield is higher than the net Basin pumping planned with project implementation because the projects have goals beyond achieving minimum thresholds that define undesirable results.

4.3 Sustainable Management Criteria

GSP Regulations require each Plan to include a sustainability goal for the basin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate.[70]

4.3.1 Evaluation Summary

Department staff find the sustainable management criteria included in the Plan were developed using sufficient and credible information and science, and substantially comply in form and presentation with the requirements outlined in the GSP Regulations. Significant and unreasonable conditions, as defined in the Plan, are based on historical conditions in the Basin that were identified as unacceptable by MGA in conjunction with feedback from stakeholders in the Basin. The minimum thresholds are generally set relative to the shallowest well near the representative monitoring point and associated with the specific groundwater use type. Specifically, the Plan aims to maintain groundwater levels that represent the specific yield necessary to support the water demand for the overlying land use in the shallowest well in the vicinity of the monitoring point. The Plan also describes the sustainable management criteria aim to limit degradation of groundwater quality resulting from groundwater management and to avoid

[68] Santa Cruz Mid-County GSP, p. 237.
[69] Santa Cruz Mid-County GSP, p. 249.
[70] 23 CCR § 354.22 *et seq*.

depletions of interconnected surface waters by maintaining shallow groundwater levels at the highest measured point during the time period of seasonal-low groundwater conditions. The minimum threshold for seawater intrusion is generally set at the 250 mg/L chloride concentration isocontour measured in 2018. The Plan also identifies the correlation between groundwater levels and sea water intrusion and sets sea water intrusion minimum thresholds using groundwater levels as a proxy in the Basin's coastal monitoring wells. Measurable objectives defined in the Plan largely aim to improve groundwater conditions in the Subbasin over time.

The Plan sufficiently describes the rationale used to develop sustainable management criteria for each sustainability indicator, including a discussion of possible effects on neighboring basins and on the uses and users of groundwater in the Basin.

As described below, Department staff believe that further work will be necessary by the GSA to identify and quantify the potential impacts to non-municipal domestic wells that the Plan describes as potentially needing to be deepened if the groundwater level minimum thresholds are reached (see Recommended Corrective Action 1).

4.3.2 Sustainability Goal

The sustainability goal, as defined in the Plan, is to "[m]anage the groundwater Basin to ensure beneficial uses and users have access to a safe and reliable groundwater supply that meets current and future Basin demand without causing undesirable results." The sustainability goal also includes nine specific goals, including to protect groundwater supply from seawater intrusion, prevent groundwater overdraft and resolve issues related to overdraft, and maintain or enhance groundwater flow to streams.[71] The Plan includes a suite of projects and management actions that are currently ongoing or may be implemented to ensure the Basin operates within its sustainable yield and achieves the sustainability goal. The information provided in the Plan for the sustainability goal reasonably sets forth how sustainable groundwater management for the Basin will be achieved and substantially complies with the GSP Regulations.

4.3.3 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.[72]

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.[73] Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon, significant

[71] Santa Cruz Mid-County GSP, p. 258.
[72] 23 CCR § 354.22 *et seq*.
[73] 23 CCR § 351(ah).

and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water[74] – 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.

The following subsections thus consolidate three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, 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.[75]

4.3.3.1 Chronic Lowering of Groundwater Levels

According to the Plan, significant and unreasonable groundwater level conditions occur when a significant number of production wells can no longer meet the demand of the beneficial uses.[76] The Plan explains that an undesirable result occurs when any representative monitoring point's average monthly groundwater elevation falls below its minimum threshold. The minimum thresholds are set at individual representative monitoring points and were established to meet the water demand in the shallowest production well in the vicinity of the monitoring point.[77]

The Plan explains the process of establishing the minimum thresholds for each representative monitoring point. The process analyzed specific details regarding the beneficial use of wells in the area around the representative monitoring point. For example, the Plan discusses determining the estimated well yield (i.e., in gallons per minute) necessary to maintain demand of the overlying land use. Then, the Plan determines the minimum saturated thickness of groundwater needed to meet that yield ultimately establishing a groundwater level to maintain. Department staff believe the Plan sufficiently explains the steps taken to establish the minimum thresholds in each representative monitoring point and find the process to be reasonable. Department staff, however, believe further explanation regarding the potential impacts to domestic wells is needed, as described below.

[74] Water Code § 10721(x).
[75] 23 CCR § 354.26(d).
[76] Santa Cruz Mid-County GSP, p. 304.
[77] Santa Cruz Mid-County GSP, p. 305.

The Plan states the minimum thresholds are protective of most rural residential uses and users. The Plan further explains that if groundwater elevations do reach the minimum thresholds in certain locations, then some of the shallowest domestic wells may be required to drill deeper wells.[78] The Plan does not discuss in detail the specific representative monitoring wells or extent of the rural domestic wells that may be affected if the minimum threshold is hit or exceeded. Department staff find that because the sustainable management criteria were established based on the demand for the shallowest well near the representative monitoring points, the minimum thresholds will likely be protective of domestic beneficial users. However, Department staff believe the MGA should provide a discussion on the extent, including approximate number of wells and general areas of the Basin, of possible domestic wells that could be impacted if the minimum thresholds are reached (see Recommended Corrective Action 1). Additionally, the GSA should inventory and better define the location of all active wells in the Basin, and document known impacts to drinking water users caused by groundwater management, should they occur, in subsequent annual reports and periodic updates.

Department staff find that MGA provides reasonable and sufficient descriptions of the relationship between groundwater conditions at the minimum thresholds for chronic lowering of groundwater levels and minimum thresholds for other sustainability indicators and the effect of the minimum thresholds on neighboring basins. Department staff also find that MGA provides reasonable and sufficient descriptions of the effects of the minimum thresholds on uses and users of groundwater in the basin.

4.3.3.2 Reduction of Groundwater Storage

The Plan defines significant and unreasonable conditions for reduction of groundwater storage in the Basin as, "[a] net volume of groundwater extracted (pumping minus annual volume of managed aquifer recharge) that will likely cause other sustainability indicators to have undesirable results."[79] The Plan describes that an undesirable result occurs if the total yearly average groundwater extraction over a five-year period exceeds the sustainable yield for any of the principal aquifers.[80] Minimum thresholds defined in the GSP for reduction of groundwater storage are the sustainable yields representing net annual volume of groundwater extracted (pumping minus volume of managed aquifer recharge) for each of the principal aquifers.[81]

The Plan explains the sustainable yields (i.e., the minimum threshold) for each of the principal aquifers were evaluated using the results of the projected water budget. The projected sustainable yield values for each principal aquifer represent conditions resulting from GSP implementation and include projects and management actions planned to avoid undesirable results. The Plan further explains that by avoiding the reduction in groundwater storage undesirable result, the Basin will effectively avoid the undesirable

[78] Santa Cruz Mid-County GSP, p. 311.
[79] Santa Cruz Mid-County GSP, p. 312.
[80] Santa Cruz Mid-County GSP, p. 313.
[81] Santa Cruz Mid-County GSP, p. 315.

results for other sustainability indicators.[82] Department staff find that the Plan's definition of minimum threshold as the sustainable yield for each of the Basin's principal aquifers is reasonable.

4.3.3.3 Seawater Intrusion

MGA defines significant and unreasonable seawater intrusion in the Basin as, "[s]eawater moving farther inland than was observed from 2013 through 2017."[83] The Plan explains that the time period between 2013 and 2017 is more protective than using the historical maximum chloride concentration, and is intended to keep chloride concentration below 250 mg/L. The Plan provides a comparison of historical maximum chloride concentrations in monitoring wells compared to the conditions observed between 2013 and 2017, demonstrating the more protective approach to significant and unreasonable seawater intrusion.

The Plan defines undesirable results from seawater intrusion using chloride concentrations and protective groundwater elevations. The Plan describes the chloride concentration undesirable results as the following:

1) For coastal wells that already have experienced seawater intrusion, an undesirable result occurs if any coastal monitoring well with current intrusion has a chloride concentration above the 2013–2017 maximum chloride concentration. This concentration must be exceeded in 2 or more of the last 4 consecutive quarterly samples.
2) For unintruded coastal monitoring wells an undesirable result occurs if any unintruded coastal monitoring well has a chloride concentration above 250 mg/L.
3) For unintruded inland monitoring wells, an undesirable result occurs if any unintruded inland monitoring well (which includes municipal production wells closest to the coast and other non-coastal monitoring wells) has a chloride concentration above 150 mg/L. These concentrations must be exceeded in 2 or more of the last 4 consecutive quarterly samples.

In addition to chloride concentrations, the Plan explains an undesirable result would also occur if the five-year average groundwater elevations are below the protective groundwater elevations for any coastal representative monitoring well.

The GSP states that if any of the above conditions occur then undesirable results from seawater intrusion are occurring.[84] The Plan explains that the upper maximum contaminant level for chloride in groundwater is 500 mg/L; however, the Plan states a chloride concentration of 250 mg/L (i.e., the recommended maximum contaminant level) is selected for the minimum threshold for the Basin because native chloride

[82] Santa Cruz Mid-County GSP, p. 315-316.
[83] Santa Cruz Mid-County GSP, p. 320.
[84] Santa Cruz Mid-County GSP, p. 321-322.

concentrations in groundwater are generally below 100 mg/L and the 250 mg/L concentration is protective of state drinking water standards.

The Plan sufficiently describes that protective groundwater elevations are also used as proxies for additional minimum thresholds due to significant correlation between groundwater elevations and seawater intrusion. Minimum thresholds for seawater intrusion using groundwater elevation proxies are the current protective groundwater elevations set at coastal monitoring wells established prior to SGMA.[85]

Department staff find that the Plan's selection of the minimum threshold at the 2013-2017 Basin conditions is a reasonable approach to protect against worsening conditions during GSP implementation. The Plan describes in detail the conditions that would lead to seawater intrusion undesirable results and Department staff believe the approach is sufficiently protective and will likely achieve the sustainability goal of the Basin. Department staff also believe the sustainable management criteria defined in the Plan for seawater intrusion are based on the best available science and information, are substantially compliant with the requirements of the GSP Regulations, and will likely have a positive impact on the beneficial uses and users of groundwater in the Basin.

4.3.3.4 Degraded Water Quality

MGA defines significant and unreasonable groundwater quality degradation in the Basin as, "Groundwater quality, attributable to groundwater pumping or managed aquifer recharge, that fails to meet state drinking water standards."[86] The Plan describes a groundwater quality undesirable result in the Basin occurs when, as a result of groundwater pumping or managed aquifer recharge, any representative monitoring well exceeds any state drinking water standard. The minimum thresholds defined in the GSP are state drinking water standards for ten constituents of concern monitored in representative monitoring points.[87]

The Plan explains that by using the state drinking water standards as minimum thresholds and establishing undesirable results as an exceedance of those standards at any representative monitoring site, all types of beneficial uses and users of groundwater in the Basin will benefit from the degraded water quality management criteria. The Plan also describes that input from the GSP Advisory Committee and public input was used to establish the sustainable management criteria for degraded water quality.[88] Department staff believe that setting the minimum thresholds at the state drinking water standards for all representative monitoring sites is reasonably protective.

4.3.3.5 Land Subsidence

The Plan explains that the best available science and information indicates that the physical characteristics (i.e., regional geology and hydrogeologic materials) of the Basin

[85] Santa Cruz Mid-County GSP, p. 331.
[86] Santa Cruz Mid-County GSP, p. 342.
[87] Santa Cruz Mid-County GSP, p. 344.
[88] Santa Cruz Mid-County GSP, p. 343.

are not susceptible to inelastic subsidence. In addition, the Plan states that no physical evidence of subsidence has been observed including during historic maximum groundwater level declines.[89] Accordingly, the Plan does not establish sustainable management criteria for subsidence. Although quantitative metrics are not set for subsidence, the Plan does state "Any land subsidence caused by lowering of groundwater levels occurring in the basin would be considered significant and unreasonable."[90] The Plan further states that if, during implementation, the Basin experiences conditions of inelastic subsidence due to groundwater use, the MGA would develop specific subsidence sustainable management criteria.

Department staff believe the Plan sufficiently demonstrates that subsidence is not present and not likely to occur in the basin due to the lack of physical conditions for subsidence to occur and the lack of observed subsidence. Department staff do encourage the MGA to continue to assess the potential for subsidence to occur due to groundwater extraction in the Basin.

4.3.3.6 Depletions of Interconnected Surface Water

The Plan defines significant and unreasonable depletion of surface water due to groundwater extraction as depletions in excess of those observed prior to 2015. The Plan further explains that significant and unreasonable conditions and undesirable results only occur in streams that support priority species. The Plan explains that, due to uncertainty in surface water-groundwater modeling and the complexities involved with determining stream depletions due to groundwater use, the Basin will use shallow near stream groundwater levels as proxy for minimum thresholds of depletions of interconnected surface water. In the shallow, near-stream groundwater wells, an undesirable result will occur if the average monthly groundwater levels fall below the highest seasonal low elevation during below- average rainfall years prior to 2015.[91] The Plan explains that the sustainable management criteria do not include the years 2016 and 2017 because those years were average and very wet, respectively, resulting in shallow groundwater levels greater than previously observed levels which would not represent conditions in which significant and unreasonable depletions would occur.[92]

The Plan discusses that stakeholder input, through public comments and the Surface Water Working Group, informed the decision to use the highest seasonal low groundwater elevation for the groundwater level proxy minimum threshold. Several public comments highlight the Plan's limited correlation between the shallow groundwater levels and surface water depletions and the limited extent of existing surface water and shallow groundwater monitoring. The Plan recognizes the limited monitoring data as a data gap and discusses the complexities of significantly correlating stream depletions and shallow groundwater levels. Modeling simulations, as described in the Plan, highlighted the

[89] Santa Cruz Mid-County GSP, p. 166.
[90] Santa Cruz Mid-County GSP, p. 352.
[91] Santa Cruz Mid-County GSP, p. 356.
[92] Santa Cruz Mid-County GSP, p. 357.

various components (i.e., evapotranspiration, precipitation events, inability to accurately calibrate flows between the stream and shallow groundwater, etc.) that affect the estimated rate of depletions due to groundwater pumping in the Basin. The modeling uncertainty also highlighted the challenges to significantly correlate stream flow, shallow groundwater levels, and groundwater pumping from the principal aquifers.

In addition to describing the difficulties in determining a rate of depletion and correlating shallow groundwater levels with a rate of depletion due to groundwater pumping, the Plan explains that the shallow groundwater levels set for the minimum thresholds are set to maintain a groundwater flow gradient toward the stream. As previously mentioned, the Plan notes that depletion of interconnected surface water monitoring is a data gap which needs to be addressed. Specifically, the Plan states that to better characterize interconnections between surface water and groundwater, additional monitoring of shallow groundwater levels is needed in the upper reaches of Soquel Creek and on other creeks that indicate hydraulic connectivity to groundwater.[93]

Department staff find that the Plan adequately describes the sustainable management criteria and approach to managing depletions of interconnected surface water. Department staff also believe the MGA uses the best information and science available at the time of Plan development to understand hydraulic connectivity of surface water in the Basin and proposes actions to address the data gaps that appear reasonable.

4.4 MONITORING NETWORKS

GSP Regulations require that a monitoring network be developed for each basin including monitoring objectives, monitoring protocols, and data reporting requirements. The network 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.[94]

4.4.1 Evaluation Summary

The Plan describes monitoring networks used for collection of data for five sustainability indicators that are applicable in the Basin: chronic lowering of groundwater levels, seawater intrusion, depletion of interconnected surface water, reduction of groundwater in storage, and degraded groundwater quality.[95] Most monitoring wells, and the full subset of monitoring wells used as representative monitoring points (i.e., those sites with established minimum thresholds and measurable objectives), are equipped with pressure transducers to collect accurate and frequent data. The GSP describes the historically established monitoring networks that currently exist in the Basin that will continue to be used during GSP implementation. The Plan also describes improvements to the monitoring networks that will be made as part of GSP implementation.

[93] Santa Cruz Mid-County GSP, p. 300.
[94] 23 CCR § 354.32 *et seq*.
[95] Santa Cruz Mid-County GSP, p. 261.

4.4.2 Monitoring Networks

Chronic lowering of groundwater levels will be monitored using 17 well locations which evaluate seven different aquifer units. The representative monitoring points include multi-depth monitoring wells. The monitoring well network is focused in areas where there is a concentration of groundwater extraction, but not immediately adjacent to municipal production wells.[96] Groundwater elevations along the coast are monitored as part of seawater intrusion sustainable management criteria.

Reduction of groundwater in storage is monitored using all the metered wells in the Basin as representative monitoring points. The GSP states that the metered wells will be used to evaluate sustainability by directly measuring extraction volumes. In areas without metered wells, including predominately non-municipal domestic well areas, groundwater extraction will be estimated based on parcels and small water system groundwater use. The Plan also notes that wells that become metered as part of GSP implementation will be added as representative monitoring points for reduction of groundwater in storage.

Seawater intrusion will be monitored using 34 well locations which are located in nine different aquifer units. The representative monitoring points include multi-depth monitoring wells. The representative monitoring points include chloride concentration monitoring, groundwater elevation proxy measurements, or both.

The Plan states that deeper monitoring wells are needed in two locations along the coast because existing wells at the proposed locations are not deep enough to evaluate the deepest water-producing aquifers.[97]

Degradation of water quality will be monitored using 103 wells currently used by the MGA member agencies to assess water quality conditions throughout the Basin. The Plan proposes to use 68 of the 103 well locations as representative monitoring points. The GSP states that the representative monitoring points for water quality are focused on monitoring areas within the districts and municipalities utilizing the majority of the municipal supply wells as monitoring sites.[98] The Plan also states that monitoring wells were chosen as representative monitoring points to supplement areas where no municipal wells were present. Being that the majority of the basin (i.e., 88% of residents) is supplied water from the districts and the primary groundwater use in the Basin is for drinking water supply, Department staff believe using municipal supply wells as representative monitoring points and supplementing the network with monitoring wells in areas with no public supply wells will adequately assess groundwater quality conditions in the Basin.

Depletions of interconnected surface water will be monitored using five well locations which evaluate shallow groundwater along portions of Soquel Creek. The Plan notes that other shallow wells are needed along Soquel Creek and other creeks that are connected to groundwater. These additional locations will be supplemented with stream flow gauges.

[96] Santa Cruz Mid-County GSP, p. 286.
[97] Santa Cruz Mid-County GSP, p. 263.
[98] Santa Cruz Mid-County GSP, p. 294.

The GSP describes that two data gaps exist for the groundwater level monitoring network: two deep coastal monitoring wells to monitor seawater intrusion in the deepest aquifer units and new near stream shallow monitoring wells to monitor depletion of interconnected surface water.[99] In addition to the proposed monitoring wells, the GSP indicates that five streamflow gauges will be installed in association with shallow monitoring wells. The Plan also explains that a metering program will be implemented on all private non-de minimis wells to fill groundwater extraction data gaps. Department staff find the current monitoring network and representative monitoring points have been sufficiently analyzed and will provide sufficient data to observe conditions in the Basin. Department staff also agree that the data gaps identified in the Plan's monitoring network should be addressed as soon as possible.

4.5 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.[100]

4.5.1 Evaluation Summary

To achieve sustainability in the basin, the MGA proposes several projects and management actions. These actions are split into three groups. Group 1 activities are existing commitments by MGA member agencies and mostly consist of conservation measures. Group 2 activities have been developed and thoroughly vetted by MGA member agencies and are planned for near-term implementation by individual member agencies. Group 2 activities are mostly comprised of recharge and replenishment projects. Group 3 activities are those that may be evaluated in the future if projects and management actions required for sustainability in previous groups either fail to be implemented or do not have the expected results.[101] Group 3 activities are comprised of water recycling projects, groundwater pumping curtailment and/or restrictions, and desalination.

Department staff find that the Plan's projects and management actions are feasible and likely to prevent undesirable results and ensure that the Basin is operated within its sustainable yield.

4.5.2 Projects and Management Actions

Group 1 activities were instituted to help mitigate overdraft by initiating water conservation and demand management efforts and redistributing municipal groundwater pumping to more inland locations. The redistribution of municipal pumping was intended to limit

[99] Santa Cruz Mid-County GSP, p. 263.
[100] 23 CCR § 354.44 *et seq*.
[101] Santa Cruz Mid-County GSP, p. 367.

pumping depressions from influencing the advancement of seawater intrusion. Activities in Group 1 are incorporated into the model's baseline conditions and water budgeting.

Group 2 activities include managed aquifer recharge and recycled water projects such as Pure Water Soquel and Distributed Storm Water Managed Aquifer Recharge. The Pure Water Soquel project would provide advanced water purification to existing secondary treated wastewater. The Plan estimates the project would replenish the aquifers in the Basin with approximately 1,500 acre-feet per year of advanced purified water that meets or exceeds drinking water standards.[102] The Distributed Storm Water Managed Aquifer Recharge project redirects storm water flows for use as groundwater recharge supply to increase groundwater storage. Where feasible, small to medium scale facilities (up to 10 acre-feet/year/site) capture and treat storm water for shallow groundwater recharge. The managed aquifer recharge projects would be accomplished through surface spreading and/or the construction of dry wells.[103]

During periods when excess water exists, the Plan proposes to recharge water transferred between MGA member agencies through an aquifer storage and recovery (ASR) project. The ASR project would inject excess surface water, treated to drinking water standards, into the Basin's aquifers, effectively raising groundwater levels. The Water Transfers/In Lieu Groundwater Recharge project would deliver excess SCWD surface water, treated to drinking water standards, to SqCWD to reduce groundwater pumping and allow an increase in groundwater in storage to help prevent seawater intrusion. However, availability of excess surface water is constrained by a number of factors, including drinking water treatment capacity, water rights place of use restrictions, required minimum fish flows, and availability of adequate surface water supplies to serve SCWD's customers prior to selling excess drinking water outside the SCWD's service area.[104]

Group 3 projects and management actions will be evaluated in the future based on GSP implementation and future groundwater conditions. The Group 3 projects generally involve supply augmentation through recycled water or desalination efforts. The Plan proposes one potential management action in Group 3 consisting of groundwater demand management through pumping curtailments or groundwater restrictions. The Plan states that appropriate Group 3 projects and/or management actions will be assessed if the Group 2 projects fail to be implemented or do not have the expected results.[105]

The projects and management actions and the grouped approach included in the Plan are reasonable and, if implemented, will likely help the MGA achieve sustainability in the Basin. Department staff believe that the Plan outlines how the groups of projects and management actions will mitigate overdraft and benefit the uses and users of the Basin. The combination of a series of projects and management actions that address the Basin's

[102] Santa Cruz Mid-County GSP, p. 373.
[103] Santa Cruz Mid-County GSP, p. 393.
[104] Santa Cruz Mid-County GSP, p. 388.
[105] Santa Cruz Mid-County GSP, p. 367.

overdraft, a stable funding source, and partnering with other entities to maximize resources appears likely to help ensure sustainability in the Basin.

4.6 Consideration of Adjacent Basins/Subbasins

SGMA requires the Department to "…evaluate whether a groundwater sustainability plan adversely affects the ability of an adjacent basin to implement their groundwater sustainability plan or impedes achievement of sustainability goals in an adjacent basin."[106] Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP should be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.[107] The Santa Cruz Mid-County Basin has four adjacent groundwater basins: the West Santa Cruz Terrace Basin, Santa Margarita Basin, Corralitos – Purisima Highlands Subbasin, and Corralitos – Pajaro Valley Subbasin. Of the four adjacent basins, two (the West Santa Cruz Terrace Basin and the Corralitos – Purisima Highlands Subbasin) are designated as low- or very low-priority and are not required to prepare a GSP. The Santa Margarita Basin is a medium-priority basin and GSAs in that basin are required to submit a GSP by January 2022. The Corralitos – Pajaro Valley Subbasin is a critically overdrafted basin that submitted an alternative to a GSP which was approved by the Department in July 2019.

In the Plan, the MGA includes an analysis of potential impacts the established minimum thresholds could have on the adjacent basins. The Plan states that the Santa Cruz Mid-County Basin is largely not hydraulically connected to the West Santa Cruz Terrace Basin and that it was not included in the assessment of impacts to adjacent basins.[108] The descriptions of potential impacts to adjacent basins provided by MGA do not indicate the minimum thresholds, if reached, would result in significant or unreasonable effects, and would likely not prevent each basin from achieving their sustainability goal.

The Plan further describes that inter-basin coordination may be beneficial especially in the Aromas Red Sands aquifer which extends into the Pajaro Valley Subbasin.[109] The Plan states that the MGA will include summaries of inter-basin coordination in the Basin's periodic plan updates, as necessary.[110]

[106] Water Code § 10733(c).
[107] 23 CCR § 354.28(b)(3).
[108] Santa Cruz Mid-County GSP, p. 310.
[109] Santa Cruz Mid-County GSP, p. 251.
[110] Santa Cruz Mid-County GSP, p. 420.

5 STAFF RECOMMENDATION

Department staff's recommendation is to approve the Santa Cruz Mid-County Groundwater Agency's GSP with the recommended corrective action listed below. The Santa Cruz Mid-County GSP complies with SGMA and substantially complies with the GSP Regulations. Implementation of the GSP will likely achieve the sustainability goal for the Basin. The MGA has identified several areas for improvement of its Plan, including adding more near-stream shallow groundwater monitoring and better understanding when and where surface water and groundwater interact. Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified an additional recommended corrective action that should be considered by the GSA for the first periodic review of the GSP. Addressing the recommended corrective action will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

RECOMMENDED CORRECTIVE ACTION 1

The MGA should more clearly explain what the Plan means when stating that the groundwater level minimum thresholds are protective of "most" domestic users of groundwater. Also, the minimum thresholds were defined at representative monitoring points so that the groundwater demand in the shallowest well in the "vicinity" of the representative monitoring point could be met. The MGA should describe the extent or coverage of each of the groundwater level minimum thresholds and provide more detail as to why "some wells may… go dry" if the minimum thresholds are based on the shallowest well near the representative monitoring point.