CALIFORNIA DEPARTMENT OF WATER RESOURCES
SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE
715 P Street, 8th Floor | Sacramento, CA 95814 | P.O. Box 942836 | Sacramento, CA 94236-0001

January 13, 2022

Don Zdeba
Indian Wells Valley Groundwater Authority GSA
500 W. Ridgecrest Blvd., Ridgecrest, CA 93555
don.zdeba@iwvwd.com

RE: "Approved" Determination of the 2020 Indian Wells Valley Basin Groundwater Sustainability Plan

Dear Don Zdeba,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP) submitted for the Indian Wells Valley 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 Groundwater Sustainability Plan for the Indian Wells Valley Groundwater Basin 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's 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 Indian Wells Valley GSP no later than January 31, 2025.

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

Thank You,

Paul Gosselin

Paul Gosselin
Deputy Director for Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Approval of the Indian Wells Valley Basin Groundwater Sustainability Plan

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATEMENT OF FINDINGS REGARDING THE APPROVAL OF THE INDIAN WELLS VALLEY 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 the Indian Wells Valley Groundwater Authority (Authority) Groundwater Sustainability Agency (GSA) for the Indian Wells Valley Basin (Basin No. 6-054).

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 basin. (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:

1. The sustainable management criteria are sufficiently justified and are commensurate with the level of understanding of the Basin. The recommended corrective actions do not materially affect the ability of the Indian Wells Valley GSP to progress towards its sustainability goal for the Basin or the likelihood that of the Plan to attain that goal. 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 Basin is being managed sustainably in accordance with SGMA.

2. The Plan demonstrates a thorough understanding of where data gaps exist and demonstrates a commitment to eliminate those data gaps. In particular, increasing evaluation of data (existing and new) and monitoring to refine water budget elements such as inflow sources to and outflow sources from the Basin, improving estimates of domestic groundwater use, and increasing the Authority's understanding of previously limited aquifer property data used to calibrate the groundwater model.

3. The projects and management actions, as described in the Plan, are technically feasible and commensurate with the level of understanding of the Basin setting and designed to improve adaptive management practices. The GSP describes project and management actions to mitigate impacts to domestic well users and further its monitoring networks and understanding of the Basin. Lastly, the Plan includes a reasonable assessment of overdraft conditions and seeks to mitigate that overdraft through the implementation of projects and management actions, though the Plan does not propose to end overdraft during the initial twenty-year Plan period or the fifty-year planning horizon. The Department finds that, although a basin in perpetual overdraft is not sustainable, as Department staff explain in the assessment, the Authority should be able to address this issue in a timely manner without interfering with the near-term implementation of the Plan.

4. 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.

5. At this time, it does not appear that the Plan will adversely affect or impede achievement of sustainability goals in an adjacent basin. The Indian Wells Valley Groundwater Basin has four adjacent subbasins surrounding it (the Rose Valley, Coso Valley, Salt Wells Valley, and Fremont Valley basins)

and five neighboring basins (the Kern River Valley, Kelso Lander Valley, Cuddleback Valley, Searles Valley, and Wild Horse Mesa Area basins) adjacent to it, none of which are currently required to be managed under a GSP.

6. The Authority member agencies have implemented projects and management actions and have funded and cooperated with numerous studies to characterize groundwater conditions and inform management strategies in the Basin. The Authority's history of groundwater management provides a reasonable level of confidence that the Authority has the legal resources necessary to implement the GSP, and a plan to obtain the financial resources necessary.

7. Through review of the Plan and public comments, the Department determines that the Authority 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.

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

1. The Plan sets forth minimum threshold levels and local management levels for chronic lowering of groundwater levels that takes into consideration domestic water well depths. (Indian Wells Valley GSP p. 4-20.) The Plan's compliance with the requirements of SGMA and substantial compliance with the GSP Regulations appears to be consistent with 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 GSP does not develop sustainable management criteria for the depletion of interconnected surface water citing insufficient data to determine whether surface water and groundwater are interconnected in the Basin. The GSP states there is no data to support that undesirable results or Basin impacts are occurring due to depletions of interconnected surface water. (Indian Wells Valley GSP p. 4-15.) However, the Authority

will reevaluate the need to establish sustainability criteria for interconnected surface water and groundwater dependent ecosystems as data gaps are filled. This information and science included in the GSP represents, at this time, the best available to the Authority, even if the available data may be imperfect or the analysis incomplete, and Department staff regard the Authority's tentative conclusion that the basin lacks interconnected surface water to be reasonable. The Department regards the Authority's inclusion of this information to represent a consideration of public trust resources in its 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 Authority for the Indian Wells Valley Basin is approved as satisfying the requirements of SGMA and being 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 31, 2025, as required by Water Code § 10733.8.

Signed:

Karla Nemeth

Karla Nemeth, Director

Date: January 13, 2022

Enclosure: Groundwater Sustainability Plan Assessment Staff Report – Indian Wells Valley Basin

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

Groundwater Basin Name:	Indian Wells Valley (Basin No. 6-054)
Submitting Agency:	Indian Wells Valley Groundwater Authority
Recommendation:	Approve
Date:	January 13, 2022

The Indian Wells Valley Groundwater Authority (Authority) submitted a Groundwater Sustainability Plan (GSP or Plan) for the Indian Wells Valley Groundwater Basin (Basin) 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 conclude that the Plan includes components required of a GSP and demonstrates a thorough technical understanding of the basin based on the best available science and information. Department staff conclude that the sustainable management criteria and proposed projects and management actions, if successfully implemented, are reasonably likely to avoid undesirable results as defined in the Plan during the initial planning and implementation horizon.

However, Department staff note that the Plan does not propose to end overdraft during the initial twenty-year Plan period or the fifty-year planning horizon and that, even with full implementation of the proposed projects and management actions, the Basin would be subject to perpetual overdraft, albeit at a reduced rate relative to current conditions. Department staff regard this to be a flaw with the Plan, but one the Authority should be able to address in a timely manner and not one that would interfere with the near-term implementation of the current Plan or, if promptly corrected, undermine long-term efforts to achieve sustainable groundwater management for the Basin. Department staff recommend approval of the Plan subject to recommended corrective actions described herein.[2]

[1] Water Code § 10720 *et seq.*

[2] SGMA requires that the Department assess a Plan within two years of its submission by a GSA. However, the Department notes that ongoing litigation raises challenges to the Plan (including *Mojave Pistachios, LLC, et al. v. Indian Wells Valley Groundwater Authority, et al*., and *Searles Valley Minerals Inc. v. Indian Wells Valley Groundwater Authority, et al*., both filed in the County of Kern Superior Court). This assessment is limited to technical review of the submitted Plan, as required by SGMA and is not intended and should not be read as a comment on the litigation or the legal or factual claims raised by the parties.

This assessment includes five sections:

- **Section 1 – Summary:** Provides an overview of the basin setting, plan 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 Assessment:** Provides a detailed assessment of the contents included in the Plan organized by each subarticle outlined in the GSP Regulations.
- **Section 5 – Staff Recommendation:** Includes the staff recommendation for the Plan and any recommended or required corrective actions, as applicable.

1 SUMMARY

The Department has designated the Indian Wells Valley Groundwater Basin as critically overdrafted and, therefore, a GSP for the Basin was required to be submitted to the Department by January 31, 2020. The Authority submitted a GSP to the Department covering the entire Indian Wells Valley Groundwater Basin, on January 31, 2020.

The Basin is located within the Indian Wells Valley in the northwestern part of the Mojave Desert in Southern California and is surrounded by nine low- or very-low priority groundwater basins. The Indian Wells Valley Groundwater Basin is the only critically overdrafted basin in the area and, therefore, the only one required to submit a GSP. Figure 1, below, is a map showing the Indian Wells Valley Groundwater Basin, GSA boundaries, and adjacent and neighboring basins.

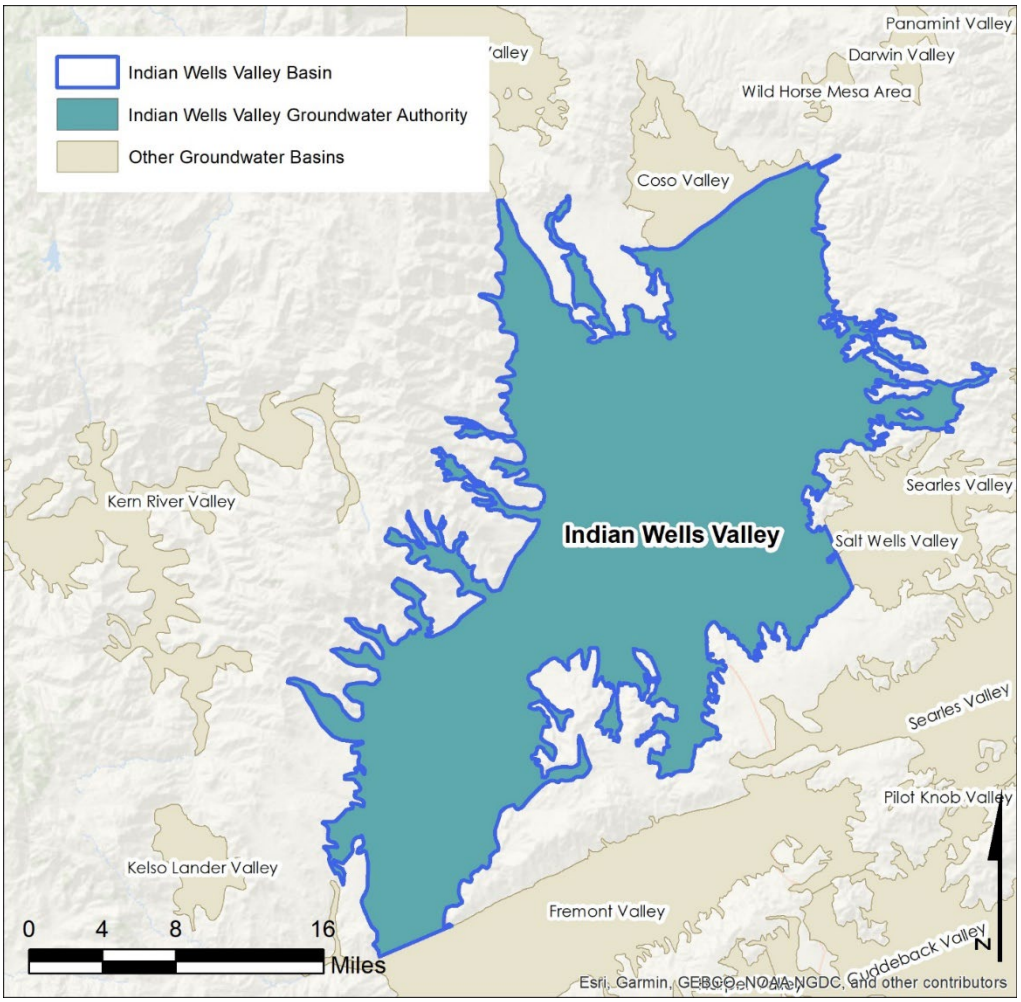

Figure 1: Vicinity Map of the Indian Wells Valley Groundwater Basin.

According to the Plan, overdraft has been documented in the Basin since at least the 1960s and represents a significant barrier to sustainability. The Plan describes the total inflow into the Basin as 7,650 acre-feet per year and the current outflow (for the years

2011-2015) as 32,640 acre-feet per year, representing an overdraft rate of over 400 percent. The Basin does not have any water importation infrastructure or significant surface water features. As a result, current and historical water producers have relied on groundwater from within the Basin to meet water demands. As described in the Plan, groundwater management actions have been ongoing in the Basin through local ordinances, data collection, analysis, and project development mainly to address the impacts of groundwater overdraft. However, as the Plan acknowledges, these efforts have not arrested overdraft of the Basin.

The Plan identifies seven types of beneficial uses and users of water in the Basin (municipal, domestic, city/county, federal, industrial, agricultural, and environmental), and seven categories of groundwater uses (domestic, municipal, small agricultural, large agricultural, landscape, industrial, and dust control). Annual groundwater withdrawals are shown in the Plan for a majority of beneficial users (the U.S. Navy, Searles Valley Minerals, municipal, domestic, and agriculture) beginning in 1920.

The federal government manages nearly 80 percent of the Basin's land area, with over 40 percent managed by the U.S. Navy, operating the Naval Air Weapons Station China Lake (NAWS China Lake). For planning purposes, the U.S. Navy indicated the Authority should use 2,041 acre-feet per year as an estimate of current and future water use, roughly 27 percent of the Basin's estimated natural recharge. The U.S. Navy reportedly asserted that the NAWS China Lake's federally reserved water right could include a majority, if not all, of the 7,650 acre-feet per year of the Basin's estimated natural recharge. The Authority appears to have accepted the planning value of 2,041 acre-feet per year and acknowledges that federally reserved water rights must be respected in full. The remaining 37 percent of federal land is mainly undeveloped property managed by the U.S. Bureau of Land Management. The remaining 20 percent of land in the Basin is managed by non-federal entities with dominant land and water uses being agricultural and municipal (city/county).

As required by SGMA and the GSP Regulations, the Authority adopted a Plan to define a sustainability goal for the Basin. The Plan also prescribes how the Authority would meet the goal within the twenty-year sustainability timeframe and maintain the goal over the fifty-year planning and implementation horizon. The Authority defined the sustainability goal for the Basin as to "[m]anage and preserve the [Basin] groundwater resource as a sustainable water supply. To the greatest extent possible, the goal is to preserve the character of the community, preserve the quality of life of the [Indian Wells Valley] residents, and sustain the mission at NAWS China Lake."

The Authority established sustainable management criteria for four of the six sustainability indicators using information from the hydrogeologic conceptual model, the description of current and historical groundwater conditions, and the Basin's numerical groundwater model. The Plan discusses potential effects that reaching the minimum thresholds may have on beneficial uses and users of groundwater. The Plan also includes an analysis of the potential impacts to domestic wells from possible lowering of groundwater levels.

According to the Plan, the Basin is currently experiencing an unreasonable reduction of groundwater in storage, chronic lowering of groundwater levels which result in impacted shallow well performance or impacts due to poorer water quality, degradation of water quality, and localized land subsidence impacting structures/facilities at NAWS China Lake.

The Authority relied upon numerical groundwater modeling analyses in estimating the Basin's groundwater budget, identifying data gaps, assessing groundwater level and quality trends, and evaluating different strategies to provide long-term sustainable groundwater management for the Basin. A scenario of the numerical groundwater model was used to simulate Basin conditions resulting from the implementation of the proposed projects and management actions and to develop certain sustainable management criteria, identified as Numerical Model Scenario 6.2. This scenario of the numerical groundwater model is referred to as Numerical Model in this assessment. Sustainable management criteria defined in the Plan are based mainly on historical groundwater elevation levels and trends combined with projections from the Numerical Model for the end of the planning and implementation horizon (2070), which assume successful implementation of the projects and management actions described in the Plan.

After reviewing the Plan, Department staff conclude that the Plan utilizes the best available science and information to analyze and describe the physical characteristics of the surface water and groundwater systems in the hydrogeologic conceptual model, groundwater conditions, and water budgets. The data and information appear largely adequately portrayed through maps and cross sections. The Plan identifies data gaps and includes a plan to address them as more information is available. Department staff agree with the Authority's conclusion that filling these data gaps will improve the understanding of the physical system and reduce uncertainty, but do not believe that these data gaps materially affect the Authority's ability to progress towards the sustainability goal for the Basin in the short-term and do not impair the Department's ability to assess the reasonableness of the Plan's approach to achieving sustainability. Department staff will monitor active progress toward better understanding conditions of the physical system and incorporating that information into the Numerical Model for active management of the Basin in future updates to the Plan.

The projected water budget (2020 through 2070 planning and implementation horizon), even assuming the implementation of all projects and management actions, predicts a continued loss in groundwater storage of 3,900 acre-feet per year on average through 2070. After 2035, when the Authority expects full implementation of the projects and management actions, the continued loss of storage is predicted to be around 2,000 acre-feet per year. Based on the minimum threshold for groundwater removed from storage established by the Plan, the Numerical Model predicts that the Basin would not exceed the minimum threshold for groundwater storage, and so would not experience undesirable results, as defined in the Plan, until after the end of the planning and implementation horizon. As discussed in detail in Section 4.3 on Sustainable Management Criteria, Department staff regard the approach adopted by the Authority to establish these criteria

to need additional clarification. Nevertheless, because the Authority expects to initiate programs intended to bring about substantial near-term reductions in groundwater use, Department staff do not believe this discrepancy would materially affect the ability of the Authority to achieve the sustainability goal for the Basin, provided it is addressed in a timely manner.

To pursue sustainability and address overdraft, the Plan proposes to assess fees for groundwater extraction, assign pumping allocations that reduce groundwater demand in the Basin, and implement a suite of projects. The Plan estimates the cumulative loss of groundwater in storage under baseline conditions (i.e., no action taken) to be approximately 1.6 million acre-feet over the fifty-year planning and implementation horizon, while the cumulative loss of groundwater storage with the proposed projects and management actions is estimated to be approximately 215,000 acre-feet. The Authority expects the Annual Pumping Allocation Plan alone will reduce pumping from an annual average of approximately 37,000 acre-feet per year under baseline conditions to an annual average of less than approximately 14,000 acre-feet per year from 2020 to 2070. Under the Allocation Plan, agricultural water use would be eliminated, and groundwater use would predominantly be for municipal and domestic uses and the U.S. Navy.

In addition to reduced groundwater allocations, a monthly Groundwater Extraction Fee will be assessed on all producers with registered groundwater extraction facilities in the Basin, except for de minimis users and federal entities. Additionally, the Authority will assign pumping fees (“Augmentation Fees”) for water produced in excess of the safe yield, which will, in turn, provide funding for the development of supplemental water supplies and other projects. Details of the fees and allocations proposed by the management actions are described in Section 4.5.2.

The Authority also describes plans to mitigate long-term overdraft via the implementation of a water import project. Although either of the two proposed imported water project options would help the Authority reach the sustainability goal for the Basin, the Authority concedes that project financing would require funding that is beyond its control and could not happen without significant public funding. Department staff do not regard the water import project as conceptually infeasible from an engineering perspective. However, uncertainty regarding financing and other project elements, including the acquisition of water rights, makes it impossible to assess the likelihood of the Authority building the water import projects. Furthermore, the Plan indicates that, even when fully implemented, these projects would not eliminate overdraft. As a result, the Authority will need to develop feasible alternatives that can be implemented if projects on which the sustainability goal currently depends cannot be carried out, with a realistic timetable for their triggering and implementation. The Authority will also need to develop new or enhanced projects and management actions that will allow the Basin to be operated without causing overdraft and are capable of being achieved within the twenty-year period of Plan implementation.

The Plan also outlines a series of other proposed and conceptual projects that the Authority or other parties in the Basin may implement to address the current overdraft,

including optimization of recycled water sources, conservation, shallow well and dust mitigation programs, pumping location optimization, a brackish groundwater use feasibility study, and a direct potable reuse project. Details of the proposed and conceptual projects are described in Section 4.5.3. The remaining proposed and conceptual projects, many of which expand on or utilize existing infrastructure and programs, appear reasonable and feasible. However, as noted above, the proposed projects and management actions would not eliminate overdraft and, in time, unless additional measures are adopted, the Basin would not be sustainable.

Department staff recommend approval of the Indian Wells Valley Groundwater Basin GSP and have recommended corrective actions designed to address shortcomings of the Plan described in this assessment. The Authority has identified several areas for improvement of its Plan (e.g., addressing data gaps, incorporating new information into the Numerical Model, and expanding monitoring networks). Department staff concur that those items are important and recommend the Authority address them as soon as possible. Department staff have also identified additional recommended corrective actions that the Authority should consider for the first periodic evaluation of the Plan (see Section 5). Addressing these recommended corrective actions will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal. The recommended corrective actions generally focus on (1) the planned continued overdraft of the Basin and (2) clarifying information related to the sustainable management criteria. Additional recommended corrective actions relate to how management of the principal aquifers could affect beneficial uses and users of groundwater and clarifying information related to the water budgets and the Authority's online data management system.

2 EVALUATION CRITERIA

The Authority 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 Indian Wells Valley Groundwater 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 the requirements of 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) and (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 provides three options for determining the status of a Plan: Approved,[20] Incomplete,[21] or Inadequate.[22]

As part of an approved determination, the Department may also include recommended corrective actions. 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 deficiencies 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 regulations, and necessary information is provided that will allow the Department to assess progress in achieving the sustainability goal within the basin.[23] Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first periodic evaluation.[24]

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 plan 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] Water Code § 10733.4(d); 23 CCR § 355.2(e).
[20] 23 CCR § 355.2(e)(1).
[21] 23 CCR § 355.2(e)(2).
[22] 23 CCR § 355.2(e)(3).
[23] Water Code § 10733.8.
[24] Water Code §§ 10728.2, 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 require the Department to periodically review the Plan and its implementation.[25] The Department's periodic reviews will assess changed circumstances that could render the Plan inadequate and evaluate the progress toward achieving the sustainability goal for the basin.

[25] Water Code § 10733.8; 23 CCR § 355.6.

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 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.[26]

The Authority submitted its Plan on January 31, 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.[27]

The Authority submitted an adopted GSP for the entire Basin. Department staff found the GSP to be complete and including the required information, sufficient to warrant an evaluation by the Department.[28] The Department posted the GSP to its web site on February 19, 2020.

3.3 BASIN COVERAGE

SGMA requires that a GSP, either on its own or in coordination with other Plans, 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 GSP intends to manage the entire Basin and the jurisdictional boundaries of the submitting GSA cover the entire Indian Wells Valley Groundwater Basin.[30]

[26] Water Code § 10720.7(a)(1).
[27] 23 CCR § 355.4(a)(2).
[28] The Department undertakes a preliminary completeness review of a submitted Plan under section 355.4(a) of the GSP Regulations to determine whether the elements of a Plan required by SGMA and the Regulations have been provided, which is different from a determination, upon review, that a Plan is "incomplete" for purposes of section 355.2(e)(2) of the Regulations.
[29] Water Code § 10727(b).
[30] Indian Wells Valley Groundwater Basin GSP, Section ES 1.2, p. 29-30.

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 Basin 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

The administrative information included in the Plan substantially complies with the requirements outlined in the GSP Regulations. The Plan 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 projects and management actions. Historically, Authority member agencies have implemented projects and management actions and have funded and cooperated with numerous studies to characterize groundwater conditions and inform management strategies. That management history provides a reasonable level of confidence that the Authority can manage groundwater to progress towards the sustainability goal in the Basin.

Department staff consider the information presented in the Plan to satisfy the general requirements of the GSP Regulations. The Plan contains sufficient detail regarding the beneficial uses and users of groundwater, types and distribution of land use, water use types, and existing water management and land use management programs in the Basin. The Authority developed the Plan using a stakeholder Communication and Engagement Plan that utilized a survey of local groundwater users, multiple public meetings, and multiple public comment periods.[32]

4.1.2 Agency Information

The Plan was developed, adopted, and will be administered by the Authority, which formed through a joint exercise of powers agreement between Kern County, Inyo County, San Bernardino County, the City of Ridgecrest, and the Indian Wells Valley Water District. The Authority is governed and administered by a Board of Directors, composed of one voting seat per each of the five member agencies of the Joint Powers Authority. The Authority's Board established an eleven voting-member Policy Advisory Committee to advise the Board on policy-related matters regarding the GSP. The Authority's Board also established a Technical Advisory Committee to allow interested parties an opportunity to

[31] 23 CCR § 354.2 *et seq*.
[32] Indian Wells Valley Groundwater Basin GSP, Section 1.5, p. 76-80.

review each technical element of the Plan before its finalization and adoption.[33] The Plan represents that the Authority has the legal authority to manage local groundwater through SGMA.[34]

The Plan includes cost estimates for each of the proposed projects and proposed funding sources for project implementation.[35] The long-term strategy outlined in the Plan to pay for projects will be the revenue generated by the Groundwater Extraction and Augmentation Fees, federal and state grants and loans, and legislative appropriations. During GSP implementation, the Department expects the Authority to provide updates about the estimated overall cost estimate for Plan implementation and how the Authority intends to meet those costs.

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 Plan describes the Basin as located in the northwestern part of the Mojave Desert in southern California (see Figure 1, above), with surface water flow from the surrounding mountain ranges draining to China Lake, a large dry lake, or playa, located in the central north-east part of the Basin. Surface water supplies are not available for substantial groundwater recharge, either direct or in-lieu.[36] Groundwater from the Basin serves as the sole supply of potable water for the Indian Wells Valley.

Almost 80 percent of the land overlying the Basin is federal land, with 42 percent owned by the U.S. Navy and occupied by the NAWS China Lake.[37] The remaining federally owned land (37 percent of the Basin area) is largely undeveloped and managed by the U.S. Bureau of Land Management. The remaining land in the Basin is owned by non-federal entities. Less than 1 percent of the total Basin area is actively farmed land. The City of Ridgecrest is the only incorporated community and covers approximately 3 percent of the total Basin area, with a population of approximately 27,000 people. Unincorporated communities in the Indian Wells Valley include the communities of Inyokern in Kern County, and Pearsonville in Inyo County, along with other smaller communities.[38] The lands overlying the Basin are governed by the general plans and land use plans of Kern County, Inyo County, San Bernardino County, the City of Ridgecrest, the NAWS China Lake, and the Bureau of Land Management.

Of the estimated 932 groundwater production wells the Plan states operate in the Basin, an estimated 832 wells are reportedly domestic/private wells. According to the Plan, these 832 domestic/private wells accounted for about 3 percent of water use in the Basin in

[33] Indian Wells Valley Groundwater Basin GSP, Section 1.4.1, p. 67-70.
[34] Indian Wells Valley Groundwater Basin GSP, Section 1.4.2, p. 70-74.
[35] Indian Wells Valley Groundwater Basin GSP, Section 6.3, p. 291-295.
[36] Indian Wells Valley Groundwater Basin GSP, Section 2.2.4, p. 89.
[37] Indian Wells Valley Groundwater Basin GSP, Section 2.2.2 p. 87.
[38] Indian Wells Valley Groundwater Basin GSP, Section 2.5, p. 98-109.

2015.[39] An estimated 51 groundwater production wells support municipal use and accounted for 33 percent of water use in the Basin in 2015.[40] The Plan states there are an estimated 38 groundwater production wells (18 for large and 20 for small entities) in the Basin and the Authority estimates that agriculture water use accounted for 52 percent of total water use in 2015. Industrial water use accounted for 10 percent of 2015 water use, supported by an estimated 5 groundwater production wells in the Basin. The Plan attributes the remaining 6 production wells to dust control and landscape irrigation. In addition to two local water agencies that rely on the Basin as a water supply source, groundwater is exported from the Basin to Searles Valley (located outside of the Basin) to support the Searles Valley Minerals Inc. industrial operations and the domestic needs of four unincorporated communities. Four other water agencies have service areas and/or spheres of influence extending into the Basin but have no water supply infrastructure or water supply services.[41]

The Plan describes existing monitoring programs operating in the Basin. There are four regional entities with water supply, management, planning, and/or regulatory authority within the Basin.[42] The Plan states that multiple entities have been measuring depth-to-groundwater in the Basin since the 1920s, including the United States Geological Survey, the United States Bureau of Reclamation, the NAWS China Lake, and local agencies.[43] A subset of groundwater level measurements are included in the Department's California Statewide Groundwater Elevation Monitoring (CASGEM) Program. The Plan states that conservation and water use efficiency efforts have been ongoing in the Basin, in addition to the use of recycled water for irrigation.[44]

4.1.4 Notice and Communication

The Plan provides information about the Authority's notice and communication efforts during Plan development and provides a copy of the Communication and Engagement Plan in an Appendix.[45] This Communication and Engagement Plan was developed by the Policy Advisory Committee, which included members from sectors including large and small agriculture, business interests, residential customers of public water agency, domestic well owners, wholesaler industrial user, and a community service district. In addition to interested parties such as local community residents (including Disadvantaged Communities, Severely Disadvantaged Communities, and Economically Distressed Areas), the Communication and Engagement Plan includes a Notification List of interested parties that includes Service Organizations, Business and Advocacy Groups, Schools and Religious Organizations, Tribal Representation, Utilities, and Government (Local, State, and Federal).

[39] Indian Wells Valley Groundwater Basin GSP, Section 2.2.4, p. 90.
[40] Indian Wells Valley Groundwater Basin GSP, Section 3.2, p. 139.
[41] Indian Wells Valley Groundwater Basin GSP, Section ES 2.4, p. 33.
[42] Indian Wells Valley Groundwater Basin GSP, Sections 2.3 and 2.4, p. 91-98.
[43] Indian Wells Valley Groundwater Basin GSP, Section 2.6, p. 109-111.
[44] Indian Wells Valley Groundwater Basin GSP, Section 2.7.3, p. 113-121.
[45] Indian Wells Valley Groundwater Basin GSP, Appendix 1-E, p. 482-495.

The Authority provided opportunities for public engagement and public input into the development of the Plan. The Authority received several public comments regarding its draft GSP and responded to those comments as "noted", "addressed", or that it would provide clarification or an explanation in the final draft of the Plan.[46] There are several suggestions for public engagement from the Communication and Engagement Plan, but it is not clear whether the Authority adopted those suggestions for use in GSP development or whether the Authority intends to incorporate them during Plan implementation. Project and management action outreach sections in the Plan have general language for the public notification process, including, "public and relevant entities will be given the opportunity and time to participate in and provide feedback on [the Project] through the project's environmental review processes."[47] The engagement of stakeholders; transparency in GSP development, the Authority's consideration of advisory committee feedback, and development of the Numerical Model; and consideration/incorporation of draft GSP comments were points of interest in multiple public comment letters received for the Plan.

Department staff believe the Authority acted in accordance with SGMA and the GSP Regulations with respect to Notice and Communication requirements for developing its Plan. However, the Plan contains few details related to how the Authority will solicit public input and involvement of diverse stakeholders during Plan implementation. Department staff encourage the Authority to update the Communication and Engagement Plan during plan implementation and to coordinate with all stakeholders in the Basin as it implements the Plan (see Recommended Corrective Action 1).

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.[48]

4.2.1 Evaluation Summary

The Plan provides a detailed description of the physical characteristics of the Basin supported by maps, cross-sections, and tables that adequately convey information and data. Detailed explanations of data and information sources and how the Authority evaluated those data in the Plan indicate the assessment of Basin conditions relied on best available science and information. The Authority demonstrates an understanding of the basin setting through the hydrogeologic conceptual model and documentation of historic and current groundwater conditions in the Basin that appears adequate to develop and implement a GSP for sustainable groundwater management.

[46] Indian Wells Valley Groundwater Basin GSP, Appendix 1-F, p. 496-1286.
[47] Indian Wells Valley Groundwater Basin GSP, Sections 5.3.1.6, p. 254 and 5.3.2.6, p. 265.
[48] 23 CCR § 354.12 *et seq*.

The Authority developed historical, current, and predicted water budgets using information from studies and investigations, previous groundwater flow models, and historical data, all of which were also used to develop the Numerical Model. The water budget components in the Plan, including an assessment of sustainable yield and change in storage (i.e., conditions of overdraft), were developed using the best available tools and information available at the time of preparing the GSP and substantially comply with the requirement outlined in the GSP Regulations. However, there are water budget components that are not clearly explained in the Plan, which Department staff recommend that the Authority provide details for (see Section 4.2.4).

The Plan contains descriptions for the development of input datasets and calibration of the Numerical Model to achieve the best fit between simulation results and observed data,[49] though the Plan acknowledges that limited aquifer property data were used to calibrate the numerical groundwater model and that the Authority will address these data gaps.[50] The Authority identifies the following data gaps: water budget elements such as inflow sources to the Basin (subsurface flows from adjacent Rose Valley basin, stream flow, and mountain front recharge), outflows from the Basin (subsurface flows towards adjacent Salt Wells Valley basin), domestic groundwater use, and limited aquifer property data used to calibrate the groundwater model. The Authority plans to incorporate more up-to-date or more representative data into the basin characterization as new tools are available or more relevant information is obtained. The Authority acknowledges the need to address data gaps in the Basin to refine elements of the hydrogeologic conceptual model and water budgets, which was the subject of several public comments. During GSP implementation, it will be important to prioritize each data gap, provide a description of what is required to fill the data gaps, and establish a schedule to fill the prioritized data gaps. As new information and data relevant to water budget elements such as inflows and outflows, domestic water use, and other data gaps outlined in the Plan as potentially affecting groundwater management are made available, they should be incorporated into the Plan.

4.2.2 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.[51] The hydrogeologic conceptual model is a non-numerical model of the physical setting, characteristics, and processes that govern groundwater occurrence within a basin, and represents a local agency's understanding of the geology and hydrology of the basin that

[49] Indian Wells Valley Groundwater Basin GSP, Appendix 3-H, p. 1439-1562.
[50] Indian Wells Valley Groundwater Basin GSP, Section 3.6.1.4, p. 188.
[51] 23 CCR § 354.12 *et seq*.

support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget.[52]

The Authority relied on a numerical groundwater flow model developed in 2009 and updated in 2016 and 2017 to include groundwater level predictions, as well as initial findings of a 2019 geophysical survey to develop a hydrogeologic conceptual model for the Basin that appears geologically reasonable. The Authority states that data and analysis from the 2019 survey will be evaluated and incorporated into future Plan updates. The Plan describes its hydrogeologic conceptual model and past investigations as the foundation for the Numerical Model, which the Authority used to develop the Plan's water budget analysis.[53]

The hydrogeologic conceptual model identifies two principal aquifers in the Basin, the shallow and deep aquifers, and three water-bearing zones, denoted as the shallow, intermediate, and deep hydrogeologic zones.[54] The Plan does offer criteria by which the aquifers can be distinguished from one another, but does not define the vertical or lateral relationship between the three hydrogeologic zones. The Plan states that the deep and shallow aquifers are not confined in the west and southwest portions of the Basin, but are confined in other parts of the Basin.[55] However, the vertical and lateral extent and specific depths at which the shallow and deep aquifers occur are not clearly described in the Plan, nor are the specific areas of unconfinement between the shallow and deep aquifers.

The Plan acknowledges the need to characterize the Basin aquifer structure and properties and plans to do so by drilling at least one additional monitoring well.[56] Department staff agree with the Authority's conclusion that filling this particular data gap would improve the understanding of the physical system and reduce uncertainty in how projects and management actions would affect or benefit the Basin. Department staff do not believe that this data gap materially affects the Authority's ability to progress towards the sustainability goal for the Basin or significantly impairs the Department's ability to assess the reasonableness of the Plan's approach to achieve sustainability. However, filling data gaps to better understand aquifer characteristics or other physical characteristics that could affect groundwater flow should be prioritized (see Recommended Corrective Action 2).

The Plan describes the Indian Wells Valley as a nearly hydrologically closed basin.[57] The Plan states there are no significant interconnected surface water systems which interact

[52] DWR Best Management Practices for the Sustainable Management of Groundwater: Hydrogeologic Conceptual Model, December 2016: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model_ay_19.pdf

[53] Indian Wells Valley Groundwater Basin GSP, Section 3.3, p. 139-140.
[54] Indian Wells Valley Groundwater Basin GSP, Appendix 5-B, p. 1699.
[55] Indian Wells Valley Groundwater Basin GSP, Section 3.3.1, p. 143.
[56] Indian Wells Valley Groundwater Basin GSP, Section 3.6.1.1, p. 185.
[57] Indian Wells Valley Groundwater Basin GSP, Section 3.3.4.1, p. 154 and Appendix 3-H, p. 1448.

with groundwater in the Basin.[58] Streams in the Indian Wells Valley are ephemeral and recharge occurs as mountain block recharge, occurring along the mountain-front areas and as subflow from adjacent Rose Valley. The main discharge of groundwater occurs from pumping wells, evapotranspiration at the playa, and estimated subsurface flow to the adjacent Salt Wells Valley Basin (50 acre-feet per year, which is less than 1 percent of the annual recharge rate of 7,650 acre-feet). The general flow direction of the groundwater system is from the mountains (recharge area) towards the playa (discharge area).

4.2.3 Groundwater Conditions

The GSP Regulations require a description of the Basin's historical and current groundwater conditions, including, as applicable, information related to groundwater elevations, groundwater storage, seawater intrusion, groundwater quality, land subsidence, interconnected surface water, and identification of groundwater dependent ecosystems (GDEs).[59]

The Plan reports that the Basin's groundwater levels have shown a general decline since at least the 1960s and that current outflows from the Basin exceed inflows by approximately four times, resulting in an average loss of storage of approximately 25,000 acre-feet per year.[60] Although groundwater levels have declined significantly in almost all areas of the Basin according to the Plan, the Plan includes hydrographs showing that groundwater levels have remained stable in some locations, including near recharge zones and in the El Paso area.[61] According to the Plan, declining water levels have historically impacted, and are currently impacting, shallow production wells, requiring them to be deepened, re-drilled, or abandoned as a water source. (See Section 4.3 for a discussion of mitigation proposed by the Authority for impacts to these wells.)

The Plan includes general groundwater flow directions,[62] but it does not include regional pumping patterns or lateral and vertical gradients, which are required by the Regulations[63] and provide information that is useful in assessing how groundwater levels and quality could be affected by pumping (see Recommended Corrective Action 2). This is also discussed briefly in Section 4.4.2 on Monitoring Networks. The Plan notes that the Little Lake and El Paso faults are assumed to impede lateral groundwater flow based on historical groundwater levels,[64] but the Plan does not otherwise provide detailed information about the horizontal movement of groundwater within or out of the Basin.

The Plan states that historical overdraft in the Basin has caused a significant reduction of groundwater in storage that is directly related to the chronic lowering of groundwater

[58] Indian Wells Valley Groundwater Basin GSP, Section 3.4.6, p. 168-169.
[59] 23 CCR § 354.16
[60] Indian Wells Valley Groundwater Basin GSP, Section 3.3.4.4, p. 157-158.
[61] Indian Wells Valley Groundwater Basin GSP, Section 3.4.2, p. 164.
[62] Indian Wells Valley Groundwater Basin GSP, Figure 3-3, p. 319.
[63] 23 CCR § 354.16(a)
[64] Indian Wells Valley Groundwater Basin GSP, Section 3.3.1, p. 141.

levels, water quality degradation, and land subsidence.[65] The Plan relies on a study that estimated 2,370,000 acre-feet available groundwater in storage in the upper 200 feet of saturated sediments in 1992, [66] and the Authority's numerical groundwater model, which calculated a loss of 620,000 acre-feet of groundwater in storage since 1992, to determine that the amount of available groundwater in storage in 2017 was 1,750,000 acre-feet.[67] Department staff regard the Authority's approach to be reasonable and to have relied on the best available information.[68] The Plan includes graphs depicting simulated estimates of the change of groundwater in storage and groundwater pumping, which demonstrate the annual and cumulative change in the volume of groundwater in storage for historic, baseline (i.e., no action taken), and modeled future conditions (assuming implementation of projects and management actions).[69] The Authority also graphically depicts that the historical cumulative change, or loss, of groundwater in storage ranges starts at zero in 1922 when data collection began and reached approximately 1,366,000 acre-feet in 2017.

The Plan characterizes the general quality of groundwater in the Basin as good. However, poorer water quality is associated with areas of elevated concentrations of total dissolved solids and/or arsenic in some of the northwest area wells, and in areas characterized by high rates of pumping in the southeast area of the Basin and beneath the U.S. Navy Base. The Plan states that where arsenic occurs above the maximum contaminant level of 10 micrograms per liter, potable water is treated by water suppliers before it is distributed.[70] The Plan notes that degraded water quality has caused some groundwater producers in the Basin to relocate pumping. Elevated and increasing total dissolved solids concentrations in areas of the Basin are, according to the Plan, indicative of groundwater degradation.[71] The Plan indicates that a Salt and Nutrient Management Plan has been adopted for the Basin[72] and that wellhead treatment for sulfates is required in some domestic wells.[73] A technical memorandum in the Plan states that the shallow aquifer generally has poorer water quality than the deep aquifer, with concentrations of total dissolved solids, arsenic, chloride, and sulfate commonly exceeding primary and secondary drinking water standards.[74] The Plan also states that the best groundwater quality is found at shallow to medium depths specific to the southwestern part of the

[65] Indian Wells Valley Groundwater Basin GSP, Section 3.4.1, p. 164.
[66] U.S. Bureau of Reclamation, 1993. *Indian Wells Valley Groundwater Project: USBR Technical Report Volumes I and II*.
[67] Indian Wells Valley Groundwater Basin GSP, Section 3.3.4.4, p. 160
[68] A public comment, relying on the same USBR study but making different assumptions, suggested that the Basin contained between 6,900,000 and 9,000,000 acre-feet of fresh groundwater in the upper 200 feet of saturated sediments. The comment does not provide evidence that would persuade Department staff that the Authority failed to use the best available information, only that the comment relied on different assumptions, which Department staff note were less conservative than those made by the Authority.
[69] Indian Wells Valley Groundwater Basin GSP, Figure 3-22, p. 340 and Figure 4-4, p. 344.
[70] Indian Wells Valley Groundwater Basin GSP, Section 3.4.4, p. 165-167.
[71] Indian Wells Valley Groundwater Basin GSP, Section 3.4.4.1, p. 166.
[72] Indian Wells Valley Groundwater Basin GSP, Section 2.7.2, p. 112.
[73] Indian Wells Valley Groundwater Basin GSP, Section 3.6.1.3, p. 187.
[74] Indian Wells Valley Groundwater Basin GSP, Appendix 5-B, p. 1700.

Valley.[75] Because the Authority does not clearly define the shallow and deep aquifers, water level and water quality data in the Plan are not clearly differentiated between the two aquifers, although both groundwater levels and groundwater quality are discussed and reported in relation to the three water-bearing zones.

The Plan describes a 'baseline' sampling event underway in Fall 2019 to monitor 30 wells and 10 springs Basin-wide to develop a baseline understanding of the distribution of total dissolved solids within the Basin, results of which are to be incorporated into Plan updates.[76] The Plan describes ongoing and potential contamination cleanup efforts and identifies the location of all groundwater contamination cleanup sites, and discusses the various water quality monitoring and regulatory programs within the Basin.

The Basin is tectonically active, making it susceptible to changes in ground elevation, as well as soft sediment deformation and compaction of fine-grained units due to seismic activity. Land subsidence is not consistently monitored across the Basin, with the exception of infrequent monitoring conducted by the U.S. Navy at established monuments on NAWS China Lake.[77] Based on an evaluation of available data, the Plan reports subsidence on the order of 0.04 to 0.08 inches per year from 2005 through 2010 in various parts of the valley (the rate was 0.12 inches per year in the southern subsidence area near NAWS China Lake during that period), which the Plan attributes to declining groundwater levels, which it states are roughly equivalent to subsidence observed from tectonic processes.[78] Because of its proximity to sensitive infrastructure associated with Navy facilities, the Authority describes this level of subsidence as undesirable.[79] The extent of land subsidence from the southern subsidence area radiates northward and westward, and the Authority expects it to impact areas in Ridgecrest and into the neighboring unincorporated communities if groundwater levels continue to decline. The Plan states that analysis of groundwater drawdown at pumping wells and land-surface changes detected by interferometric synthetic aperture radar (InSAR) demonstrates a temporal correspondence between the magnitude of drawdown calculated at the wells and the observed land-surface changes. Subsidence rates calculated for the well sites range from 0.01 to 0.04 inches per year, but the Plan does not state where these data were collected. Data for the Indian Wells Valley indicate that the Basin has aquifer materials susceptible to compaction as groundwater levels decline, but that compaction and other mechanisms of land elevation change also occur due to tectonic processes, at rates of two to four times that of compaction due to lowering groundwater levels, according to rates given in the Plan and summarized above. Given this information, Department staff conclude that land subsidence does not seem to be a large threat to infrastructure in the Basin aside from what the Plan identifies, but that the Authority should

[75] Indian Wells Valley Groundwater Basin GSP, Section 3.3.1, p. 143.
[76] Indian Wells Valley Groundwater Basin GSP, Section 3.6.1.3, p. 187.
[77] Indian Wells Valley Groundwater Basin GSP, Section 4.7.1, p. 231.
[78] Indian Wells Valley Groundwater Basin GSP, Section 3.4.5, p. 167-168.
[79] Indian Wells Valley Groundwater Basin GSP, Section 3.4.5, p. 168.

continue to monitor subsidence that may result from the lowering of groundwater levels due to groundwater management in the Basin.

The Authority identified and mapped GDEs utilizing the Natural Communities Commonly Associated with Groundwater dataset available from the Department. The Plan shows the vast majority of GDEs are located on federal land on NAWS China Lake, which it states are supported by the vertical upward gradient of groundwater under the China Lake Playa which discharges groundwater to the surface.[80] In addition, the Plan states that smaller and scattered communities of GDEs may be present in canyons along the Sierra Nevada within the Basin, in the El Paso area along the ephemeral streams, and in the southwest region of the Basin.[81]

Comments submitted to the Department raised questions by the public about the Authority's characterization of interconnected surface water and consideration of, and potential impacts to GDEs in the Basin, and whether the Authority used the best available science and information. In particular, one comment noted that the Plan does not explain the hydrologic relationships between the two principal aquifers or between the principal aquifers and springs and seeps in the Basin. For reasons related to the adequacy of the Authority's hydrogeologic conceptual model of the Basin, Department staff have raised concerns about the Plan's characterization of its principal aquifers (see Section 4.2.2 and Recommended Corrective Action 2). However, Department staff do not regard the Authority to have erred in its characterization of the Basin's general lack of interconnected surface waters. The Department expects that, as the Authority collects information about the principal aquifers and refines its model of the Basin, the Plan's discussion of GDEs would be updated to reflect insights gained from those studies, as applicable.

4.2.4 Water Budgets

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.[82]

The Authority developed six water budgets that account for the inflow and outflow of water for the Basin and two tables of predicted pumping distribution/allocation by water use sectors. Two water budgets are historical, one representing pre-development conditions before the 1920s and the other modeling conditions from 1922-2016; [83] the third represents current conditions that rely on 2011-2015 averages;[84] the fourth represents a predicted water budget for water years 2035, 2040, and 2070 based on the implementation of all projects and management actions; and the remaining two water budgets represent predicted conditions that rely on calculated averages over the planning

[80] Indian Wells Valley Groundwater Basin GSP, Section 3.4.7, p. 169-170.
[81] Indian Wells Valley Groundwater Basin GSP, Figure 3-16, p. 334.
[82] 23 CCR § 354.18.
[83] Indian Wells Valley Groundwater Basin GSP, Section 3.3.4.2, p. 155-156.
[84] Indian Wells Valley Groundwater Basin GSP, Section 3.3.4.3, p. 157.

and implementation horizon (2020-2070) for baseline (i.e., no action taken)[85] and Numerical Model[86] (implementation of projects and management action) conditions. The Plan presents each water budget as a simple water accounting analysis of inflows and outflows, shown in tabular and graphical formats. The water budgets and Numerical Model used in the development of the Plan rely on a variety of reports and studies conducted by various groups over a number of years, that the Department regards to be consistent with the best available information and science.

The Plan describes that estimated total annual outflow is primarily due to groundwater pumping, with smaller outflows to interbasin flow and evapotranspiration (i.e., root uptake of shallow groundwater). The Plan describes mountain front recharge of 7,650 acre-feet per year as the primary source of inflow to the groundwater system, and assigns that value as the Basin's "Current Sustainable Yield".[87] The Plan describes an estimated "Future Sustainable Yield" for the year 2035 of 11,150 acre-feet per year, which adds inflow due to the assumed successful implementation of proposed projects and management actions, including the proposal to import water into the Basin, to the "Current Sustainable Yield". The Plan recognizes that "while it would be beneficial to immediately reduce all pumping to the Current Sustainable Yield of 7,650 acre-feet per year, it is not feasible for the community to make such immediate and drastic reductions without extreme lifestyle changes, alteration of the community character, loss of livelihoods, great financial costs, and other significant negative impacts."[88]

The Plan projects that groundwater pumping would increase by 1 percent per year, mitigated somewhat by the Authority's plan to develop imported water. Although the Plan acknowledges that pumping may need to be reduced to the current sustainable yield of 7,650 acre-feet per year if the development of imported water becomes infeasible,[89] there is no proposal to entirely eliminate overdraft. Both issues are discussed in greater detail elsewhere in the Sustainable Management Criteria and Projects and Management Actions sections below (Sections 4.3 and 4.5, respectively).

Groundwater conditions described by the six water budgets contained in the Plan are summarized by the Department in Table 1, below, which compares total inflow with and without the implementation of projects and management actions. The most significant increase in inflow comes from the proposed project to import water. Table 1 also shows groundwater extractions and the expected change in groundwater storage but does not summarize outflow sources of evapotranspiration and interbasin subflow. The Numerical Model predicts that the rate of evapotranspiration in the Basin would decrease over time with the implementation of projects and management activities,[90] which is not clearly explained, but could indicate that GDEs located near the playa may be affected. An

[85] Indian Wells Valley Groundwater Basin GSP, Section 3.5.4, p. 178-179.
[86] Indian Wells Valley Groundwater Basin GSP, Section 3.5.5, p. 181-182.
[87] Indian Wells Valley Groundwater Basin GSP, Section 3.3.5, p. 161-163.
[88] Indian Wells Valley Groundwater Basin GSP, Section 5.1, p. 235.
[89] Indian Wells Valley Groundwater Basin GSP, Section ES 5.2, p. 53.
[90] Indian Wells Valley Groundwater Basin GSP, Section 3.3.5, p. 162.

increase in imported water recharge, included in the Numerical Model to offset evapotranspiration outflows, did not show noticeable increases in groundwater levels or noticeable benefits in avoiding undesirable results or meeting sustainable management criteria, according to the Plan. The Authority should clarify why evapotranspiration is anticipated to decrease as water imports increase, and whether any effects to GDEs in the Basin are anticipated (see Recommended Corrective Action 3).

Table 1: Department Summary of Projections for Groundwater Extraction, Change in Storage, and Sustainable Yield in the Indian Wells Groundwater Basin without and with the Implementation of Projects and Management Actions.

Water Budget (units in acre-feet per year)	Total Inflow (Sustainable Yield)	Groundwater Extraction	Change in Storage
Water Budget Projections Without the Implementation of Projects and Management Actions			
Historical (Pre-development conditions)[91]	7,650	0	0
Historical (1922-2016 average)[92]	7,650	21,880	-14,230
Current (2011-2015 average)[93]	7,650	27,740	-24,990
Baseline Predicted (2020-2070 average)[94]	7,650	36,870	-30,880
Water Budget Projections With the Implementation of Projects and Management Actions			
Predicted: Water Year 2035[95]	11,150	11,140	-2,160
Predicted: Water Year 2040	11,240	11,240	-1,990*
Predicted: Water Year 2070	13,990	13,990	-1,350**
Numerical Model: 2020-2070 average[96]	11,340	13,320	-3,900

** Value reported in the Plan as -1,980; value should be -1,990 according to other values in table.*
*** Value reported in the Plan as positive 1,350; value should be negative according to other values in table.*

Table 2 summarizes the Plan's projections for water use by sector, at three different milestones, with and without implementing projects and management actions. Sustainable yield values in Table 2 represent total available volumes for use by all sectors. As shown for the Numerical Model values, representing the predicted condition with implementation of projects and management actions, agricultural water use would decrease from 40 percent of the Basin's water use in 2020 to zero by 2040. During the same period, city/municipal/domestic water use would increase both volumetrically, because the Authority has assumed a 1 percent per year increase in municipal water use, and as a percentage of water use by sector because of the projected decreases in other sectors.

[91] Indian Wells Valley Groundwater Basin GSP, Table 3-5, p. 155.
[92] Indian Wells Valley Groundwater Basin GSP, Table 3-6, p. 156.
[93] Indian Wells Valley Groundwater Basin GSP, Table 3-7, p. 157.
[94] Indian Wells Valley Groundwater Basin GSP, Table 3-10, p. 178-179 and Figure 3-22, p. 340.
[95] Indian Wells Valley Groundwater Basin GSP, Table 3-8, p. 162.
[96] Indian Wells Valley Groundwater Basin GSP, Table 3-12, p. 181-182 and Figure 3-22, p. 340.

Table 2: Department Summary of Pumping Distribution by Water Use Sector Under Baseline and Numerical Model Conditions.

Water Use Sector	Year 2020	Year 2040	Year 2070
Baseline (i.e., No Action Taken) Pumping Distribution by Water Use[97]			
Sustainable Yields, in acre-feet:	34,900	36,700*	38,100
Agriculture	62%	62%	59%
Industrial	8%	8%	8%
City/Municipal/Domestic	24%	25%	28%
U.S. Navy	6%	6%	5%
Water Use Projections With the Implementation of Projects and Management Actions[98]			
Sustainable Yields, in acre-feet:	20,800	11,200	14,000*
Agriculture	40%	0%	0%
Industrial	10%	3%	3%
City/Municipal/Domestic	40%	79%	83%
U.S. Navy	10%	18%	15%

** Likely due to a rounding issue, percentages reported add up to 101 percent.*

Most elements of inflows and outflows contributing to water budgets are adequately described in the Plan and appear to use the best available science and information. Although the GSP Regulations require that the water budget assess future scenarios of hydrologic uncertainty associated with climate change projections, the Authority did not incorporate climate change into models used to develop its Plan.[99] The Authority did not specifically explain this omission but the Plan relies on a 2016 study[100] which modeled the impact of predicted climate change on groundwater simulations in the Indian Wells Valley and a portion of the Coso Valley Groundwater Basin to the north and found no appreciable effect on water levels. Department staff conclude that the Authority's decision was not unreasonable because the best available evidence suggests that climatic fluctuations in this desert basin would have a negligible effect on groundwater levels in the Basin over a period that exceeds SGMA's planning and implementation horizon. Although Department staff do not believe that the effects of climate change warrant further investigation and a revision of this GSP at this time, the Authority should be prepared to incorporate climate change projections into future models if the results of the 2016 study are not borne out, or as otherwise needed based on information obtained in the course of addressing data gaps.

The Plan does not fully describe some assumptions associated with projected water budgets. The projected Numerical Model simulation lacks a detailed explanation of some water budget inflow and outflow elements, for example, how the artificial recharge volume of 3,690 acre-feet per year (unknown distribution of imported water and recycled water) was reached. Department staff assume this is a weighted average over the 2020-2070

[97] Indian Wells Valley Groundwater Basin GSP, Table 3-9, p. 178.
[98] Indian Wells Valley Groundwater Basin GSP, Table 3-11, p. 181.
[99] Indian Wells Valley Groundwater Basin GSP, Section 3.5.6, p. 182.
[100] McGraw, D., Carroll, R., Pohll, G., Chapman, J., Bacon, S., and Jasoni, R. 2016. *Groundwater Resource Sustainability: Modeling Evaluation for the Naval Air Weapons Station, China Lake, California*.

period, but the Authority does not clearly explain how it arrived at this number or what it represents. In addition, Department staff note confusing inconsistencies in the way sustainable yield values are reported in tables that show Future Sustainable Yields, corresponding "pumping distribution" tables, and predicted water budget tables. Future Sustainable Yield budget tables report values for years 2035, 2040, and 2070, while "pumping distribution" tables report values for years 2020, 2040, and 2070, and predicted water budgets average values over the 2020-2070 timeframe. Additionally, the Numerical Model projects a continual loss of groundwater in storage that increases over time. Although the Plan describes the implementation of proposed projects and management actions as intending to bring the operation of the Basin within its "Future Sustainable Yield" of 11,150 acre-feet per year in 2035, the Plan anticipates, per the Numerical Model and the water budget, continued long-term overdraft in the Basin (see Recommended Corrective Action 3). As the Authority periodically evaluates its Plan, the planning and implementation will extend past the point when groundwater storage is predicted to exceed the minimum threshold (see Section 4.3.4).

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.[101]

4.3.1 Evaluation Summary

GSP Regulations combine several requirements of a GSP under the heading of "Sustainable Management Criteria," including undesirable results and the sustainability goal, minimum thresholds, and measurable objectives. Except for the sustainability goal, the components of sustainable management criteria must be quantified so that progress towards sustainability can be monitored and evaluated objectively. A local agency relies on information developed in its basin setting—the hydrogeologic conceptual model, the description of current and historical groundwater conditions, and the water budget—to develop criteria for defining undesirable results, setting minimum thresholds and measurable objectives.[102]

In establishing sustainable management criteria for the Plan, the Authority appears to have relied on the best available information and scientific methods. However, as discussed further, the approach the Authority used to develop those criteria was not consistent with GSP Regulations. The Authority will need to provide clarification for some of the criteria to ensure they completely align with the requirements of the GSP

[101] 23 CCR § 354.22 *et seq.*
[102] DWR Best Management Practices for the Sustainable Management of Groundwater: Sustainable Management Criteria (DRAFT), November 2017: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-6-Sustainable-Management-Criteria-DRAFT_ay_19.pdf.

Regulations (see Section 4.3.3). Additionally, sustainable management criteria were not established at all representative monitoring locations.[103]

The Plan identifies and developed sustainable management criteria for four sustainability indicators (chronic lowering of groundwater levels, reduction in groundwater storage, degraded water quality, and land subsidence) that the Authority states are currently and/or historically causing undesirable results in the Basin.[104] The Plan describes the rationale and criteria from the Numerical Model used to develop sustainable management criteria for each of the four sustainability indicators and includes broad discussions of possible effects on uses and users of groundwater in the Basin with and without the implementation of projects and management actions. The Plan states that, after considering several factors including the past, present, and probable future beneficial use of the groundwater, economic considerations, and environmental considerations, the Lahontan Regional Water Quality Control Board removed the designation for Municipal and Domestic Supply for a large portion of the Basin underlying NAWS China Lake, due to existing poor water quality. The water quality in this area is considered by the Authority to be a pre-SGMA undesirable result, is not addressed by projects and management actions, and does not have sustainable management criteria established. A figure showing the de-designated area on NAWS China Lake is included in the Plan.[105]

The Plan includes a specific analysis of the potential effects of the defined groundwater level minimum thresholds on shallow wells in the Basin. Results of the analysis, which are based on projected groundwater levels from the Numerical Model and the Authority's understanding of shallow well construction, estimate that 22 shallow wells (less than 3 percent of the total estimated shallow wells) would be impacted if the proposed projects and management actions are fully implemented. The Plan states that 22 shallow wells can be feasibly mitigated by the Authority (see Section 4.5.3), as opposed to the approximately 800 wells that could be impacted by 2070 under baseline (i.e., without implementation of projects and management actions) conditions.[106]

Measurable objectives defined in the Plan largely aim to lessen the effects of groundwater overdraft conditions in the Basin over time. The Plan states that, given the amount of current overdraft in the Basin and the cost and scarcity of supplemental water supplies, the Authority plans to allow what it considers "some reasonable overdraft" of the Basin, due to groundwater production, to continue until supplemental water supplies are acquired.[107] Department staff recognize the Authority is taking significant steps to reduce long-term overdraft in the Basin, which is why the Plan is being recommended for

[103] The (Water Year 2020, WY20) Annual Report also included representative monitoring well sites without established sustainable management criteria (see Section 4.3.3.4).
[104] Depending on the context, it appears to Department staff that the Authority sometime uses the phrase "undesirable results" in the colloquial sense, and not as the term is used to define sustainable groundwater management in SGMA (Water Code § 10721(v)).
[105] Indian Wells Valley Groundwater Basin GSP, Section 4.3.3.1, p. 206-207 and Figure 4-1, p. 341.
[106] Indian Wells Valley Groundwater Basin GSP, Section 4.3.1.2, p. 203 and Section 4.3.2.2, p. 205.
[107] Indian Wells Valley Groundwater Basin GSP, Section ES 5.1, p. 52.

approval at this time. But the Plan, as deliberately designed, allows for continued overdraft past the twenty-year plan implementation period and throughout the fifty-year planning and implementation horizon. Department staff do not understand perpetual overdraft to be consistent with the objectives of SGMA or the concept of groundwater sustainability, and do not believe it can form the basis of a reasonable sustainability goal (see Recommended Corrective Action 4).

4.3.2 Sustainability Goal

The sustainability goal represents a non-quantitative statement of the GSA's objectives and desired conditions of the groundwater basin, how the basin will get to that desired condition, and why the measures planned will lead to success.[108]

The sustainability goal, as defined in the Plan, is to "[m]anage and preserve the [Basin] groundwater resource as a sustainable water supply. To the greatest extent possible, the goal is to preserve the character of the community, preserve the quality of life of Indian Wells Valley residents, and sustain the mission at NAWS China Lake."[109] The Plan further states the absence of undesirable results, defined as significant and unreasonable effects of groundwater conditions, throughout the planning and implementation horizon will indicate that the sustainability goal has been achieved. Department staff recommend the Authority include information to support that continued, sustained overdraft (as described elsewhere in this assessment) achieves the sustainability goal set in the Plan.

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.[110]

The Authority relied on reasonable data to establish sustainability indictors, including historical conditions and projections of future conditions from the Numerical Model. However, the Authority set indicators based on presumed Basin conditions at the end of fifty years with the implementation of projects and management actions described in the Plan. In doing so, it appears that the Authority inverted the process required by the GSP Regulations by first defining the scope of projects and management actions the Authority was willing to undertake, and then defining sustainability by reference to future conditions those projects and management actions were expected to produce. In contrast, the GSP Regulations require that local agencies set undesirable results based on a determination of circumstances that would trigger significant and unreasonable conditions for relevant sustainability indicators. In some cases, the initial suite of projects and management actions may prove inadequate to bring about sustainable management of the basin. But

[108] DWR Best Management Practices for the Sustainable Management of Groundwater: Sustainable Management Criteria (DRAFT), November 2017, p. 31: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-6-Sustainable-Management-Criteria-DRAFT_ay_19.pdf.
[109] Indian Wells Valley Groundwater Basin GSP, Section 4.2, p. 196-200.
[110] 23 CCR § 354.22 *et seq*.

if sustainable management could be defined based on projects and management actions a local agency was willing to undertake, achieving sustainability would be a fait accompli realized upon adoption of a plan for a basin. This constitutes a discrepancy the Authority will need to address. However, as stated in Section 1, because the Authority expects to initiate programs intended to bring about substantial near-term reductions in groundwater use, Department staff do not believe this discrepancy would materially affect the ability of the Authority to achieve the sustainability goal for the Basin, provided it is addressed in a timely manner, and so does not preclude approval of the Plan at this time (see Recommended Corrective Action 5).

4.3.3.1 Chronic Lowering of Groundwater Levels

SGMA defines the undesirable result for chronic lowering of groundwater levels to be a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. However, SGMA provides that overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.[111]

The Authority defines the undesirable result for chronic lowering of groundwater levels to be the number of wells estimated to be impacted (i.e., 22 wells) as the criterion to define significant and unreasonable conditions resulting from the lowering of groundwater levels based on current and prolonged state of overdraft in the Basin.[112] The Plan includes a shallow well impact analysis,[113] which relies on groundwater level projections of the Numerical Model. The Authority considers shallow well impacts to occur when the simulated average static water level drops to 5 feet above the well's pump, which would result in cavitation or air entrainment when the well is pumping. The Plan states that in areas of the Basin where groundwater levels have historically been declining, water levels have dropped enough to impact shallow wells, requiring wells to be deepened, re-drilled, or abandoned as a water source. The Authority estimates that 22 shallow wells would be impacted based on projected groundwater levels, with 19 wells impacted by 2025 and 3 additional wells by 2030. The Authority acknowledges that limited data are available to assess shallow wells impacts in the Basin, and the Plan identifies this as a data gap. The analysis estimates that 97 shallow wells were impacted from 1980 to 2018, and approximately 800 wells could be impacted by 2070 under the baseline condition.[114]

The Authority set minimum thresholds based on measured historical groundwater elevations, trends, and simulated predicted groundwater elevations at ten specific representative monitoring sites.[115] The Authority used the lower value between the

[111] Water Code § 10721(x)(1).
[112] Indian Wells Valley Groundwater Basin GSP, Section 4.3.2.1, p. 205.
[113] Indian Wells Valley Groundwater Basin GSP, Appendix 3-E, p. 1372-1390.
[114] Indian Wells Valley Groundwater Basin GSP, Section 4.3.1.2, p. 204.
[115] Indian Wells Valley Groundwater Basin GSP, Table 4-4, p. 228.

following approaches to determine the minimum threshold for each of the representative sites:

- 5 feet below the minimum simulated groundwater level before groundwater level recovery is anticipated due to the implementation of projects and management actions,[116] or
- 5 feet below the recent [undefined timeframe] minimum historical value.

The Authority assigned measurable objectives as the projected groundwater level in 2040 under the Numerical Model Scenario.[117] Two representative wells in the Plan (USBR-01 and USBR-06) have measurable objectives set at the Numerical Model predicted groundwater level elevations for the year 2070, rather than the projected groundwater level in 2040. It is unclear why measurable objectives were established differently at those two representative monitoring wells, and the Authority should clarify the reasoning for this as it addresses the other factors described in this section (see Recommended Corrective Action 5).

Although the Authority did not develop its sustainable management criteria for groundwater levels according to the process described by the GSP Regulations (see Section 4.3.3 above), Department staff consider the Authority's commitment to mitigate impacts on well users that may occur due to groundwater level decline to be likely to avoid any adverse impacts that were not properly analyzed during Plan development.[118] Therefore, while not in the form envisioned, Department staff believe the approach used by the Authority substantially complies with the intent of SGMA and the GSP Regulations. However, Department staff note that the Plan does not address how the Authority would handle a scenario where more wells are impacted than the 22 predicted in the Authority's analysis. Department staff expect that the Authority would mitigate those impacts or otherwise modify its GSP to include projects or management actions to address those impacts and any other impacts to groundwater users the Authority encounters during GSP implementation, but the Authority should address that scenario in future updates to the GSP (see Recommended Corrective Action 5).

4.3.3.2 Reduction of Groundwater Storage

SGMA defines the undesirable result for groundwater storage to be a significant and unreasonable reduction of groundwater storage caused by groundwater conditions occurring throughout the basin.[119]

As discussed in Section 4.3.3.1 above, the Plan describes the number of wells estimated to be impacted (i.e., 22 wells) as the criterion the Authority will use to define significant

[116] *As shown on* Indian Wells Valley Groundwater Basin GSP, Figures 4-5a through 4-5j, p. 345-354.
[117] Indian Wells Valley Groundwater Basin GSP, Section 4.5.2, p. 226.
[118] Indian Wells Valley Groundwater Basin GSP, Section 4.3.2.2, p. 205 and Section 5.3.4, p. 273-276.
[119] Water Code § 10721(x)(2).

and unreasonable groundwater storage conditions.[120] The Plan states the amount of groundwater estimated to be removed from storage with the proposed projects and management actions is the maximum amount of useable groundwater reserves than can be extracted to prevent undesirable results while still providing a margin of safety for future use, uncertainties, and potential changes to the NAWS China Lake mission.[121] The Plan does not quantify the value of groundwater in storage that if surpassed, would be unprotective of U.S. Navy operations. However, the Plan states that setting minimum thresholds to preserve groundwater in storage, and limit the decline of groundwater levels, will minimize undesirable results to shallow wells and those caused by land subsidence.[122]

The Plan defines the measurable objective at the simulated total loss of storage at the end of the planning and implementation horizon in 2070, estimated to be 213,474 acre-feet. The Authority indicates this value is less than the Numerical Model estimation of groundwater removed from storage over that time, approximately 215,000 acre-feet. The Authority establishes the minimum threshold as the measurable objective volume, plus an additional 10 percent buffer for the purposes of operational flexibility.[123]

As the Authority periodically evaluates its Plan, the planning and implementation will extend past the point at which groundwater storage is predicted to exceed the minimum threshold. Department staff recommend that, as the Authority moves forward with the implementation of the proposed GSP, groundwater management in the Basin be operated considering long-term sustainability, not just through initial planning and implementation (see Recommended Corrective Action 4).

Although the Authority did not evaluate the sustainable management criteria for groundwater storage in the manner required by the GSP Regulations (see Section 4.3.3.1 above), Department staff consider the deficiency to be relatively minor and one that may be easily corrected by the Authority. Department staff note that proposing to operate the Basin with continuing, albeit reduced, groundwater depletion, does not ensure groundwater extraction in the Basin does not result in overdraft and the long-term reduction of groundwater storage. However, Department staff understand that impacts on well users that may occur due to ongoing groundwater storage decline will be minimized due to the Authority's commitment to mitigating those impacts. Department staff recommend that the Authority clarify the value of groundwater in storage that if surpassed, would be unprotective of U.S. Navy operations because, without clarification, it will be difficult to know with certainty whether an undesirable result will occur during future evaluations of the planning and implementation horizon. The Authority may consider mitigating impacts on well users or include projects or management actions to address those impacts and any other impacts to groundwater users the Authority encounters

[120] Indian Wells Valley Groundwater Basin GSP, Section 4.3.1, p. 203.
[121] Indian Wells Valley Groundwater Basin GSP, Section 4.3.1.2, p. 203-204.
[122] Indian Wells Valley Groundwater Basin GSP, Section 4.4.4.1, p. 223.
[123] Indian Wells Valley Groundwater Basin GSP, Section 4.4.1, p. 211-213.

during GSP implementation, in future updates to the GSP (see Recommended Corrective Action 5).

4.3.3.3 Seawater Intrusion

SGMA defines the undesirable result for seawater intrusion as significant and unreasonable seawater intrusion caused by groundwater conditions occurring throughout the basin.[124]

As explained in the Plan, the Basin is an inland basin located more than 100 miles from, and not hydraulically connected to a sea or ocean. Based on this, the Authority concludes that seawater intrusion is not a factor in the Basin and the Plan does not describe undesirable results due to seawater intrusion[125] or consider seawater intrusion as a sustainability indicator requiring sustainable management criteria.[126] The Plan's discussion of seawater intrusion is concise, but given the physical setting of the Basin Department staff regard it as adequate to support the Authority's decision.[127]

4.3.3.4 Degraded Water Quality

SGMA defines the undesirable result for water quality to be significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, caused by groundwater conditions occurring throughout the basin.[128]

The Plan describes significant and unreasonable water quality conditions as those where quality is degraded such that it is unsuitable for the current beneficial uses in the Basin.[129] The Authority adheres to the Lahontan Regional Water Quality Control Board recommended and upper total dissolved solids secondary maximum contaminant level of 500 milligrams per liter and 1,000 milligrams per liter, respectively.[130] Minimum thresholds at four representative wells near Inyokern, with what the Plan states is generally good water quality, were set at the secondary maximum contaminant level for total dissolved solids (500 milligrams per liter) in order to protect current beneficial uses for domestic supply. Minimum thresholds were set at 600 milligrams per liter in two wells with poorer water quality, near Ridgecrest and NAWS China Lake. At representative monitoring sites that have historical total dissolved solids data, the Authority set measurable objectives at the highest recent total dissolved solids concentration.[131]

Department staff note that water quality representative monitoring wells are only being sampled for total dissolved solids, although arsenic is also a known concern in the

[124] Water Code § 10721(x)(3).
[125] Indian Wells Valley Groundwater Basin GSP, Section 3.4.3, p. 164-165.
[126] Indian Wells Valley Groundwater Basin GSP, Section 4.3, p. 202.
[127] Although not mentioned in the Plan, Department staff also note that the lowest elevation of the Basin is over 2,000 feet above sea level.
[128] Water Code § 10721(x)(4).
[129] Indian Wells Valley Groundwater Basin GSP, Section 4.3.3.2, p. 207.
[130] Indian Wells Valley Groundwater Basin GSP, Section 4.4.3, p. 218-223.
[131] Indian Wells Valley Groundwater Basin GSP, Section 4.5.3, p. 226.

Basin.[132] No minimum threshold is established for arsenic because the Authority states that arsenic is treated by potable water suppliers before it is distributed. At this time, Department staff find the GSP's approach to arsenic to be reasonable and encourage the Authority to continue monitoring and assessing the relationship between groundwater production and arsenic concentrations.

The Plan states that at representative monitoring sites in areas of the Basin where there is not enough historical data to set criteria, these will be established after 'baseline' total dissolved solids conditions are established through monitoring (see Section 4.2.3). Not all wells the Authority designated in the Plan as representative monitoring wells have sustainable management criteria established. Criteria for five of the eleven representative wells in the submitted Plan are shown as "ND" for "not determined at this time". Wells without established sustainable management criteria cannot be monitored and evaluated for SGMA compliance during GSP implementation (see Recommended Corrective Action 6 and 7).

4.3.3.5 Subsidence

SGMA defines the undesirable result for subsidence to be significant and unreasonable land subsidence that substantially interferes with surface land uses, caused by groundwater conditions occurring throughout the basin.[133] Minimum thresholds for subsidence shall be supported by the identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin.[134]

The Plan describes significant and unreasonable land subsidence conditions as those that are related to impacts on facilities and infrastructure, specifically at Supersonic Naval Ordnance Research Track testing and laboratory facilities on NAWS China Lake. The Authority indicates these facilities are the most sensitive to impacts of land subsidence in the Basin. The Plan did not establish subsidence sustainable management criteria at any other locations within the Basin and states that the Authority will evaluate new surveying, InSAR data, and Light Detection and Ranging (LiDAR) data for the Basin, as available, to analyze basin-wide land subsidence rates and to determine if additional monitoring locations are necessary and if additional minimum thresholds are required for additional Basin locations.[135]

The minimum threshold for land subsidence is set at a rate of 0.09 inches per year, which the Plan states is the rate from the most recent period analyzed by the Authority (2005-2010) and is reflective of declines in water levels and not tectonic processes.[136] The Plan indicates that subsidence rates above the 0.09 inches per year would cause undesirable results to occur at the Supersonic Naval Ordnance Research Track testing and laboratory

[132] Indian Wells Valley Groundwater Basin GSP, Section 3.4.4.2, p. 166-167 and Figure 3-15, p. 333.
[133] Water Code § 10721(x)(5).
[134] 23 CCR § 354.28 (c)(5)(A).
[135] Indian Wells Valley Groundwater Basin GSP, Section 4.4.4.6, p. 224.
[136] Indian Wells Valley Groundwater Basin GSP, Section 4.4.4, p. 223-225.

facilities on NAWS China Lake. The Authority indicates that it will coordinate with the U.S. Navy to obtain data related to land subsidence, to evaluate potential minimum threshold exceedances. The Plan indicates that while the current property of interest for land subsidence is the NAWS China Lake testing and laboratory facilities, the Authority will analyze basin-wide land subsidence rates to determine if additional monitoring locations and minimum thresholds are required for additional Basin locations. Department staff concur that as the Authority implements its Plan, it considers whether undesirable results due to subsidence will occur at proposed project infrastructure locations given historical and potential (due to groundwater pumping) subsidence locations (e.g., imported water supply canals and piping).

The Authority set the measurable objective for subsidence at the historical rate (1992-2010) of subsidence of approximately 0.04 inches per year, indicating this rate is protective of the Supersonic Naval Ordnance Research Track testing and laboratory facilities on NAWS China Lake. The Plan acknowledges that the low threshold may not provide the NAWS China Lake testing and laboratory facilities total protection from land subsidence, but that the Authority does not know if it is feasible to manage the Basin to prevent such small increments of land subsidence.[137]

The Plan states that the current rate of land subsidence is not anticipated to increase from the most recent available data period (2005-2010), due to the implementation of projects and management actions that will result in stabilization of groundwater levels. It appears that the Authority first defined projects and management actions to reduce overdraft, then determined the resultant groundwater conditions (i.e., groundwater levels and groundwater in storage) and the effects of those conditions on beneficial uses and users. These resultant conditions and current rates of subsidence (although they represent pre-2015 and pre-drought conditions) are used as the basis for setting the minimum threshold and measurable objective for land subsidence at the Supersonic Naval Ordnance Research Track testing and laboratory facilities on NAWS China Lake.

Given the low tolerance to land subsidence of the NAWS China Lake equipment and apparent lack of unreasonable effects experienced at other Basin infrastructure, Department staff regard the Authority's characterization and the established sustainable management criteria to be reasonable. Department staff agree with the Authority that managing the Basin to prevent such small increments of land subsidence has unknowns, including the feasibility of avoiding land subsidence to this degree (i.e., less than a tenth of an inch).[138] The Authority should clarify how it will (and if it can) identify land subsidence caused by groundwater conditions versus land subsidence caused by tectonic activity, and explain what conditions would trigger further actions by the Authority to prevent such small increments of land subsidence (see Recommended Corrective Action 5).

[137] Indian Wells Valley Groundwater Basin GSP, Section 4.4.4.1, p. 223.
[138] Indian Wells Valley Groundwater Basin GSP, Section 4.4.4.1, p. 223.

4.3.3.6 Depletion of Interconnected Surface Water

SGMA defines the undesirable result for depletions of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of the surface water caused by groundwater conditions occurring throughout the basin.[139]

The Plan states that surface water is not interconnected with groundwater in the Basin, describing valley streams as ephemeral with most springs in the watershed located outside the boundaries of the Basin.[140] The Plan states that surface streams in the valley do not flow past the mouths of canyons except in wet years and even in those cases the surface water is not connected to groundwater in the Basin. Based on this information, the Authority elected not to establish sustainable management criteria for the depletion of interconnected surface water, although the Plan concedes that information about the relationship between groundwater and GDEs constitutes a data gap and suggests that evaluation of information obtained by filling that data gap may require the need to develop sustainable management criteria.[141]

Given the Basin setting and lack of significant precipitation, Department staff regard the Authority's characterization to be reasonable, but agree with the Authority that data gaps relating to the relationship between surface water and groundwater in the Basin should be reexamined as additional information is collected.

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.[142]

4.4.1 Evaluation Summary

Separate monitoring networks were developed for four sustainability indicators to track and monitor parameters that demonstrate progress toward meeting the sustainability goals: groundwater levels, groundwater in storage, groundwater quality, and subsidence. Each monitoring network leverages existing monitoring efforts already occurring in the Basin.

The Plan states the Authority will assess and improve the monitoring networks as needed.[143] Data gaps in each monitoring network are identified and a strategy to address the gaps are included in the Plan. Department staff concur that there are important data gaps that should be addressed early in GSP implementation. Failure to do so may make

[139] Water Code § 10721(x)(6).
[140] Indian Wells Valley Groundwater Basin GSP, Section 3.4.6, p. 168; Figure 3-11, pg. 329
[141] Indian Wells Valley Groundwater Basin GSP, Section 4.3.5, p. 209
[142] 23 CCR § 354.32 *et seq.*
[143] Indian Wells Valley Groundwater Basin GSP, Section 4.7.1, p 230.

it difficult to demonstrate that implementation of the Plan is achieving the sustainability goal of the Basin, which may influence subsequent plan assessments by the Department.

The Authority's website and data management system is referenced in the Plan as a source for information, as required by the GSP Regulations, such as groundwater level and water quality data results and trends, and well characteristics including depths and screen intervals. The data management system was used by the Authority to develop and organize data collected for the development of the Plan, as part of its on-going groundwater management activities.[144] The Plan states the data management system will continue to be updated with monitoring data throughout the implementation period of the GSP, and Department staff agree this should be accomplished if the Authority rely on the data management system for providing relevant and up to date information to beneficial users and interested parties in the Basin.

4.4.2 Monitoring Networks

The Authority has selected representative monitoring sites to specifically measure and monitor groundwater conditions caused by the sustainability indicators applicable to the Basin and to evaluate the efficacy of the proposed projects and management actions achieving sustainability.[145] The Plan states that data from wells that are not designated as representative monitoring sites will continue to be monitored as part of the complete monitoring network, as they provide valuable data and information regarding overall Basin conditions.

Groundwater Levels. Basin groundwater level monitoring relies on the existing groundwater level monitoring network established by the Kern County Water Agency in 1995, operational responsibility of which was taken over by the Authority in 2018. Groundwater levels will be used along with other Basin data to also calculate the annual change in storage. The Plan states that depth to water is, and will continue to be, measured biannually at 198 wells during spring and fall to observe seasonal changes in groundwater levels; 33 of these wells are CASGEM wells. These 198 wells will also be used to determine the change of storage in the Basin annually. The Plan identifies ten representative key wells that will be used to monitor sustainable management criteria for the chronic lowering of groundwater levels on a semi-annual basis and to track progress toward sustainability. The Plan states that data gaps in the groundwater level monitoring program exist outside of the pumping areas, in mostly open spaces of the El Paso area managed by the U.S. Bureau of Land Management.[146] This area of the Basin also has data gaps relating to the commencement of the largest ephemeral stream system in the Indian Wells Valley, and according to the Plan, additional wells to characterize the aquifer structure and properties could provide a better understanding of the occurrence and movement of water in this area. The Authority submitted a Technical Support Services

[144] Indian Wells Valley Groundwater Basin GSP, Section 2.8, p. 128-133.
[145] Indian Wells Valley Groundwater Basin GSP, Section 4.1.2, p. 196.
[146] Indian Wells Valley Groundwater Basin GSP, Section 3.6.1.1, p. 185.

application with the Department prior to submittal of the Plan for funding of a multi-level monitoring well in the El Paso area to address this data gap.

Water Quality. The monitoring network to evaluate degradation of groundwater water quality is based on four existing water quality regulatory programs operating in the Basin: the U.S. Navy's Basewide Groundwater Monitoring Program, the Lahontan Regional Water Quality Control Board's overview of the Basin Salt and Nutrient Management Plan, the Kern County Public Health Services Department's Small Water Systems Program, and the Inyo County Water Department's groundwater extractor monthly reporting requirement.[147] The Authority's existing total dissolved solids database has water quality data from 1920 to present; however, the Plan indicates the dataset includes only a limited number of wells, or a one-time sample when the well was drilled. The Plan identifies eleven representative monitoring wells to be monitored annually for sustainable management criteria, though some representative monitoring well locations may only have one monitoring data point according to the Authority's data management system 'GSP Dashboard' webpage (see Section 4.4.2). Additionally, water quality data from 39 wells that are currently reporting under the State Water Resources Control Board's Groundwater Ambient Monitoring and Assessment Program (GAMA) program will continue to be incorporated into the Authority's data management system and used to evaluate the changes in total dissolved solids within the Basin. As stated in Section 4.2.3, 'baseline' sampling at 30 wells and 10 springs basin-wide will be conducted to fill water quality data gaps. Department staff recommend the Authority provide updates on the progress toward filling this data gap in its annual reports and that more details be provided in the first periodic update of the Plan, since it is unclear to Department staff if this data gap was addressed during the WY20 reporting period (see Recommended Corrective Action 6).

Land Subsidence. The Plan states that land subsidence monitoring is currently limited to infrequent monitoring conducted by the U.S. Navy at established monuments on NAWS China Lake. The Plan states that the Authority will coordinate with the U.S. Navy to obtain data related to land subsidence as monitored and will consult InSAR and earthquake activity data provided by the United States Geological Survey to monitor for land subsidence. Monitoring frequency and locations are not clearly established for subsidence monitoring and it is unclear whether monitoring will be required over time for the entire Basin (i.e., with the construction of surface water importation infrastructure), or just at the NAWS China Lake which has sensitive equipment. The Authority may wish to consult the statewide InSAR data available from the Department, which can be used for monitoring land subsidence.

Other Monitoring. A monitoring network for seawater intrusion was not established, as this inland basin is not likely to be subject to seawater intrusion. Additionally, there is no monitoring network, per se, for depletions of interconnected surface water, since

[147] Indian Wells Valley Groundwater Basin GSP, Section 2.6, p. 109-111; Section 2.7.2, p.112; and Section 2.7.7, p. 122-128.

groundwater levels throughout the majority of the Basin do not appear to support interconnected surface waters, according to the Plan. However, the Plan states that two stream gages, four weather stations, and an eddy covariance station (to monitor evapotranspiration/evaporation) will continue to be monitored and newly installed stream gages and weather stations will be incorporated into the monitoring network. A draft figure showing the locations of weather stations, stream gages, and the average annual precipitation for the Basin is included in the Plan.[148] Dataloggers are used by the Authority to estimate the rate of drainage within tributary alluvium and fan deposits, determine gradients toward the Basin's alluvial aquifer, and to provide a better estimate of subsurface flow from Rose Valley.[149]

The rationale for the selection process of representative monitoring sites lacks detail on how the Authority will adjust the monitoring frequency and density of monitoring sites to demonstrate short-term, seasonal, and long-term trends based on: 1) the amount of current and projected groundwater use and 2) aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow,[150] to provide an adequate level of detail about site-specific surface water and groundwater conditions. Because the Plan has identified two principal aquifers but does not clearly define their vertical or lateral extents (see Section 4.2.2), it is unclear whether the representative monitoring sites are appropriate to detect the effects on shallow wells that the Plan aims to avoid (see Recommended Corrective Action 2).

Department staff note that the data management system reports inconsistent information from what is referenced in both the Plan and in the WY20 Annual Report, or is missing information altogether, such as representative monitoring wells identified in the Plan and some water quality data. Examples of these inconsistencies include the following: two groundwater level representative wells that are not included in the Plan are shown in both the online 'GSP Dashboard' and in the WY20 Annual Report, but neither have sustainable management criteria established for them; there are three wells included in the online 'GSP Dashboard' that are not included in the Plan (AB 303-5, 26S/38E-01M05, and 26S/39E-06P01) that, in addition to another well found in the GSP (Sandquist Spa), do not have sustainable management criteria established. Additionally, although the Plan does not discuss management areas, there are five shown on the 'GSP Dashboard' page (see Recommended Corrective Action 7).

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,

[148] Indian Wells Valley Groundwater Basin GSP, Figure 3-8, p. 326.
[149] Indian Wells Valley Groundwater Basin GSP, Section 3.6.1.2, p. 186-187.
[150] 23 CCR § 354.34 (f)(1) and (f)(2).

including projects and management actions to respond to changing conditions in the basin.[151]

4.5.1 Evaluation Summary

The Plan includes a suite of projects and management actions that appear to be conceptually feasible, which if implemented, will make progress towards operating the Basin within its sustainable yield.[152] However, as previously noted, groundwater management under the current Plan would not eliminate overdraft even with the implementation of all proposed projects and management actions. As a result, unless additional measures are adopted, the Basin would eventually be rendered unsustainable based on the definition of sustainability in the GSP, which Department staff consider to be flawed. The fundamental structure of groundwater management in the Basin is heavily reliant on the proposed management action to reduce pumping and projects to develop supplemental water supplies.[153]

The Plan states that project and management action costs may be funded through fees, grants, state and federal appropriations, pumping assessments, or combinations thereof, and includes a table of estimated GSP implementation costs[154] and details of funding source options.[155] Department staff note that funding sources did not seem to be secured at the time of GSP submittal, and the Plan states that the Indian Wells Valley community is not financially capable of supporting an imported water supply without significant public funding. Federal entities (NAWS China Lake and U.S. Bureau of Land Management) are exempt from fees implemented by the Authority.

The feasibility, reliability, and schedules (related to timing of permitting) of projects, particularly the development of an imported water source, was a point of interest in multiple public comments letters received for the Plan. Public comments raised issues related to the legal authority of the GSA to implement the imported water project, primarily due to water rights, and how the project would affect users outside the Basin (adjacent and neighboring basins and other users of the State Water Project). The GSP Regulations require that a Plan provide information that the Agency has the legal authority to implement the Plan[156] and carry out projects and management actions[157] and in various places the Authority provides information to that effect. A representation by the GSA that it has the necessary legal authority to implement its Plan carries with it a presumption of validity, and comments that merely cast doubt on that authority are not sufficient to overcome that presumption for purposes of the Department's assessment. Public

[151] 23 CCR § 354.44.
[152] Indian Wells Valley Groundwater Basin GSP, Section 5, p. 235-286.
[153] Indian Wells Valley Groundwater Basin GSP, Section 5.2, p. 238-247.
[154] Indian Wells Valley Groundwater Basin GSP, Table 6-1, p. 292-293.
[155] Indian Wells Valley Groundwater Basin GSP, Section 6.3.2, p. 294-295.
[156] 23 CCR § 354.6(d).
[157] 23 CCR § 354.44(b)(7)).

comments also questioned the cost and affordability of the proposed projects, but the Plan itself recognizes that some of the projects will be beyond the ability of the local community to fund independently. While the cost of a project may not preclude its implementation, it does provide added support for the development of alternative projects and management actions that may be implemented if one or more of the proposed projects prove financially infeasible.

Throughout GSP implementation, as the Authority pursues the projects and management actions, the Plan should identify the metrics and criteria that will determine if projects are successful and how these programs will be monitored (particularly for Project 3: Conservation Efforts, Project 4: Shallow Well Mitigation Program, Project 5: Dust Control Mitigation Plan, and Project 6: Pumping Optimization). Updates should include timelines for when the Authority expects to see adequate progress toward developing management actions and proposed and/or conceptual projects, particularly the recycled water sub-projects that are reliant upon the availability of treated effluent generated at the City of Ridgecrest's wastewater treatment facility (see Recommended Corrective Action 4).

4.5.2 Management Actions

The Plan includes one management action that is intended to reduce or optimize local groundwater use, supporting the Numerical Model predicted pumping distributions by water use sector.[158] The management action establishes three allocation plans that will charge fees for groundwater extraction in the Basin:

- Annual Pumping Allocation Plan: This allocation plan will assign pumping fees ("Augmentation Fees") for water produced in excess of the safe yield. This will not directly limit groundwater extraction by any individual entity, but it is anticipated by the Authority that the fee will result in voluntary pumping reductions and the implementation of additional conservation measures to lower demands thereby assisting in achieving sustainability. The Augmentation Fees will in turn provide the funding for the development of supplemental water supplies and other projects and management actions to attempt to achieve sustainability.
- Transient Pool Allocation: All current groundwater pumpers who are not given an Annual Pumping Allocation will be eligible to receive a Transient Pool Allocation, which consists of a limited non-transferable one-time allocation of water to be used prior to 2040. The Transient Pool will be created to facilitate coordinated production reductions and to allow groundwater users to plan and coordinate their individual groundwater pumping termination. The total allocations from Transient Pool are anticipated to be limited to no more than 51,000 acre-feet and each party will be assessed the Administration Fee for water pumped from the Transient Pool.

[158] Indian Wells Valley Groundwater Basin GSP, Section 5.2.1, p. 238-247.

- Fallowing Program: All groundwater pumpers who are assigned a Transient Pool Allocation may be enrolled, at its sole election, in a Fallowing Program. Pursuant to the Fallowing Program, the groundwater pumper may elect to sell their Transient Pool Allocation back to the Authority.

The Plan states that economically viable agricultural operations cannot be sustained with a greatly reduced water supply (pumping allocation) as would be required with a proportional reduction to the "Current Sustainable Yield" and that similarly, domestic and municipal users would not be able to meet basic health and safety requirements under a proportional reduction allocation. The Plan estimates that groundwater production will reduce to approximately 12,000 acre-feet per year plus any agricultural pumping as part of the Transient Pool program in the first year of implementation, anticipated to be 2021.

The Plan states the Authority has worked with groundwater users in the Basin to determine an equitable process for assigning allocations. The Authority identifies the highest beneficial use of water in the Basin to be for domestic purposes including human consumption, cooking, and sanitary uses, but does not regulate groundwater use by de minimis pumpers as defined in SGMA and claims no authority over federal water use. The Authority recognizes that the safe yield is significantly lower than current pumping and some groundwater pumpers with inferior rights will not be granted any Annual Pumping Allocations.[159]

The Authority proposes management actions designed to reduce groundwater use by imposing fees on the assumption that groundwater users are likely to voluntarily reduce pumping volumes to avoid paying higher fees. Many of the public comments that discuss this proposal raise potential water rights issues or question the wisdom of the policy choices made by the Authority, all of which are beyond the scope or authority of the Department to assess. Department staff note only that fee-based strategies represent a feasible way to manage groundwater use.

4.5.3 Projects

Eight total projects, six described as planned projects and two conceptual projects, are included in the Plan to help the Basin achieve its sustainability goal. The proposed projects are divided into four types: supplemental water supplies, water conservation, mitigation programs, and pumping optimization. Each project in the Plan includes a description, a list of relevant measurable objectives, expected benefits and evaluation of benefits, circumstances for implementation, public noticing, the permitting and regulatory process, implementation schedule, legal authority, and estimated cost. Also included for the imported and recycled water supply projects are an estimate of the expected water savings. The estimated benefits for these projects were calculated using the Numerical Model.

[159] Indian Wells Valley Groundwater Basin GSP, Section 5.2.1.1, p. 240.

The development of an imported water supply project, according to the Plan, will require purchasing water supplies (with all required contractual and/or appurtenant water rights) as well as obtaining access to existing water conveyance facilities and constructing additional infrastructure to bring imported water to the Basin.[160] The Authority has identified two imported water project options as conceptually feasible. The Plan states that the Option 1 project will directly meet groundwater demands above the "Current Sustainable Yield" of the Basin and that the Option 2 project will replace any groundwater produced above the natural recharge to the Basin and allow the Basin to be operated within the "Future Sustainable Yields". The Plan anticipates that either one of the two imported water project options will be fully implemented by 2035 and that final selection of the most feasible imported water project option will occur in January 2023 after preparation of an engineering report and negotiation with the relevant transfer agencies.

The three recycled water subprojects proposed as other supplemental water supply sources will rely on the availability of treated effluent generated at the City of Ridgecrest's wastewater treatment facility. Before implementation of the Authority's recycled water subprojects can commence, the City must complete negotiations with the NAWS China Lake and construct the modified/relocated wastewater treatment facility. The Authority proposes to replace the groundwater currently used for landscape irrigation within the City with recycled water from Recycled Water Subproject 1, extend the recycled water distribution system from Recycled Water Subproject 1 to replace existing groundwater use for landscape irrigation at Cerro Coso Community College with recycled water from Recycled Water Subproject 1a, and to further treat the produced recycled water supplies at the City wastewater treatment facility for groundwater recharge through subsurface applications (deep injection) under Recycled Water Subproject 2.

The remaining proposed projects include demand management conservation measures to develop voluntary, rebate-based, and mandatory conservation efforts for domestic beneficial uses in the Basin, building on previously adopted conservation measures; a shallow well mitigation program for wells impacted by lost production capacity due to lower groundwater levels or increasing total dissolved solids concentrations; a dust mitigation plan, if needed, from the implementation of Augmentation Fees and the Fallowing Program that may cause secondary impacts caused by windblown dust due to fallowed agricultural land; and optimization of Basin pumping to reduce concentrated pumping centers that would lead to continuing localized declining groundwater levels and corresponding continuing impacts to shallow domestic wells. The conceptual projects include a Brackish Groundwater Feasibility Study that will examine the feasibility of extracting brackish groundwater, options for treating the brackish groundwater, and options for delivery of all water quality types to the various connection points. The second, a Direct Potable Reuse Project, will evaluate the compatibility of the planned recycled water subprojects with a future direct potable reuse project as the regulations for those projects are developed and adopted.

[160] Indian Wells Valley Groundwater Basin GSP, Section 5.3.1, p. 247-256.

Department staff consider the projects described in the Plan to be technically feasible. However, the Plan acknowledges that the imported water supply project, in particular, which the Authority regards as being instrumental to meeting its sustainability goal, requires the securing of funds and formalizing agreements with third parties that are beyond its control. In addition, as discussed extensively above, even with full implementation of all projects, the current Plan does not anticipate the elimination of groundwater overdraft at any time, although the rate of overdraft could be dramatically reduced in the short term with successful implementation of existing projects and management actions. For these reasons, Department staff recommend corrective actions that will bring greater specificity and certainty to the planning process and introduce alternative projects and management actions that the Authority may implement if the preferred options are found to be infeasible (Recommended Corrective Action 4).

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."[161] Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.[162] The Indian Wells Valley Groundwater Basin has four adjacent subbasins surrounding it (the Rose Valley, Coso Valley, Salt Wells Valley, and Fremont Valley basins) and five neighboring basins (the Kern River Valley, Kelso Lander Valley, Cuddleback Valley, Searles Valley, and Wild Horse Mesa Area basins) adjacent to it, none of which are currently required to be managed under a GSP. The Plan includes an analysis of potential impacts to adjacent basins with the defined minimum thresholds for each of the four considered sustainability indicators. The Plan does not anticipate any impacts to adjacent basins from the minimum thresholds defined in the Plan. Based on information available at this time, Department staff have no reason to believe that groundwater management in the Indian Wells Valley Groundwater Basin will adversely affect groundwater conditions in adjacent basins, but the Department will review the situation as information becomes available or as otherwise deemed necessary.

[161] Water Code § 10733(c).
[162] 23 CCR § 354.28(b)(3).

5 STAFF RECOMMENDATION

Department staff's recommendation is to approve the Indian Wells Valley Groundwater Basin GSP with the recommended corrective actions listed below. The Plan conforms with the requirements of Sections 10727.2 and 10727.4 of SGMA and substantially complies, but does not fully satisfy, the requirements of the GSP Regulations. However, Department staff conclude that the current Plan is designed to achieve near-term progress towards groundwater sustainability, especially by reducing basin overdraft, whereas the deficiencies affect long-term conditions in the Basin. Department staff further conclude that the Authority should be able to address Plan deficiencies before they would affect the ability of the Basin to achieve sustainability. The Authority has identified several other areas for improvement of its Plan and Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified additional recommended corrective actions that should be considered by the Authority for the first five-year assessment of the GSP. Addressing these recommended corrective actions will be important to demonstrate that implementation of the Plan is likely to achieve the sustainability goal. The recommended corrective actions include:

Recommended Corrective Action 1
Provide additional information on the required, ongoing communications elements required in the GSP Regulations,[163] and describe how those required elements fit into the Authority's Communication and Engagement Plan, including how it will continue to allow an open collaborative process with active diverse stakeholder engagement (such as those identified in the Communication and Engagement Plan's Notification List, see Section 4.1.4) during Plan implementation.

Recommended Corrective Action 2
Investigate the hydraulic connectivity of the vertical and lateral relationships between the three hydrogeologic zones within the shallow and deep principal aquifers to improve the understanding of potential migration of impaired water. Provide a timeline and discuss the steps that will be taken to fill the data gap identified in the Plan related to groundwater monitoring. During Plan implementation and in filling data gaps, the Authority should reassess the groundwater level and groundwater quality monitoring networks to include information about the amount of current and projected groundwater use and aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow and how that flow could exacerbate groundwater quality challenges.

Recommended Corrective Action 3
Explain water budget elements and values as they are updated to include information obtained during GSP implementation, such as implementing groundwater allocations and finalizing imported water volumes. Tabular values, especially, should be explained and should not include mathematical errors (see Section 4.2.4). Describe how much of the

[163] 23 CCR § 354.10(d).

predicted volumes of artificial recharge are attributed to each of the imported water and recycled water projects. Additionally, revise climate change projections based on data obtained from addressing data gaps, as needed.

Recommended Corrective Action 4
Update the Plan to include projects and management actions sufficient to eliminate perpetual overdraft currently projected beyond the fifty-year planning and implementation horizon. Include contingency elements that would be triggered if water budget inflows are not increased over the rolling fifty-year planning and implementation horizon, particularly if imported water sources are not available. The contingency plan should include additional projects and management actions that may be implemented to achieve the sustainability goal for the Basin within and beyond the twenty-year timeframe of SGMA, in the event that the Authority is unable to implement projects and management actions described in the Plan or that those projects and management actions fail to produce the anticipated results. The Plan should be amended to include an updated and detailed timetable for the adoption and implementation of current projects and management actions, as well as an explanation of when and under what circumstances the Authority would implement alternative or additional projects and management actions, as needed.

Provide updates related to the negotiated details and implementation of the imported water project options. Details are warranted regarding the feasibility of confidential supply sources (availability of water rights, infrastructure, and funding), particularly because imported water supplies were reported in the WY20 Annual Report not to have been pursued, and how they could be affected in times of drought and when sources for water importers are less than anticipated.

Recommended Corrective Action 5
Identify effects caused by groundwater conditions occurring through the Basin that would produce undesirable results based on significant and unreasonable impacts to applicable sustainability indicators. Minimum thresholds need to be identified to prevent conditions in the Basin from causing those undesirable results. Additionally, the Authority should provide relevant updates in Annual Reports and five-year updates to sustainable management criteria based on results from addressing data gaps and any observed impacts due to the implementation of proposed projects (e.g., the introduction of imported water supplies and infrastructure), such as water quality degradation and depletions of interconnected surface water.

Recommended Corrective Action 6
During Plan implementation and before the first five-year assessment, establish sustainable management criteria at all wells the Authority intends to designate as representative monitoring locations, particularly for degraded water quality. In doing so, the Authority should collaborate and coordinate with the appropriate groundwater users, water quality regulatory agencies, and existing programs in the Basin to understand and develop a process for determining if groundwater management and extraction is resulting in degraded water quality in the Basin.

Recommended Corrective Action 7

Update the data management system to reflect correct and complete information and to comply with GSP Regulations.[164] If the Authority intends to implement management areas in the Basin, include information describing the rationale for management area boundaries and their use consistent with GSP Regulations.[165] Report information in a consistent manner in Annual Reports and on the Authority's 'GSP Dashboard' website if the Authority intends to continue to provide Basin monitoring to the public on this platform. Information should be consistent between updates to the Plan, Annual Reports, and the data management system 'GSP Dashboard' page, including representative monitoring well locations and names, sustainable management criteria, and monitoring reporting data.

[164] 23 CCR § 352.6.
[165] 23 CCR § 354.20.