



CALIFORNIA DEPARTMENT OF WATER RESOURCES

SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE

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October 26, 2023

Lisette Gold

City of Santa Monica, Public Works Department – Water Resources

2500 Michigan Ave, Building 1

Santa Monica, CA 90404

lisette.gold@santamonica.gov

RE: Coastal Plain of Los Angeles – Santa Monica Subbasin - 2022 Groundwater Sustainability Plan

Dear Lisette Gold,

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

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The Department will initiate the first periodic review of the Santa Monica Subbasin GSP no later than January 27, 2027.

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

Thank You,

Paul Gosselin
Paul Gosselin
Deputy Director
Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Approval of the Coastal Plain of Los Angeles – Santa Monica Subbasin Groundwater Sustainability Plan

**STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES**

**STATEMENT OF FINDINGS REGARDING THE
APPROVAL OF THE
COASTAL PLAIN OF LOS ANGELES - SANTA MONICA SUBBASIN
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 its 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 Santa Monica Basin Groundwater Sustainability Agency (GSA or Agency) for the Coastal Plain of Los Angeles – Santa Monica Subbasin (Subbasin) (Basin No. 4-011.01).

Department management has discussed the Plan with staff and has reviewed the Department Staff Report, entitled Sustainable Groundwater Management Program Groundwater Sustainability Plan Assessment Staff Report, attached as Exhibit A, recommending approval of the GSP. 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 therefore **APPROVES** the Plan and makes the following findings:

- 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, 2022. (Water Code § 10720.7(a); 23 CCR § 355.4(a)(1).)
 2. The Plan was complete, meaning it generally appeared to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation and issuance of an assessment by the Department. (23 CCR § 355.4(a)(2).)
 3. The Plan, either on its own or in coordination with other Plans, covers the entire Subbasin. (23 CCR § 355.4(a)(3).)
- B. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) "conformance" with the specified statutory requirements, (2) "substantial compliance" with the GSP Regulations, (3) whether the Plan is likely

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to achieve the sustainability goal for the Subbasin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) Application of these standards requires exercise of the Department's expertise, judgment, and discretion when making its determination of whether a Plan should be deemed "approved," "incomplete," or "inadequate."

The statutes and GSP Regulations require Plans to include and address a multitude and wide range of informational and technical components. The Department has observed a diverse array of approaches to addressing these technical and informational components being used by GSAs in different basins throughout the state. The Department does not apply a set formula or criterion that would require a particular outcome based on how a Plan addresses any one of SGMA's numerous informational and technical components. The Department finds that affording flexibility and discretion to local GSAs is consistent with the standards identified above; the state policy that sustainable groundwater management is best achieved locally through the development, implementation, and updating of local plans and programs (Water Code § 113); and the Legislature's express intent under SGMA that groundwater basins be managed through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.1(h)) The Department's final determination is made based on the entirety of the Plan's contents on a case-by-case basis, considering and weighing factors relevant to the particular Plan and Subbasin under review.

- C. In making these findings and Plan determination, the Department also recognized that: (1) the Department maintains continuing oversight and jurisdiction to ensure the Plan is adequately implemented; (2) the Legislature intended SGMA to be implemented over many years; (3) SGMA provides Plans 20 years of implementation to achieve the sustainability goal in a Subbasin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA. (Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.)
- D. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with 23 CCR § 355.4, and appears likely to achieve the sustainability goal for the Subbasin. It does not appear at this time that the Plan will adversely affect the ability of adjacent basins to implement their GSPs or impede achievement of sustainability goals.

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1. The minimum thresholds are selected for groundwater levels based on a level would indicate a depletion of supply for municipal wells, which are identified as the predominant beneficial use of groundwater in the Subbasin. The Plan relies on credible information and science to quantify the groundwater conditions, discusses current limitations in understanding basin properties and dynamics, and identifies data gaps to improve the Agency's understanding of the Basin's hydrogeologic conceptual model, groundwater conditions related to seawater intrusion, and groundwater dependent ecosystems. (23 CCR § 355.4(b)(1).)
2. The Plan has identified reasonable measures and schedules to eliminate data gaps and the anticipated benefits (e.g., refinement of SMC and monitoring networks, improved water budget and modeling, etc.) of filling known data gaps. (23 CCR § 355.4(b)(2).)
3. The projects and management actions proposed are designed to increase local water supply availability and reduce groundwater pumping. The projects and management actions are reasonable and commensurate with the level of understanding of the Subbasin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Subbasin's sustainability goal and should provide the GSA with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation. (23 CCR § 355.4(b)(3).)
4. The Plan considers varied interests of groundwater uses and users in the Subbasin in developing the sustainable management criteria and how those interests would be impacted by the chosen minimum thresholds. (23 CCR § 355.4(b)(4).)
5. The Plan's projects and management actions appear feasible at this time and appear capable of preventing undesirable results and ensuring that the Subbasin is managed within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes. (23 CCR § 355.4(b)(5).)
6. The Plan includes a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present. (23 CCR § 355.4(b)(6).)
7. At this time, it does not appear that the Plan will adversely affect the adjacent basins, which are designated as low-priority basins and are not subject to SGMA except that there is an adjudicated area in the West Coast Subbasin subject to adjudication process. The Department

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recommend the GSA to coordinate with the watermaster for the adjudicated area of the adjacent West Coast Subbasin. (23 CCR § 355.4(b)(7).)

8. Because a single plan was submitted for the Subbasin, a coordination agreement was not required. (23 CCR § 355.4(b)(8).)
9. At this time, it appears the GSA has the legal authority and financial resources necessary to implement the Plan. (23 CCR § 355.4(b)(9).)
10. Through review of the Plan and consideration of public comments, the Department determines that the GSA adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may preclude approval of the Plan in those future evaluations. (23 CCR § 355.4(b)(10).)

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

1. The Department developed its GSP Regulations consistent with and intending to further the State's human right to water 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 in its evaluation of the Plan. (Water Code § 106.3; 23 CCR § 350.4(g).)
2. The Plan identifies that, with sufficient evidence and support, depletion of interconnected surface waters is not an applicable sustainability indicator within the Subbasin.
3. The Subbasin is not currently in a state of long-term overdraft and projections of future basin extractions are likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSA and the Department. Projections of future basin extractions appear likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSA and the Department. Subbasin groundwater levels and other SGMA sustainability indicators appear unlikely to substantially deteriorate while the GSA implements the Department's recommended corrective actions.

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4. The California Environmental Quality Act (Public Resources Code § 21000 *et seq.*) does not apply to the Department's evaluation and assessment of the Plan.


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Accordingly, the GSP submitted by the Agency for the Coastal Plain of Los Angeles – Santa Monica Subbasin is hereby **APPROVED**. The recommended corrective actions identified in the Staff Report will assist the Department’s future review of the Plan’s implementation for consistency with SGMA and the Department therefore recommends the Agency address them by the time of the Department’s periodic review, which is set to begin on January 27, 2027, as required by Water Code § 10733.8. Failure to address the Department’s recommended corrective actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:



Karla Nemeth, Director
Date: October 26, 2023

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – Coastal Plain of Los Angeles – Santa Monica Subbasin

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

Groundwater Basin Name: Coastal Plain of Los Angeles – Santa Monica Subbasin (No. 4-011.01)
Submitting Agency: Santa Monica Basin Groundwater Sustainability Agency
Submittal Type: Initial GSP Submission
Submission Date: January 27, 2022
Recommendation: Approved
Date: October 26, 2023

The Santa Monica Basin Groundwater Sustainability Agency (Agency or GSA) submitted the Santa Monica Subbasin Groundwater Sustainability Plan (GSP or Plan) for the Coastal Plain of Los Angeles – Santa Monica Subbasin (Subbasin) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)¹ and GSP Regulations.² The GSP covers the entire Subbasin for the implementation of SGMA.

After evaluation and assessment, Department staff conclude the Plan includes the required components of a GSP, demonstrates a thorough understanding of the Subbasin based on what appears to be the best available science and information, sets well explained, supported, and reasonable sustainable management criteria to prevent undesirable results as defined in the Plan, and proposes a set of projects and management actions that will likely achieve the sustainability goal defined for the Subbasin.³ Department staff will continue to monitor and evaluate the Subbasin's progress toward achieving the sustainability goal through annual reporting and future periodic evaluation of the GSP and its implementation.

- Based on the current evaluation of the Plan, Department staff recommend the GSP be approved with recommended corrective actions described herein.

This assessment includes five sections:

- **Section 1 – Summary**: Provides an overview of the Department's assessment and recommendations.

¹ Water Code § 10720 *et seq.*

² 23 CCR § 350 *et seq.*

³ 23 CCR § 350 *et seq.*

- **[Section 2 – Evaluation Criteria](#)**: Describes the legislative requirements and the Department’s evaluation criteria.
- **[Section 3 – Required Conditions](#)**: Describes the submission requirements, Plan completeness, and basin coverage required for a GSP to be evaluated by the Department.
- **[Section 4 – Plan Evaluation](#)**: Provides an assessment of the contents included in the GSP 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

Department staff recommend approval of the Santa Monica Subbasin GSP. The GSA has identified areas for improvement of its Plan (e.g., addressing data gaps related to seawater intrusion, water budgets uncertainties, incorporating new information into the numerical model, and expanding monitoring networks). Department staff concur that those items are important and recommend the GSA address them as soon as possible. Department staff have also identified additional recommended corrective actions that the GSA should consider for the first periodic evaluation of the Plan. The recommended corrective actions generally focus on the following:

- (1) Identify the principal aquifers for the Subbasin. Include the shallow aquifer in the hydrogeologic conceptual model and cross sections and clearly characterize the connection (or disconnection) between surface water, shallow groundwater, the Ballona Aquifer, and the Silverado Aquifer.
- (2) Provide Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.
- (3) Provide additional information to support the development of sustainable management criteria for groundwater levels.
- (4) Support the development of sustainable management criteria for seawater intrusion consistent with the Subbasin’s sustainability goal.
- (5) Identify constituents of concern for the Subbasin and establish sustainable management criteria for degraded water quality.
- (6) Include a cumulative metric in the minimum threshold for land subsidence.

Addressing the recommended corrective actions identified in [Section 5](#) of this assessment will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

2 EVALUATION CRITERIA

The GSA submitted a single GSP to the Department to evaluate whether the Plan conforms to specified SGMA requirements⁴ and is likely to achieve the sustainability goal for the Santa Monica Subbasin.⁵ To achieve the sustainability goal for the Subbasin, 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.⁶ Undesirable results must be defined quantitatively by the GSAs.⁷ 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.⁸

For the GSP to be evaluated by the Department, it must first be determined that the Plan was submitted by the statutory deadline,⁹ and that it is complete and covers the entire basin.¹⁰ If these conditions are satisfied, the Department evaluates the Plan to determine whether it complies with specific SGMA requirements and substantially complies with the GSP Regulations.¹¹ “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.”¹²

When evaluating whether the Plan is likely to achieve the sustainability goal for the Subbasin, Department staff reviewed the information provided and relied upon in the GSP for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice.¹³ The Department’s review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the GSA, 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.¹⁴

⁴ Water Code §§ 10727.2, 10727.4.

⁵ Water Code § 10733(a).

⁶ Water Code § 10721(v).

⁷ 23 CCR § 354.26 *et seq.*

⁸ Water Code § 10733(c).

⁹ 23 CCR § 355.4(a)(1).

¹⁰ 23 CCR §§ 355.4(a)(2), 355.4(a)(3).

¹¹ 23 CCR § 350 *et seq.*

¹² 23 CCR § 355.4(b).

¹³ 23 CCR § 351(h).

¹⁴ 23 CCR §§ 355.4(b)(1), (3), (4) and (5).

The Department also considers whether the GSA has the legal authority and financial resources necessary to implement the Plan.¹⁵

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.¹⁶ The Department also considers whether the Plan provides reasonable measures and schedules to eliminate identified data gaps.¹⁷ Lastly, the Department's review considers the comments submitted on the Plan and evaluates whether the GSA adequately responded to the comments that raise credible technical or policy issues with the Plan.¹⁸

The Department is required to evaluate the Plan within two years of its submittal date and issue a written assessment of the Plan.¹⁹ The assessment is required to include a determination of the Plan's status.²⁰ The GSP Regulations define the three options for determining the status of a Plan: Approved,²¹ Incomplete,²² or Inadequate.²³

Even when review indicates that the GSP satisfies the requirements of SGMA and is in substantial compliance with the GSP Regulations, the Department may recommend corrective actions.²⁴ Recommended corrective actions are intended to facilitate progress in achieving the sustainability goal within the basin and the Department's future evaluations, and to allow the Department to better evaluate whether the Plan adversely affects adjacent basins. While the issues addressed by the recommended corrective actions do not, at this time, preclude approval of the Plan, the Department recommends that the issues be addressed to ensure the Plan's implementation continues to be consistent with SGMA and the Department is able to assess progress in achieving the sustainability goal within the basin.²⁵ Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first periodic assessment.²⁶

The staff assessment of the GSP involves the review of information presented by the GSA, including models and assumptions, and an evaluation of that information based on scientific reasonableness, including standard or accepted professional and scientific methods and practices. 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

¹⁵ 23 CCR § 355.4(b)(9).

¹⁶ 23 CCR § 355.4(b)(6).

¹⁷ 23 CCR § 355.4(b)(2).

¹⁸ 23 CCR § 355.4(b)(10).

¹⁹ Water Code § 10733.4(d); 23 CCR § 355.2(e).

²⁰ Water Code § 10733.4(d); 23 CCR § 355.2(e).

²¹ 23 CCR § 355.2(e)(1).

²² 23 CCR § 355.2(e)(2).

²³ 23 CCR § 355.2(e)(3).

²⁴ Water Code § 10733.4(d).

²⁵ Water Code § 10733.8.

²⁶ 23 CCR § 356.4 *et seq.*

does not signify that Department staff, were they to exercise the professional judgment required to develop a GSP for the basin, would make the same assumptions 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 GSA are supported by adequate, credible evidence, and are scientifically reasonable.

Lastly, the Department's review and approval of the Plan is a continual process. Both SGMA and the GSP Regulations provide the Department with the ongoing authority and duty to review the implementation of the Plan.²⁷ Also, GSAs have an ongoing duty to provide reports to the Department, periodically reassess their plans, and, when necessary, update or amend their plans.²⁸ The passage of time or new information may make what is reasonable and feasible at the time of this review to not be so in the future. The emphasis of the Department's periodic reviews will be to assess the progress toward achieving the sustainability goal for the basin and whether Plan implementation adversely affects the ability of adjacent basins to achieve their sustainability goals.

3 REQUIRED CONDITIONS

A GSP, to be evaluated by the Department, must be submitted within the applicable statutory deadline. The GSP must also be complete and must, either on its own or in coordination with other GSPs, cover the entire basin.

3.1 SUBMISSION DEADLINE

SGMA required basins categorized as high- or medium-priority and not subject to critical conditions of overdraft to submit a GSP no later than January 31, 2022.²⁹

The GSA submitted its GSP on January 27, 2022.

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.³⁰

The GSA submitted an adopted GSP for the entire Subbasin. After an initial, preliminary review, Department staff found the GSP to be complete and appearing to include the

²⁷ Water Code § 10733.8; 23 CCR § 355.6.

²⁸ Water Code §§ 10728 *et seq.*, 10728.2.

²⁹ Water Code § 10720.7(a)(2).

³⁰ 23 CCR § 355.4(a)(2).

required information, sufficient to warrant an evaluation by the Department.³¹ The Department posted the GSP to its website on February 7, 2022.³²

3.3 BASIN COVERAGE

A GSP, either on its own or in coordination with other GSPs, must cover the entire basin.³³ A GSP that is intended to cover the entire basin may be presumed to do so if the basin is fully contained within the jurisdictional boundaries of the submitting GSAs.

The GSP intends to manage the entire Santa Monica Subbasin and the jurisdictional boundary of the submitting GSA fully contains the Subbasin.³⁴

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’s assessment is based on a number of related factors including whether the elements of a GSP were developed in the manner required by the GSP Regulations, whether the GSP was developed using appropriate data and methodologies and whether its conclusions are scientifically reasonable, and whether the GSP, through the implementation of clearly defined and technically feasible projects and management actions, is likely to achieve a tenable sustainability goal for the basin. 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, its decision-making process, and its legal authority;³⁵ a description of the Plan area and identification of beneficial uses and users in the Plan area,³⁶ and a description of the ability of the submitting Agency to develop and implement a Plan for that area.³⁷

The Plan identifies the Santa Monica Basin Groundwater Sustainability Agency as the submitting agency.³⁸ By entering into a Memorandum of Understanding (MOU), the GSA

³¹ 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.

³² <https://sgma.water.ca.gov/portal/gsp/preview/129>.

³³ Water Code § 10727(b); 23 CCR § 355.4(a)(3).

³⁴ Santa Monica GSP, Section 2.1, p. 63.

³⁵ 23 CCR § 354.6 *et seq.*

³⁶ 23 CCR § 354.8 *et seq.*

³⁷ 23 CCR § 354.2 *et seq.*

³⁸ Santa Monica GSP, Section 1.1, p. 57.

was formed by five members that have water supply, water management, or land use responsibilities within the Subbasin including the City of Santa Monica, the City of Los Angeles (by and through its Department of Water and Power), the City of Beverly Hills, the City of Culver City, and the County of Los Angeles.³⁹ The GSP states that the City of Santa Monica is the only local agency that currently produces groundwater from the Subbasin and is the coordinating agency for the GSA and the point of contact for the Department. All actions undertaken by the GSA must receive unanimous consent from the member agencies.⁴⁰

The Subbasin contains approximately 50 square miles entirely located in Los Angeles County⁴¹ and is bound by the Pacific Ocean to the west, the Santa Monica Mountains to the north Hollywood and Central Subbasins to the east, and West Coast Subbasin Adjudicated Area to the south.⁴² The Subbasin is highly urbanized. Land use is predominantly residential (64%), with commercial, industrial, and public facilities accounting for an additional 23.5% of the area. Open space occupies 11.5% of the area in the Subbasin.⁴³ A map showing the Subbasin and adjacent subbasins is provided as Figure 1.



Figure 1: Santa Monica Subbasin Location Map.

³⁹ Santa Monica GSP, Section 1.3, p. 59; Appendix B, p. 411-469.

⁴⁰ Santa Monica GSP, Section 1.3.1, p. 59.

⁴¹ Santa Monica GSP, Section 2.1, p. 63, and Section 2.1.1.1.1, p. 64.

⁴² Santa Monica GSP, Section 2.1, p. 63.

⁴³ Santa Monica GSP, Section ES-2.0, p. 20.

The GSP identifies beneficial uses and users in the Subbasin including municipal well operators, public and private water purveyors, local land use planning agencies, environmental users, and disadvantaged communities.⁴⁴ The GSP also identifies private wells used for irrigating several golf courses and the Holy Cross Cemetery within the Subbasin as beneficial uses and users.⁴⁵ No domestic well is identified in the Subbasin. The GSP states that the disadvantaged communities with groundwater use are served by the water system of the City of Santa Monica.

The GSA has developed the Outreach and Engagement Plan⁴⁶ and has been able to involve and engage interested parties in the development and implementation of the GSP. The GSA has posted the public meetings agenda and minutes, materials, and notifications on its website (<https://www.santamonica.gov/gsp>) to inform the public of the status of the GSP development and implementation.

The GSA estimates that the implementation of the GSP over the first five years costs approximately \$4,425,000.⁴⁷ The GSP states that these costs will be funded by the Cities of Santa Monica and Los Angeles, including the remediation settlement fund administrated by the City of Santa Monica for activities related to groundwater sampling and monitoring.

Overall, staff conclude that the administrative information included in the Plan substantially complies with the requirements outlined in the GSP Regulations.

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 Hydrogeologic Conceptual Model

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 support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget.⁴⁹ The GSP Regulations require a descriptive hydrogeologic conceptual model that includes a written description of geologic

⁴⁴ Santa Monica GSP, Section 2.1.5.1, pp. 107-109.

⁴⁵ Santa Monica GSP, Table 2-11, p. 109.

⁴⁶ Santa Monica GSP, Appendix D, pp. 631-640.

⁴⁷ Santa Monica GSP, Section 5.3, pp. 382-383.

⁴⁸ 23 CCR § 354.12 *et seq.*

⁴⁹ 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.

conditions, supported by cross sections and maps,⁵⁰ and includes a description of basin boundaries and the bottom of the basin,⁵¹ principal aquifers and aquitards,⁵² and data gaps.⁵³

The GSP describes the Subbasin as being located within the northwestern portion of the Los Angeles Basin, a northwest-trending alluvial filled structural trough, with the Subbasin bounded to the west by the Pacific Ocean, to the north by the Santa Monica Mountains, and bordering three very low-priority basins, the Hollywood and Central Subbasins to the east, and West Coast Subbasin Adjudicated Area to the south.⁵⁴

In describing aquifers in the Subbasin, the Plan does not directly identify principal aquifers. The Plan describes three water-bearing units in the basin, all of which are non-marine deposits of Pleistocene or Holocene age that overlie a thick succession of Miocene and Pliocene sediments (see Santa Monica GSP, Figures 2-18 through 2-21). The GSP identifies the Silverado aquifer as a ‘primary’ aquifer but does not designate the Silverado aquifer as a principal aquifer per SGMA’s regulations. The two lowest units, the Sunnyside and Silverado Aquifers,⁵⁵ occur within the Early Pleistocene San Pedro Formation, which overlies the Pliocene Pico Formation. The Plan states that the groundwater production in the Subbasin is derived exclusively from these two aquifers, with the upper Silverado identified as the primary producing aquifer.⁵⁶ Located in the central portion of the Subbasin, the City of Santa Monica’s Olympic and Charnock Wellfields extract groundwater primarily from the Silverado Aquifer.⁵⁷

The primary groundwater production areas of the Silverado aquifer are at the City of Santa Monica’s Olympic and Charnock wellfields.⁵⁸ All of the City of Santa Monica’s extracted groundwater is treated before being distributed to customers throughout the city. The GSP reports no agricultural and domestic uses of groundwater in the Subbasin.⁵⁹ Below the Silverado aquifer lies the Sunnyside Aquifer, which is designated as the bottom of the Subbasin fresh groundwater in conjunction with another unnamed, poorly characterized unit that extends to the base of the upper San Pedro Formation.⁶⁰

The Plan also describes a third water-bearing unit, the Holocene Ballona Aquifer, primarily located in the southern half of the Subbasin.⁶¹ The base of the Ballona Aquifer is about 60 feet below the sea level near the southern Subbasin boundary but higher than the sea level to the north of Pico Boulevard where the aquifer pinches out. No municipal

⁵⁰ 23 CCR §§ 354.14 (a), 354.14 (c).

⁵¹ 23 CCR §§ 354.14 (b)(2) and (3).

⁵² 23 CCR § 354.14 (b)(4) *et seq.*

⁵³ 23 CCR § 354.14 (b)(5).

⁵⁴ Santa Monica GSP, Section 2.1, p. 63.

⁵⁵ Santa Monica GSP, Section 2.3.1.1, pp. 118-120.

⁵⁶ Santa Monica GSP, Section 2.3.2, p. 122.

⁵⁷ Santa Monica GSP, Section 2.3.2.3, p. 124, Figure 2-6, p. 189.

⁵⁸ Santa Monica GSP, Section 2.3.2.3, p. 124, Figure 2-6, p. 189.

⁵⁹ Santa Monica GSP, Section ES-2.0, p. 20.

⁶⁰ Santa Monica GSP, Section 2.3.2.4, p. 125.

⁶¹ Santa Monica GSP, Section 2.3.2.2, p. 124, Figure 2-24, p. 227, Figures 2-18 to 2-19, pp. 215-219.

wells are screened with the Ballona Aquifer except for the wells associated with groundwater quality remediation at the Playa Vista development in the southern portion of the Subbasin. The GSP states that the Ballona aquifer is hydraulically connected to the underlying Silverado aquifer in the vicinity of Charnock and Olympic wellfields and in the Playa Vista area.⁶² Based on the information provided above, Department staff interpret that groundwater pumping in the Silverado principal aquifer can potentially impact the groundwater flow and storage in the Ballona aquifer. Also, if seawater intrusion occurs first in the Ballona Aquifer, it can make its way to the Silverado Aquifer.

Department staff conclude that the GSP has not sufficiently identified principal aquifers in the Subbasin but instead identifies ‘primary’ aquifer zones. For this review, Staff assume that the GSA has identified a single principal aquifer. Department staff recommend the GSA provide a clear description of the principal aquifers to be managed by the GSA so that the GSA may sustainably manage groundwater in its principal aquifers, consistent with the requirements of the GSP Regulations⁶³ (see [Recommended Corrective Action 1a](#)).

The Plan identifies the Bellflower Aquitard that overlies the Ballona Aquifer. The Plan describes that the Bellflower Aquitard occurs within the Holocene alluvium forming the surficial deposits in the central and southern portions of the Subbasin. Clay and sandy clay are the predominant sediment types within the Bellflower Aquitard with a maximum thickness of 40 feet.⁶⁴ By using the term “aquitard,” the Plan indicates that the Bellflower Aquitard is a low permeable surficial layer that hydraulically separates the surface from the underlying Ballona and Silverado Aquifers. However, the Plan also identifies the materials in the Bellflower Aquitard as “alluvial gravel, sand, and silt-clay” (with map symbol “Qa”) in the hydrogeologic cross sections,⁶⁵ which indicates some level of permeability and groundwater bearing capacity.

In addition, the Plan describes beneficial uses and users as extracting groundwater from the Bellflower Aquitard, which seems to indicate that it may not behave as an aquitard throughout the basin. For example:

- Historically shallow wells extracted water from “shallow sediments within and overlay the Bellflower Aquitard.”⁶⁶
- Surface water in Ballona Creek can infiltrate into the Bellflower Aquitard contributing to the Ballona Creek Wetlands.⁶⁷

⁶² Santa Monica GSP, Section 2.3.2.2, p. 124.

⁶³ 23 CCR § 354.14 (b)(4) *et seq.*

⁶⁴ Santa Monica GSP, Section 2.3.2.1, p. 123.

⁶⁵ Santa Monica GSP, Figures 2-18 to 2-21, pp. 215-221.

⁶⁶ Santa Monica GSP, Section 2.4.3.1, p. 131.

⁶⁷ Santa Monica GSP, Section 2.4.6, p. 141.

- Groundwater pumped out of the Ballona Aquifer and Bellflower Aquitard in Playa Vista.⁶⁸
- The identified GDEs are supported by shallow groundwater that occurs within the Bellflower Aquitard.⁶⁹

The Plan's characterization of the Bellflower Aquitard is inconsistent and unclear as many of the characteristics included in GSP do not align with typical descriptions of aquitards. Department staff additionally note that the Department has received multiple comments about hydrogeologic conditions near the Ballona Wetlands which are likely hydrologically connected to the shallow aquifer.⁷⁰ The comments question whether the GSA considered the best available science and whether the GSA has used available studies and resources that may assist with fully understanding the hydrogeology of this area. Department staff recommend the GSA include the shallow aquifer in the hydrogeologic conceptual model and cross sections (see [Recommended Corrective Action 1b](#)).

Based on the information and discussions presented above for the hydrogeologic conceptual model, Department staff conclude that the GSP provides sufficient detail about the geologic conditions, basin boundaries, basin bottom, primary aquifers, and data gaps. Although Department staff have identified a couple of recommended corrective actions for the hydrogeologic conceptual model, the recommended corrective actions do not preclude plan approval at this time given the Subbasin's unique urban settings and no documented significant impacts to beneficial users and uses. Department staff expect the GSA to address the recommended corrective action accordingly in the first periodic evaluation.

4.2.2 Groundwater Conditions

The GSP Regulations require a written description of historical and current groundwater conditions for each of the applicable sustainability indicators and groundwater dependent ecosystems that includes the following: groundwater elevation contour maps and hydrographs,⁷¹ a graph depicting change in groundwater storage,⁷² maps and cross-sections of the seawater intrusion front,⁷³ maps of groundwater contamination sites and plumes,⁷⁴ maps depicting total subsidence,⁷⁵ identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,⁷⁶ and identification of groundwater dependent ecosystems.⁷⁷

⁶⁸ Santa Monica GSP, Section 2.4.7.4, p. 145.

⁶⁹ Santa Monica GSP, Section 3.3.3.2, p. 317.

⁷⁰ <https://sgma.water.ca.gov/portal/gsp/comments/129> (Submitted After Comment Period.)

⁷¹ 23 CCR § 354.16 (a)(1-2).

⁷² 23 CCR § 354.16 (b).

⁷³ 23 CCR § 354.16 (c).

⁷⁴ 23 CCR § 354.16 (d).

⁷⁵ 23 CCR § 354.16 (e).

⁷⁶ 23 CCR § 354.16 (f).

⁷⁷ 23 CCR § 354.16 (g).

The GSP describes historical and current groundwater elevations in both Silverado and Ballona Aquifers. The GSP demonstrates that the two aquifers are hydraulically connected.⁷⁸ For Silverado Aquifer, the GSP provides a collection of hydrographs⁷⁹ for wells in various parts of the Subbasin with measurements dating back to the 1930s for the Charnock Wellfield and 1970s/1980s for Olympic and Arcadia areas. Most of the groundwater elevation measurements for the Silverado Aquifer started in the 2000s in Playa Vista. Historically, regional groundwater flowed generally from the Santa Monica Mountains toward the south. In recent years, groundwater production has resulted in hydraulic gradients that flow toward the production wells.⁸⁰ Hydrographs from the Charnock Wellfield area show a rise in groundwater levels from 1996 to about 2010 followed by a declining trend after 2011, coinciding with five wells in the Charnock Wellfield taken offline in 1996 due to methyl tert-butyl ether (MTBE) contamination but reassumed production in 2010 after remediation efforts.⁸¹ For Ballona Aquifer, the GSP provides hydrographs for monitoring wells installed in the Charnock Wellfield and Playa Vista areas with measurements dating back late 1990s or early 2000s.⁸² The hydrographs show a groundwater level trend similar to that observed for the Silverado Aquifer. The GSP reports that monitoring wells in the Charnock Wellfield area went dry since 2016 due to increased pumping.

The GSP estimates that the Subbasin's available groundwater storage is between 141,368 at historical low-groundwater levels to 338,304 acre-feet at historical high-groundwater levels.⁸³ Between 1985 and 2015, the estimated groundwater storage decreased by an average rate of approximately 1,200 acre-feet per year and a cumulative total of 35,000 acre-feet based on the Los Angeles Coastal Plain Groundwater Model (Groundwater Model).⁸⁴

The GSP states the Subbasin documented seawater intrusion beginning in the 1940s, indicated by chloride concentration exceeding 500 milligrams per liter, impacting an approximate area of 3,400 acres in the Ballona aquifer located in the southeast portion of the Subbasin.⁸⁵ Since then, chloride and total dissolved solids concentrations have not been commonly measured in the Ballona aquifer partly because a small volume of groundwater has been produced from the Ballona aquifer. Based on the limited data collected in the Playa Vista area, the GSP states that seawater intrusion likely has not occurred in the Ballona aquifer.⁸⁶ In the Silverado aquifer, chloride and total dissolved solids concentrations have been regularly sampled from the City of Santa Monica's production wells since 1985. The GSP states that the data collected for chloride and total

⁷⁸ Santa Monica GSP, Section 2.3.2.2, p. 124.

⁷⁹ Santa Monica GSP, Figures 2-29B and 2-29C, pp. 239-241.

⁸⁰ Santa Monica GSP, Section 2.4.1.3, pp. 219-130; Figures 2-33 and 2-34, pp. 249-251.

⁸¹ Santa Monica GSP, Section 2.4.1.2, pp. 127-129; Figure 2-30, p. 243.

⁸² Santa Monica GSP, Figure 2-29A, p. 237.

⁸³ Santa Monica GSP, Section 2.3.3, p. 125.

⁸⁴ Santa Monica GSP, Section 2.4.2, p. 131.

⁸⁵ Santa Monica GSP, Figure 2-26, p. 231.

⁸⁶ Santa Monica GSP, Sections ES-3.1, ES-3.2, and 2.4.3.1, pp. 29, 31-32, 132; Figure 2-37, p. 257.

dissolved solids concentrations in these production wells does not show evidence of seawater intrusion in the Silverado aquifer.⁸⁷ Although seawater intrusion has not been detected, the GSP indicates pumping-induced seawater intrusion into the Subbasin could potentially occur as the aquifers along the coast may be exposed to the ocean.⁸⁸

The GSP identifies the lack of monitoring for seawater intrusion as a data gap as the network of wells that are used to track seawater intrusion is limited to wells in the vicinity of the municipal supply wellfields near the central portion of the Subbasin.⁸⁹ The GSP further states that additional monitoring may be warranted if groundwater production increases in the Ballona aquifer.⁹⁰ The GSP intends to improve the data gap by incorporating an existing well at City Hall into the monitoring network and seeking opportunities to include up to two additional wells in the vicinity of Marina Del Rey.⁹¹

While the GSP identifies seawater intrusion as a data gaps, it does not document seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer, as required by the GSP Regulations.⁹² Considering the GSA is proposing to lowering groundwater levels substantially below historical lows (which, as the GSP notes, may lead to the induction of seawater intrusion), understanding where the seawater intrusion front is and managing it will be critical for the GSA. Department staff recommend the GSA investigate and identify where seawater intrusion is occurring in the Subbasin in each principal aquifer including the development of current maps and cross-sections of the seawater intrusion front to fully understand the extent and magnitude of seawater intrusion in the Subbasin (see [Recommended Corrective Action 2](#)).

The GSP states that significant and unreasonable degradation of groundwater quality occurred in the Subbasin prior to 2015 resulting from historical industrial and manufacturing activities as well as leaking underground storage tanks at multiple gas stations. In 1996, five production wells in the Charnock Wellfield were taken offline due to MTBE contamination in the groundwater. These wells reassumed production in 2010 following the groundwater remediation efforts since 2006.⁹³ Groundwater produced from the ten municipal supply wells located in the Arcadia, Charnock, and Olympic wellfields require treatment prior to distribution.⁹⁴ The GSP states that these municipal wells are monitored monthly for volatile organic compounds (VOCs), quarterly for physical and select chemical parameters, and every three years for general mineral and physical and inorganic constituents as part of Title 22 compliance. Also, the City of Santa Monica regularly measures VOC concentration at 78 observations wells (26 near the Olympic

⁸⁷ Santa Monica GSP, Section 2.4.3.2, pp. 131-132.

⁸⁸ Santa Monica GSP, Section 2.4.3.2, p. 133.

⁸⁹ Santa Monica GSP, Section 2.4.3.2, p. 133; Section 3.5.4.1, p. 334; Section 3.5.8.4, p. 346.

⁹⁰ Santa Monica GSP, Section 2.4.3.2, p. 132.

⁹¹ Santa Monica GSP, Figure 3-7, p. 361; Section 3.2.7.2, p. 310; Section 3.5.8.4, p. 346.

⁹² 23 CCR § 354.16(c).

⁹³ Santa Monica GSP, Section 2.1.2.3.5, p. 84.

⁹⁴ Santa Monica GSP, Section 2.4.4.4, pp. 138-139.

Wellfield and 52 near the Charnock Wellfield) as part of the ongoing remediation process.⁹⁵

The GSP states that the Subbasin experienced no or minimal land subsidence in the past, and that the minimal land subsidence was likely associated with tectonic forces instead of groundwater pumping.⁹⁶ Department staff note that oil production activities in the region may be another factor but that can contribute to land subsidence, but is not discussed in the Plan. Land subsidence within the Subbasin is monitored at the continuous GPS station located on UCLA campus in conjunction with the InSAR data available from the Department. Land surface elevations at the GPS station experienced uplifting by 0.4 to 0.8 inches (0.3 to 0.6 feet) between 1996 and 2020. According to the InSAR data between 2015 and 2019, land surface elevations declined from 0.01 to 0.02 feet in the central part of the Subbasin but rose slightly in the same amount near the northern and southern margins of the Subbasin.⁹⁷

The GSP states that there is no interconnectivity between groundwater and surface water as the creeks and channels are predominantly lined with concrete within the Plan Area.⁹⁸ The Plan identifies the Ballona Creek Wetlands in the Ballona Wetland Ecological Reserve (BWER) as the major groundwater dependent ecosystems (GDEs) within the Subbasin.⁹⁹ The GSP describes that the last three miles of Ballona Creek are paved or boulder-lined banks and that this stretch of Ballona Creek is located within the sediments of the Bellflower Aquitard. It states, “infiltration of surface water into the Bellflower Aquitard...contributes to the palustrine Ballona Creek Wetlands...constitute the primary area of groundwater-surface water interaction in the Subbasin.” The GSP states the Bellflower Aquitard limits hydraulic communication between the shallow surficial groundwater system and the underlying Ballona Creek,¹⁰⁰ and that groundwater production from the Silverado Aquifer will not impact the shallow groundwater elevations or the GDEs within the BWER.¹⁰¹ As discussed earlier in this report, the Plan’s characterization of the groundwater-surface water interaction, particularly related to the Bellflower Aquitard, is not sufficiently supported in the Subbasin’s the hydrogeologic conceptual model.

The Plan also describes the Ballona Freshwater Marsh as a potential GDE. The freshwater marsh “treats urban runoff and stormwater from the Playa Vista development and also receives treated groundwater pumped from the Ballona Aquifer and Bellflower Aquitard in Playa Vista.”¹⁰² Because the Ballona and Silverado Aquifers are hydraulically

⁹⁵ Santa Monica GSP, Section 2.1.4, p. 134.

⁹⁶ Santa Monica GSP, Section 2.4.5, p. 140-141; Figures 2-29A to 2-29C, pp. 237-241.

⁹⁷ Santa Monica GSP, Section 2.4.5, p. 140, Figure 2-50, p. 283.

⁹⁸ Santa Monica GSP, Section 2.4.6, p. 141.

⁹⁹ Santa Monica GSP, Section 2.4.7.3, pp. 143-145.

¹⁰⁰ Santa Monica GSP, Section 2.4.7.3, p. 143.

¹⁰¹ Santa Monica GSP, Section 2.4.7.3, p. 145.

¹⁰² Santa Monica GSP, Section 2.4.7.4, p. 145.

connected, Department staff conclude that the freshwater marsh can potentially be impacted by groundwater pumping in the principal aquifer.

Based on the information and discussions presented above, Department staff conclude that the GSP covers the specific items listed in the regulations related to groundwater conditions.

4.2.3 Water Budget

GSP Regulations require a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions, and the sustainable yield.¹⁰³

The Plan estimates the water budgets for the Subbasin's groundwater system using the Groundwater Model, including historical (1985-2012), current (2013-2015), and future water budgets (2016-2076).¹⁰⁴ The Plan adopts the Subbasin's sustainable yield to be 10,800 to 19,700 acre-feet per year based on prior studies.¹⁰⁵ The Plan identifies data gaps and uncertainties with the Groundwater Model¹⁰⁶ and plans to fill the data gaps in the next periodic evaluation.¹⁰⁷

The Plan's water budgets show an average groundwater pumping of 5,300 acre-feet in historical condition,¹⁰⁸ 10,700 acre-feet in current condition,¹⁰⁹ and 9,200 acre-feet in future condition.¹¹⁰ The historical water budget shows a decline of 600 acre-feet per year in groundwater storage, a decline of 8,500 acre-feet per year in the current water budget, and an increase of 100 acre-feet per year in the projected water budget. However, the water budgets also show an amount of seawater intrusion: 300 acre-feet per year, 1,300 acre-feet per year, and 2,100 acre-feet per year for historical, current, and projected conditions, respectively. In other words, without including the seawater intrusion amounts, the groundwater storage will be in deficit as the aerial recharge (from mountain front, precipitation, and return flows etc.) are less than the groundwater pumping. Department staff recommend the GSA re-evaluate the sustainable yield with the model update in the next periodic evaluation.

As the GSA identifies data gaps with the water budget modeling and plans to fill the data gaps within the next periodic evaluation, Department staff conclude the GSP covers the specific items related to water budgets listed in the GSP Regulations.

¹⁰³ 23 CCR § 354.18 (b)(7).

¹⁰⁴ Santa Monica GSP, Section 2.5.5, pp. 161-167.

¹⁰⁵ Santa Monica GSP, Section 2.6, p. 171.

¹⁰⁶ Santa Monica GSP, Section 2.5.5.4, pp. 169-170.

¹⁰⁷ Santa Monica GSP, Table 5-1, p. 383.

¹⁰⁸ Santa Monica GSP, Table 2-27, p. 162.

¹⁰⁹ Santa Monica GSP, Table 2-28, p. 163.

¹¹⁰ Santa Monica GSP, Table 2-29, p. 164.

4.2.4 Management Areas

The GSP Regulations provide the option for one or more management areas to be defined within a basin if the GSA has determined that the creation of the management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives, provided that undesirable results are defined consistently throughout the basin.¹¹¹

The GSP does not define management areas.

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. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the basin including the process by which the GSA characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.¹¹²

4.3.1 Sustainability Goal

GSP Regulations require that GSAs establish a sustainability goal for the basin. The sustainability goal should be based on information provided in the GSP's basin setting and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.¹¹³

The GSP describes the sustainability goal for the Subbasin as “to ensure the long-term health and availability of groundwater resources for current and future stakeholders through ongoing, proactive stewardship.”¹¹⁴ The GSP states that the conditions of long-term health and availability include:

- Maintaining sufficient groundwater in storage to allow for continued groundwater production that meet the operational demands and regulatory commitments of the City of Santa Monica as well as other groundwater producers and stakeholders.
- Ensuring groundwater conditions in the Subbasin support sufficient seaward flow of fresh water to prevent significant and unreasonable seawater intrusion in the Silverado aquifer.
- Continuing groundwater production at rates and in aquifers that do not impact the ability of groundwater dependent ecosystems to access groundwater.¹¹⁵

To meet the sustainability goal, the GSP has developed sustainable management criteria and proposes a list of projects and management actions focusing largely on reducing

¹¹¹ 23 CCR § 345.20.

¹¹² 23 CCR § 354.22 *et seq.*

¹¹³ 23 CCR § 354.24.

¹¹⁴ 23 CCR § 354.24; Santa Monica GSP, Section 3.1, p. 297.

¹¹⁵ 23 CCR § 354.22; Santa Monica GSP, Section 3.1, p. 297.

groundwater production, increasing storage, and improving water quality. The GSP also identifies data gaps related to seawater intrusion and plans to fill the data gaps by adding new monitoring wells. The GSA plans to monitor and adjust groundwater production in addition to other projects and management actions throughout the 50-year GSP implementation and planning horizon.¹¹⁶

Overall, Department staff conclude the GSP's discussion and presentation of information on the sustainability goal covers the specific items listed in the regulations in an understandable format using appropriate data. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and therefore have no significant concerns regarding the quality, data, and discussion of this subject in the GSP.

4.3.2 Sustainability Indicators

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results.¹¹⁷ Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon, significant and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water¹¹⁸ – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result.

GSP Regulations require that GSAs provide descriptions of undesirable results including defining what are significant and unreasonable potential effects to beneficial uses and users for each sustainability indicator.¹¹⁹ GSP Regulations also require GSPs provide the criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.¹²⁰

GSP Regulations require that the description of minimum thresholds include the information and criteria relied upon to establish and justify the minimum threshold for each

¹¹⁶ Santa Monica GSP, Section 3.1, p. 298.

¹¹⁷ 23 CCR § 351(ah).

¹¹⁸ Water Code § 10721(x).

¹¹⁹ 23 CCR §§ 354.26 (a), 354.26 (b)(c).

¹²⁰ 23 CCR § 354.26 (b)(2).

sustainability indicator.¹²¹ GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,¹²² and the relationship between the minimum thresholds for each sustainability indicator, including an explanation for how the GSA has determined conditions at each minimum threshold will avoid causing undesirable results for other sustainability indicators.¹²³

GSP Regulations require that GSPs include a description of the criteria used to select measurable objectives, including interim milestones, to achieve the sustainability goal within 20 years.¹²⁴ GSP Regulations also require that the measurable objectives be established based on the same metrics and monitoring sites as those used to define minimum thresholds.¹²⁵

The following subsections thus consolidate three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, pertaining to the processes and criteria relied upon to define undesirable results applicable to the Subbasin, as quantified through the establishment of minimum thresholds, are addressed for each applicable sustainability indicator. A submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a basin.¹²⁶

4.3.2.1 Chronic Lowering of Groundwater Levels

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the chronic lowering of groundwater, the GSP Regulations require the minimum threshold for chronic lowering of groundwater levels to be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results that is supported by information about groundwater elevation conditions and potential effects on other sustainability indicators.¹²⁷

The GSP describes the significant and unreasonable chronic lowering of groundwater levels as conditions that prevent municipal and private well operators from meeting their water demands using local groundwater sources.¹²⁸ The Plan also states that the reduction in groundwater supply would result in a higher demand for imported water, which will result in higher water costs for all users in the Subbasin. Other factors the GSA has considered may constitute undesirable results caused by a decline in groundwater levels include:

- Water quality degradation management projects' effectiveness is impaired,

¹²¹ 23 CCR § 354.28 (b)(1).

¹²² 23 CCR § 354.28 (b)(4).

¹²³ 23 CCR § 354.28 (b)(2).

¹²⁴ 23 CCR § 354.30 (a).

¹²⁵ 23 CCR § 354.30 (b).

¹²⁶ 23 CCR § 354.26 (d).

¹²⁷ 23 CCR § 354.28(c)(1) *et seq.*

¹²⁸ 23 CCR § 354.26 (b) (3); Santa Monica GSP, Section 3.2.1, p. 300.

- Significant and unreasonable seawater intrusion is induced, or
- Subsidence that substantially interferes with land users is induced.¹²⁹

The GSP defines undesirable results of chronic lowering of groundwater levels as “groundwater elevations that are below the minimum threshold at five out of the eight groundwater level representative monitoring points for two consecutive spring monitoring events”.¹³⁰ The Plan notes that the City of Santa Monica is the primary groundwater user in the Subbasin, and that a loss of the city’s 50% groundwater production capacity would constitute an undesirable result for the city.¹³¹ However, the GSP does not explain the rationale for choosing five out of eight (62%) representative monitoring wells to define the city’s undesirable results (50% loss of capacity), nor why a loss of 50% is significant and unreasonable while a loss of 20% (for example) is not significant and unreasonable. Department staff recommend the GSA provide additional information related to how an undesirable result was defined and will be identified in the Subbasin (see [Recommended Corrective Action 3a](#)).

Department staff conclude the decision to set sustainable management criteria based on spring measurements may not adequately consider the interests of beneficial uses and users. As for municipal users, the City of Santa Monica’s water demand is the highest in the summer/fall, and groundwater levels typically hit seasonal lows where potential impacts to beneficial uses and users will be most severe. The GSA’s decision to set sustainable management criteria for the chronic decline of groundwater levels based on the highest anticipated groundwater levels of the season in spring, instead of during the time of most impacts in summer or fall, is flawed as it likely disregards potential impacts to beneficial uses and users from seasonal variations. The GSA should revise the sustainable management criteria to be based on seasonal low groundwater levels to ensure potential impacts to beneficial uses and users are considered (see [Recommended Corrective Action 3b](#)).

The Plan sets the minimum threshold at each representative monitoring well corresponding to the mid-point of the combined thickness of the Silverado and Sunnyside aquifers at production wells.¹³² The Plan presents the selected minimum threshold values in both tabular¹³³ and graphic¹³⁴ formats, indicating that the minimum thresholds are 150 feet lower than the historical lows near the Charnock Wellfield and 50 - 75 feet lower near the Olympic Wellfield. The Plan describes that the minimum thresholds were selected by analyzing the well construction information, production history, and previous investigations and assessing the levels at which the Subbasin may experience a depletion of groundwater supply related to groundwater elevation.¹³⁵ The analysis indicates that

¹²⁹ Santa Monica GSP, Section 3.2.1, p. 300.

¹³⁰ Santa Monica GSP, Section 3.2.7.1, p. 309.

¹³¹ Santa Monica GSP, Section 3.2.1, p. 301.

¹³² Santa Monica GSP, Section 3.3.1.1, pp. 311-312.

¹³³ Santa Monica GSP, Table 3-2, p. 310.

¹³⁴ Santa Monica GSP, Figure 3-3, p. 353.

¹³⁵ Santa Monica GSP, Section 3.2.1, pp. 301-302.

“...a depletion of groundwater supply may occur when pumping groundwater elevations in the San Pedro Formation fall below the approximate mid-point elevation of the combined Silverado and Sunnyside aquifer. ” At this level, “three of the City of Santa Monica’s current drinking water production wells would go dry (Charnock 13, 16, and 19) ... and would reduce the City’s current ability to produce groundwater by approximately 50%.”

The Plan describes the effects of the minimum thresholds on beneficial uses and users including municipal well operators, public and private water purveyors, local land use planning agencies, environmental users, and disadvantaged communities.¹³⁶ The Plan states that the selected minimum thresholds will protect the municipal well operator (i.e., the City of Santa Monica) and the disadvantaged communities, which are connected to the city’s water distribution system. The selected minimum thresholds will not impact local land use agencies because only the City of Santa Monica relies on groundwater produced from the Subbasin. The Plan also states that the selected minimum thresholds will not impact the environmental groundwater user such as GDEs in the Subbasin rely on shallow groundwater that is disconnected from the principal aquifer by the Bellflower Aquitard.

The GSP does not discuss how the selected minimum thresholds of groundwater levels would avoid negatively impacting the private wells (for irrigating the golf courses and the cemetery) and the environmental users (the Ballona Freshwater Marsh). Based on the information presented in the Plan, it does not appear the selection of minimum thresholds incorporated any private wells’ information. Also, as the Ballona Freshwater Marsh receives groundwater partially pumped from the Ballona Aquifer (hydraulically connected to the Silverado Aquifer),¹³⁷ Department staff question how its freshwater availability would be impacted at the minimum thresholds defined in the plan. Department staff recommend the GSA provide additional information and discussion of how the selected minimum thresholds may impact the private wells and environmental users (see [Recommended Corrective Action 3c](#)).

The GSP states that the selection of the minimum thresholds for groundwater levels will not cause undesirable results related to the other sustainability indicators.¹³⁸ However, the GSP does not provide sufficient information to support this conclusion, as described in detail below:

- **Seawater Intrusion.** The GSP explains that the minimum thresholds for groundwater levels will not cause undesirable results related to seawater intrusion because the minimum thresholds for groundwater levels are “separate from the chloride concentrations that will be used to determine whether or not the Subbasin is experiencing undesirable results from seawater intrusion.” However, because the minimum thresholds are 50 to 150 feet below the historical lows, it may

¹³⁶ Santa Monica GSP, Section 3.3.1.4, pp. 313-314.

¹³⁷ Santa Monica GSP, Section 2.4.7.4, p. 145.

¹³⁸ Santa Monica GSP, Section 3.3.1.2, pp. 312-313.

exacerbate and accelerate seawater intrusion in the Subbasin. The GSP states that the GSA will take action to mitigate the impact of seawater intrusion if that occurs, this is inconsistent with one of the Subbasin’s sustainability goals ensuring groundwater conditions to “support sufficient seaward flow of fresh water to prevent significant and unreasonable seawater intrusion.” Staff recommend the GSA provide additional information to support the selection of minimum thresholds for groundwater levels will not interfere with those developed for seawater intrusion.

- **Groundwater Storage.** The GSP states that the minimum thresholds for groundwater levels will not interfere with those for groundwater storage because the GSP uses groundwater levels as a proxy. However, the water budget indicates that seawater intrusion may cause a portion of freshwater in the storage to be replaced by saline water (referred to as "Recharge from the Ocean" in the Plan). Department staff conclude the correlation between groundwater levels and groundwater storage may no longer exist if seawater is being induced into the Subbasin; therefore, recommend the GSA provide additional information to support the selection of minimum thresholds for groundwater levels will result in a significant and unreasonable reduction of groundwater storage.
- **Degradation of Groundwater Quality.** The GSP states that the minimum thresholds for groundwater levels were selected to avoid negatively impacting the existing groundwater remediation activities in the Subbasin. Since the minimum thresholds for groundwater levels are set significantly lower than the historical lows, it may change the groundwater gradient drawing more contaminated groundwater toward the production well fields. Although under the regulatory oversight of the State Water Resources Control Board, the GSP needs to verify the increased groundwater flow gradient due to lowered groundwater levels will not interfere with the existing groundwater remediation capacity.

Department staff conclude the GSP does not sufficiently discuss the relationship between the sustainable management criteria for chronic lowering of groundwater levels and other sustainability indicators. While the Plan includes a brief discussion, it does not provide a thorough analysis of how the proposed management of lowering groundwater levels 50 to 150 feet below historical lows will prevent significant and unreasonable effects for the other sustainability indicators. Department staff recommend the GSA analyze and provide information to the GSP detailing how the proposed minimum thresholds will avoid causing undesirable results for the other sustainability indicators, including groundwater storage, seawater intrusion, and degradation of water quality, as required by the GSP Regulations (see [Recommended Corrective Action 3d](#)).

The GSP states that the selection of the minimum thresholds for groundwater levels will not adversely impact the adjacent basins.¹³⁹ The GSP states that the Santa Monica Subbasin is separated from the Hollywood and Central Subbasins by the Newport-

¹³⁹ Santa Monica GSP, Section 3.3.1.2, pp. 312-313.

Inglewood fault. The GSP indicates that there is subsurface flow between the Santa Monica Subbasin and the West Coast Subbasin. However, modeling results presented in the GSP show that the inter-basin flow between the Santa Monica Subbasin and the West Coast Subbasin adjudicated area would decrease from 1,000 acre-feet per year historically to a reversed flow rate of 400 acre-feet per year,¹⁴⁰ a 1,400 acre-feet per year change which was identified as a concern in a public comment submitted by the adjudicated area water master. Department staff recommend the GSA coordinate with neighboring basins about future changes in underflow. For more information about potential impacts to adjacent basins, please see [Section 4.6](#) of this report.

The GSP sets the measurable objective 100 feet higher than the minimum threshold so that it could provide an estimated water supply buffer of five to ten years for the City of Santa Monica.¹⁴¹ The resulting measurable objectives will be within 50 feet of the top of the Silverado Aquifer and approximately 50 feet below the historical low at each of the City of Santa Monica's production wells. The Plan presents the measurable objectives in both tabular¹⁴² and graphic¹⁴³ formats. The GSP notes that the Groundwater Model projects that future groundwater elevations are near the 2016 elevations and higher than the measurable objectives.¹⁴⁴ Therefore, the GSP does not establish interim milestones for groundwater levels.¹⁴⁵ Department staff recommend the GSA re-evaluate the measurable objectives once the GSA updates the Groundwater Model and addresses the identified recommended corrective actions.

In summary, the GSA selected the minimum thresholds for groundwater levels based on a level that would indicate a depletion of supply for municipal wells. While municipal uses are the primary beneficial use of groundwater in the Subbasin, the GSP does not fully consider the potential impacts of the selected minimum thresholds on other beneficial uses such as environmental uses and private wells. The GSP defines the undesirable results related to the chronic lowering of groundwater levels based on a quantitative description of the combination of minimum threshold exceedances as required by the GSP Regulations but does not provide sufficient information to explain how the GSA selected sustainable management criteria. Additionally, the GSA's selection of the minimum thresholds for groundwater levels needs additional discussion and information to support the conclusion that it will not adversely impact other sustainability indicators and the adjacent basins.

Given the urban setting of the Subbasin where all residents are supplied municipal water which is also under the purview of an Urban Water Management Plan, the identified recommended corrective actions do not preclude plan approval at this time. While the GSA must perform further analysis and potentially revise the sustainable management

¹⁴⁰ Santa Monica GSP, Section 3.3.1.3, p. 313.

¹⁴¹ Santa Monica GSP, Section 3.4.1, p. 321.

¹⁴² Santa Monica GSP, Table 3-3, p. 320.

¹⁴³ Santa Monica GSP, Figure 3-3, p. 353.

¹⁴⁴ Santa Monica GSP, Section 3.2.1, p. 300, Figure 3-1, p. 349.

¹⁴⁵ Santa Monica GSP, Section 3.4.1, pp. 321-322.

criteria for the chronic lowering of groundwater levels to ensure beneficial uses and users are adequately considered in the management of the Subbasin, this analysis can be provided in the periodic evaluation to the GSP. Department staff expect the GSA to update the plan accordingly and potentially refine the groundwater level sustainable management criteria as more information becomes available to ensure the sustainable management criteria for the chronic lowering of groundwater levels meets the requirements of GSP Regulations.

4.3.2.2 Reduction of Groundwater Storage

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the reduction of groundwater storage, the GSP Regulations require the minimum threshold for the reduction of groundwater storage to be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.¹⁴⁶

The GSP uses groundwater levels as a proxy to define the minimum thresholds and measurable objectives for the reduction of groundwater storage.¹⁴⁷ The GSP states reduction of groundwater in storage is directly related to the chronic lowering of groundwater levels. Department staff note that the Subbasin’s western boundary is the Pacific Ocean and that the GSP identifies that seawater intrusion is projected to occur in the Subbasin. Staff are concerned this influx of seawater will cause a portion of freshwater extracted to be replaced by saline water, potentially invalidating the correlation between groundwater levels and storage. GSP Regulations require that GSAs establish the minimum threshold for reduction of groundwater storage by identifying the total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. However, if groundwater levels are used as a proxy, the GSA must provide sufficient information about the correlation between groundwater levels and the reduction of groundwater storage to determine whether is an appropriate proxy given the unique conditions within the Subbasin.¹⁴⁸

4.3.2.3 Seawater Intrusion

The GSP states that significant and unreasonable seawater intrusion may limit the operational capacity and flexibility of groundwater quality management projects resulting in higher water costs for all users in the Subbasin.¹⁴⁹ Department staff note that the GSP appears to limit its evaluation of impacts from seawater intrusion on beneficial uses and users to municipal users only operated by the City of Santa Monica.

The GSP defines the undesirable results related to seawater intrusion as when “the concentration of chloride exceeds 500 mg/L at six of the ten water quality representative

¹⁴⁶ 23 CCR § 354.28(c)(2).

¹⁴⁷ Santa Monica GSP, Section 3.3.2.1, p. 314.

¹⁴⁸ 23 CCR § 354.28 (c)(2).

¹⁴⁹ Santa Monica GSP, Section 3.2.3, p. 303.

monitoring points for two consecutive annual groundwater quality sampling events.”¹⁵⁰ As described above, the identified representative monitoring wells for seawater intrusion primarily consist of the City of Santa Monica’s production wells located inland near the central portion of the Subbasin.¹⁵¹ Department staff note this appears to be inconsistent with one of the Subbasin’s sustainability goals to ensure groundwater conditions “support sufficient seaward flow of fresh water to prevent significant and unreasonable seawater intrusion” as the representative monitoring wells are located multiple miles inland from the ocean. Department staff recommend the GSA revise the definition of undesirable results to include all beneficial uses and users in the Subbasin, not only the City of Santa Monica’s municipal production wells. Additionally, explain how the GSA’s definition of undesirable results is consistent with one of the Subbasin’s sustainability goals ensuring groundwater conditions to “support sufficient seaward flow of fresh water to prevent significant and unreasonable seawater intrusion” (see Recommended Corrective Action 4a).

The GSP does not discuss the potential impacts of seawater intrusion on other beneficial uses and users such as private wells (for golf courses and cemeteries) and environmental users (the Ballona Freshwater Marsh). The freshwater marsh receives groundwater pumped from the Ballona Aquifer in the southern portion of the Subbasin near the Pacific Ocean; therefore, the Ballona Aquifer Freshwater Marsh may be impacted first if seawater intrusion occurs. Department staff recommend the GSA provide additional information to describe what constitutes significant and unreasonable effects of seawater intrusion for the private wells and the Ballona Freshwater Marsh (see [Recommended Corrective Action 4b](#)).

The GSP sets the minimum threshold for seawater intrusion at 500 mg/L at each of the representative monitoring point.¹⁵² The GSP states that the minimum thresholds for seawater intrusion intent to protect “the long-term beneficial use of the Subbasin’s groundwater for municipal well operators.”¹⁵³ However, it does not appear the minimum threshold was selected to protect municipal use by preventing significant and unreasonable effects from occurring. Instead, it appears that the GSA will allow seawater intrusion but plans for additional treatment if seawater intrusion occurs. The GSP states, “[t]he minimum thresholds may require additional treatment for groundwater produced from the City of Santa Monica’s wells over time.”¹⁵⁴ The GSP indicates that the City of Santa Monica has planned for that contingency and is already treating the groundwater as a result of historical industrial contamination. The GSP identifies the lack of dedicated wells for monitoring seawater intrusion as a data gap,¹⁵⁵ and the GSA intends to address the data gap by adding up to two wells along the coast in the vicinity of Marina Del Rey.¹⁵⁶

¹⁵⁰ Santa Monica GSP, Section 3.2.7.2, p. 310.

¹⁵¹ Santa Monica GSP, Figure 3-2, p. 351.

¹⁵² Santa Monica GSP, Section 3.2.3, p. 302.

¹⁵³ Santa Monica GSP, Section 3.3.3.4, p. 317.

¹⁵⁴ Santa Monica GSP, Section 3.3.3.4, p. 317.

¹⁵⁵ Santa Monica GSP, Section 2.4.3.2, p. 133; Section 3.5.4.1, p. 334; Section 3.5.8.4, p. 346.

¹⁵⁶ Santa Monica GSP, Figure 3-7, p. 361; Section 3.2.7.2, p. 310; Section 3.5.8.4, p. 346.

With the additional of these wells, the GSA can gain a better understanding to identify the preferential flow pathways where seawater can intrude inland.

The GSP regulations require the minimum threshold for seawater intrusion to be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Department staff question whether the GSA met the GSP Regulations by simply selecting a set of wells that are far inland and currently not experiencing seawater intrusion. Without understanding where seawater intrusion is occurring in the Subbasin, it will be extremely difficult for the GSA to sustainability manage the seawater intrusion front and prevent significant and unreasonable effects from occurring. As stated in [Section 4.2.2](#), the GSA should investigate and identify where seawater intrusion is occurring in the Subbasin in each principal aquifer. Based on the results of the investigation, Department staff recommend the GSA develop the minimum threshold based on a chloride concentration isocontour map delineating an area along the coast where seawater intrusion may lead to undesirable results, as required by the GSP Regulations¹⁵⁷ (see [Recommended Corrective Action 4c](#)).

The GSP sets the measurable objectives for seawater intrusion as chloride concentrations in groundwater of 200 mg/L based on the objective for chloride defined in the Water Quality Control Plan for the Los Angeles Region (Basin Plan). While considering the numerical value acceptable, Department staff recommend the GSA develop the measurable objective using the same methodology identified in the recommended corrective action for the development of minimum threshold.

Overall, Department staff conclude that the GSP's discussion and presentation of information on seawater intrusion is extensive and using appropriate data, and that the GSP identifies the data gap and measures to fill the data gap in future periodic evaluation. Although seawater intrusion is not well understood in the Subbasin, there does not appear to be significant impacts to beneficial uses and users occurring based on the information presented in the GSP or through public comments. Allowing the GSA to further investigate seawater intrusion to improve future management of the sustainability indicator is warranted given the lack of monitoring data in the Subbasin. While the identified recommended corrective actions do not preclude plan approval at this time. Department staff expect the GSA to update the plan accordingly and potentially refine the groundwater level sustainable management criteria as more information becomes available.

4.3.2.4 Degraded Water Quality

In addition to components identified in 23 CCR §§ 354.28 (a-b), for degraded water quality, the GSP Regulations require the minimum threshold for degraded water quality to be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds

¹⁵⁷ 23 CCR § 354.28(c)(3).

concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.¹⁵⁸

The GSP does not establish sustainability management criteria for groundwater quality. The GSP states that significant and unreasonable degradation of groundwater quality occurred in the Subbasin prior to 2015 resulting from historical industrial and manufacturing activities, as well as leaking underground storage tanks at multiple gas stations. The City of Santa Monica is actively remediating the contamination under the regulatory oversight of the State Water Resources Control Board and Regional Water Quality Control Board and is committed to the full restoration of the groundwater quality in the Subbasin through the groundwater treatment program.¹⁵⁹ The City of Santa Monica routinely tests groundwater samples for all Title 22 constituents¹⁶⁰ and treats groundwater to the drinking water standards before distribution.¹⁶¹ The GSP also notes that groundwater level declines in the City of Santa Monica's production wellfields will help control contaminants migrating toward the wellfields for remediation. Department staff note that the GSP does not provide information on whether the GSA coordinated with the regulatory agencies and whether they agree with the GSA's assessment on the impacts of groundwater levels on groundwater remediation efforts.

Department staff recognize that GSAs are not responsible for improving existing degraded water quality conditions. GSAs are required; however, to manage future groundwater extraction to ensure that groundwater use subject to its jurisdiction does not significantly and unreasonably exacerbate existing degraded water quality conditions. Where natural and other human factors are contributing to water quality degradation, the GSAs may have to confront complex technical and scientific issues regarding the causal role of groundwater extraction and other groundwater management activities, as opposed to other factors, in any continued degradation. As also discussed earlier in this report, setting the minimum thresholds for groundwater levels significantly lower than the historical lows, as well as potential seawater intrusion, may lead to degradation of groundwater quality. Based on this, Department staff conclude that degradation of groundwater quality is an applicable sustainability indicator to the Subbasin and thus the GSA must establish sustainable management criteria. Department staff recommend the GSA identify constituents of concern and establish sustainable management criteria as required by the GSP Regulations¹⁶² (see [Recommended Corrective Action 5](#)).

Overall, Department staff conclude the GSP's discussion and presentation of information on groundwater quality covers the specific items listed in the regulations in an understandable format using appropriate data. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and therefore have

¹⁵⁸ 23 CCR § 354.28(c)(4).

¹⁵⁹ Santa Monica GSP, Section 3.2.4, p. 304.

¹⁶⁰ Santa Monica GSP, Section 3.4.4, p. 323.

¹⁶¹ Santa Monica GSP, Section 3.2.4, p. 304.

¹⁶² 23 CCR § 354.28(c)(4).

no significant concerns regarding the quality, data, and discussion of this subject in the GSP.

4.3.2.5 *Land Subsidence*

In addition to components identified in 23 CCR §§ 354.28 (a-b), the GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.¹⁶³ Minimum thresholds for land subsidence shall be supported by identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects and maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum thresholds and measurable objectives.¹⁶⁴

The GSP states that the Subbasin has not experienced land subsidence in the past and that the minimal land subsidence reported from the central portion of the Subbasin was likely associated with tectonic forces rather than groundwater withdrawal. However, the GSP considers potential land subsidence may occur if groundwater levels drop below the historical conditions. The GSP proposes to use groundwater levels as a proxy to set the sustainability management criteria for land subsidence¹⁶⁵ based on the rationale that groundwater level decline will increase the pressure on the aquifer matrix likely causing the pore-structure to collapse resulting in land surface subsidence.¹⁶⁶

Department staff generally understand the Plan's rationale for using groundwater levels as a proxy for subsidence. However, Department staff note that while undesirable results related to land subsidence may not have occurred in the past, there is potential that undesirable results could occur in the future given the GSA's proposed management strategy to lower groundwater levels below historical lows in the Subbasin. Given the uncertainty of these novel conditions, Department staff conclude that groundwater levels may not be a suitable proxy for land subsidence. Department staff believe that it is critical for the GSA to monitor land subsidence using a method that can directly measure land elevation changes and provide quantitative data. Therefore, Department staff recommend the GSA establish sustainable management criteria for land subsidence utilizing a monitoring network that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations (see [Recommended Corrective Action 6](#)).

4.3.2.6 *Depletions of Interconnected Surface Water*

SGMA defines undesirable results for the depletion of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of

¹⁶³ 23 CCR § 354.28(c)(5).

¹⁶⁴ 23 CCR §§ 354.28(c)(5) (A-B).

¹⁶⁵ Santa Monica GSP, Section 3.2.5, pp. 305-306.

¹⁶⁶ Santa Monica GSP, Section 3.2.5, p. 305.

surface water and are caused by groundwater conditions occurring throughout the basin.¹⁶⁷ The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the basin and estimate the quantity and timing of depletions of those systems.¹⁶⁸ The GSP Regulations further require that minimum thresholds be set based on the rate or volume of surface water depletions caused by groundwater use, supported by information including the location, quantity, and timing of depletions, that adversely impact beneficial uses of the surface water and may lead to undesirable results.¹⁶⁹

The GSP states that interconnected surface water is not present in the Subbasin because all channels in the Subbasin are lined with concrete to facilitate flood protection with the exception of the last three miles of Ballona Creek that has paved or boulder-lined banks and unpaved bottom. The GSP states that the unlined portion of the channel and the groundwater dependent ecosystems are located within the sediments of the Bellflower Aquitard that is hydraulically disconnected from the principal aquifer. As discussed earlier in [Section 4.1.2](#), the GSA should differentiate the upper alluvium layer from the Bellflower Aquitard layer and clarify that surface water and groundwater dependent ecosystems are only connected to the shallow groundwater within the upper alluvium but separated from the principal aquifer by the Bellflower Aquitard.

GSP Regulations state that an Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators (23 CCR § 354.26(d)). Because the GSP has demonstrated that all surface waters in the basin are disconnected from the producing aquifers, Department staff conclude that the GSP is not required to establish sustainable management criteria for depletions of interconnected surface water, pending the GSA sufficiently addresses the identified recommended corrective action.

4.4 MONITORING NETWORKS

The GSP Regulations describe the monitoring network that must be developed for each sustainability indicator including monitoring objectives, monitoring protocols, and data reporting requirements. Collecting monitoring data of a sufficient quality and quantity is necessary for the successful implementation of a groundwater sustainability plan. The GSP Regulations require a monitoring network of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.¹⁷⁰ Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,¹⁷¹ monitor changes in groundwater conditions relative to measurable objectives

¹⁶⁷ Water Code § 10721(x)(6).

¹⁶⁸ 23 CCR § 354.16 (f).

¹⁶⁹ 23 CCR § 354.28 (c)(6).

¹⁷⁰ 23 CCR § 354.32.

¹⁷¹ 23 CCR § 354.34(b)(2).

and minimum thresholds,¹⁷² capture seasonal low and high conditions,¹⁷³ include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.¹⁷⁴

The GSP designated the City of Santa Monica's eight municipal production wells located primarily in the central portion of the Subbasin as the representative monitoring wells for groundwater levels.¹⁷⁵ Department staff understand the city is the primary groundwater user of the Subbasin, and the GSP also identifies private well owners and environmental users as beneficial users. Department staff recommend the GSA re-evaluate the sufficiency of the groundwater level monitoring network if the GSA revises the sustainable management criteria by addressing the recommended corrective actions.

The GSP proposes to use the groundwater level monitoring network as a proxy for the groundwater storage monitoring network because changes in groundwater storage are directly related to changes in groundwater levels.¹⁷⁶ Because the potential for seawater intrusion exists,¹⁷⁷ losses in groundwater in storage could potentially be replaced by seawater; thus, measuring groundwater levels as a proxy may require additional considerations.

The GSP describes a monitoring network for seawater intrusion. The monitoring network consists of the City of Santa Monica's ten municipal production wells located in the central portion of the Subbasin. and the GSA uses chloride concentration measured at these wells once every three years as part of Title 22 compliance to assess if seawater intrusion occurs in the Subbasin. The GSP also proposes two future monitoring wells located in the area between Marina del Rey and the Charnock Wellfield to fill the data gap for the lack of monitoring wells in this area. Department staff consider that the proposed monitoring network is suitable for monitoring seawater intrusion after addressing the data gap.

The GSP describes a water quality monitoring network that consists of the City of Santa Monica's ten municipal production wells intended to monitor water quality condition in the Silverado aquifer. These wells are analyzed monthly for volatile organic compounds, quarterly for physical and select chemical parameters, and every three years for general mineral and physical and inorganic constituents as part of Title 22 compliance.¹⁷⁸

The GSA does not propose any specific monitoring network for land subsidence as undesirable results related to land subsidence is not occurring or not likely to occur in the future for the Subbasin. However, The GSA intends to monitor subsidence using

¹⁷² 23 CCR § 354.34(b)(3).

¹⁷³ 23 CCR § 354.34(c)(1)(B).

¹⁷⁴ 23 CCR §§ 354.34(g-h).

¹⁷⁵ Santa Monica GSP, Section 3.2.7, p. 308.

¹⁷⁶ Santa Monica GSP, Section 3.5.4.2, p. 335; Section 3.5.5.2, p. 343.

¹⁷⁷ Santa Monica GSP, Section 2.4.3.2, p. 133.

¹⁷⁸ Santa Monica GSP, Section 2.4.4, p. 134.

groundwater levels as a proxy for land subsidence in combination of the monitoring data from the continuous GPS station as well as InSAR data from the Department.

The GSP states that no connection exists between surface water and the principal aquifer, and that undesirable results related to depletions of surface water are not occurring and are not likely to occur in the future. As a result, the GSA does not propose any specific monitoring network for interconnected surface water.

Department staff note that most components of the GSP monitoring well network were installed before SGMA and have a long historical record, but the Plan does not describe any data management system. Department staff recommend that the GSA describe how and where those monitoring data are stored and how the public can access the data.

In summary, Department staff conclude that the GSP's description of monitoring well network is consistent with the GSP Regulations. The GSA should continue collecting monitoring data as specified in the GSP, follow SGMA data and reporting standards,¹⁷⁹ fill data gaps identified in the GSP prior to the first periodic update,¹⁸⁰ update monitoring network information as needed, follow monitoring best management practices,¹⁸¹ and submit all monitoring data to the Department's Monitoring Network Module immediately after collection including any additional groundwater monitoring data that is collected within the Plan area that is used for groundwater management decisions. If GSAs do not fill their identified data gaps, the GSA's basin understanding may not represent the best available science for use to monitor basin conditions.

4.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.¹⁸² Each Plan's description of projects and management actions must include details such as: how projects and management actions in the GSP will achieve sustainability, the implementation process and expected benefits, and prioritization and criteria used to initiate projects and management actions.¹⁸³

The GSP proposes five projects and five management actions that focus largely on reducing groundwater production, increasing storage, and improving water quality. The GSP describes respective expected benefit, circumstances for implementation and schedule, permitting and authority.

The five projects include:

¹⁷⁹ 23 CCR § 352.4 *et seq.*

¹⁸⁰ 23 CCR § 354.38(d).

¹⁸¹ Department of Water Resources, 2016, [Best Management Practices and Guidance Documents](#).

¹⁸² 23 CCR § 354.44 (a).

¹⁸³ 23 CCR § 354.44 (b) *et seq.*

1. Increase recycled water production for non-potable and potable reuse by expanding the existing Santa Monica Urban Runoff Recycling Facility and the construction of a below-ground advanced water purification facility.¹⁸⁴
2. Feasibility study and the potential recharge groundwater aquifers via (yet to be installed) injection wells using advanced treated water from Project 1.¹⁸⁵
3. Production efficiency enhancement by improving the Arcadia Water Treatment Plant efficiency.¹⁸⁶
4. Install two additional monitoring wells.¹⁸⁷
5. Conduct additional investigations and/or technical studies to fill in data gaps identified in the model projections and hydrogeologic conceptual model.¹⁸⁸

The five management actions include:

1. Adjust or shift groundwater production in different geographic areas as needed to meet water level and/or seawater intrusion objectives.¹⁸⁹
2. Impose replenishment or imported water purchase/pumping offset fees to develop and support projects that would increase recharge and purchase additional imported water when groundwater production exceeds the production rates modeled in the future baseline scenarios.¹⁹⁰
3. Develop a Salt Nutrient Management Plan (SNMP).¹⁹¹
4. Develop a groundwater allocation for the Subbasin when groundwater production rates equal or exceed the estimated sustainable yield of the Subbasin.¹⁹²
5. Increase water conservation through continuation of existing water saving programs and implementation of new incentives and programs.¹⁹³

The proposed projected and management actions are directly related to the sustainable management criteria and present a generally feasible approach to achieving the sustainability goal of the Subbasin and are presented in a manner generally consistent with the requirements of the GSP Regulations. Department staff recognize the City of Santa Monica is working on implementation of water recycling and stormwater storage project to reduce groundwater pumping and overall water supply reliability.

Department staff note that several projects or management actions have the same implementation circumstances with the same targeted measurable objective. Department staff recommend that the GSA provide additional information to clarify/justify the implementation priority among these projects/ management actions.

¹⁸⁴ Santa Monica GSP, Section 4.6, pp. 373-374.

¹⁸⁵ Santa Monica GSP, Sections 4.7-4.7.8, pp. 374-375.

¹⁸⁶ Santa Monica GSP, Sections 4.8-4.8.8, pp. 375-376.

¹⁸⁷ Santa Monica GSP, Sections 4.9-4.9.8, pp. 377-378.

¹⁸⁸ Santa Monica GSP, Sections 4.10-4.10.8, pp. 378-379.

¹⁸⁹ Santa Monica GSP, Section 4.1, pp. 363-364.

¹⁹⁰ Santa Monica GSP, Section 4.2, pp. 365-366.

¹⁹¹ Santa Monica GSP, Section 4.3, p. 368.

¹⁹² Santa Monica GSP, Section 4.4, p. 369.

¹⁹³ Santa Monica GSP, Section 4.5, p. 371.

Overall, Department staff conclude that the GSP’s discussion and presentation of projects and management actions cover the specific items listed in the regulations in an understandable format using appropriate data.

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.”¹⁹⁴ 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.¹⁹⁵

The Santa Monica Subbasin has two adjacent subbasins: Hollywood, Central, and West Coast Subbasins. Both of these adjacent subbasins are located within the Coastal Plain of Los Angeles Groundwater Basin and are hydraulically connected with the Santa Monica Subbasin. The Hollywood and Central and West Coast Subbasins are designated as low priority and are not required to be managed under SGMA. A portion of the West Coast Subbasin is designated as an adjudicated area and is managed under adjudication requirements.

The GSP describes that the inter-basin flow would change from historical 1,000 acre-feet per year (1985 -2015) flowing out of the Subbasin to the West Coast Subbasin, reversed the flow direction in the future at an average rate of 400 acre-feet per year.¹⁹⁶ The GSP states that the magnitude of the potential inter-basin flow changes “...is not anticipated to limit the ability of the West Coast Basin watermaster to sustainably manage this adjudicated area.”¹⁹⁷

Department staff note that the proposed minimum thresholds established for the Santa Monica Subbasin are significantly below historical low measurements in the Subbasin, which potentially will change underflows to the West Coast Subbasin adjudicated area. The Department also received comments from the watermaster in the adjacent adjudicated area in the West Coast Subbasin expressing concerns about the potential inter-basin flow changes between the Santa Monica Subbasin and the adjudicated area of the West Coast Subbasin.¹⁹⁸ Department staff recommend the GSAs coordinate with interested parties in the adjacent subbasin to ensure plan implementation of the GSP is not negatively impacting the adjacent West Coast Subbasin.

Department staff will monitor the inter-basin flow both into and out of the Santa Monica Subbasin during plan implementation to evaluate whether the implementation of the GSP is negatively impacting the ability of an adjacent basins to meet their sustainability goals.

¹⁹⁴ Water Code § 10733(c).

¹⁹⁵ 23 CCR § 354.28(b)(3).

¹⁹⁶ Santa Monica GSP, Section 3.3.1.3, p. 313.

¹⁹⁷ Santa Monica GSP, Section 3.3.1.3, p. 313.

¹⁹⁸ <https://sgma.water.ca.gov/portal/service/gsp/document/129>

Department staff will continue to review periodic updates to the Plan to assess whether implementation of the Santa Monica Subbasin GSP or adjacent GSPs are potentially impacting adjacent subbasins.

4.7 CONSIDERATION OF CLIMATE CHANGE AND FUTURE CONDITIONS

The GSP Regulations require a GSA to consider future conditions and project how future water use may change due to multiple factors including climate change.¹⁹⁹

Since the GSP was adopted and submitted, climate change conditions have advanced faster and more dramatically. It is anticipated that the hotter, drier conditions will result in a loss of 10 percent of California’s water supply. As California adapts to a hotter, drier climate, GSAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAs to:

1. Explore how their proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the Subbasin based on current and future drought conditions.
2. Explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the Subbasin given increasing aridification and effects of climate change, such as prolonged drought.
3. Take into consideration changes to surface water reliability and that impact on groundwater conditions.
4. Evaluate updated watershed studies that may modify assumed frequency and magnitude of recharge projects, if applicable.
5. Continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces²⁰⁰ to evaluate how their Plan’s groundwater management strategy aligns with drought planning, response, and mitigation efforts within the basin.

¹⁹⁹ 23 CCR § 354.18.

²⁰⁰ Water Code § 10609.50.

5 STAFF RECOMMENDATION

Department staff recommend the approval of the GSP with the recommended corrective actions listed below. The Santa Monica GSP conforms with Water Code Sections 10727.2 and 10727.4 of SGMA and substantially complies with the GSP Regulations. Implementation of the GSP will likely achieve the sustainability goal for the Santa Monica Subbasin. The GSA has identified several 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 GSA for the first periodic assessment of its 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 and clarification for the Subbasin's hydrogeologic conceptual model described in the Plan:

- a) Identify and describe the principal aquifers in the Subbasin including formation names, physical properties, including hydrogeologic properties, structural properties, and general water quality of each principal aquifer. Department staff additionally recommend identifying the principal aquifer for each aquifer and aquitard identified in the GSP.
- b) Provide clarification about the Bellflower Aquitard and the shallow aquifer:
 - Differentiate the upper alluvium layer (shallow aquifer) from the Bellflower Aquitard in the text description and all cross sections.
 - Provide physical properties (e.g., depth, transmissivity, specific yield etc.) for the shallow aquifer and the Bellflower Aquitard in Table 2-16.²⁰¹
 - Clarify that shallow groundwater and surface water occur in the shallow aquifer only instead of the Bellflower Aquitard.

RECOMMENDED CORRECTIVE ACTION 2

Investigate and identify where seawater intrusion is occurring in the Subbasin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.²⁰² Establish enough monitoring locations along the coast of the Subbasin and measure salinity as often as necessary to understand the extent and rate of increase of seawater intrusion conditions.

²⁰¹ Santa Monica GSP, Table 2-16, p. 123.

²⁰² 23 CCR § 354.16 (c).

RECOMMENDED CORRECTIVE ACTION 3

Provide the following information related to the sustainable management criteria for chronic lowering of groundwater levels:

- a) Provide information to support that significant and unreasonable impacts are not occurring prior to the identified undesirable result. Provide the process used to identify that a loss of 50% of municipal pumping capacity is significant and unreasonable for the Subbasin. Additionally, explain how the GSA determined that five of eight wells (62%) exceeding minimum thresholds is defined as undesirable result.
- b) Revise the sustainable management criteria to be based on seasonal low groundwater levels to ensure potential impacts to beneficial uses and users are considered.
- c) Explain how the GSA developed minimum thresholds that are protective of municipal beneficial uses and users considered other beneficial uses such as the golf courses and the cemetery and environmental users (e.g., Ballona Freshwater Marsh).
- d) Further evaluate how groundwater conditions at the minimum thresholds for groundwater levels will not interfere with other sustainability indicators such as seawater intrusion, degradation of water quality, and the reduction of groundwater storage.

RECOMMENDED CORRECTIVE ACTION 4

Provide the following information related to the sustainable management criteria for seawater intrusion:

- a) Revise the definition of undesirable results to include all beneficial uses and users in the Subbasin, not only the City of Santa Monica’s municipal production wells. Additionally, explain how the GSA’s definition of undesirable results is consistent with one of the Subbasin’s sustainability goals ensuring groundwater conditions to “support sufficient seaward flow of fresh water to prevent significant and unreasonable seawater intrusion.”
- b) Evaluate the potential impacts of seawater intrusion to other beneficial uses and users such as the private wells (golf courses and cemetery) and environmental users (Ballona Freshwater Marsh).
- c) Develop the minimum threshold for seawater intrusion based on a chloride concentration isocontour map delineating an area where seawater intrusion may lead to undesirable results, as required by the GSP Regulations.²⁰³

²⁰³ 23 CCR § 354.28(c)(3).

RECOMMENDED CORRECTIVE ACTION 5

Identify constituents of concern for the Subbasin and establish monitoring networks, sustainable management criteria for degradation of water quality as required by the GSP Regulations.²⁰⁴

RECOMMENDED CORRECTIVE ACTION 6

Establish sustainable management criteria for land subsidence for the Subbasin utilizing a monitoring network that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations.

²⁰⁴ 23 CCR § 354.28(c)(4).