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California Department of Water Resources
Sustainable Groundwater Management Office
715 P Street
Sacramento, California 95814

Subject: Submittal of Five-Year Periodic Evaluation for the San Pasqual Valley Basin Groundwater Sustainability Plan (Basin No. 9-010)

Dear Department of Water Resources Staff:

On behalf of the San Pasqual Valley Groundwater Sustainability Agency (SPV GSA), comprised of the City of San Diego and the County of San Diego, we are pleased to submit the Five-Year Periodic Evaluation of the 2022 San Pasqual Valley Basin (SPV Basin) Groundwater Sustainability Plan (2022 GSP) in accordance with the Sustainable Groundwater Management Act (SGMA) and California Code of Regulations §356.4.

The 2022 GSP was adopted by the SPV GSA member agencies and submitted to Department of Water Resources (DWR) in January 2022. DWR approved the 2022 GSP on October 26, 2023, and provided six recommended corrective actions for consideration during implementation and future plan updates. This Periodic Evaluation Report was prepared by Rincon Consultants, Incorporated and INTERA Incorporated, in collaboration with Snyder Geologic and Balk Biological Consulting, and assesses groundwater conditions, implementation progress, monitoring results, projects and management actions, new technical information, and the effectiveness of the 2022 GSP during the evaluation period covering Water Years 2020 through 2025.

The Periodic Evaluation Report documents the substantial work completed by the SPV GSA to advance implementation of the 2022 GSP and address DWR's recommended corrective actions. Notable efforts completed during this reporting period include:

- Completion of a Groundwater Dependent Ecosystem Study
- Expanded evaluation of interconnected surface waters and groundwater-dependent resources
- Development of sustainable management criteria and a monitoring framework for land subsidence
- Completion of a basin-wide well inventory and representative monitoring network assessment
- Collection and incorporation of additional groundwater level, groundwater quality, surface water, and land subsidence data
- Updates to the SPV Basin integrated groundwater/surface water model
- Continued implementation of projects and management actions identified in the 2022 GSP

Based on the analyses presented in this Periodic Evaluation Report, the SPV GSA finds that the SPV Basin remains sustainable, no undesirable results have occurred, and implementation of the 2022 GSP continues to meet the SPV Basin's sustainability goal. The evaluation further concludes that the existing 2022 GSP remains appropriate for continued implementation.

This Periodic Evaluation Report is not accompanied by a formal amendment to the 2022 GSP. The report identifies refinements, updated technical information, and recommendations for continued adaptive management, but does not propose revisions that constitute a GSP amendment under SGMA regulations.

The SPV GSA appreciates DWR's continued coordination and oversight during implementation of SGMA. We look forward to continuing our collaborative efforts to ensure the long-term sustainable management of groundwater resources within the SPV Basin.

If you have any questions regarding this submittal, please contact:

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Sincerely,

[Authorized SPV GSA Representative]

For the San Pasqual Valley Groundwater Sustainability Agency

Enclosures

Five-Year Periodic Evaluation Report for the San Pasqual Valley Basin Groundwater Sustainability Plan
Appendices A–J



Five-Year Periodic Evaluation

San Pasqual Valley Basin Groundwater Sustainability Plan

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MM/DD/YYYY

Signatures of Environmental Professionals

This Five-Year Periodic Evaluation was prepared in accordance with generally accepted environmental practices and procedures, under the direction of the following environmental professionals with Rincon Consultants.



Kelley List, PG
Principal, Water Resources

*This document has been
digitally signed and sealed by
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DRAFT

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Appendix D	San Pasqual Valley Basin Representative Monitoring Network Technical Memorandum
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Appendix F	Interconnected Surface Water and Groundwater Dependent Ecosystems Technical Memorandum
Appendix G	San Pasqual Valley Groundwater Model Update Technical Memorandum
Appendix H	San Pasqual Valley Basin Land Subsidence Recommended Corrective Actions
Appendix I	San Pasqual Valley Basin Groundwater Level Sustainable Management Criteria Technical Memorandum
Appendix J	Erratum to 2022 Groundwater Sustainability Plan

Acronyms and Abbreviations

AB	Assembly Bill
AC	Advisory Committee
AF	Acre-foot
AFY	Acre-feet per Year
APN	Assessor's Parcel Number
BCM	Basin Characterization Model
bgs	Below Ground Surface
BMP	Best Management Practice
CA	California
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
City	City of San Diego
CEDEN	California Environmental Data Exchange Network
County	County of San Diego
CWC	California Water Code
DSOD	California Division of Safety of Dams
DTW	Depth to Water
DWR	Department of Water Resources
ET	Evapotranspiration
EPM	TransNet Environmental Mitigation Program
FAQ	Frequently Asked Questions
FMP	Farm Process (MODFLOW package)
GAMA	Groundwater Ambient Monitoring and Assessment
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSA	Groundwater Sustainability Agency
GSE	Ground Surface Elevation
GSP	Groundwater Sustainability Plan
GWQ	Groundwater Quality
IDDE	Illicit Discharge Detection and Elimination

San Pasqual Valley Basin
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InSAR	Interferometric Synthetic Aperture Radar
IRWM	Integrated Regional Water Management
ISW	Interconnected Surface Waters
JPA	Joint Powers Authority
MA	Management Action
MCL	Maximum Contaminant Level
mg/L	Milligrams per Liter
MIROC5	Model for Interdisciplinary Research on Climate, Version 5
MO	Measurable Objective
MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer System
MT	Minimum Threshold
NAVD88	North American Vertical Datum of 1988
NCCAG	Natural Communities Commonly Associated with Groundwater
NDMI	Normalized Difference Moisture Index
NDVI	Normalized Difference Vegetation Index
NO ₃ N	Nitrate as Nitrogen
NPDES	National Pollutant Discharge Elimination System
NRD	Non-Routed Delivery
NWIS	National Water Information System
OHWM	Ordinary High Water Mark
OpenET	Open Evapotranspiration data platform
OSWCR	Online System for Well Completion Reports
PE	Periodic Evaluation
PMA	Project and Management Action
PRISM	Parameter-elevation Regressions on Independent Slopes Model
PT	Planning Threshold
PUD	Public Utilities Department
QA/QC	Quality Assurance/Quality Control
QR	Quick Response (code)
RCA	Recommended Corrective Action
RFI	Request for Information
RMA	Residential Management Area
RMWD	Ramona Municipal Water District
RTK	Real-Time Kinematic
SB	Senate Bill

SANDAG	San Diego Association of Governments
SDCWA	San Diego County Water Authority
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SNMP	Salt and Nutrient Management Plan
SPV	San Pasqual Valley
SPV GSA	San Pasqual Valley Groundwater Sustainability Agency
SPVRMG	San Pasqual Valley Resource Management Guide
SFR	Streamflow Routing (MODFLOW package)
TDS	Total Dissolved Solids
TM	Technical Memorandum
TPR	Technical Peer Review
UR	Undesirable Result
USGS	United States Geological Survey
WBS	Water Balance Subregion
WCR	Well Completion Report
WDL	Water Data Library
WMA	Watershed Management Area
WQIP	Water Quality Improvement Plan
WY	Water Year

Executive Summary

This Executive Summary provides a high-level overview of the implementation progress under the San Pasqual Valley Basin (SPV Basin) Groundwater Sustainability Plan (GSP), evaluates progress toward achieving the SPV Basin's sustainability goals, and summarizes new information developed during the current evaluation cycle.

Period of Evaluation

This Periodic Evaluation covers the implementation period from Water Year (WY) 2020 through WY 2025, consistent with the five-year evaluation requirements under the California Sustainable Groundwater Management Act (SGMA). SGMA passed in 2014 and requires the formation of local Groundwater Sustainability Agencies (GSAs) to oversee the development and implementation of GSPs, with the goal of achieving sustainable management of California's groundwater basins. Additionally, SGMA requires GSPs to be evaluated in the form of Periodic Evaluations every five years after the GSP is submitted to the Department of Water Resources (DWR) and whenever a GSP is amended (DWR 2023a). The purpose of this Periodic Evaluation is to provide an update to the DWR, interested parties, and the public on the progress the GSA has made on implementing the SPV Basin GSP.

GSP Amendment Status

This evaluation is not accompanied by an amended GSP. Findings indicate that the existing GSP remains appropriate for continued implementation, with updates incorporated into this evaluation to refine understanding and guide ongoing implementation.

Updated GSA Information and Governance

During the evaluation period, the SPV Basin's GSA framework remained stable. No substantial changes in participating agencies occurred. The governance processes, including board composition, decision-making procedures, and inter-agency coordination mechanisms remain consistent. Continued collaboration with member agencies of the GSA ensured consistent basin-wide data collection, reporting, and management actions.

DWR Feedback and Corrective Actions

This 5-Year Periodic Evaluation details numerous significant actions undertaken by the GSA to address the Corrective Actions provided to the GSA by the DWR in the *Groundwater Sustainability Plan Assessment Staff Report – San Pasqual Valley Basin* (attached as Attachment 1 to the determination letter) issued by DWR on October 26, 2023 (DWR 2023b). Below is a table of the recommended Corrective Actions and the status of each.

Table ES-1 Recommended Corrective Actions and Their Status

Recommended Corrective Action	Status of Corrective Action
1. Provide sufficient information regarding the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds.	Completed. Additional evaluation of groundwater levels, projected conditions, and well inventory data was conducted. A Groundwater Dependent Ecosystem (GDE) Study and Interconnected Surface Water (ISW) analysis confirm that groundwater levels remain protective of beneficial uses and users, including groundwater wells and environmental receptors. No groundwater level minimum threshold (MT) exceedances or related impacts were identified. Interactions with other sustainability indicators were evaluated and no adverse cross-impacts were found.
2. Revise the definition of undesirable results for degraded groundwater quality so that exceedances of minimum thresholds caused by groundwater extraction, whether they are a direct result of groundwater management activities or not, are considered in the assessment of undesirable results in the Basin.	Completed. The GSA evaluated groundwater quality trends relative to groundwater levels and pumping. Results demonstrate that nitrate and TDS exceedances are attributable to land use and surface water sources, not groundwater extraction. Accordingly, undesirable results are not occurring under the revised interpretation, and no changes to the definition are warranted.
3. Establish sustainable management criteria for land subsidence as required by the GSP Regulations.	Completed. Land subsidence conditions were evaluated using updated InSAR data. A monitoring network and Sustainable Management Criteria, including a planning threshold, have been established consistent with GSP Regulations. Observed subsidence is minimal and does not impact beneficial uses or infrastructure.
4. Address the following items related to sustainable management of depletions of interconnected surface waters (ISW).	Completed / Ongoing. The GSA conducted an ISW evaluation and completed a GDE Study to improve understanding of interconnectivity, timing, and beneficial uses. The undesirable results definition has been refined for consistency with regulatory requirements. Monitoring has been expanded, and coordination with regulatory agencies is ongoing. Groundwater levels continue to serve as a proxy; future updates will incorporate DWR guidance when available.
5. Address miscellaneous monitoring and data gaps, including subsidence monitoring and well construction details.	Completed / Ongoing. A basin-wide land subsidence monitoring network has been implemented using InSAR data. A 2025 well inventory and supporting data review improved monitoring network metadata and understanding of well construction. Monitoring network updates will be incorporated into the SGMA Portal, with continued refinement through adaptive management.
6. Conduct the GDE Study and update sustainable management criteria as needed.	Completed. The GDE Study was completed and incorporated into this evaluation. Results confirm that groundwater conditions are protective of GDEs, and no undesirable results are occurring. Based on the best available science, no updates to minimum thresholds or undesirable results are warranted at this time.

These corrective actions did not result in formal amendments to the 2022 GSP. Further discussions on the Recommended Corrective Actions are documented in subsequent sections within this Periodic Evaluation.

Sustainability Goal and Progress toward Sustainability

The sustainability goal laid out in the 2022 GSP for the SPV Basin is:

- To maintain a locally managed, economically viable, sustainable groundwater resource for existing and future beneficial use in the SPV Basin by managing groundwater to avoid the occurrence of undesirable results.

Undesirable results are evaluated based on the six sustainability indicators defined by SGMA Regulations include chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletion of interconnected surface water; however, seawater intrusion is not applicable to the SPV Basin.

Water Code § 10721(x) “Undesirable result” means one or more of the following effects caused by groundwater conditions occurring throughout the basin:

*(1) **Chronic lowering of groundwater levels** indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.*

*(2) Significant and unreasonable **reduction of groundwater storage**.*

*(3) Significant and unreasonable **seawater intrusion**.*

*(4) Significant and unreasonable **degraded water quality**, including the migration of contaminant plumes that impair water supplies.*

*(5) Significant and unreasonable **land subsidence** that substantially interferes with surface land uses.*

*(6) **Depletions of interconnected surface water** that have significant and unreasonable adverse impacts on beneficial uses of the surface water.*

DWR’s best management practices (BMPs) and Guidance Documents (DWR, 2021) state that “Undesirable results will be defined by minimum threshold exceedances.” A MT is defined in the SGMA regulations as a numeric value for each sustainability indicator used to define undesirable results. The SGMA regulations require a GSA to establish MTs that quantify groundwater conditions for each applicable sustainability indicator at each representative monitoring site. If a GSA-defined percentage of those monitoring sites exceed the minimum threshold for a specified duration, then an undesirable result for that sustainability indicator would be present.

Current data and analyses indicate that the GSP implementation is achieving the sustainability goal and the SPV Basin remains sustainable. Key findings include:

- Groundwater levels have remained stable within established thresholds.
- No undesirable results have been observed for any of the sustainability indicators.

GSP Implementation Progress and Significant New Information Collected

GSA implementation activities are progressing effectively and in alignment with the GSP framework. Notable accomplishments include:

- Groundwater levels remained within established thresholds with no MT exceedances during WYs 2020-2025. The SPV Basin continues to be effectively monitored and operates within its sustainable yield with no observed undesirable results.
- Installation and use of pressure transducers improved temporal resolution of groundwater level data. Continued collection of groundwater level, groundwater quality, and surface water data to support SGMA reporting and model updates.
- Implemented multiple Tier 0 Project and Management Actions (PMAs) (e.g., agricultural BMPs, outreach, coordination efforts). Advanced grant-funded and conceptual projects expected to provide long-term groundwater benefits (e.g., recharge, demand reduction).
- Conducted a basin-wide well inventory and field survey. Enhanced understanding of well construction, condition, and representativeness of monitoring networks.

Collectively, these activities demonstrate steady progress toward enhancing a robust, adaptive groundwater management program, supported by improved data and institutional coordination.

During this Periodic Evaluation cycle, the GSA incorporated several important datasets and technical advancements:

- GDE Study that included a desktop analysis, field verification, and identification of groundwater-dependent vegetation and habitat needs and improved understanding of ecological groundwater thresholds and connectivity.
- ISW Evaluation included refined mapping of interconnectivity and the improved understanding of spatial and temporal relationships between groundwater and surface water. Data gaps and monitoring needs for long-term management were also identified.
- Expanded Groundwater Monitoring Data with the collection of high-frequency groundwater level data from transducers and updated datasets for WYs 2020-2025 supporting trend analysis and model calibration.
- Reanalysis of InSAR land subsidence data (2015-2025) was completed to identify localized subsidence trends not previously resolved and established baseline conditions for subsidence monitoring and SMC development.
- A field survey of approximately 30 wells and an extensive database review were completed to improve well metadata and fill monitoring network data gaps.
- Groundwater Model Updates included the extension of the historical simulation period through 2024 using observed data; integration of updated hydrologic, pumping, and monitoring datasets; and improved ability to evaluate future groundwater conditions and climate scenarios.
- Additional supporting studies and datasets were developed including a groundwater recharge feasibility study, watershed and habitat restoration data, and expanded surface water and water quality datasets.

These new studies and datasets were used to reassess basin conditions relative to sustainable management criteria, improve confidence in observed trends, identify potential early warning indicators, and inform adaptive management strategies.

Outreach and Engagement

Since adoption of the 2022 GSP, the San Pasqual Valley (SPV) GSA has maintained active stakeholder and public engagement to support GSP implementation and long-term basin sustainability. Outreach efforts included stakeholder and community workshops, educational fact sheets, resource management guidance, website updates, and targeted communications focused on groundwater conditions, water quality, annual reporting, and implementation of PMAs. A total of 11 workshops were held between 2022 and 2026 that focused on annual reporting, groundwater conditions, recharge feasibility evaluations, and

the Periodic Evaluation process. Four of these workshops were held between 2025 and 2026 specifically to inform and engage with the public and interested parties regarding the 5-Year Periodic Evaluation process, preliminary findings, and to transparently respond to public comments on the Periodic Evaluation Report.

Outreach also included development and distribution of three educational resources (an IRWM Fact Sheet, the San Pasqual Valley Resource Management Guide, and a Nitrate/TDS Fact Sheet) that continue to support stakeholder awareness and implementation of best management practices. Through coordination with watershed programs, additional outreach reached approximately 1,800 septic-system parcels, more than 10 percent of homeowner associations, and 100 percent of inspected commercial facilities within priority watershed areas, helping support ongoing groundwater and water quality management efforts.

Conclusion

The SPV Basin GSP implementation continued to advance in a structured and adaptive manner, with progress supported by improved data, responsive governance, and active outreach and engagement. Current data and analysis indicate GSP implementation is achieving the sustainability goal, and the SPV Basin remains sustainable. Continued monitoring, evaluation, and adaptive management will support ongoing sustainable groundwater management.

1 Introduction and Background

This Five-Year Periodic Evaluation Report presents an assessment of groundwater sustainability planning and implementation in the San Pasqual Valley Groundwater Basin (SPV Basin) under the Sustainable Groundwater Management Act (SGMA). The San Pasqual Valley Groundwater Basin is managed by the San Pasqual Valley Groundwater Sustainability Agency (SPV GSA), comprised of the City of San Diego (City) and the County of San Diego (County), pursuant to the adopted 2022 Groundwater Sustainability Plan (2022 GSP).

Consistent with statutory and regulatory requirements, this report evaluates progress made during the first five years of GSP implementation, including changes in groundwater conditions, effectiveness of projects and management actions, and incorporation of new information. The evaluation also assesses whether the SPV Basin continues to achieve its sustainability goal and whether sustainable conditions are expected to be maintained through the 20-year implementation period and over the long-term planning horizon. In accordance with California Code of Regulations (CCR) § 356.4, this report provides a comprehensive review of SPV GSP implementation, identifies data gaps and adaptive management needs, and documents any proposed revisions to strengthen continued sustainable groundwater management.

This section provides an overview of SGMA regulatory background, including required content of Periodic Evaluations and how the SPV Basin meets the GSP Regulations and recommended guidance to prepare this report including reference to the Department of Water Resources (DWR) recommendations for corrective actions, and SPV GSA information. An outline of the report is included in Chapter 1.1.3.

1.1 Regulatory Background

SGMA was enacted in 2014, which established a statewide framework for sustainable groundwater management in California. SGMA requirements are set forth in a three-bill legislative package: Assembly Bill (AB) 1739 (Dickinson), Senate Bill (SB) 1168 (Pavley), and SB 1319 (Pavley), and is codified as California Water Code (CWC) Sections 10720–10737.8. SGMA requires that groundwater basins designated as medium- and high-priority be managed by local Groundwater Sustainability Agencies (GSAs) through the development and implementation of GSPs. These plans must define basin sustainability, identify measurable objectives and minimum thresholds to avoid undesirable results, and include projects and management actions to achieve sustainability within 20 years of plan implementation.

CWC §10721(v) “Sustainable groundwater management” means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

Under SGMA, high- and medium-priority basins not identified as critically overdrafted must be managed via adoption of a GSP by January 31, 2022 to reach long-term sustainability by 2042, within 20 years of adoption of the GSP pursuant to CCR §356.4. Separate from the 20-year implementation period, CWC Section 10721(r) defines a planning and implementation horizon as a 50-year period over which plans and measures are implemented to ensure the basin is operated within its sustainable yield. This longer horizon is used to evaluate whether sustainable groundwater conditions can be maintained beyond the 20-year implementation period.

Following adoption of GSPs, GSAs are responsible for implementing their GSPs and reporting progress annually to DWR on April 1. Each GSA is required to submit an annual report to DWR that summarizes basin conditions for the preceding water year, including groundwater levels, groundwater extraction,

surface water supplies, total water use, and changes in groundwater storage. These requirements are further defined in the GSP Regulations, which specify the content and data reporting standards for annual reports, including monitoring results and water budget components.

1.1.1 Periodic Evaluations

In addition to annual reporting, SGMA requires GSAs to conduct a comprehensive evaluation of GSP implementation at least every five years as set forth by CCR §356.4. The GSP Regulations require that each GSA evaluate its plan and submit a written five-year Periodic Evaluation to DWR that assesses whether implementation of the GSP, including projects and management actions, is achieving the basin's sustainability goal, and to identify any necessary adjustments (DWR 2023a).

CCR §356.4 Each Agency shall evaluate its Plan at least every five years and whenever the Plan is amended, and provide a written assessment to the Department. The assessment shall describe whether the Plan implementation, including implementation of projects and management actions, are meeting the sustainability goal in the basin...

Required Evaluation Components

Pursuant to GSP Regulations, the Periodic Evaluation must include the following elements, at a minimum, as summarized below from CCR §356.4. Additionally, criteria GSAs should consider criteria outlined in CWC §10728.2 when preparing their Periodic Evaluation.

- **Current Groundwater Conditions:** a description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives, interim milestones and minimum thresholds.
- **Projects and Management Action Performance:** a description of the implementation of any projects and management actions, and the resulting effects on groundwater conditions.
- **Reconsideration of Plan Elements:** review of key GSP components such as the basin setting, management areas, undesirable results, and sustainability criteria, with proposed revisions where necessary.
- **Updated Basin Setting and Overdraft Assessment:** an evaluation of the basin setting in light of new information or changes in water use, including identification of any significant changes. If the basin is experiencing overdraft conditions, an assessment of measures to mitigate the overdraft must be included.
- **Monitoring Network Assessment:** a description of the monitoring network within the basin, including 1) an evaluation of data collected to date; 2) identification of data gaps; 3) actions and priorities to improve the network; and 4) plans for acquiring and incorporating additional monitoring well metadata.
- **New Information and Adaptive Management:** a description of significant new information since GSP adoption, amendment, or last Periodic Evaluation, and an assessment of whether new information warrants changes to any aspect of the GSP.
- **Governance and Implementation Actions:** a description and documentation of relevant GSA actions taken including adopted regulations, ordinances, enforcement actions, and legal measures supporting GSP implementation.
- **Plan Amendments and Coordination:** a description of completed or proposed GSP amendments and a summary of coordination with other GSAs, adjacent basins, and land use agencies.
- **Additional Information:** other information deemed relevant by the GSA or required by DWR for its oversight to conduct a periodic review.

In addition to regulatory requirements, in October 2023, DWR issued *A Guide to Annual Reports, Periodic Evaluations, & Plan Amendments* (DWR Guidance) to clarify the content and level of analysis expected in periodic evaluations. The DWR Guidance is encouraged for GSAs to use to prepare their Periodic Evaluations but emphasizes that it does not propose any new legal requirements beyond GSP regulations

and SGMA and does not guarantee DWR approval of GSP implementation or compliance with SGMA (DWR 2023a).

1.2 Purpose and Outline of this Periodic Evaluation Report

The purpose of this Periodic Evaluation Report is to assess whether GSP implementation continues to achieve the Basin's sustainability goal, described in detail in Chapter 2. The Periodic Evaluation provides DWR, interested parties, and the public with an update on implementation of the 2022 GSP, required information included in this Periodic Evaluation, and resulting proposed revisions to Plan Elements (included here as Appendix A), including progress toward sustainability and overall GSP performance. This Periodic Evaluation Report also identifies and discusses proposed revisions to elements of the 2022 GSP in response to the *Groundwater Sustainability Plan Assessment Staff Report – San Pasqual Valley Basin* (attached as Attachment 1 to the determination letter) issued by DWR on October 26, 2023 (DWR 2023b; included here as Appendix B), as well as other new information collected through GSP implementation.

Specifically, this Periodic Evaluation Report summarizes and assesses: (1) new and significant information; (2) groundwater conditions for each applicable sustainability indicator identified in the 2022 GSP; (3) actions taken to address recommended corrective actions issued by DWR (DWR 2023b); (4) the status of projects and management actions (PMAs); (5) updates to the basin setting and monitoring network; and (6) authorities exercised and actions taken by the SPV GSAs during the evaluation period. The evaluation is based on a review of monitoring data, groundwater conditions and trends, and the effectiveness of implemented projects and management actions. It provides an evaluation of whether the SPV Basin is maintaining sustainable groundwater conditions and whether existing management actions remain adequate to support long-term sustainability, while identifying minor refinements to strengthen ongoing GSP implementation.

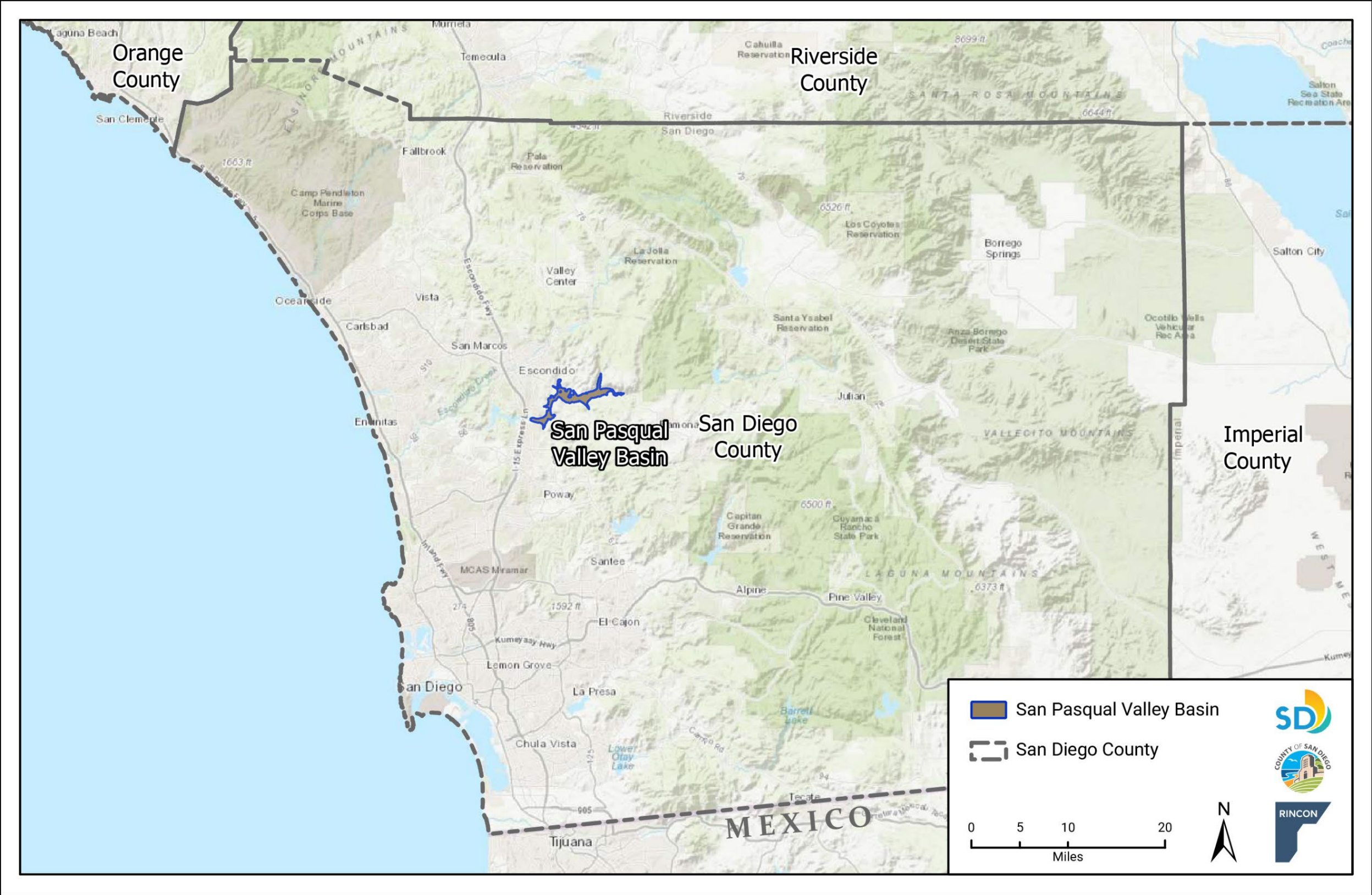
1.2.1 Periodic Evaluation Report Outline

This report is prepared using the following outline which follows DWR Guidance for writing Periodic Evaluations and addresses requirements under GSP Regulations CCR §356.4 and CWC §10728.2.

- **Chapter 1: Introduction and Background**, provides a summary of SGMA regulatory requirements focusing on Periodic Evaluations, the purpose of this Periodic Evaluation Report, and an overview of SPV Basin and SPV GSA information.
- **Chapter 2: Sustainability Goal for the SPV Basin**, includes a high-level summary of the sustainability indicators that are relevant to the SPV Basin and salient trends that were observed during development and adoption of the 2022 GSP.
- **Chapter 3: DWR Approval Letters, Recommended Corrective Actions, and Work Performed to Address Corrective Actions**, includes an overview of the 2023 DWR approval of the 2022 GSP and identification of DWR's six recommended corrective actions addressed in this report.
- **Chapter 4: New Information Collected**, summarizes new data and information collected and analyzed by the SPV GSA since adoption of the 2022 GSP, including ongoing monitoring and targeted studies.
- **Chapter 5: Groundwater Conditions Relative to Sustainable Management Criteria**, evaluates groundwater conditions relative to Sustainable Management Criteria (SMCs) established in the 2022 GSP including recent monitoring data to assess trends, compare current conditions to thresholds and objectives, evaluate progress toward measurable objectives, and documents any updates to SMCs, monitoring networks, and related DWR-recommended Corrective Actions.

- **Chapter 6: Basin Setting Based on New Information, Groundwater Model Updates, or Changes in Water Use**, discusses topography, surface waters, recharge, and soils, and describes geologic history and setting, geologic formations present in and around the SPV Basin, and identifies the primary aquifer and its characteristics.
- **Chapter 7: Status of Projects and Management Actions**, includes summaries of the status of projects and management actions implemented, including ongoing and newly initiated efforts, changes to project scope or necessity, incorporation of new information affecting project development, and evaluation of achieved and anticipated benefits.
- **Chapter 8: Monitoring Networks**, addresses the additional analyses, surveys, and data mining undertaken as part of this report to improve the understanding of representative monitoring networks and their wells, including new information collected in response to DWR-recommended Corrective Action 5b.
- **Chapter 9: GSA Public Outreach, Engagement, and Coordination with Other Agencies**, summarizes public outreach, engagement, and interagency coordination activities conducted during implementation, including efforts to involve stakeholders and collaboration with GSAs, land use agencies, and federal, state, and local entities to support SGMA implementation.
- **Chapter 10: Other Information**, provides supplemental information supporting the Periodic Evaluation, including considerations of adjacent basin impacts, identification of technical, financial, and institutional challenges affecting GSP implementation, and discussion of any relevant legal issues or coordination needs not addressed elsewhere in the report.
- **Chapter 11: Summary of Proposed or Completed Revisions to Plan Elements**, summarizes the key components from this Periodic Evaluation Report and contains a brief overview of next steps, including a summary of how the SPV GSA intends to use this evaluation to support meeting the SPV Basin's sustainability goal.

Figure 1-1 San Pasqual Valley Basin Location in California and the County of San Diego



1.3 Groundwater Sustainability Agency Information

This section provides information about the SPV GSA including how it was formed and is managed. Discussions include summaries of the GSA's organizational structure and decision-making framework, the roles of the Core Team and Executive Group, and how the SPV GSA reaches final decisions.

1.3.1 SPV GSA Formation

The SPV GSA is a multi-agency GSA, comprised of the City and the County. Approximately 90-percent of the SPV Basin is under the jurisdiction of the City. The County jurisdiction includes the entire Basin; however, for the purposes of SGMA, the County manages the 10-percent of the Basin that is outside of City jurisdiction (Figure 1-2). In order to eliminate overlapping jurisdictions, the City and the County entered into a Memorandum of Understanding (MOU) on June 29, 2017, to create the multi-agency GSA. The County Board of Supervisors approved the MOU on June 21, 2017, and the City Council approved the MOU on June 27, 2017. Pursuant to CWC §10723.8, notice of formation of the SPV GSA was provided to DWR on June 28, 2017. This MOU established an agreement to cooperatively develop a single GSP for the SPV Basin that would be implemented in accordance with City and County jurisdictions. Figure 1-2 shows the City and County jurisdictional boundaries in the SPV Basin.

The SPV GSA covers 100 percent of the SPV Basin and is designated by DWR as an exclusive multi-agency GSA. Pursuant to DWR's *California's Groundwater Bulletin 118—Update 2003* (Bulletin 118) (DWR 2003), the Basin is designated Groundwater Basin Number 9-010 (09-010). The Memorandum of Understanding to Create a Groundwater Sustainability Agency was executed between the City and County on June 29, 2017 (City of San Diego and County of San Diego 2017) and the Notice of Intent to develop a GSP was provided to DWR on January 7, 2019 (City of San Diego 2019), included in the 2022 GSP as Appendix B and C, respectively.

1.3.2 SPV GSP and Annual Reporting

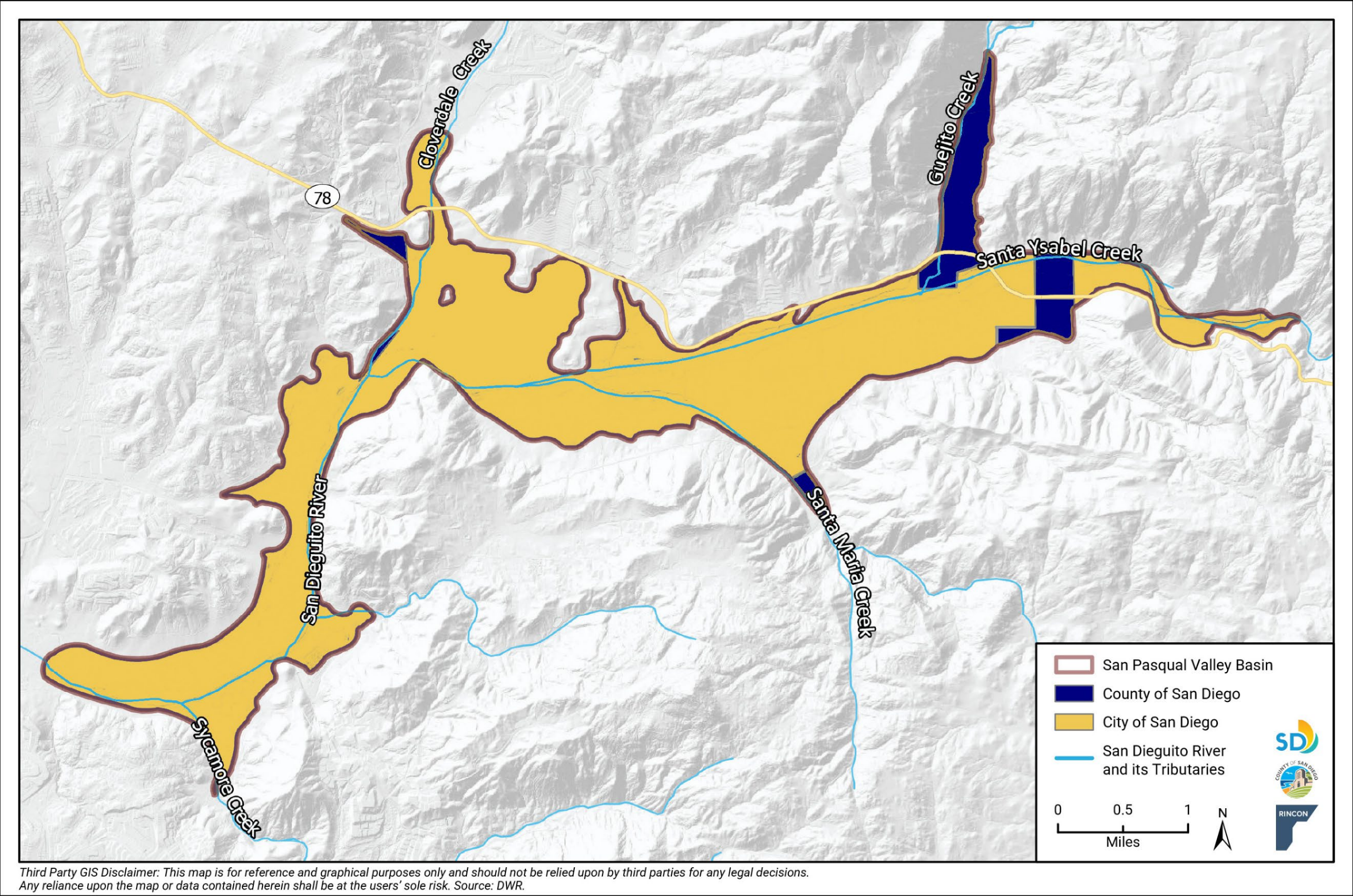
The SPV GSA worked collaboratively with stakeholders and interested parties during development of the 2022 GSP. The SPV GSA facilitated an Advisory Committee of local stakeholders, a Peer Review Group of technical and hydrogeological experts, and conducted multiple public workshops throughout the planning process. The City Council adopted the 2022 GSP on December 14, 2021, and the County Board of Supervisors adopted the 2022 GSP on January 12, 2022. The adopted 2022 GSP was submitted to DWR for approval on January 28, 2022, and DWR approved the GSP in 2023.¹

The 2022 GSP contains water budgets and changes in groundwater storage through Water Year (WY) 2019. Annual Reports² have been prepared and submitted to DWR following adoption of the 2022 GSP, Annual Reports have been submitted for WYs 2020, 2021, 2022, 2023 and 2024. The most recent Annual Report was prepared for the SPV Basin and submitted to DWR on April 1, 2026, which summarizes SPV Basin conditions for WY 2025.

¹ The 2022 GSP is publicly available at <https://sgma.water.ca.gov/portal/gsp/preview/75>.

² GSP Annual Reports are submitted to DWR by April 1 annually and are publicly available at <https://sgma.water.ca.gov/portal/gspar/submitted>

Figure 1-2 San Pasqual Valley Basin Jurisdictional Boundaries



1.3.3 SPV GSA Management Structure

The SPV GSA is managed by City and County representatives which are comprised of two groups, the SPV GSA Core Team and Executive Group, which collaboratively guided the 2022 GSP and Periodic Evaluation Report development process. Each agency implements the GSP in accordance with its jurisdictional boundaries, and these two management groups are described in detail below.

Core Team

The Core Team consists of City and County staff that are responsible for developing a coordinated GSP. City staff were designated to lead the effort in hiring the consultant and developing the GSP in collaboration with the County (City of San Diego and County of San Diego 2017). The GSP Core Team responsibilities include the following:

- Creating a detailed breakdown of City and County responsibilities for GSP implementation
- Calculating anticipated costs of implementing the GSP
- Recommending cost recovery mechanisms (if necessary)

The Core Team also appointed a representative from the City to be the main point of contact with DWR throughout implementation of the GSP. This representative is responsible for communicating actions conducted under the MOU (City of San Diego and County of San Diego 2017).

Executive Group

The Executive Group consists of City and County representatives (typically directors, general managers, and chief executives). This group is responsible for providing information, direction, and oversight to the Core Team on matters, such as:

- Progress on meeting goals and objectives
- Progress on implementing actions undertaken pursuant to the MOU and resolving issues related to those actions
- Measures to increase efficiency reaching the MOU's goals

Prior to GSP development, the Executive Group developed and approved guiding principles that established a foundation for collaborative discussion, planning, establishing operational values, and mutual understandings among members of the Core Team. The Executive Group is coordinated by a City representative (City of San Diego and County of San Diego 2017).

1.3.4 SPV GSA Legal Authority and Enforcement

As presented in the 2022 GSP, the SPV GSA is a multi-agency GSA comprised of the City and County. The City and County each have their own legal authorities under SGMA as a local agency. SGMA defines a local agency as “a local public agency that has water supply, water management, or land use responsibilities within a groundwater basin (Water Code § 10721(n))” (DWR, 2019). Any local agency or combination of local agencies overlying a groundwater basin is eligible to become a GSA for that basin. Pursuant to CWC Section 10723.8, the notice of intent to manage groundwater resources as the SPV GSA was provided to DWR on June 28, 2017.

The Periodic Evaluation is intended to describe any new authorities gained, established, or exercised since the last GSP submittal, including relevant actions related to regulations and ordinances and describe any enforcement or legal actions taken within the basin to further the sustainability goal. At the time of this report, there have been no changes to authorities as described in the 2022 GSP that have been implemented since adoption. This Periodic Evaluation Report and all accompanying Appendices will be submitted to the DWR for its review by January 28, 2026.

2 Sustainability Goal for the SPV Basin

This chapter provides a summary of the sustainability indicators that are relevant to the SPV Basin and salient trends that were observed during the writing and adoption of the 2022 GSP. Section 2.1 describes the sustainability indicators and associated SMCs relevant to the SPV Basin and as laid out in the 2022 GSP. Together, these indicators provide the foundation for evaluating whether the SPV Basin continues to meet its long-term sustainability objectives. Under SGMA, the SMCs are evaluated to the defined “sustainability goal,” which guides groundwater management over the implementation horizon. Accordingly, the overarching aim of SGMA is to establish and achieve the sustainability goal through the development and implementation of a GSP, with required measures to achieve sustainable conditions by 2042.

CWC § 10721(u) “Sustainability Goal” means the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield.

The SPV Basin’s sustainability goal is supported by the locally defined minimum thresholds (MTs) that prevent undesirable results (URs). Achievement of the goal is demonstrated by maintaining the sustainable yield for the SPV Basin and the avoidance of URs. Planning thresholds (PTs) were also established to inform the SPV GSAs in implementing proactive management actions prior to reaching MTs. The SPV Basin remains sustainable ahead of SGMA regulation’s timeline of 2042.

2.1 Sustainability Indicators and Undesirable Results

This section describes SGMA’s sustainability indicators, sustainability goals, and URs for the SPV Basin, and are defined as follows:

- **Sustainability Indicators:** These indicators are defined in DWR’s *Draft Best Management Practices for the Sustainable Management of Groundwater—Sustainable Management Criteria* (Sustainable Management Criteria BMP) (DWR 2017).
- **Sustainability Goal:** A sustainability goal qualitatively describes a basin’s overall objectives and desired conditions. The SPV Basin’s sustainability goal is presented above.
- **Undesirable Results:** URs statements are developed to describe the conditions under which each applicable sustainability indicator (listed below) would become significant and unreasonable and adversely affect beneficial uses in a basin.

SGMA defines sustainability indicators as one of six effects caused by groundwater conditions that, when significant and unreasonable, could potentially cause undesirable results. The six sustainability indicators are described by DWR as:

- **Chronic lowering of groundwater levels**, indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.
- 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.

- Significant and unreasonable **land subsidence** that substantially interferes with land uses.
- **Depletions of interconnected surface waters** that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

A sustainability goal is a qualitative description of the objectives and desired conditions in a basin. It is supported by locally defined undesirable results, monitoring networks (Section 8, *Monitoring Networks*), and sustainable management criteria including MTs, PTs, MOs, and interim milestones. The discrete, quantifiable criteria on which the sustainability goal is assessed are:

- **Minimum Thresholds:** Numerical benchmark established for each sustainability indicator that identifies unacceptable conditions. An undesirable result is considered to occur if a GSA-specified percentage of monitoring locations surpass the MT for a defined period of time.
- **Planning Thresholds:** Non-regulatory benchmark developed by the SPV GSA to support GSP implementation. The PT serves as an early alert, enabling the GSA to take proactive management actions before Minimum Thresholds are exceeded.
- **Measurable Objectives:** A clearly defined, quantifiable target for maintaining or improving groundwater conditions identified in an approved GSP to support long-term basin sustainability. MOs provide guidance for the GSA's ongoing groundwater management efforts throughout the GSP's planning and implementation timeframe.
- **Interim Milestones:** Refers to a target value representing measurable groundwater conditions, in increments of five years, set by a GSA as part of a GSP.

At the time of the 2022 GSP adoption, groundwater conditions and the water budget showed that the SPV Basin is in a sustainable condition. Since interim milestones are intended to show progress toward sustainability and the SPV Basin is already in a sustainable condition, the 2022 GSP did not identify interim milestones for the SPV Basin.

Through future Annual Reports, GSP updates, and regular monitoring, the SPV GSA will continue to reassess basin conditions to ensure that the SPV Basin remains sustainable over the planning horizon. Future evaluations will be reported in subsequent Annual Reports.

Additionally, the water budget for the SPV Basin indicates the SPV Basin has been operated within its sustainable yield (SPV GSA 2021). Conditions in the SPV Basin may change in the future, and the 2022 GSP included PMAs that the SPV GSA may undertake if conditions change, and additional management is necessary to maintain sustainability.

2.1.1 Chronic Lowering of Groundwater Levels

The chronic lowering of groundwater level sustainability indicator evaluates whether groundwater elevations are declining over time due to pumping exceeding recharge. Under SGMA, the concern is long-term declines that indicate depletion of the aquifer rather than short-term drought fluctuations. Persistent declines are a key warning sign of unsustainable management and often drive impacts to other sustainability indicators.

Undesirable Results

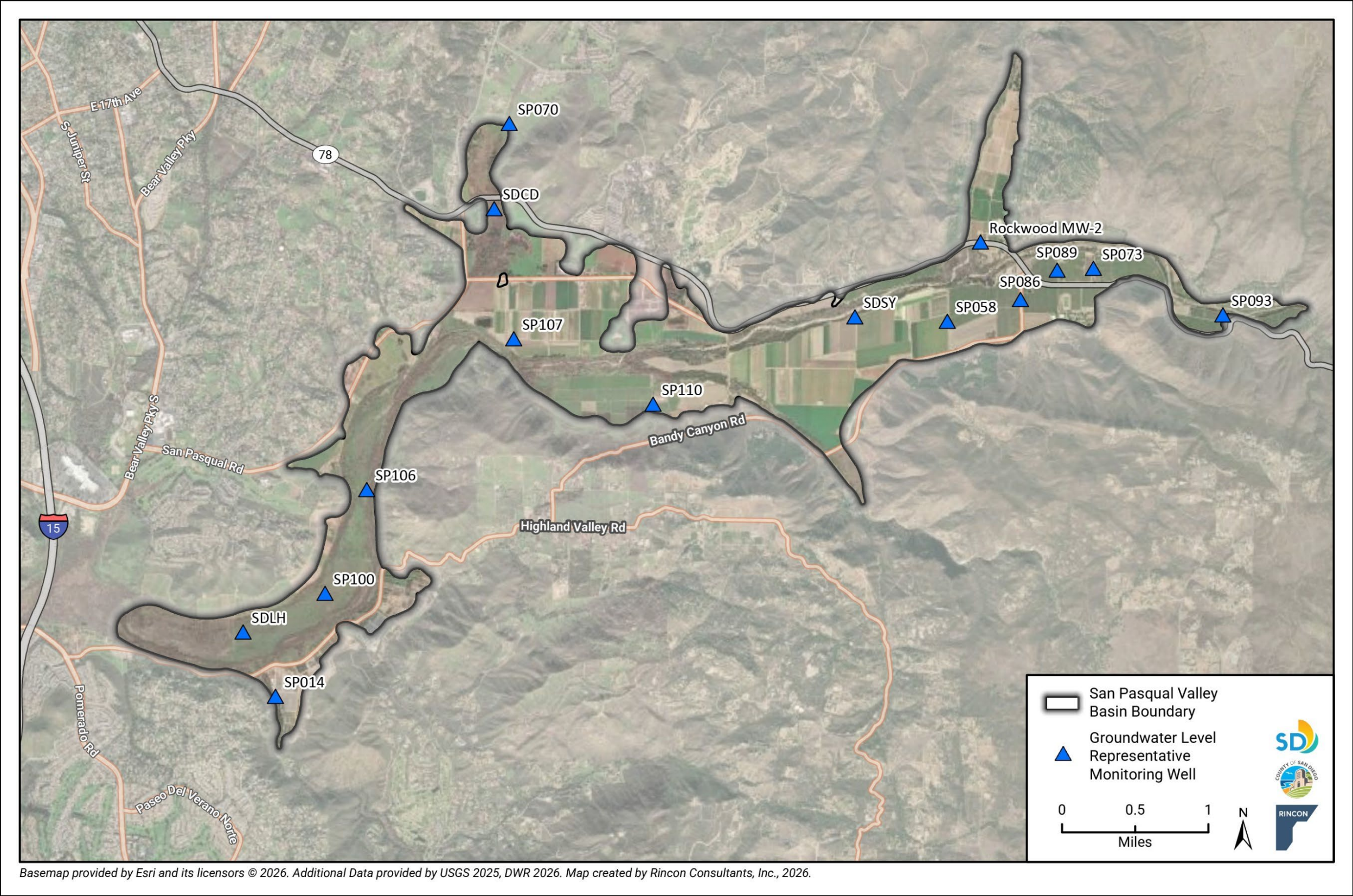
An undesirable result for the chronic lowering of groundwater levels is a result that causes significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of the 2022 GSP. The undesirable results would involve lowering water levels to depths not accessible by supply wells or levels that substantially limit water availability for GDEs.

2022 GSP, UR for Chronic Lowering of Groundwater Levels, is considered to occur during GSP implementation when 30 percent of representative monitoring wells (i.e., 5 of 15 wells) fall below their minimum groundwater elevation thresholds for two consecutive years.

Identification of Undesirable Results

As described in Chapter 8, the groundwater level monitoring network consists of 15 representative wells located throughout the SPV Basin (Figure 2-1). MT exceedances in five of these wells is considered indicative of a widespread decline in groundwater levels, as opposed to a more localized groundwater level decline (e.g., minimum threshold exceedances in one monitoring well), which could be associated with pumping concentrated in a particular area of the SPV Basin. Furthermore, groundwater levels in areas of the Basin fluctuate over a wide range in response to changes in conditions (see Chapter 4.1, Section 5.1.2). Therefore, sustained exceedances of MTs are more significant than short-term exceedances from a basin management perspective.

Figure 2-1 Map of Existing Groundwater Level Representative Monitoring Network in the SPV Basin



Sustainable Management Criteria

The 2022 GSP established the following thresholds used to prevent undesirable results related to the chronic lowering of groundwater levels:

Minimum Thresholds

MTs were set based on proximity to GDEs. For wells within 2,000 feet of a GDE, MTs were set at a more protective threshold equal to 100 percent of the historical groundwater range below the historic minimum. For wells farther than 2,000 feet from a GDE, MTs were set at 50 percent of that range. Because groundwater levels in the eastern Basin have historically fluctuated over a much wider range, these MTs allow greater groundwater-level declines than those established near GDEs.

Planning Thresholds

PTs were set based on proximity to GDEs. For wells within 2,000 feet of a GDE unit, PTs were set at a more protective threshold equal to the historical low groundwater elevations observed at these wells. For wells farther than 2,000 feet from a GDE, PTs were set at 30 percent of the five-year drought decline projected above the MTs. Because groundwater levels in the eastern Basin have historically fluctuated over a much wider range, these MTs allow greater groundwater-level declines than those established near GDEs. The PTs are established to give the GSA an 18-month lead time to provide the sufficient advance notice to plan and implement management actions before MTs are reached.

Measurable Objectives

MOs were set based on proximity to GDEs. For wells within 2,000 feet of a GDE, MOs were set at 10 feet below ground surface to remain within historical variability and provide more than a five-year drought buffer. For wells farther than 2,000 feet from a GDE, MTs were set at a calculated five-year drought decline (2011–2016, extrapolated as needed) to allow operational flexibility in deeper groundwater areas.

The MTs, PTs, and MOs calculated for the 15 representative monitoring wells as presented in the 2022 GSP are shown in Table 2-1.

Table 2-1 Sustainable Management Criteria for Groundwater Levels

City Well Name	SPV GSP Well Number	Representative for ISW	MT (feet bgs)	PT (feet bgs)	MO (feet bgs)	GSE (feet)
SP110	SPV GSP-19	No	60	51	30	375.3
SP107	SPV GSP-22	Yes	61	32	10	357.8
SP106	SPV GSP-23	Yes	32	17	10	335.9
SP100	SPV GSP-29	Yes	39	20	10	327.3
SP093	SPV GSP-36	No	100	75	15	468.2
SP089	SPV GSP-40	No	150	131	85	438.7
SP086	SPV GSP-43	No	99	84	51	431.4
SP073	SPV GSP-56	No	151	127	70	446.0
SP070	SPV GSP-59	No	38	19	10	381.5
SP058	SPV GSP-70	No	135	122	93	415.5
SDSY	SPV GSP-155	No	124	108	68	401.4
SDCD	SPV GSP-168	Yes	37	21	10	362.1
SDLH	SPV GSP-131	Yes	34	18	10	321.8
SP014	SPV GSP-114	Yes	35	20	10	330.0
Rockwood MW-2	SPV GSP-198	No	124	98	36	424.6

Notes:

bgs – below ground surface

GSE – ground surface elevation, datum is NAVD88

GDE – groundwater dependent ecosystem

ISW – interconnected surface waters

MO – measurable objective

MT – minimum threshold

PT – planning threshold

SPV GSP – San Pasqual Valley Groundwater Sustainability Plan

2.1.2 Reduction of Groundwater Storage

The reduction of groundwater storage sustainability indicator addresses the total volume of water stored in an aquifer system. While groundwater levels measure elevation at a point, storage reflects basin-wide water availability. Maintaining storage is critical because it supports drought resilience and long-term supply reliability.

Undesirable Results

An undesirable result for the reduction in groundwater storage is a result that causes significant and unreasonable reduction in the viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of the 2022 GSP. The undesirable results would involve insufficient groundwater availability to support these beneficial uses.

Identification of Undesirable Results

Groundwater storage is monitored by proxy through the measurement of groundwater levels. Consistent with DWR Best Management Practices and guidance, reductions in groundwater storage are evaluated using groundwater levels measured at representative monitoring sites, reflecting the volume of groundwater that can be withdrawn without causing undesirable results (DWR 2017). As described in

Chapter 8, the SPV Basin monitoring network includes 15 representative wells with good spatial distribution, such that groundwater-level trends reasonably represent basin-wide storage conditions.

Sustainable Management Criteria

MTs for groundwater level were established above the depths of most nearby supply wells, including all known domestic wells (Chapter 2, Section 2.1.1), and are therefore protective of effective groundwater storage. In addition, groundwater level PTs and MOs allow for temporary groundwater-level declines over a five-year period to accommodate drought storage. Accordingly, groundwater levels are an appropriate proxy metric for the groundwater storage sustainability indicator, and the adopted groundwater-level thresholds are protective of groundwater storage conditions.

2.1.3 Depletion of Interconnected Surface Waters

The depletion of ISW sustainability indicator addresses the hydrologic connection between groundwater and surface water (streams, rivers, wetlands). Excessive pumping can reduce groundwater contributions to these systems, leading to reduced streamflow or drying ecosystems.

Undesirable Results

The UR for depletions of ISWs is a result that causes significant and unreasonable adverse effects on beneficial uses of ISWs over the planning and implementation horizon of the 2022 GSP. The primary beneficial use of interconnected streams is water availability to support GDEs. Undesirable results can be associated with a substantial decrease in available groundwater that supports GDEs.

2022 GSP, Undesirable Results for Interconnected Surface Waters, is a result that causes significant and unreasonable adverse effects on beneficial uses of interconnected surface water over the planning and implementation horizon of this GSP.

Surface water features (streams) that are hydraulically connected to the underlying aquifer are designated as interconnected streams. This implies that the groundwater elevation in the aquifer beneath the stream is greater than the elevation of the stream bed. Pumping that causes lower groundwater levels in the vicinity of the stream that induce steeper gradients away from the stream can increase seepage from the stream, or during times when streams have gaining reaches, reduce groundwater discharge (baseflow) to the stream. Stream–aquifer interconnection in these areas may be transient based on a complex interaction among streamflow, precipitation, groundwater recharge, and pumping. In the SPV Basin, the interconnected streams occur in the western portion of the basin where groundwater conditions are shallow (Figure 2-2). Surface water runs off during intense storms and extended wet periods and discharges to Hodges Reservoir. There are no known diverters of surface water within the SPV Basin.

Identification of Undesirable Results

Depletions of ISWs are monitored by proxy through the measurement of groundwater levels. Per DWR Best Management Practices, “the minimum threshold metric for depletion of interconnected surface waters shall be a rate or volume of surface water depletion” (DWR 2017). The rates and volumes of surface water depletion can be estimated by calculation or modeling and are impractical metrics for thresholds for streamflow depletion. As described above, the primary beneficial use of interconnected streams is water availability to support potential GDEs. Groundwater levels are an important factor for the availability of interconnected groundwater to support potential GDEs, and therefore, the 2022 GSP uses groundwater levels as a proxy to monitor for surface water depletions.

As described in Chapter 8, Section 8.2.1, a subset of the groundwater level monitoring wells is used to monitor for depletion of interconnected groundwater. This ISW monitoring network consists of six representative monitoring wells located in the western portion of the SPV Basin that are within 2,000 feet of a potential GDE (Figure 2-2). **For ISWs, the SPV GSA determined that if 30 percent of the six wells (i.e., two of the six wells) in the western portion of the SPV Basin within 2,000 feet of a potential GDE fall below the PT simultaneously, the SPV GSA will consider conducting a study to determine the extent and locations of GDEs in the SPV Basin and will determine if additional potential PMAs are needed to address the protection of GDEs.**

Sustainable Management Criteria

MTs, PTs, and MOs for groundwater level at the six ISW monitoring wells were set at a more protective threshold than in the rest of the SPV Basin to reflect greater GDE sensitivity. MTs at these wells are equal to 100% of the historical groundwater range below the historic minimum groundwater level. PTs at these wells are equal to the historical low groundwater elevation for each well. MOs at these wells are set at 10 feet below ground surface to remain within historical variability and provide more than a five-year drought buffer. The MTs, PTs, and MOs calculated for the six representative ISW monitoring wells as presented in the 2022 GSP are shown in Table 2-2. During the course of the 5-Year Periodic Evaluation, one additional well was identified as an appropriate representative monitoring well for ISWs (SP-070) and is also included in the following table.

Table 2-2 Sustainable Management Criteria for Groundwater Levels at ISW Monitoring Wells

City Well Name	SPV GSP Well Number	MT (feet bgs)	PT (feet bgs)	MO (feet bgs)	GSE (feet)
SP107	SPV GSP-22	61	32	10	357.8
SP106	SPV GSP-23	32	17	10	335.9
SP100	SPV GSP-29	39	20	10	327.3
SP070 ¹	SPV GSP-59	38	19	10	381.5
SDCD	SPV GSP-168	37	21	10	362.1
SDLH	SPV GSP-131	34	18	10	321.8
SP014	SPV GSP-114	35	20	10	330.0

Notes:

¹ SP070 is not included in the existing interconnected surface waters monitoring network defined in the 2022 GSP. Due to proximity to an SPV GDE Unit during the 5-Year Periodic Evaluation, this well is included here and discussed further in later Sections.

bgs – below ground surface

GSE – ground surface elevation, datum is NAVD88

GDE – groundwater dependent ecosystem

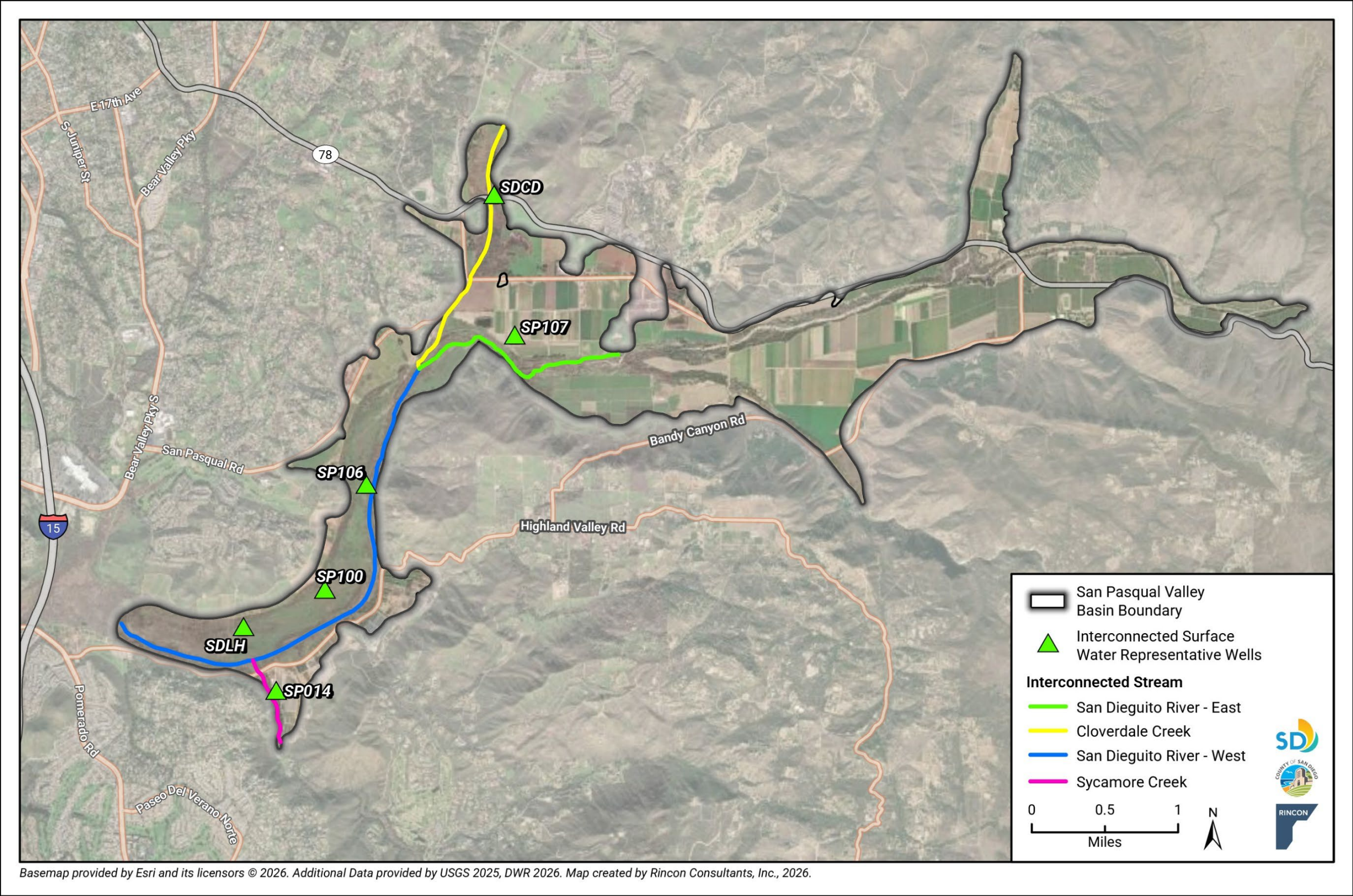
MO – measurable objective

MT – minimum threshold

PT – planning threshold

SPV GSP – San Pasqual Valley Groundwater Sustainability Plan

Figure 2-2 Map of Existing Interconnected Surface Waters Monitoring Network in the SPV Basin



2.1.4 Degraded Water Quality

The degraded water quality sustainability indicator addresses the chemical condition of water in the aquifer and whether it is becoming degraded in ways that impairs beneficial uses (drinking, irrigation, ecosystems). GSAs must consider both existing contamination and whether management actions (like pumping) could worsen conditions or spread pollutants.

Undesirable Results

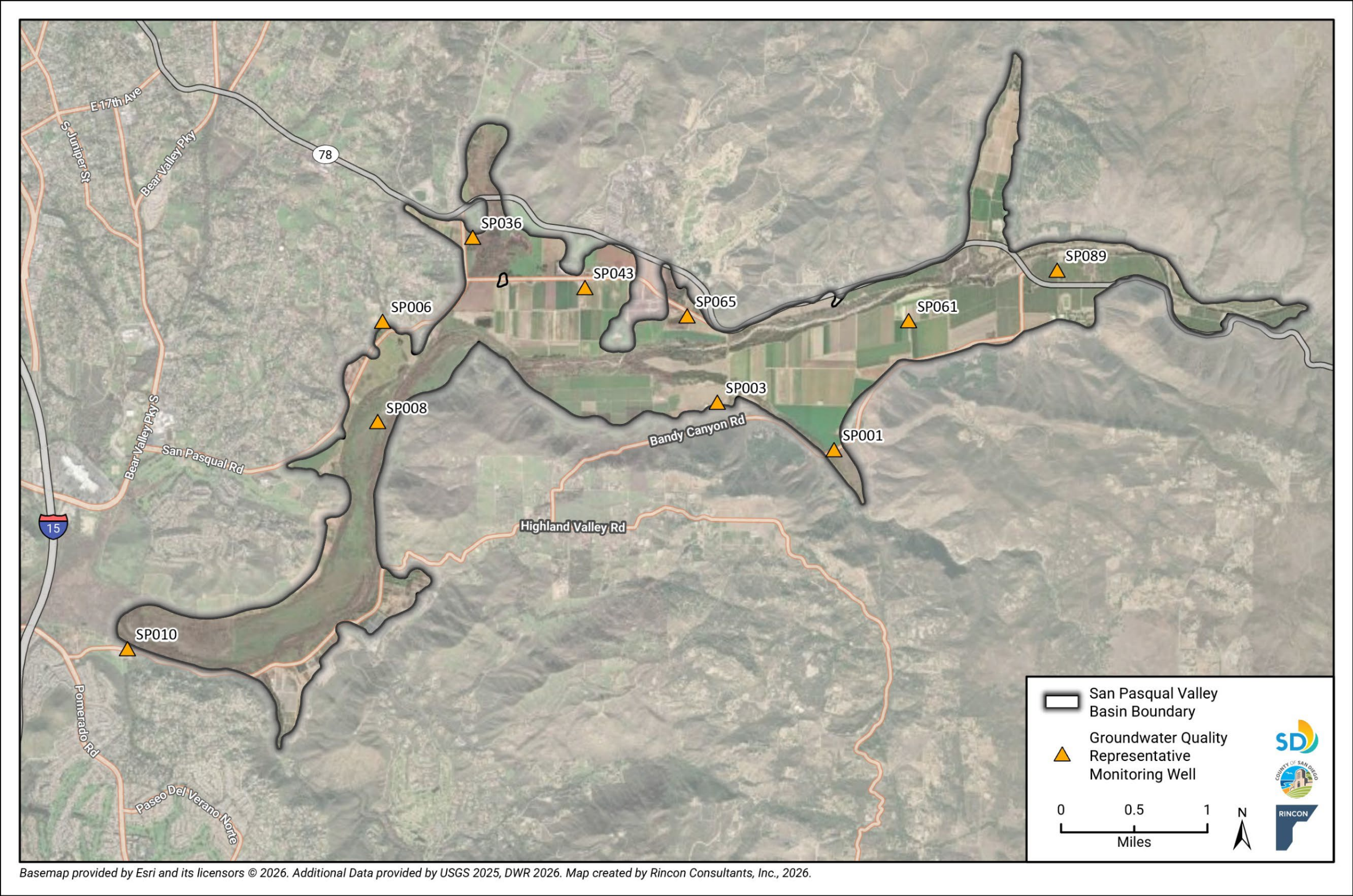
For degraded water quality to be characterized as an undesirable result, it must be associated with groundwater-management activities and the impacts those activities have on water quality. If those activities cause a significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of the 2022 GSP; that would be considered an undesirable result for degraded water quality.

2022 GSP, Undesirable Results for Degraded Water Quality, are considered to occur during 2022 GSP implementation when 30 percent of the representative monitoring wells (i.e., 3 of 10 wells) for water quality exceed the minimum threshold for a constituent for two consecutive years.

Identification of Undesirable Results

As described in Chapter 8, the groundwater quality monitoring network consists of 10 representative wells located throughout the SPV Basin (Figure 2-3). Analogous to groundwater levels, exceedances of MTs for groundwater quality in multiple wells are more representative of basin-wide conditions than exceedances in a single well. Additionally, the concentrations of TDS and nitrate have fluctuated year-to-year over a wide range in some wells (see Chapter 5, Section 5.4.2) and therefore, sustained exceedances of MTs are considered more indicative of basin-scale water quality issues than a one-time exceedance or anomalous occurrence.

Figure 2-3 Map of Existing Groundwater Quality Representative Monitoring Network in the SPV Basin



Sustainable Management Criteria

The 2022 GSP established the following thresholds used to prevent undesirable results related to degraded water quality, specifically relating to nitrate (as NO₃N) and total dissolved solids (TDS):

Minimum Thresholds:

- **Nitrate (as NO₃N):** 10 mg/L: consistent with the maximum contaminant level (MCL) established by the U.S. Environmental Protection Agency under the Safe Drinking Water Act (Titles 17 and 22 CCR).
- **TDS:** The higher of either the historical maximum measured concentration for the well or 1,000 mg/L, which is the upper secondary MCL for TDS. Setting the MT at the maximum reported concentration reflects existing historical water quality conditions in the SPV Basin. The secondary MCL for TDS is an aesthetic standard, and exceedances are not associated with toxicity or health risks.

The 2022 GSP defines groundwater quality sustainability criteria for nitrate and TDS. A separate PT is not explicitly defined. Instead, the SPV GSP evaluates exceedances of the MT across representative monitoring wells to determine whether undesirable results may be occurring.

Measurable Objectives:

- **Nitrate (as NO₃N):** 5 mg/L: which represents half of the MCL of 10 mg/L.
- **TDS:**
 - 1,000 mg/L for wells with historical concentrations above 1,000 mg/L. This concentration aligns with the upper secondary MCL for TDS and the water quality objective established in the SPV Salt and Nutrient Management Plan (City of San Diego, 2014).
 - 500 mg/L for wells with historical concentrations generally below 1,000 mg/L, consistent with the recommended secondary MCL for TDS

The MTs and MOs calculated for the 10 representative monitoring wells as presented in the 2022 GSP are shown in Table 2-3.

Table 2-3 Sustainable Management Criteria for Groundwater Quality

City Well Name	SPV GSP Well Number	Nitrate (as NO ₃ N)		Total Dissolved Solids	
		MT (mg/L)	MO (mg/L)	MT (mg/L)	MO (mg/L)
SP001	SPV GSP - 127	10	5	1,900	1,000
SP003	SPV GSP - 125	10	5	1,310	500
SP006	SPV GSP - 122	10	5	1,680	1,000
SP008	SPV GSP - 120	10	5	2,170	1,000
SP010	SPV GSP - 118	10	5	1,270	500
SP036	SPV GSP - 91	10	5	1,900	1,000
SP043	SPV GSP - 85	10	5	3,060	1,000
SP061	SPV GSP - 67	10	5	1,000	500
SP065	SPV GSP - 64	10	5	1,750	1,000
SP089	SPV GSP - 40	10	5	1,300	500

Notes:

mg/L – milligrams per liter

MO – measurable objective

MT – minimum threshold

SPV GSP – San Pasqual Valley Groundwater Sustainability Plan

2.1.5 Land Subsidence

The land subsidence sustainability indicator addresses the permanent sinking of land surface caused by compaction of compressible clays in the subsurface due to groundwater pumping. This can damage infrastructure (canals, roads, pipelines) and permanently reduce aquifer storage capacity, making it both an environmental and economic concern.

Identification of Undesirable Results and Sustainable Management Criteria

The 2022 GSP determined that land subsidence had not caused URs in the SPV Basin and was not anticipated to cause URs in the foreseeable future. Therefore, no SMCs or monitoring networks were set at the time of the 2022 GSP adoption. However, the DWR's October 2023 acceptance of the 2022 GSP included Recommended Corrective Actions 3 and 5a which directed the SPV GSA to establish SMCs and a monitoring network (respectively) for land subsidence. **These Recommended Corrective Actions are further discussed in Chapter 3, Sections 3.1.3 and 3.1.5, and Chapter 5, Section 5.5.**

2.1.6 Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator in the SPV Basin because seawater intrusion is not present and not likely to occur given the SPV Basin's distance from the Pacific Ocean, bays, deltas, or inlets. The SPV Basin is located approximately 25 miles northeast of downtown San Diego within the San Pasqual Valley and approximately 12 miles away from the Pacific Ocean. Therefore, there is no possibility of an UR due to seawater intrusion.

3 DWR Approval Letter, Recommended Corrective Actions, and Work Performed to Address Corrective Actions

DWR issued a determination letter to the SPV Basin GSA, care of City of San Diego Public Utilities Department, on October 26, 2023 which approved the 2022 GSP and provided an attached *Statement of Findings Regarding the Approval of the San Pasqual Valley Basin Groundwater Sustainability Plan* (Statement of Findings) which described that the SPV Basin GSP satisfies the objectives of SGMA and substantially complies with the GSP Regulations (DWR 2023b). In an exhibit to the Statement of Findings, the DWR included a *Groundwater Sustainability Plan Assessment Staff Report – San Pasqual Valley Basin* (Staff Report) which proposed six Recommended Corrective Actions that the DWR strongly encouraged be given due consideration and suggested incorporating all resulting changes to the GSP in future updates (Appendix B).

As part of this Periodic Evaluation, the SPV GSA is addressing the six Recommended Corrective Actions provided in the Staff Report, as described below.

3.1 DWR Recommended Corrective Actions

3.1.1 Recommended Corrective Action 1

Provide sufficient information regarding the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds. The GSA should address the following items:

- a. Provide information on impacts to groundwater wells during projected conditions where minimum thresholds are exceeded but undesirable results do not occur and quantify groundwater wells that will be impacted by the minimum thresholds.*
- b. Evaluate the impacts of minimum thresholds on other beneficial uses and users, such as environmental uses and users (GDEs).*
- c. Evaluate how the minimum thresholds for the chronic lowering of groundwater levels may impact other sustainability indicators (e.g., subsidence, water quality, depletion of interconnected surface water, etc.).*

Recommended Corrective Action 1 relates to the Chronic Lowering of Groundwater Levels sustainability indicator and is addressed in Chapter 5 Section 5.1.

3.1.2 Recommended Corrective Action 2

Revise the definition of undesirable results for degraded groundwater quality so that exceedances of minimum thresholds caused by groundwater extraction, whether they are a direct result of groundwater management activities or not, are considered in the assessment of undesirable results in the Basin.

Recommended Corrective Action 2 relates to the Degraded Water Quality sustainability indicator and is addressed in Chapter 5 Section 5.4.

3.1.3 Recommended Corrective Action 3

Establish sustainable management criteria for land subsidence as required by the GSP Regulations.

Recommended Corrective Action 3 relates to the Land Subsidence sustainability indicator and is addressed in Chapter 5 Section 5.5.

3.1.4 Recommended Corrective Action 4

Address the following items related to sustainable management of depletions of interconnected surface water:

1. *Revise the definition of undesirable results to be a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin required by the GSP Regulations.*
2. *Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions using the rate or volume of surface water depletions.*
3. *Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.*
4. *Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA's jurisdictional area.*

Recommended Corrective Action 4 relates to the Depletions of Interconnected Surface Waters sustainability indicator and is addressed in Chapter 5 Section 5.3.

3.1.5 Recommended Corrective Action 5

- a. *Establish a monitoring network for land subsidence that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations.*
- b. *Improve the understanding of well construction details of monitoring sites in the existing networks. Conduct a reconciliation between the details of the monitoring network provided in the GSP with the requirements of the data and reporting standards and representative monitoring in the GSP Regulations and include the required information in the periodic update of the Plan. As a reminder, updates to the monitoring network must be reflected in the SGMA Portal's Monitoring Network Module.*

Recommended Corrective Action 5a relates to the Land Subsidence sustainability indicator and is addressed in Chapter 5 Section 5.5. Recommended Corrective Action 5b is unrelated to a sustainability indicator and is addressed in Chapter 5 Section 5.4.

3.1.6 Recommended Corrective Action 6

Conduct the proposed GDE study, as described in Management Action 8, prior to the first periodic evaluation of the Plan. Update minimum thresholds and undesirable results quantification based on the best available science and information, including information gained from the proposed GDE study.

Recommended Corrective Action 6 is addressed in Chapter 4 Section 4.1, Chapter 5 Section 5.3, and Chapter 7 Section 7.2.8.

4 New Information Collected

Through the implementation of the SPV GSP, and completion of this first 5-Year Periodic Evaluation since 2022 GSP adoption, significant new data and information have been collected and analyzed by the SPV GSA and support staff. This includes both regular semi-annual or annual data collection and detailed studies in support of the PMAs, the 5-Year Periodic Evaluation, and in response to the DWR's Corrective Actions.

Across WYs 2020–2025 annual reporting periods for the SPV Basin, the primary regularly collected new data consisted of multiple, coordinated datasets to track groundwater system conditions and evaluate compliance with SGMA sustainability indicators. These datasets included (1) precipitation records, (2) groundwater level measurements, (3) groundwater storage estimates, (4) groundwater quality samples, and (5) groundwater extraction and total water use estimates. Precipitation data were obtained as monthly datasets from Parameter-elevation Relationships on Independent Slopes Model (PRISM) and aggregated annually to classify water year types (e.g., Wet, Dry, Critically Dry), which provides climatic context for interpreting groundwater conditions and storage trends. Groundwater level data were collected semiannually from a network of 15 representative monitoring wells, with measurements typically recorded seasonally (spring and fall conditions) and supplemented by continuous groundwater level data where transducers were installed on 10 of these wells beginning in 2022. Groundwater quality data were also collected from 10 representative monitoring wells and sampled semiannually (spring and fall) (Woodard & Curran 2022; 2023; 2024; Rincon 2025; Rincon 2026a).

Additional details are provided in the following subsections regarding new data and information that were collected between WYs 2020-2025 in support of SPV Basin PMAs and/or in support of the 5-Year Periodic Evaluation, and in response to DWR's Recommended Corrective Actions (DWR 2023b).

Table 4-1 summarizes the new information collected since the submittal of the original 2022 SPV GSP.

Table 4-1 Summary of New Information Collected Since Submittal of 2022 San Pasqual Valley GSP

Significant New Information	Description
Projects and Management Actions	
Invasive Species Removal Planning and Performance Monitoring (Project No. 2)	Baseline assessments, implementation tracking, and post-treatment monitoring were conducted to improve understanding of invasive species distribution, treatment effectiveness, and long-term restoration outcomes within the Santa Ysabel Creek corridor.
Farming BMP Implementation and Effectiveness Data (Management Action No. 1)	Regulatory monitoring, self-assessment reporting, and field-level performance data were compiled to evaluate the effectiveness of agricultural BMPs for reducing pollutant loading, improving irrigation efficiency, and protecting water quality.
Habitat Restoration Monitoring and Performance Assessment (Management Action No. 6)	Restoration planning, implementation records, and ecological monitoring data were collected to evaluate native vegetation establishment, invasive species reduction, and habitat recovery within the Hodges Watershed Improvement Project area.
Groundwater Recharge Feasibility Investigation (Management Action No. 7)	New hydrologic datasets, field investigations, infiltration testing, and groundwater modeling analyses were conducted to improve understanding of recharge potential and supported evaluation of future groundwater recharge strategies within the basin.
Groundwater Dependent Ecosystem Study Update (Management Action No. 8)	Expanded field surveys, remote sensing analyses, groundwater monitoring data, and hydrologic evaluations were incorporated to improve characterization of groundwater dependent ecosystems, groundwater trends, and ecosystem resilience.
2025 Well Survey	
Well Inventory	Field survey and database review of basin wells was completed to improve well construction information and identify candidate monitoring wells, supporting evaluation and potential enhancement of representative monitoring networks.
Degraded Water Quality Sustainability Indicator	
Groundwater Quality Monitoring Dataset Expansion	Expanded groundwater quality monitoring datasets were evaluated to assess nitrate and TDS trends, identify persistent exceedances, and improve understanding of temporal water quality conditions across the basin.
Surface Water Quality and MS4 Data Integration	Surface water quality and MS4 monitoring data were incorporated to evaluate potential contaminant sources and watershed influences affecting groundwater quality conditions.
Groundwater Quality Source and Trend Analysis	Updated analyses of groundwater quality patterns relative to land use, hydrology, and potential contaminant sources were incorporated to improve understanding of factors influencing nitrate and TDS concentrations throughout the basin.
Interconnected Surface Water Sustainability Indicator	
Interconnected Surface Water and GDE Assessment	New analyses of stream–aquifer interactions, groundwater dependent ecosystems (GDEs), and groundwater conditions were incorporated to improve understanding of interconnected surface waters and ecosystem dependence on groundwater.

Significant New Information	Description
SPV Groundwater/Surface Water Model	
SPV GSP Model v3.0 update	The integrated groundwater/surface water model was updated using newly available hydrologic, monitoring, and groundwater level datasets, extending the simulation period and supporting updated sustainability evaluations and future scenario analyses.
Land Subsidence Sustainability Indicator	
Updated Land Subsidence Analysis	Updated evaluation of DWR InSAR data using refined analytical methods improved characterization of land surface displacement and supported development of land subsidence sustainable management criteria.

4.1 New Information Collected in Support of the SPV GSP PMAs

4.1.1 Project No. 2—Coordinate on the Implementation of Invasive Species Removal

During the timeframe of this Periodic Evaluation, the GSA generated extensive new data and information through the Hodges Watershed Improvement Project specifically related to invasive species removal through planning analyses, implementation tracking, and ongoing monitoring. During the planning phase in 2020 through 2021, new baseline information was compiled through literature review, mapping, and field surveys to characterize the extent, density, and spatial distribution of priority invasive species within the Santa Ysabel Creek riparian corridor and adjacent watershed areas. These assessments identified key target species, including giant reed (*Arundo donax*), salt cedar (*Tamarix* sp.), eucalyptus, pampas grass, and other invasive non-native vegetation, and helped prioritize restoration sites and treatment approaches based on infestation severity and feasibility (City 2025).

During implementation in 2022 through 2024, detailed quantitative data were collected documenting the scale and effectiveness of invasive species removal efforts. This included measurements of treated areas (e.g., acres or square footage of invasive vegetation removed or controlled), counts of individual species addressed (such as eucalyptus trees), and records of treatment methods (mechanical removal, herbicide application, and biomass disposal) (City 2025).

Following implementation, new monitoring data collected between 2023 and 2025 focused on tracking invasive species re-establishment and treatment success over time. Monitoring included quarterly qualitative observations and annual quantitative surveys measuring invasive species cover relative to performance standards, with a target of 0% cover for priority species within restored areas. Monitoring results documented very low levels of re-growth (generally less than 1% cover), identification of new seedlings or resprouts, and subsequent adaptive management actions such as follow-up removal and retreatment. This iterative monitoring and maintenance approach generated time-series data on invasive species dynamics, demonstrating both the effectiveness of initial removal efforts and the need for continued control to address upstream seed sources and natural dispersal processes (City 2026).

Overall, the data collected between 2020 and 2025 provide a comprehensive record of invasive species conditions, treatment extent, and post-removal outcomes. These datasets show substantial reductions in invasive vegetation across the project area, improved control of priority species, and corresponding ecological benefits such as increased native plant establishment and enhanced habitat function, while also highlighting ongoing management needs to sustain long-term restoration success.

A detailed summary of the implementation progress of Project No. 2 in the SPV Basin is provided in Chapter 7 Section 7.1.2.

4.1.2 Management Action No. 1: Farming Best Management Practices

Since the adoption of the SPV GSP, the SPV GSA collected and evaluated a range of new data, monitoring results, and programmatic information to better evaluate and document the effectiveness of farming BMPs in reducing pollutant loading and improving watershed conditions. This information was drawn from many sources including regulatory monitoring under the Regional Agricultural Order and expanded field-level data collection efforts. The new data indicated that BMPs targeting nutrient management, irrigation efficiency, and erosion control were the most viable for improving water quality and meeting watershed objectives such as reducing nitrate inputs and limiting phosphorus and sediment transport to Hodges Reservoir (City 2022a).

A key data collection component during the timeframe of the Periodic Evaluation was the incorporation of systematic monitoring and self-assessment data required under the Regional Agricultural Order, including quarterly inspections, annual self-assessment reports (San Diego RWQCB 2016). These data provided direct, site-specific information on BMP implementation and effectiveness, including evaluation of irrigation practices, runoff management, erosion control, and chemical handling. The monitoring framework requires regular visual observations, water quality sampling (e.g., nutrients, salinity), and performance evaluations, allowing operators to identify deficiencies, document noncompliance incidents, and adapt BMPs over time. This iterative approach improved understanding of BMP effectiveness by linking on-the-ground practices with observed water quality outcomes and operational performance (City 2022a).

In addition, new technical information was incorporated on quantitative and qualitative indicators of BMP effectiveness, particularly for nutrient management and irrigation. Data from soil, water, plant tissue, manure, and feed testing programs provide improved estimates of nutrient inputs, availability, and losses, enabling operators to optimize fertilizer application and reduce excess nutrient loading. Similarly, irrigation monitoring tools, such as soil moisture monitoring, evapotranspiration-based scheduling, and system efficiency evaluations, generated data that demonstrated reductions in water use, runoff, and associated pollutant transport. These datasets highlighted that BMP effectiveness is strongly tied to improved management of inputs (water and nutrients), resulting in both environmental benefits (reduced loading to groundwater and surface water) and operational benefits (reduced costs and improved productivity) (City 2022a). Overall, the new BMP data and information incorporation reflect a shift toward data-driven evaluation of BMP effectiveness, combining regulatory monitoring, field data, and technical studies to support adaptive management and continuous improvement of water quality and habitat conditions in the SPV Basin.

A detailed summary of the implementation progress of MA No. 1 and installed BMPs in the SPV Basin is provided in Chapter 7 Section 7.2.1.

4.1.3 Management Action No. 6: Hodges Watershed Improvement Project

In the timeframe of this Periodic Evaluation, the Hodges Watershed Improvement Project generated substantial new data and information related to habitat restoration through a combination of planning, baseline assessments, implementation tracking, and post-installation monitoring. During the planning phase in 2020 through 2021, new information was collected through literature review, mapping analysis, and field reconnaissance to evaluate riparian habitat conditions along Santa Ysabel Creek and surrounding areas. These efforts identified priority restoration reaches based on the distribution and density of invasive species, geomorphic conditions, and feasibility constraints, and established a minimum restoration target of 17 acres. In addition, stakeholder input, including site visits with agricultural lessees, provided qualitative data on land use practices, pollutant sources, and restoration constraints, which informed site selection and restoration (City 2025).

During implementation in years 2022 through 2024, the project produced detailed quantitative records describing restoration activities and baseline conditions. These included mapping and measurement of invasive species removal (e.g., acres and square footage treated), installation counts of native vegetation (such as hundreds of container plants and willow cuttings), and application of native seed mixes across large treatment areas. Construction and as-built documentation, combined with biological monitoring during installation and the plant establishment period, also generated data on site conditions, irrigation performance, erosion control effectiveness, and establishment of and viability of vegetation (City 2025).

New monitoring data collected during and after restoration in the 2023 through 2025 timeframe focused on ecological performance metrics tied to habitat recovery. These included quantitative and qualitative assessments of native plant establishment (e.g., survival rates of installed vegetation), invasive species cover (tracked against a target of 0% for priority species), and overall non-native vegetation cover (target <10%). Monitoring also documented spatial patterns of invasive species re-establishment, success of

treatment measures, and adaptive management actions such as follow-up treatment and supplemental planting. Additionally, repeated site visits and photo documentation provided time-series information on habitat condition, vegetation structure, and site stability (City 2025).

Collectively, these new datasets spanning baseline assessments, implementation metrics, and post-construction ecological monitoring, allowed the project to track habitat restoration progress at multiple scales. The information demonstrates changes in vegetation composition, increasing native plant cover, reductions in invasive species, and corresponding improvements in ecosystem functions such as erosion control, habitat quality, and watershed health within the Hodges Reservoir drainage area and the SPV Basin (City 2026).

A detailed summary of the implementation progress of MA No. 6 in and surrounding the SPV Basin is provided in Chapter 7 Section 7.2.6.

4.1.4 Management Action No. 7: Groundwater Recharge Feasibility Study

In the timeframe of this Periodic Evaluation, a series of six technical memoranda were prepared for the Initial Surface Water Recharge Evaluation that assembled a comprehensive set of new data and information spanning hydrologic characterization, field investigations, and numerical modeling to support feasibility analysis of recharge strategies in the SPV Basin. Initial information collection focused on synthesizing existing hydrologic datasets and developing new analytical frameworks, including compilation of streamflow records from USGS gages, precipitation and runoff estimates, groundwater level data, and water quality information (e.g., total dissolved solids and nitrate concentrations). These datasets were integrated into the SPV GSP Integrated Groundwater/Surface Water Model Version 2.0 (SPV GSP Model v2.0) and used to establish baseline groundwater conditions, water budgets, and evaluation metrics such as recharge efficiency, groundwater storage change, and water quality impacts (Jacobs and Woodard & Curran 2022).

Subsequent efforts generated significant new field-based datasets that reduced uncertainty in recharge processes, particularly within the Santa Ysabel Creek corridor. These included detailed stream channel surveying at multiple transects to define channel geometry, elevation profiles, and spatial variability, as well as extensive streambed infiltration testing at multiple locations to quantify vertical hydraulic conductivity and infiltration capacity. Additionally, photographic surveys conducted following storm events provided new observational data on the timing, extent, and persistence of streamflow in response to precipitation, helping to better understand flow thresholds and groundwater response lag times (Jacobs and Woodard & Curran 2023a).

Building on these new datasets, efforts in 2023 incorporated updated hydrologic modeling and simulation results that further expanded the information base. The SPV GSP Model v2.0 was refined using newly collected field data, including improved representation of stream channel geometry, updated hydraulic conductivity parameters, and enhanced runoff routing based on subwatershed boundaries. These simulations also produced new time-series datasets for groundwater levels, streamflow conditions, and recharge volumes, as well as sensitivity analyses to evaluate uncertainty and system response (Jacobs and Woodard & Curran 2023b).

Overall, the data collected and generated between 2020 and 2025 significantly advanced the understanding of surface water recharge potential in the SPV Basin by combining newly collected field measurements, enhanced hydrologic datasets, and refined modeling analyses. The resulting body of information provides a robust, data-driven foundation for evaluating recharge feasibility, identifying suitable strategies, and supporting future design and implementation of groundwater recharge projects and is further described in Chapter 7 Section 7.2.7.

4.1.5 Management Action No. 8: Study Groundwater Dependent Ecosystems

The updated groundwater GDEs studies conducted in the timeframe of the Periodic Evaluation incorporated a substantial body of new data and information collected between 2020 and 2025, building upon the earlier 2020 baseline assessment that was conducted in support of the 2022 GSP (Woodard & Curran 2020). Key additions included expanded field survey data, remote sensing analyses, updated groundwater monitoring records, and refined hydrologic and ecological datasets (Jacobs and Woodard & Curran 2023e). Notably, a comprehensive field survey conducted as part of this first Periodic Evaluation, and in response to DWR Corrective Action No. 6 (DWR 2023b), provided current, site-specific observations of vegetation communities, wildlife presence, and habitat conditions in the SPV Basin, which were used to validate and refine mapped potential GDE extents presented in the 2022 GSP, and characterize ecological conditions. These field observations were complemented by updated special-status species records compiled from multiple databases, resulting in the identification of 28 species with potential groundwater associations and documentation of several recent occurrences within the basin (Rincon 2026b).

In addition, the latest GDE study incorporated multiple new geospatial and analytical datasets to better evaluate vegetation health and hydrologic conditions. These included Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI) remote sensing indices (1985–2024, with emphasis on recent 2020–2025 trends), precipitation records, and expanded groundwater level datasets from representative wells through WY 2025. The integration of these datasets enabled a more detailed assessment of correlations between vegetation condition, climatic variability, and groundwater fluctuations (Rincon 2026b).

The study also incorporated new hydrologic analyses, including an updated ISW evaluation using USGS LiDAR-derived streambed elevations and groundwater level data. This allowed for improved characterization of when and where stream reaches in the SPV Basin are gaining, losing, or disconnected, revealing strong seasonal and interannual variability tied to precipitation patterns. In parallel, updated groundwater modeling (through 2042 and 2072) and extended monitoring records (WYs 2008–2025) provided a clearer understanding of groundwater trends (Rincon 2026b).

Overall, the new data collected and incorporated between 2020 and 2025 significantly enhanced the scientific understanding of GDEs in the SPV Basin by providing updated, multi-source information on vegetation condition, species occurrence, groundwater dynamics, and surface water interactions. These additions allowed for a more robust, integrated evaluation of GDE extent, function, and resilience, supporting improved characterization of ecosystem health trends and informing management decisions under SGMA, further discussed in Chapter 5 Section 5.3 and Chapter 7 Section 7.2.8. The full GDE study report is included here as Appendix C.

4.2 New Information Collected in Support of the 5-Year Periodic Evaluation and in Response to DWR Corrective Actions

4.2.1 2025 Well Survey

As part of the 5-Year Periodic Evaluation, and to address DWR Recommended Corrective Action 5b (Chapter 3, Section 3.1.5), efforts were made to improve the understanding of well construction details of monitoring sites in the existing SPV Basin networks, as well as identify potential candidate wells for the representative monitoring networks should it be determined that replacement wells or expansion of any of the monitoring networks is necessary. This effort included an October 2025 field survey of wells both inside and outside the representative monitoring networks established in the 2022 GSP and a desktop

database review (Rincon 2026c), as detailed below. The full report including in-field well survey, methodology, and databases queried is included here as Appendix D.

October 2025 Well Survey

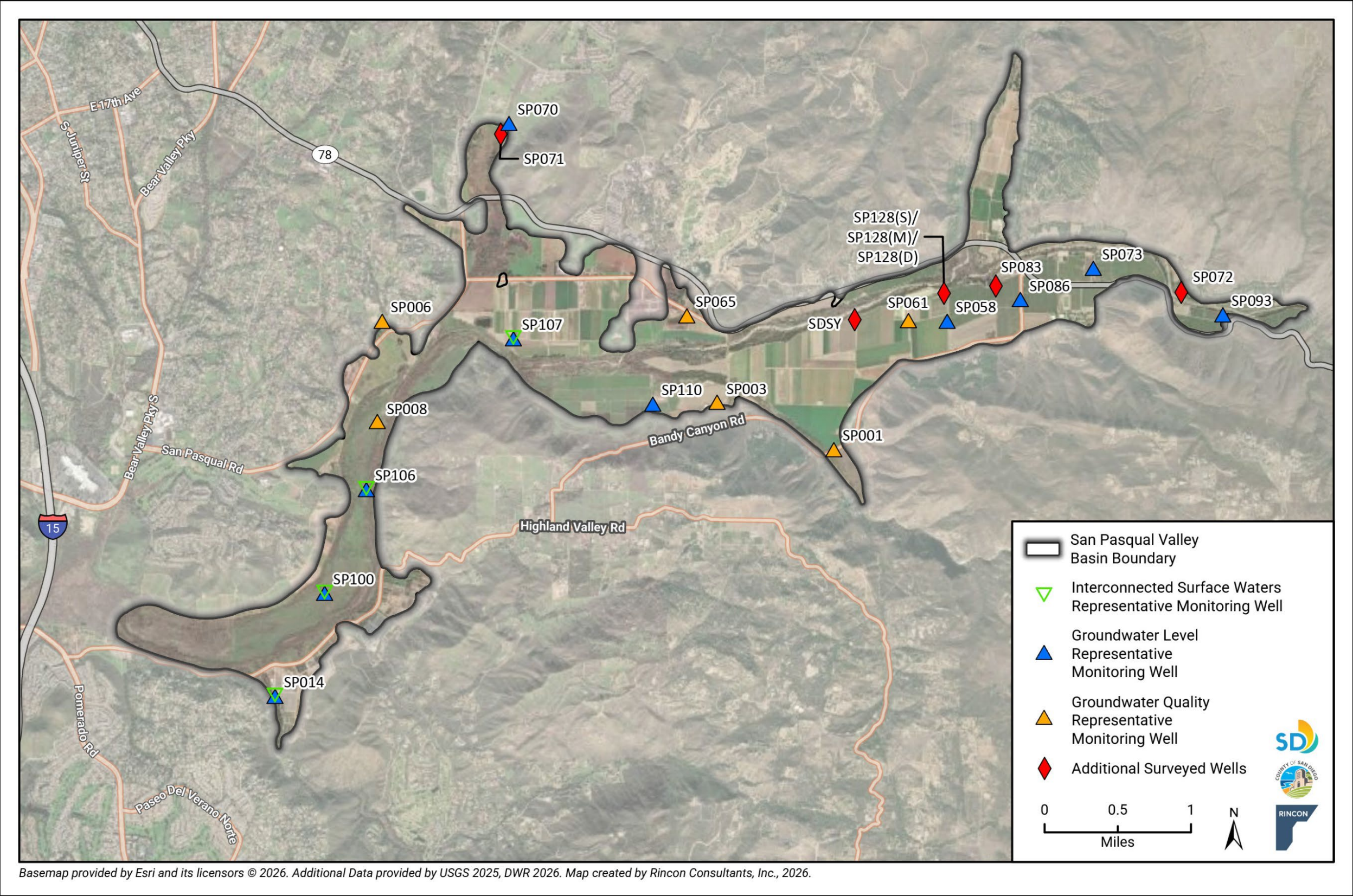
In October 2025, staff from Rincon Consultants, Snyder Geologic, City of San Diego, and GIS Surveyors conducted a two-day, on-site well survey to observe the well conditions and setting, and gather up-to-date metadata on the existing representative monitoring wells and potential candidate wells to add to the representative monitoring network in the case that it was determined that a given monitoring network should be changed or expanded during the data collection of the 5-Year Periodic Evaluation. The wells were surveyed using Trimble R12i GNSS/GPS receivers in real-time kinematic (RTK) mode. At each location, this equipment was used to capture ground and/or lid elevations as well as the top of the well casing at the notch on the pipe underneath the lid.

In total, 30 wells were surveyed (Figure 4-1). Findings from this survey enabled a better understanding of the data gaps in the representative monitoring networks and provided updated information on well condition, site description, and functionality.

The October 2025 well survey provided current information for nine of the 10 wells included in the groundwater quality monitoring network and 11 of the 15 wells included in the groundwater level monitoring network (four of the wells surveyed in October 2025 are proxy wells for the interconnected surface waters sustainability indicator). Eleven (11) additional wells (including two sets of nested wells) were also surveyed to identify potential candidate wells for the representative monitoring networks. Data collected included:

- Well location coordinates
- Ground surface elevation and reference point elevation, using North American Vertical Datum of 1988 (NAVD88 ft)
- Total well depth
- Condition of well
- Location and site description of well

Figure 4-1 Map of Wells Surveyed in October 2025



Desktop Database Review

The primary objective of this desktop database review was to identify and compile well completion reports (WCRs) and any other available well metadata to address data gaps identified in the DWR determination letter, specifically related to improving the understanding of basin conditions and monitoring network metadata.

To support this effort, multiple federal, state, and local databases were reviewed and cross-referenced. The following summarizes the data sources evaluated. A complete description of the 2025 well survey, detailed descriptions of publicly available databases that were reviewed, along with the methodology and limitations encountered are presented in the Monitoring Network technical memorandum (Rincon 2026c) and included here as Appendix D. Briefly, the databases reviewed included: DWR Online System for Well Completion Reports (OSWCR),³ DWR Water Data Library (WDL) Station Map,⁴ Groundwater Ambient Monitoring and Assessment (GAMA),⁵ California Statewide Groundwater Elevation Monitoring (CASGEM),⁶ USGS National Water Information System (NWIS) Mapper,⁷ 2022 GSP Appendix G – Well Completion Reports,⁸ and extensive well log and well permit data provided by the County (Appendix D),

The desktop database review provided additional information on several groundwater level monitoring wells including:

- Site code
- Well location coordinates
- Ground surface elevation and reference point elevation (NAVD88 ft)
- Well use type
- Well status

The new information collected on the representative monitoring networks, as well as any existing and applicable data, are presented in Table 4-2 and Table 4-3. October 2025 well survey information for the additional wells not already in the representative monitoring networks is presented in Table 4-4. Additionally, descriptions of the well site and reference point locations are provided in Table 4-5.

³ <https://dwr.maps.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37>

⁴ <https://wdl.water.ca.gov/waterdatalibrary/Map.aspx>

⁵ <https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/>

⁶ <https://casgem.water.ca.gov/Well/Wells#>

⁷ <http://apps.usgs.gov/nwismapper/>

⁸ SPV GSA 2021, available online at <https://sgma.water.ca.gov/portal/gsp/preview/75>.

Table 4-2 Updated Groundwater Quality Representative Monitoring Wells Metadata

City Well Name	SPV GSP Well Number	State Well Number	Latitude	Longitude	Ground Surface Elevation (NAVD88 ft)	Total Well Depth (feet bgs)	Borehole Depth (feet bgs)	Screen Interval (feet bgs)	Well Use Type	Well Status	Well Completion Type
SP001 ¹	SPV GSP-127	-	33.074246	-116.976894	401.7	112*	120*	52-112	Irrigation*	Active*	Single Well
SP003 ¹	SPV GSP-125	13S001W04C	33.078839	-116.990746	383.0	108*	N/A	58-98*	Domestic*	Active*	Single Well
SP006	SPV GSP-122	-	33.086614	-117.030235	393.8	>300*	N/A	N/A	Irrigation*	Inactive*	Single Well
SP008	SPV GSP-120	-	33.076677	-117.030733	341.0	200	N/A	N/A	Irrigation*	Active*	Single Well
SP010 ¹	SPV GSP-118	-	33.054043	-117.060124	321.3	230*	230*	None	Irrigation*	Active*	Single Well
SP036 ²	SPV GSP-91	12S001W30R001S	33.09503	-117.019646	365.3	N/A	N/A	N/A	Irrigation*	Inactive*	Single Well
SP043	SPV GSP-85	-	33.090111	-117.006436	364.0	100	N/A	N/A	Domestic*	Active*	Single Well
SP061 ¹	SPV GSP-67	12S001W34K003S	33.087031	-116.968922	407.2	202*	205*	92-112, 132-152, 172-192*	Irrigation*	Active*	Single Well
SP065	SPV GSP-64	12S001W33M001S	33.087379	-116.994374	379.8	80	N/A	N/A	N/A	Active*	Single Well
SP089	SPV GSP-40	12S001W35B001S	33.09218	-116.95084	440.3	190	N/A	60-183	Irrigation*	Active*	Single Well

Notes:

- ¹ Well completion reports were identified for wells P001, SP003, SP010, and SP061 (Appendix D, Attachment 1)
- ² Well SP036 was observed to be caved in and no longer a viable well for the groundwater quality representative monitoring network
- * New data gathered during this Periodic Evaluation and to be updated in the DWR SGMA Portal Monitoring Network Module
- < – Total Well Depth below given value
- bgs – below ground surface
- N/A – Not Available
- SPV GSP – San Pasqual Valley Groundwater Sustainability Plan

Table 4-3 Updated Groundwater Level and ISW Representative Monitoring Wells Metadata

City Well Name	SPV GSP Well Number	Representative for ISW	Site Code	State Well Number	Latitude	Longitude	RPE (NAVD88 feet)	GSE (NAVD88 feet)	Total Well Depth (feet bgs)	Screen Interval (feet bgs)	Well Construction Year	Well Use Type	Well Status	Well Completion Type	Borehole Depth (feet bgs)
SP110	SPV GSP-19	No	330786N1169983W002*	13S001W04D	33.07860	-116.99832	378.5	375.3	120	N/A	N/A	Monitoring	Active*	Single Well	N/A
SP107	SPV GSP-22	Yes	330848N1170146W001*	-	33.08482	-117.01464	360.8	357.8	43	N/A	N/A	Monitoring	Active*	Single Well	N/A
SP106	SPV GSP-23	Yes	330699N1170319W002*	-	33.06991	-117.03198	339.2	335.9	73.78*	N/A	N/A	Monitoring	Active*	Single Well	N/A
SP100	SPV GSP-29	Yes	330596N1170367W002*	-	33.05960	-117.03678	330.7	327.3	66.53*	N/A	N/A	Monitoring	Active*	Single Well	N/A
SP093	SPV GSP-36	No	330878N1169312W002*	-	33.08785	-116.93125	472.1	468.2	79.5*	N/A	N/A	Monitoring	Active*	Single Well	N/A
SP089	SPV GSP-40	No	330921N1169508W002*	12S001W35B001S	33.09218	-116.95084	440.3	438.7	190	60-183	1984	Irrigation	Active*	Single Well	N/A
SP086	SPV GSP-43	No	330891N1169551W002*	-	33.08918	-116.95510	432.1	431.4	160.95*	N/A	N/A	Monitoring	Active*	Single Well	N/A
SP073	SPV GSP-56	No	330924N1169465W001*	-	33.09239	-116.94650	449.3	446.0	192	N/A	N/A	Monitoring	Active*	Single Well	N/A
SP070	SPV GSP-59	No	331063N1170154W002*	-	33.10633*	-117.01549*	384.3	381.5	190	N/A	1991	Monitoring*	Inactive*	Single Well	N/A
SP058	SPV GSP-70	No	330870N1169636W002*	12S01W35B001S*	33.08702	-116.96367	418.1	415.5	190	80-100, 120-189	1991	Monitoring	Active*	Single Well	N/A
SDSY1	SPV GSP-155	No	3305141165829022	12S001W34L003S	33.08736	-116.97481	402.3	401.4	340	190-210, 250-270*	2010	Monitoring	Active*	Part of a nested well	355*
SDCD1	SPV GSP-168	Yes	3305551170101022	12S001W30J004S	33.09871	-117.01720	369.8	362.1	130	110-130	2013	Monitoring	Active*	Part of a nested well	287.5*
SDLH1	SPV GSP-131	Yes	3303201170247032	13S02W12M003S	33.05570*	-117.04640*	322.2	321.8	280	30-50	2012	Residential	Active*	Part of a nested well	280*
SP014	SPV GSP-114	Yes	330494N1170425W001*	-	33.04940*	-117.04250*	331.3	330.0	43	N/A	N/A	Industrial*	Active*	Single Well	N/A
Rockwood MW-2	SPV GSP-198	No	330949N1169598W002*	-	33.09490	-116.95987	424.6	424.6	200	40-180	2014	Monitoring*	Active*	Single Well	N/A

Notes:
¹Well completion reports were identified for wells SDSY, SDCD, and SDLH (Appendix D, Attachment 1)
*New data gathered during this Periodic Evaluation and to be updated in the DWR SGMA Portal Monitoring Network Module
bgs – below ground surface
GSE – ground surface elevation
ISW – interconnected surface waters
RPE – reference point elevation
SPV GSP – San Pasqual Valley Groundwater Sustainability Plan

Table 4-4 Survey Data for Wells Not in the Representative Monitoring Networks

City Well Name	SPV GSP Well Number	Latitude*	Longitude*	RPE (NAVD88 feet)*	GSE (NAVD88 feet)*	Total Well Depth (feet bgs)	Well Construction Year	Screen Interval
SP072	SPV GSP-57	33.09030	-116.93616	459.4	458.0	70	N/A	N/A
SP071	SPV GSP-58	33.10515	-117.01636	N/A	N/A	N/A	N/A	N/A
SDSY ¹	SPV GSP-182	33.08739	-116.97461	401.3	402.0	60	2010	50-60
SP128(S) ²	-	33.09006	-116.96410	N/A	416.5	165	2020	145-165
SP128(M) ²	-	33.09006	-116.96410	N/A	416.4	200	2020	190-200
SP128(D) ²	-	33.09006	-116.96410	N/A	416.5	300	2020	225-300
SP129(S) ²	-	N/A	N/A	N/A	N/A	105	2020	95-105
SP129(D) ²	-	N/A	N/A	N/A	N/A	215	2020	130-215
SP083	SVP GSP-46	33.09079	-116.95801	429.9	425.9	163.55*	N/A	N/A
SP033	SPV GSP-94	33.054131	-117.050318	N/A	N/A	68*	N/A	N/A
SP023 ³	SPV GSP–105	33.084965	-117.014938	N/A	358.0	120	N/A	N/A
Orfila	-	N/A	N/A	N/A	N/A	92.75*	N/A	N/A

Notes:
* Data collected during the October 2025 well survey
¹ Single well adjacent to nested groundwater level monitoring well SDSY; this SDSY/SPV GSP-182 is approximately 20 feet away and separate from nested well SDSY
² Well installation report identified for nested wells SP128 and SP129 (Appendix D, Attachment 1)
³ Well not surveyed in October 2025, however is a potential candidate well for the groundwater quality monitoring network and therefore listed in this Table
bgs – below ground surface
GSE – ground surface elevation
RPE – reference point elevation
SPV GSP – San Pasqual Valley Groundwater Sustainability Plan

Table 4-5 Descriptions of Well Site and Reference Point Location

City Well Name	SPV GSP Well Name	Representative SMC	Description of Well Location	Description of Reference Point
SP001	SPV GSP-127	GWQ	Southernmost tip of West Coast Turf sod farm. Immediately northwest of Bandy Canyon Road*	Top of steel sampling port embedded in well casing, north side.*
SP003	SPV GSP-125	GWQ	San Dieguito River Park, east of BeWise Ranch, approximately 500' east of dirt access road*	Top of steel well casing, north side.*
SP006	SPV GSP-122	GWQ	Off northwest boarder of BeWise Ranch, approximately 500' north of San Pasqual Road*	Top of steel well casing, south side.*
SP008	SPV GSP-120	GWQ	East edge of Suncoast Botanicals Farm, approximately 500 meters north of Bandy canyon Road*	Top of steel well casing, north side.*
SP010	SPV GSP-118	GWQ	San Dieguito River Park, approximately 500' feet east of I-15 & Hodges Reservoir, immediately north of Highland Valley Road*	Top of steel well casing, north side.*
SP036	SPV GSP-91	GWQ	Central area of West Coast Turf sod farm, on dirt road approximately 1,200' north of Bandy Canyon Road*	Top of steel well casing, north side.*
SP043	SPV GSP-85	GWQ	AMSOD farm in northeast corner, approximately 100' south of Old Milky Way Road*	Top of steel well casing, north side.*
SP061	SPV GSP-67	GWQ	Central area of West Coast Turf sod farm, on dirt road approximately 1,200' north of Bandy Canyon Road*	Sample port on steel well casing, west side
SP065	SPV GSP-64	GWQ	Northern edge of San Pasqual Valley Soils. Immediately south of Old Milky Way Road*	Top of steel sampling port embedded in well casing, north side.*
SP089	SPV GSP-40	GWQ	Witman Ranch citrus farm, approximately 500' north of San Pasqual Valley Rd and 500' south of Santa Ysabel Creek*	Top of steel well casing, north side.*
SP110	SPV GSP-19	GWL	Suncoast Botanicals farm, approximately 1/2 mile west of Santa Ysabel Ck Rd, 1250' south of Santa Ysabel Creek	Top of steel casing, north side
SP107	SPV GSP-22	GWL & ISW	AMSOD farm off Old Milky Way between production wells in southwest corner, approximately 770' north of Santa Ysabel Creek	Top of steel casing, north side.
SP106	SPV GSP-23	GWL & ISW	San Dieguito River Park, east of BeWise Ranch, approximately 600' east of dirt road	Top of steel casing, north side
SP100	SPV GSP-29	GWL & ISW	San Dieguito River Park, east of BeWise Ranch, approximately 1,850' west of San Dieguito River along dirt trail	Top of steel casing, north side
SP093	SPV GSP-36	GWL	Witman Ranch citrus farm at laydown yard, approximately 150' south of Santa Ysabel Creek	Top of steel casing, north side.
SP089	SPV GSP-40	GWL	Witman Ranch citrus farm, on dirt road, approximately 900' north of San Pasqual Valley Road; borders County land	Top of steel flange on casing, north side.
SP086	SPV GSP-43	GWL	Witman Ranch citrus farm, west side of Bandy Canyon Road approximately 1000' south of intersection with San Pasqual Valley Road	Top of casing, north side.
SP073	SPV GSP-56	GWL	Northeast of San Pasqual Academy, approximately 630' north of San Pasqual Valley Road (SR-78)	Top of steel well casing, north side.*
SP070	SPV GSP-59	GWL	North side of SR-78 on Caltrans ROE, approximately 0.25 mile east of Cloverdale Road*	Top of steel well casing, north side.*
SP058	SPV GSP-70	GWL	Eastern edge of West Coast Turf sod farm. On dirt road approx. 1,150' north of Bandy Canyon Road	Top of casing, north side.
SDSY	SPV GSP-155	GWL	Approximately 0.3 miles southeast of San Diego Archaeological Center, south side of Santa Ysabel Creek at northern edge of West Coast Turf sod farm*	Top of casing (piezometer #3).
SDCD	SPV GSP-168	GWL & ISW	South side of SR-78 on Caltrans ROE, approximately 0.25 mile east of Cloverdale Road	Top of casing (piezometer #3).
SDLH	SPV GSP-131	GWL & ISW	Approximately 7,300 feet east of I-15 & Hodges Reservoir, approximately 1,580 feet north of Highland Valley Rd., 26' east of San Dieguito River hiking trail in San Pasqual Basin*	Top of casing (piezometer #3).
SP014	SPV GSP-015	GWL & ISW	Pinery Tree Farm off Highland Valley Rd; west end of lease, City of San Diego ref: SP014*	Top of steel port where PVC pipe is inserted.*
Rockwood MW-2	SPV GSP-198	GWL	Rockwood Canyon approximately 100' north of center line of CA-78	Top of casing.

Notes:
*New data gathered during this Periodic Evaluation and to be updated in the DWR SGMA Portal Monitoring Network Module
GWL – groundwater level
GWQ – groundwater quality
ISW – interconnected surface waters
SPV GSP – San Pasqual Valley Groundwater Sustainability Plan

4.2.2 Degraded Water Quality Sustainability Indicator

In the timeframe of this Periodic Evaluation, additional data were gathered and analyzed to understand better groundwater quality trends in the SPV Basin, including incorporating expanded monitoring datasets, additional surface water quality information, and refined analyses to better characterize nitrate and total dissolved solids (TDS) conditions in the SPV Basin. The primary new data consisted of groundwater quality sampling results from ten representative monitoring wells, with multiple sampling events per year used to evaluate temporal trends and variability in nitrate (as $\text{NO}_3\text{-N}$) and TDS concentrations. These data were compiled into detailed chemographs and summary tables, allowing for identification of persistent exceedances, increasing concentration trends at specific wells, and differentiation between wells with stable versus degrading water quality conditions (Rincon 2026d).

In addition to groundwater monitoring, the new surface water quality data from Municipal Separate Storm Sewer System (MS4) monitoring programs between 2022 and 2024 were gathered and incorporated, including dry-weather and wet-weather sampling results. These data provided important context for evaluating potential sources of contamination, particularly elevated nitrogen concentrations associated with illicit discharges, irrigation runoff, and upstream land uses. The integration of MS4 monitoring results, including Illicit Discharge Detection and Elimination (IDDE) investigations, helped link observed groundwater quality conditions to watershed-scale processes and anthropogenic inputs (Rincon 2026d).

Updated analyses of spatial patterns and trends in groundwater quality relative to land use, hydrology, and potential contaminant sources were also newly incorporated. This included evaluation of agricultural practices, animal operations, irrigation return flows, compost and soil stockpiles, and upstream contributions such as the San Diego Zoo Safari Park. Historical data comparisons were used to distinguish long-standing water quality impairment from recent changes, demonstrating that elevated nitrate and TDS concentrations in several wells predate SGMA implementation and are likely driven by surface and land use activities rather than groundwater extraction (Rincon 2026d).

Collectively, the new data and analyses developed between 2020 and 2025 provided a more comprehensive and integrated understanding of groundwater quality conditions, pollutant sources, and controlling factors, strengthening the technical basis for evaluating sustainability and supporting coordinated management with external regulatory programs and the full report, data compilations, and chemographs of representative groundwater quality monitoring wells are included here as Appendix E.

4.2.3 Interconnected Surface Water Sustainability Indicator

In the timeframe of this Periodic Evaluation, several new datasets and analytical approaches were incorporated to characterize better the relationship between groundwater and surface water, as well as associated GDEs in the SPV Basin. A key component of the updated analysis was the use of high-resolution USGS LiDAR data to estimate streambed elevations in the San Dieguito River and Cloverdale Creek, which were then compared with measured groundwater levels at nearby monitoring wells across multiple hydrologic conditions (including Dry and Wet WYs such as 2018, 2020, 2021, and 2023). This comparison enabled classification of stream reaches as gaining, losing, or disconnected, and improved understanding of the timing and spatial variability of interconnectivity (Rincon 2026e).

In parallel, the comprehensive GDE study synthesized multiple data sources to identify, map, and evaluate groundwater dependent ecosystems. These data included groundwater level measurements and modeled contours, capillary fringe estimates, aerial imagery, vegetation and wetland mapping databases, rooting depth information, and field survey observations. Together, these inputs were used to delineate GDE units, assess ecological conditions, and evaluate groundwater dependence and interconnection to surface waters (Rincon 2026a; Rincon 2026e).

Additional new information included expanded groundwater monitoring datasets covering water years 2020 through 2025, which documented seasonal and interannual groundwater level fluctuations at representative wells near ISW features and GDEs. These data were used to evaluate current basin conditions relative to sustainability criteria. Furthermore, numerical groundwater modeling (INTERA

2026a) was used to generate updated groundwater level projections under future climate scenarios, extending the analytical timeframe beyond observed data. Collectively, these new data and analyses filled prior data gaps, refined understanding of stream–aquifer interactions and ecosystem dependence on groundwater, and strengthened the technical basis for evaluating sustainability and informing adaptive management of ISWs in the SPV Basin. The findings of the new information collected related to ISWs are discussed in Chapter 5 Section 5.3, and the full technical memorandum regarding ISWs in the SPV Basin is included here as Appendix F.

4.2.4 SPV Groundwater/Surface Water Model Updates

This section summarizes the updates completed to the SPV GSP Integrated Groundwater/Surface Water Flow Model (SPV GSP Model) as part of the Periodic Evaluation. Updates included reviewing and incorporating newly available hydrologic and monitoring datasets, extending the historical simulation period through 2024, evaluating the existing agricultural demand framework, and implementing model refinements to support updated historical and future scenario analysis (INTERA 2026a). A discussion of data collection, results, analyses, methodology, and conclusions are further detailed in Chapter 6 and included in full in Appendix G.

Data Collection

The first phase of the SPV GSP Model v3.0 update consisted of a comprehensive review and compilation of publicly available data relevant to the SPV GSP. Data sources included the SGMA Data Viewer, City of San Diego Public Utilities records, the San Diego Regional Data Warehouse, the USGS National Water Dashboard, the California Open Data Portal, and publicly available technical reports and supporting documentation relevant to Basin conditions and groundwater management.

To support this effort, available Basin monitoring and hydrologic datasets were reviewed, compiled, and evaluated to inform model input updates, assess recent Basin conditions, and evaluate model performance. Although substantial information was available from public sources, the usefulness of many datasets for quantitative model refinement was limited by inconsistent temporal coverage, irregular measurement frequency, incomplete metadata, or data that were primarily qualitative. The GSA compiled several new datasets including groundwater level observations from the representative groundwater level monitoring wells established for SGMA implementation, as well as additional monitoring wells maintained by the City and County.

Overall, newly collected, compiled, and analyzed available monitoring network data provided sufficient spatial and temporal coverage to support model validation and evaluation of SPV Basin-scale groundwater conditions.

4.2.5 Land Subsidence Sustainability Indicator

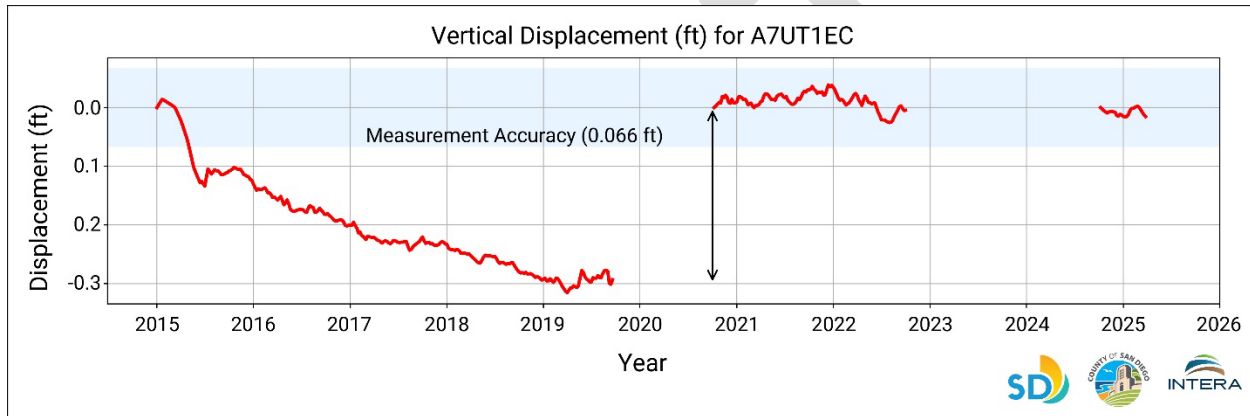
As part of the 5-Year Periodic Evaluation, and to address DWR Recommended Corrective Actions 3 and 5a (Chapter 3, Sections 3.1.3 and 3.1.5 respectively), a reanalysis of updated DWR InSAR data was conducted to assess the potential of land subsidence in the SPV Basin and to establish land subsidence SMC in accordance with GSP regulations.

Land subsidence maps reported in the 2022 GSP utilized available InSAR information from the SGMA Data Viewer, which shows (both at GSP adoption and currently) that surface displacement since 2015 has ranged between -0.25 ft and 0.25 ft. However, inspection of the data revealed that these maps include locations where surface displacement resets to zero, caused by InSAR processing artifacts designed to improve spatial coverage (Figure 4-2).

To address these offsets while also enhancing spatial coverage in regions with data decorrelation (i.e., data gaps), the following approach was taken:

1. Downloaded the InSAR weekly point data provided by DWR (California Natural Resources Agency, 2025). This data has a spatial resolution of 100-meter (m) pixels (~330 ft by 330 ft). Dataset was subsampled to monthly solutions.
2. For each monthly time slice, a median filter with a 500 m radius was applied. This process smooths the data spatially and provides estimates of displacement where data was previously decorrelated for that specific time, provided the location is within 500 m of a pixel containing data.
3. Filtered time slices were sequentially differenced. By applying a filter to each time slice prior to the sequential differencing, values at locations where a temporal data gap exist may be estimated assuming geographic similarities and allow for calculating the change between dates.
4. Results from the sequentially differenced time slices were cumulatively summed to reconstruct the displacement time series.

Figure 4-2 Example of Data Artifacts in The InSAR Time Series



Results of this process revealed a much more high-resolution subsidence pattern than what was shown by the SGMA Data Viewer and documented in the GSP (INTERA 2026b). The complete, updated, land subsidence analysis including methodology and conclusions is included here as Appendix H.

5 Groundwater Conditions Relative to Sustainable Management Criteria

This section evaluates groundwater conditions within the SPV Basin relative to the SMC established in the 2022 GSP including MTs, PTs, MOs, and URs. Using monitoring data collected during the Periodic Evaluation timeframe, this section characterizes trends for each applicable sustainability indicator and compares current conditions to the adopted SMCs. The evaluation also includes a forward-looking assessment of the likelihood of achieving measurable objectives within the next evaluation period. In addition, this section documents any changes to the SMC and monitoring networks and addresses related recommended corrective actions from the DWR as listed in the determination letter and attached Staff Report (DWR 2023b).

5.1 Chronic Lowering of Groundwater Levels

This section addresses the additional analyses undertaken as part of the 5-Year Periodic Evaluation for understanding groundwater level conditions in the SPV Basin, including new information that was collected in response to DWR Recommended Corrective Action 1a. The full groundwater level technical memorandum is included as Appendix I (Rincon 2026f).

5.1.1 Overview Based on 2022 GSP

At the time of the 2022 GSP adoption, the SPV Basin was determined to be sustainable for the groundwater level sustainability indicator based on the 2022 GSP definition and SGMA regulations. The 2022 GSP did not identify any data gaps and concluded that the monitoring network exceeds DWR density requirements for monitoring protocols and has sufficient historical data. No revisions to sustainable management criteria were recommended in the DWR determination letter and attached Staff Report (DWR 2023b). However Recommended Corrective Action 1a (Chapter 3, Section 3.1.1), directed the SPV GSA to provide information on impacts to groundwater wells during projected conditions where minimum thresholds are exceeded but undesirable results do not occur and quantify groundwater wells that will be impacted by the minimum thresholds.

5.1.2 Conditions prior to and during Periodic Evaluation Timeframe

Groundwater level data for the 15 representative groundwater level monitoring wells were provided by the GSA for WYs 2020 through 2025. Groundwater levels in the SPV Basin are measured each spring and fall using a portable electronic water-level meter with tape. Table 5-1 below summarizes the available depth to water data for the 15 representative monitoring wells sampled from WYs 2020–2025.

Table 5-1 Summary of Depth to Water in Representative Monitoring Wells for WYs 2020–2025

City Well Name	SPV GSP Well Number	Representative for ISW	MT (feet bgs)	PT (feet bgs)	MO (feet bgs)	Depth to Water (feet bgs)												
						Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024	Fall 2024	Spring 2025	Fall 2025
SP110	SPV GSP–19	No	60	51	30	N/A	27.8	23.5	26.4	32.2*	54.2	59.6	55.9	20.6	16.8	19.0	20.3	25.8
SP107	SPV GSP–22	Yes	61	32	10	31.6	9.0	14.9	13.9	19.9*	19.4	20.3	9.9	13.2	9.2	13.4	11.6	17.1
SP106	SPV GSP–23	Yes	32	17	10	N/A	N/A	N/A	N/A	N/A	9.9	11.1	6.5	27.1	6.3	26.9	26.0	25.0
SP100	SPV GSP–29	Yes	39	20	10	9.1	6.9	6.4	8.0	10.6*	10.4	12.9	2.7	7.0	4.0	8.2	8.2	11.6
SP093	SPV GSP–36	No	100	75	15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	44.9	37.3	27.5	43.0	39.9	60.9
SP089	SPV GSP–40	No	150	131	85	73.7	71.5	63.3	72.9	88.2*	89.9	108.2	100.1	45.4	24.8	39.3	37.8	53.5
SP086	SPV GSP–43	No	99	84	51	69.0	72.9	63.9	63.6	68.3*	69.7	N/A	N/A	42.9	35.6	24.4	26.6	48.3
SP073	SPV GSP–56	No	151	127	70	68.2	53.6	62.1*	64.7*	85.3*	87.4	98.4	97.5	41.2	25.1	36.9	41.7	55.0
SP070	SPV GSP–59	No	38	19	10	9.5*	6.5*	3.5*	2.8*	9.9*	6.6	9.5	5.3	5.0	4.4	N/A	N/A	9.0
SP058	SPV GSP–70	No	135	122	93	N/A	N/A	N/A	N/A	N/A	108.5	N/A	N/A	N/A	37.9	29.3	29.8	39.0
SDSY	SPV GSP–155	No	124	108	68	78.0	74.7	65.4	65.1	68.3*	70.6	80.4	71.6	50.2	23.5	31.4	N/A	37.0
SDCD	SPV GSP–168	Yes	37	21	10	12.5	6.6	9	6.83	5.3*	9.7	15.9	7.3	15.2	-0.9	10.6	N/A	N/A
SDLH	SPV GSP–131	Yes	34	18	10	9.2	6.4	8.1	7.6	11.4*	10.9	N/A	4.8	7.3	3.2	8.1	7.7	15.0
SP014	SPV GSP–114	Yes	35	20	10	13.7*	6.9*	19.9*	12.1*	13.9*	16.1	17.4	14.4	9.0	6.7	7.0	10.9	11.6
RockwoodMW-2	SPV GSP–198	No	124	98	36	84.4	79.8	71.6	68.5	N/A	74.7	80.3	82.9	48.0	36.4	27.2	29.1	36.7

Notes:
* groundwater levels not included in previous Annual Reports, but for which groundwater level data were available at the time of the writing of this Report
bgs – below ground surface
ISW – interconnected surface waters
MO – measurable objective
MT – minimum threshold
N/A – Not Available
PT – planning threshold
SPV GSP – San Pasqual Valley Groundwater Sustainability Plan

Groundwater level data were reviewed for accuracy and data points that did not align with groundwater level trends were removed from the analysis when it was determined that these outliers were due to reporting errors. Additionally, several groundwater level values reported in Annual Reports and presented in this table differ slightly from data available at the time of the writing of this Technical Memorandum, however these minimal differences were determined to be due to variance in reference point used at the time of depth to water measurement.

Groundwater Level Trends

Groundwater level data have been collected for wells in the representative groundwater level monitoring network following the adoption of SGMA regulations in January 2015. Rincon reviewed the groundwater level data dating back to January 2015 through fall 2019, representing the period between SGMA adoption and the formulation of the 2022 SPV GSP. No groundwater level representative monitoring wells fell below their respective MTs during this time period. Additionally, as part of this Periodic Evaluation, Rincon gathered, performed QA/QC, and analyzed groundwater level data from WYs 2020-2025. Hydrographs presenting depth-to-water data for each well in the groundwater level representative monitoring network from WYs 2020-2025 are provided in Appendix I (as Attachment 1) and discussed below.

Historically, groundwater levels in the eastern portion of the SPV Basin have large fluctuations in response to drier and wetter periods and generally recover to pre-drought levels quickly, while groundwater levels in the western portion of the SPV Basin have been consistently shallow with comparatively little fluctuation.

Groundwater levels in the eastern portion of the SPV Basin generally ranged between approximately 20-110 feet bgs from 2015-2025. Groundwater levels in the eastern portion of the SPV Basin showed a steady decline from pre-2015 through fall 2016, associated with the historic 2011-2016 drought in California. Groundwater levels made a partial recovery and fluctuated from spring 2017 through fall 2020 with relative lows associated with a Critically Dry WY 2018. Groundwater levels again decreased from spring 2021 to fall 2022 following a Critically Dry WY 2021 and a Dry WY 2022. This period of decreased precipitation was followed by a Wet WY 2023, which brought the highest recorded groundwater levels in the 2015-2025 time period. These levels have begun to decline again since spring 2024, however historical monitoring results indicate that such declines are consistent with past hydrologic patterns and have been followed by recovery during wetter conditions.

Groundwater levels in the western portion of the SPV Basin generally ranged between approximately 0-33 feet bgs from 2015-2025, with little fluctuation. Groundwater trends in this area follow the same patterns as in the eastern portion of the SPV Basin, however groundwater level variability in the western half of the SPV Basin is less pronounced, with less extreme groundwater level highs and lows (Rincon 2026f).

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While groundwater levels have fluctuated over time, no representative monitoring wells have exceeded their respective MTs in the SPV Basin since the adoption of SGMA or in the WYs 2020–2025 period. Several wells have exceeded MOs, but MO exceedances are acceptable (above our target groundwater levels) and do not trigger undesirable results. Four wells (SP100, SP106, SP110, and SDLH), have exceeded their respective PTs once or more between Fall 2019 and Fall 2025 (WYs 2020–2025).

Sustainability Conclusion

Under the 2022 GSP definition and SGMA regulations, the SPV Basin remains sustainable for the groundwater level sustainability indicator and no revisions to MOs, MTs, PTs, or undesirable results definition are warranted at this time.

5.1.3 Forecasted Results

Based on groundwater level monitoring data collected through WYs 2025, the SPV Basin is sustainable with respect to groundwater levels and is expected to remain on track with respect to the groundwater level sustainability indicator during the next evaluation cycle. Groundwater levels are anticipated to remain generally consistent with recent trends over the next evaluation period and are expected to continue to fluctuate within historical ranges and thresholds identified in the 2022 GSP. As such, sustainability and lack of exceedances of MTs for these wells are likely to be maintained.

Projected Groundwater Level Results

Historical groundwater level data can be used as a predictive tool. Measured historical groundwater level data demonstrate that even during the historic drought between 2012 and 2016, consisting of 5 consecutive years of Normal, Dry, or Critically Dry precipitation conditions, no wells in the SPV Basin representative monitoring network fell below their respective MTs. Therefore, it is unlikely that there will be MT exceedances during the remainder of the implementation period (2042). Future groundwater levels were also modeled within the SPV Basin by INTERA, Inc. (INTERA) as part of this Periodic Evaluation. The model identified five (5 wells in the eastern portion of the SPV Basin (SP093, SP089, SP086, SP073, and Rockwood MW-2) that may fall below their MTs under future conditions as early as 2045 to 2050. Groundwater levels in these wells will continue to be monitored during future periodic evaluations, and adaptive management actions may be implemented if wells are observed to exceed their MOs or MTs, consistent with the established groundwater management framework. Modeled future groundwater level results are further discussed in (Chapter 6 Section 6.4).

Influence of Hydrologic and Climatic Conditions

Hydrologic variability and climatic extremes are expected to continue influencing groundwater levels in the SPV Basin. Periods of drought and extended dry conditions will result in lower groundwater levels due to reduced groundwater recharge from precipitation, applied water, and streams. Recent climatic conditions have included multi-year drought followed by episodic high-precipitation events. Despite these extremes, groundwater levels have not shifted in a manner that would indicate a trajectory toward a groundwater level undesirable result.

Hydrologic and climatic extremes have not materially impeded 2022 GSP implementation and SMC related to groundwater levels, as observed groundwater elevations have remained generally consistent with MOs and MTs despite projected groundwater level declines. While modeling identified potential exceedances of MTs under certain future scenarios, available monitoring data indicated that groundwater levels have not fallen below established thresholds during the evaluation period. However, climate-driven variability highlights the importance of continued groundwater level monitoring to differentiate long-term trends from short-term hydrologic responses and to support timely implementation of MAs should threshold exceedances occur.

5.1.4 Conclusions and Corrective Actions

Changes to the Sustainability Criteria

Groundwater levels in the SPV Basin have fluctuated over time due to climate variability, particularly in the eastern portion of the SPV Basin. However, no representative wells have exceeded their respective MTs in the SPV Basin. Consequentially, under the 2022 GSP definition and SGMA regulations, the SPV Basin remains sustainable for the groundwater level sustainability indicator and no revisions to the sustainability criteria are warranted currently.

Corrective Actions Addressed

In Recommended Corrective Action 1a, DWR directed the SPV Basin to provide additional information regarding potential impacts to beneficial uses and users of groundwater related to the chronic lowering of groundwater level. In response, the GSA analyzed historic (WYs 2015-2020) and current (WYs 2020-2025) groundwater levels in the SPV Basin, evaluated projected groundwater level conditions, and potential interactions with other sustainability indicators such as land subsidence, GDEs, and interconnected surface waters.

Groundwater level projections developed as part of the SPV GSP Model v3.0 update indicate that no representative monitoring wells are projected to exceed their MTs during the 20-year GSP implementation period through 2042 under the modeled climate scenarios. Although some representative monitoring

wells in the eastern portion of the SPV Basin are projected to approach or exceed planning thresholds during the simulation period, projected MT exceedances are limited to the latter portion of the model forecast period, beyond 2042. This area of the basin includes both agricultural groundwater users and domestic well users. Six domestic wells were identified in Table 8-2 of the 2022 GSP; however, only one domestic well, SP073, is included in the representative monitoring network and was evaluated as part of the SPV GSP Model v3.0 update. Modeled groundwater level exceedances projected during the 2020–2025 period did not occur, and groundwater levels will continue to be monitored through future periodic evaluations. Adaptive management actions may be implemented if wells are observed to exceed their MTs, consistent with the established groundwater management framework.

Additionally, representative monitoring wells located in the western portion of the SPV Basin, where interconnected surface waters and GDEs are present, are not projected to exceed MTs under future modeled conditions. Observed and projected groundwater levels in this portion of the SPV Basin remain above MTs, indicating that groundwater availability necessary to support environmental beneficial uses has been, and is expected to be, maintained. Therefore, GDEs are not anticipated to be adversely affected by current or projected groundwater level conditions.

5.2 Reduction of Groundwater Storage

This section addresses the additional analyses undertaken as part of the 5-Year Periodic Evaluation for understanding groundwater storage in the SPV Basin. Groundwater levels are used as proxy for monitoring groundwater storage, as allowed by SGMA regulations and detailed in Chapter 2, Section 2.1.2.

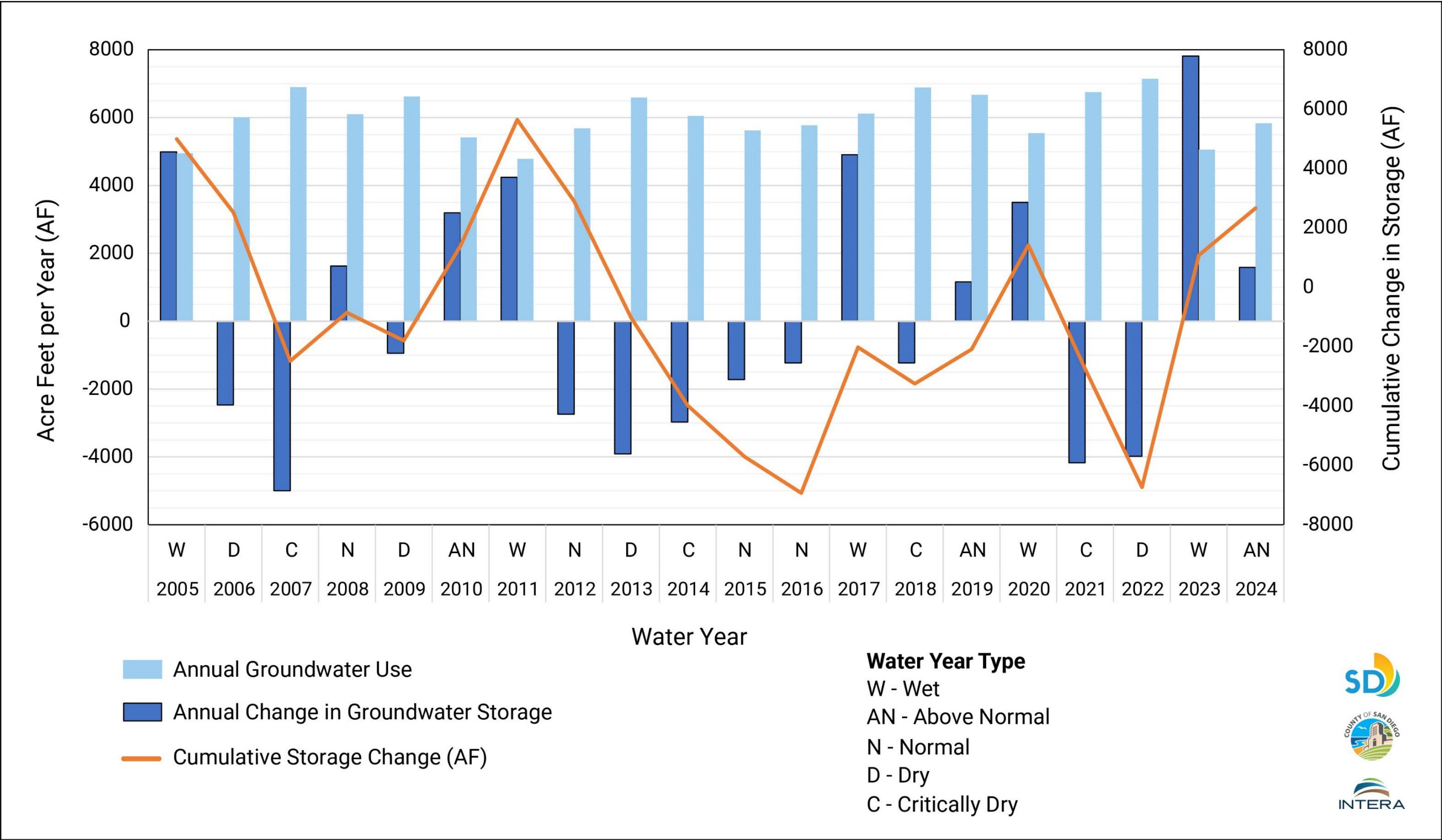
5.2.1 Overview Based on 2022 GSP

At the time of the 2022 GSP adoption, the SPV Basin was determined to be sustainable for the groundwater storage sustainability indicator based on the 2022 GSP definition and SGMA regulations. The 2022 GSP did not identify any data gaps and concluded that the groundwater level monitoring network exceeds DWR density requirements for monitoring protocols and has sufficient historical data. No revisions to sustainable management criteria were recommended in the DWR determination letter and attached Staff Report (DWR 2023b).

5.2.2 Conditions prior to and during Periodic Evaluation Timeframe

The change in groundwater storage was modeled for WYs 2005-2024 using the updated SPV GSP Model v3.0 described in Chapter 6. The model tracks the change in water stored in the aquifer system between time steps, based on a full accounting of inflows and outflows. Inflows include recharge from precipitation, stream seepage, and other boundary inflows, while outflows include groundwater pumping, evapotranspiration, discharge to streams, and boundary outflows. The model tracks these components monthly and computes a net groundwater budget (inflow minus outflow). Any imbalance in the groundwater budget is then attributed to a change in groundwater storage. These storage changes are summed over time to produce cumulative storage change, which shows whether the basin is experiencing long-term depletion or recovery. Figure 5-1 below summarizes the estimated basin groundwater storage from 2005-2024.

Figure 5-1 Estimated Basin Groundwater Storage by Year, WY Type, and Cumulative Change in Storage



Groundwater Storage Trends

Model results for WYs 2005–2024 indicate that groundwater storage declined during extended dry periods, including 2005–2009, 2011–2016, 2020–2022. During wetter periods, groundwater storage partially recovered as recharge from precipitation and streamflow increased. However, these recoveries were often incomplete, and cumulative storage change reflects alternating periods of depletion and recovery rather than a consistent return to pre-drought conditions. Overall, the model demonstrates that groundwater storage in the SPV Basin is highly sensitive to the timing, duration, and sequencing of wet and dry periods, with longer multi-year droughts producing more pronounced and persistent storage declines.

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Since groundwater storage is assessed using groundwater levels and the associated threshold values as a proxy, the evaluation of the reduction of groundwater storage sustainability indicator is consistent with the assessment for chronic lowering of groundwater levels. While groundwater levels have fluctuated over time, no representative monitoring wells have exceeded their respective MTs in the SPV Basin since the adoption of SGMA or in the WYs 2020–2025 period. See Chapter 5, Section 5.1.2 for additional information.

Sustainability Conclusion

Under the 2022 GSP definition and SGMA regulations, the SPV Basin remains sustainable for the groundwater storage sustainability indicator and no revisions to MTs, MOs, or undesirable results definition are warranted at this time.

5.2.3 Forecasted Results

Based on the updated SPV groundwater model (SPV GSP Model v3.0) and analysis of historical and projected groundwater budgets, the SPV Basin is expected to continue exhibiting variable but generally stable groundwater storage conditions, with storage trends strongly controlled by future hydrologic variability rather than a persistent long-term decline under all scenarios.

Projected Groundwater Level Results

Future groundwater storage conditions in the SPV Basin were evaluated by INTERA as part of this Periodic Evaluation (see Chapter 6 for more detail) using two climate scenarios developed from the USGS Basin Characterization Model (BCM) and recommended by the DWR for SGMA planning: HadGEM2-ES, representing a warmer, drier future with greater hydrologic stress, and MIROC5, representing a comparatively more moderate climate with less severe variability (Appendix G). These scenarios provide a range of plausible future conditions to evaluate Basin response rather than a single deterministic forecast.

Model results indicate that groundwater storage will continue to fluctuate in response to interannual and multi-year climate variability, consistent with historical behavior. Under both evaluated climate scenarios, storage increases during wetter periods when recharge from streamflow and precipitation is elevated and decreases during dry periods when recharge is reduced and groundwater pumping demand increases. However, long-term groundwater storage projections diverge depending on the duration and sequencing of future dry and wet periods. Under the HadGEM2 scenario, the SPV Basin experiences a prolonged drought from approximately 2061 through 2071, resulting in sustained reductions in recharge, increased reliance on groundwater pumping, and pronounced cumulative groundwater storage depletion with limited opportunity for recovery. In contrast, the MIROC5 scenario is characterized by shorter dry periods (generally on the order of five years) followed by wetter conditions, allowing partial or substantial recovery of groundwater storage and resulting in comparatively more stable long-term storage conditions.

Overall, model results demonstrate that groundwater storage in the SPV Basin is highly sensitive to extended multi-year drought conditions, with longer and more persistent dry periods producing greater cumulative depletion than shorter droughts interrupted by hydrologic recovery. Continued monitoring of groundwater levels, pumping, and recharge conditions will be critical for evaluating whether observed storage trends remain consistent with modeled projections and for supporting adaptive management actions to maintain long-term SPV Basin sustainability.

5.2.4 Conclusions and Corrective Actions

Changes to the Sustainability Criteria

As described in Chapter 5, Section 5.1.4, while groundwater levels, and by proxy groundwater storage, have fluctuated over time due to climate variability, no representative wells have exceeded their respective MTs in the SPV Basin. Consequentially, under the 2022 GSP definition and SGMA regulations, the SPV Basin remains sustainable for the groundwater storage sustainability indicator and no revisions to the sustainability criteria are warranted currently.

Corrective Actions Addressed

DWR did not issue a Recommended Corrective Action relating to the Reduction of Groundwater Storage sustainability indicator.

5.3 Depletion of Interconnected Surface Waters

This section addresses the additional analyses undertaken as part of the 5-Year Periodic Evaluation for understanding interconnected surface waters and GDEs in the SPV Basin, and new information that was collected in response to DWR Recommended Corrective Actions 4 and 6, described in detail in Chapter 3, Sections 3.1.4 and 3.1.6. The full interconnected surface waters technical memorandum (Rincon 2026e) is included as Appendix F, and the full SPV Basin 2026 GDE Study Report (in response to DWR Recommended Corrective Action 6) is included as Appendix C.

5.3.1 Overview Based on 2022 GSP

At the time of the 2022 GSP adoption, the SPV Basin was determined to be sustainable for the ISW sustainability indicator based on the 2022 GSP definition and SGMA regulations. The 2022 GSP did not identify any data gaps and concluded that the monitoring network meets DWR density requirements for monitoring protocols as supported by the DWR determination letter and attached Staff Report (DWR 2023b). However Recommended Corrective Action 4 (Chapter 3, Section 3.1.4), directed the SPV GSA to further evaluate the ISW sustainability indicator by clearly defining quantitative criteria for URs, incorporating DWR ISW guidance when available, continuing to address data gaps through expanded monitoring, and enhancing coordination with regulatory agencies and stakeholders to better understand and protect beneficial uses potentially affected by pumping-induced surface water depletion. Additionally, Recommended Corrective Action 6 directed the SPV GSA to conduct the proposed GDE study, as described in MA No. 8, and update MTs and UR quantification based on the best available science and information, including information gained from the proposed GDE study.

5.3.2 Conditions prior to and during Periodic Evaluation Timeframe

Groundwater level data for the six representative ISW monitoring wells were provided by the GSA for WYs 2020 through 2025. Groundwater levels in the SPV Basin are measured each spring and fall using a portable acoustic water level sounder. Table 5-2 below summarizes the available depth to water data for the six ISW representative monitoring wells sampled from WYs 2020–2025.

Table 5-2 Summary of Depth to Water at Interconnected Surface Waters Monitoring Wells (WYs 2020-2025)

City Well Name	SPV GSP Well Number	Minimum Threshold (ft bgs)	Planning Threshold (ft bgs)	Measurable Objective (ft bgs)	Depth to Water (ft bgs)												
					Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024	Fall 2024	Spring 2025	Fall 2025
SP107	SPV GSP-22	61	32	10	31.6	9.0	14.9	13.9	19.9*	19.4	20.3	9.9	13.2	9.2	13.43	11.6	17.1
SP106	SPV GSP-23	32	17	10	NA	NA	NA	NA	NA	9.9	11.1	6.5	27.1	6.3	26.9	26.0	25.0
SP100	SPV GSP-29	39	20	10	9.1	6.9	6.4	8	10.6*	10.4	12.9	2.7	7.0	4.0	8.2	8.2	11.6
SDCD ²	SPV GSP-168	37	21	10	12.5	6.6	9	6.8	5.3*	9.7	15.9	7.3	15.2	-0.9	10.6	NA	NA
SDLH	SPV GSP-131	34	18	10	9.2	6.4	8.1	7.6	11.4*	10.9	NA	4.8	7.3	3.2	8.1	7.7	15.0
SP014	SPV GSP-114	35	20	10	13.7*	6.9*	19.93*	12.08*	13.9*	16.1	17.4	14.4	9.0	6.7	7.0	10.9	11.6

* Groundwater levels not included in previous Annual Reports, but for which groundwater level data were available at the time of the writing of this Technical Memorandum.

¹ SDCD is a nested well with three completions at three different depths. The middle completion was used to develop the groundwater level SMC and is used for analysis in this section. The shallowest completion was used for analysis in the GDE Study, as that completion is the most relevant for tracking groundwater conditions in comparison with plant rooting depths and interconnected aquatic habitat.

Interconnected Surface Waters Trends

Groundwater levels at wells in the ISW monitoring network have been tracked since the adoption of SGMA regulations in January 2015 and reflect a consistent pattern of drought-driven declines followed by recovery during wetter periods. Across the monitoring period from WYs 2015-2025, all wells exhibited seasonal and interannual variability, with groundwater levels generally declining during historic and recent droughts and rebounding after wet years.

Key observations are described below.

Wells SP070 and SDCD⁹

These wells, located near the Cloverdale Creek Willow Communities GDE Unit, showed drought-related declines in 2015-2016 and 2021-2022, followed by recovery. Groundwater levels at both wells remained above the 10 ft bgs MO for most years and recovered promptly after wet conditions.

Well SP106

Located near the San Dieguito River Willow Communities GDE Unit, this well experienced notable fluctuation, including a decline approaching but not exceeding its MT in 2025, before earlier recovery above the MO. Despite variability, the MT was not exceeded.

Wells SP100, SDLH, and SP107

These wells followed similar patterns of decline during drought and recovery, thereafter, fluctuating largely around or above their respective MOs.

Well SP014

This well temporarily dropped below its PT during the 2015-2017 drought but rebounded quickly and remained above the MT throughout the evaluation period.

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This section discusses current conditions and the existing SMC as they relate to GDEs within the SPV Basin. This section also provides descriptions of specific negative effects to GDEs from changing groundwater conditions that could serve as indicators of significant and unreasonable impacts. This assessment is informed by the findings of the SPV Basin GDE Study (Appendix C) and the ISW technical memorandum (Appendix F).

The MO for groundwater level is 10 ft bgs for all monitoring wells within the ISW monitoring network. This MO is within the maximum rooting depth of the dominant plant species within the willow communities that comprise the SPV GDE units and is therefore expected to ensure access to groundwater, even without considering capillary action.

The PTs for groundwater level vary by monitoring well and are generally consistent with the minimum observed DTW at each representative well in the western Basin for the period of record. Groundwater levels at all monitoring wells declined from 2012 through 2016, during a period of historic drought. During this time, groundwater levels at most of the monitoring wells within 2,000 ft of SPV GDE units reached or approached their respective PTs. Corresponding declines in plant health indices (particularly NDMI) occurred within GDE vegetation communities during this time period. However, both NDVI and NDMI values recovered following subsequent wet years, indicating that no long-term, substantial adverse

⁹ SDCD is a nested well with three completions at three different depths. The middle completion was used to develop the groundwater level SMC and is therefore used for analysis in this section. The shallowest completion was used for analysis in the SPV Basin GDE Study, as that completion is the most relevant for tracking groundwater conditions in comparison with plant rooting depths and interconnected aquatic habitat.

impacts to these vegetation communities were experienced (Rincon 2026b). NDVI/NDMI, precipitation, and groundwater level data for each GDE community are included in the GDE Study Report (Appendix C).

No MT exceedances for groundwater levels have occurred at any monitoring wells for the period of record. If groundwater levels dropped to the MTs for two consecutive years, plants may be unable to access groundwater and significant adverse impacts to GDEs could occur. Groundwater levels within the western Basin are correlated with precipitation and decrease during periods of drought and increase during wet years. If groundwater levels within the SPV GDE units were to decline to the MTs established in the GSP, this would likely occur during a period of prolonged and severe drought when willows and other plant species within the SPV GDE units would have less access to surface water and would be more likely to depend on groundwater. Undesirable results for GDEs due to chronic lowering of groundwater levels may be indicated by long-term declines in NDVI and NDMI that do not recover during wet years. Significant changes in the composition of dominant plant species within GDE communities, particularly invasions of giant reed and salt cedar, could also indicate that negative impacts to GDEs are occurring due to chronic lowering of groundwater levels.

Critically, no groundwater level MTs were exceeded at any ISW monitoring well during the WYs 2020-2025 evaluation period or since the implementation of SGMA in January 2015. Based on these observed trends, groundwater levels supporting ISWs and nearby GDEs remain within sustainable ranges. Accordingly, under the 2022 GSP definition and SGMA regulations, the SPV Basin continues to be sustainable with respect to the depletion of ISWs.

Sustainability Conclusion

Adaptive management strategies implemented to date, including new data analyzed and incorporated in the SPV Basin GDE Study and additional ISW investigation as part of this Periodic Evaluation cycle, are expected to keep the SPV Basin on track to maintain sustainability. Given that groundwater levels have not fallen below MTs in any of the representative interconnected surface waters monitoring wells, groundwater pumping is not causing exceedances of MTs even in Dry and Critically Dry WYs, and no undesirable results for GDEs within the SPV Basin due to groundwater pumping have been observed, no changes to pumping management or groundwater level MOs and MTs are anticipated during this or the next evaluation cycle.

The SPV Basin is currently sustainable with respect to groundwater levels and depletion of ISWs. The 2022 GSP did not establish interim milestones because interim milestones are intended to demonstrate progress toward sustainability, and the SPV Basin was determined to be sustainable at the time of 2022GSP adoption.

Accordingly, interim milestones are not required under SGMA for the SPV Basin and are not applicable for purposes of the Periodic Evaluation. Basin conditions are evaluated based on continued attainment of MOs and avoidance of MTs using observed groundwater level data and other monitoring information presented herein.

5.3.3 Forecasted Results

Groundwater monitoring data through WY 2025 indicate that the SPV Basin remains sustainable with respect to groundwater levels and is expected to remain on track for the ISW sustainability indicator during the next evaluation cycle. Groundwater levels are expected to continue exhibiting seasonal and interannual variability consistent with historical patterns and to fluctuate within the thresholds established in the 2022 GSP.

Influence of Hydrologic and Climatic Conditions

Hydrologic variability and climatic extremes are expected to continue influencing groundwater levels in the SPV Basin. Periods of drought and extended dry conditions will result in lower groundwater levels due to reduced groundwater recharge from precipitation, applied water, and streams. Recent climatic

conditions have included multi-year drought followed by episodic high-precipitation events. Despite these extremes, groundwater levels have not shifted in a manner that would indicate a trajectory toward URs for ISWs or GDEs.

Hydrologic and climatic extremes have not materially impeded GSP implementation and SMC related to groundwater levels, as observed groundwater elevations have remained generally consistent with MOs and MTs despite projected groundwater level declines. While modeling identified potential exceedances of MTs under certain future scenarios, available monitoring data indicated that groundwater levels have not fallen below established thresholds during the evaluation period. However, climate-driven variability highlights the importance of continued groundwater level and ISW monitoring to differentiate long-term trends from short-term hydrologic responses and to support timely MAs should threshold exceedances occur.

5.3.4 Conclusions and Corrective Actions

Justification for Using Groundwater Levels to Monitor Depletion of Interconnected Surface Water

The SGMA regulations (i.e., Title 23 CCR § 354.28 (c)(6)) state that “The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following: (A) The location, quantity, and timing of depletions of interconnected surface water, and (B) A description of the groundwater and surface water model used to quantify surface water depletion.” These regulations require a numerical model to estimate the depletions of ISW from groundwater pumping. However, this is not a measured value and there is no functional way for a monitoring network to directly measure depletions of ISW from groundwater pumping. DWR recommends establishing SMC for ISW using the rate or volume of surface water depletion. However, as explained in the 2022 GSP, due to the intermittent, seasonal nature of the streams within the SPV Basin, using groundwater levels as a proxy to monitor ISW is justifiable. According to the USGS California Water Science Center, “*surface water depletion is directly associated with chronic lowering of groundwater levels*” (USGS 2026a). Surface water depletions due to groundwater pumping occur when groundwater levels within the vicinity of interconnected, gaining stream reaches decline to the point that these stream reaches become losing and/or disconnected. Interconnectivity in the intermittent streams within the SPV Basin is transient and the location and timing of gaining reaches is dependent on climatic conditions. Furthermore, streamflow data for the intermittent streams within the Basin are lacking, and modeled streamflow data are limited by the granularity of the model and lack of streamflow data for calibration. The surface area of streambeds constitutes a small percentage of the total area covered by the groundwater model, and LiDAR data used to determine streambed elevations can be impacted by water and canopy cover, making accurate stream thalweg estimation difficult. Thus, modeled outputs of surface water depletion rates have a large margin for error. Defining a rate or volume of surface water depletion caused by groundwater use that would have adverse impacts on beneficial users of ISWs would therefore be challenging in the SPV Basin’s dynamic system, where streamflow data are lacking, streamflow is primarily fed by rainfall and agricultural irrigation runoff, streams typically go dry for at least several months each year, and interconnectivity is fleeting.

Changes to the Sustainability Criteria

The SPV GSA monitors ISWs using groundwater levels as a proxy. As previously discussed, the MTs, PTs, and MOs for this sustainability indicator are therefore the same as those established for chronic lowering of groundwater levels. The groundwater level MOs and PTs established in the GSP for the wells within the depletion of ISW monitoring network have been reevaluated for this 5-Year Periodic Evaluation and are deemed appropriate for protecting the health of GDEs within the Basin. The groundwater level MTs are likely to be protective of vegetative health within the GDE willow communities, though the impacts of

lowering groundwater levels that fall below the minimum historical observed DTW are unknown. Monitoring of the SPV GDE units should be conducted to document any significant declines in GDE health. If any significant or unreasonable impacts to GDEs are observed when DTW is between the PT and MT for nearby monitoring wells, and these impacts can be attributed to lowering groundwater levels, then the groundwater level MTs could require revision. Declining groundwater levels could affect aquatic habitat within interconnected, gaining stream reaches within the SPV GDE units.

Groundwater levels at most wells within the western Basin are within their historic range, and groundwater pumping therefore does not appear to be causing significant or unreasonable impacts to ISWs. If MTs for groundwater level were exceeded for greater than two years, URs for aquatic habitat within interconnected stream reaches could occur. Undesirable results for GDEs from depletion of ISW could include a substantial reduction in the quantity or duration of surface water available for aquatic or semi-aquatic species, including the arroyo toad. Defining a rate or volume of surface water depletion caused by groundwater use that would have adverse impacts on beneficial users of ISWs is challenging in this dynamic system, where interconnectivity is fleeting and streamflow is primarily fed by rainfall and agricultural irrigation runoff. Streamflow data for Cloverdale Creek and the San Dieguito River, as well as additional information on the timing and location of ISW within the SPV GDE units, would contribute to a better understanding of the potential impacts of groundwater use on groundwater-dependent aquatic habitat within these riparian communities. Monitoring of aquatic habitat within potentially ISWs in the SPV GDE units could help inform the ISW SMC in the years to come.

Forthcoming DWR guidance on depletions of ISW would also guide any necessary SMC updates for this sustainability indicator, and when that guidance is released, it will be incorporated into future 5-Year Periodic Evaluations. In conclusion, no changes to the MTs, PTs, or MOs are recommended at this time, though revisions could be required if monitoring of ISWs and GDEs within the Basin suggests that current groundwater level MTs are not sufficient to protect the health of aquatic habitat within interconnected stream reaches and/or vegetation communities within GDEs. It is recommended that the URs defined in the GSP for depletion of ISWs be revised to remove the following language “...if *Management Action 8 – Study Groundwater Dependent Ecosystems* supports this conclusion,” to ensure that URs are defined independently and quantitatively, consistent with GSP Regulations.

Corrective Actions Addressed

DWR directed the SPV GSA to address the following items related to depletion of ISW by the first Periodic Evaluation (Recommended Corrective Action 4):

- “Revise the definition of undesirable results to be a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin required by the GSP Regulations.” It is recommended that the URs defined in the GSP for depletion of ISW be revised to remove the following language “...if *Management Action 8 – Study Groundwater Dependent Ecosystems* supports this conclusion.” The definition would therefore be a quantitative description of the number of wells with MT exceedances that would constitute an UR.
- “Consider utilizing the ISW guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions using the rate or volume of surface water depletions.” The updated DWR ISW guidance has not yet been released at the time of writing of this Periodic Evaluation. Defining a rate or volume of surface water depletion caused by groundwater use that would have adverse impacts on beneficial users of ISW would be challenging for the intermittent streams within the Basin, where streamflow data are lacking, streamflow is primarily fed by rainfall and agricultural irrigation runoff, streams typically go dry for at least several months each year, and interconnectivity is fleeting. Therefore, the GSA plans to continue using groundwater level measurements to monitor ISWs within the SPV Basin, as this is the best currently available data-driven approach for sustainable management.

- “Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface waters and define segments of interconnectivity and timing.” The SPV GSA conducted an updated ISW analysis that corroborates the general location of ISWs and potential GDEs identified in the GSP and provides additional information regarding the timing and location of interconnectivity in stream reaches in the western Basin. Long-term monitoring of potential ISWs within the Basin is recommended to gain additional information on the location and timing of persistently gaining stream reaches and the potential aquatic habitat they may provide for protected species.
- “Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA’s jurisdictional area.” The SPV Basin GDE Study conducted an in-depth analysis of potential beneficial uses and users that may be impacted by ISW depletion within the SPV Basin, included literature and database reviews that focused on local, state, and federally protected species and habitats.

In addition, DWR directed the SPV GSA to address the following item by the first Periodic Evaluation (Recommended Corrective Action 6): “Conduct the proposed GDE study, as described in Management Action 8, prior to the first periodic evaluation of the Plan. Update minimum thresholds and undesirable results quantification based on the best available science and information, including information gained from the proposed GDE study.” Rincon, on behalf of the SPV GSA, conducted a full GDE Study for the SPV Basin (Appendix C). The GDE Study provides a review of the existing SMC based on the best available science and information and provides the following recommendations for GDE monitoring.

PT-Triggered Annual Field Monitoring

Monitoring of vegetative communities and aquatic habitat within the SPV GDE units is recommended to ensure the continued health of GDEs within the Basin. It is recommended that annual field monitoring be initiated when multiple representative wells (two of six ISW monitoring network wells) fall below PTs simultaneously for two consecutive sampling events (spring/fall or fall/spring), and that annual field monitoring continue while groundwater conditions remain below those PT thresholds. PT exceedances (and the need for annual field monitoring) could be determined during the annual reporting process. Field surveys should be conducted at a minimum of two locations within the SPV GDE units, each within stream reaches near the representative wells where PT exceedances are occurring. The following field data collection is recommended for PT-triggered annual monitoring:

- Stream transects to measure streambed elevation and document the presence or absence of surface water. If surface water is present, the following data would also be collected:
 - a. water depth
 - b. thalweg location
 - c. streamflow
- Biological surveys to document:
 - a. Dominant plant species and overall vegetative health
 - b. Percent native and non-native vegetative cover
 - c. Observed wildlife species
 - d. Location of any special-status species observed
 - e. Location and extent of any significant invasive plant species presence
 - f. Aquatic habitat conditions - substrate type, surface water conditions, presence of algae, presence of non-native predatory aquatic species
 - g. Observations on breeding habitat for special-status species, including the arroyo toad and western spadefoot
 - h. Overall GDE health/ecological condition

- Photographs from established photo points, in each of the cardinal directions

It is recommended that triggered annual field monitoring be conducted twice per year in the same locations - once during spring to capture the time of year when plant species are most likely to be in bloom and when amphibian species are most likely to utilize aquatic habitat for breeding; and once during fall to capture the time of year when plants are most likely to depend on groundwater and when any surface water present is most likely to be groundwater-fed. The surveys could be conducted by a team of two qualified biologists familiar with the plant and wildlife species within the Basin. Depending on the number of survey locations, each survey effort (spring/fall) could likely be conducted in one to two field days, for a total of two to four field days annually.

Once GDE monitoring locations are established for representative ISW monitoring wells, subsequent annual field surveys (if triggered) should be conducted in the same locations to allow for comparison of multi-year field data.

Five-Year Periodic Evaluation Monitoring

In addition to the PT- triggered monitoring described above, the following desktop monitoring is recommended every five years, in advance of each Periodic Evaluation:

- Review of NDVI/NDMI trends for vegetative communities within SPV GDE units (Publicly available online through TNC)
- Review of aerial imagery to document any changes in the extent or greenness of vegetation over the five-year period, as well as any significant changes in the composition of dominant plant species

The desktop review of NDVI/NDMI values and aerial imagery would determine whether any significant changes in vegetative health, extent, and/or composition within SPV GDE units have occurred. Significant changes within the SPV GDE units that would require further analysis could include: multi-year decreases in NDVI/NDMI values that do not recover following increased rainfall; multi-year decreases in the extent of native vegetation; and/or significant new infestations of invasive plant species, particularly salt cedar and tamarisk. If these or other significant declines in GDE health are observed, then additional desktop analysis is recommended to determine whether these changes could be attributed to groundwater conditions within the Basin. This additional desktop analysis would pull in contextual data from the Annual Reporting and Periodic Evaluation processes and could include (but would not be limited to) the following:

- Review of groundwater level trends at nearby representative monitoring wells
- Review of groundwater level PTs for nearby representative monitoring wells and whether PTs have been approached or exceeded
 1. Review of recent precipitation data and analysis of multi-year climatic conditions (e.g. U.S. Army Corp of Engineers Antecedent Precipitation Tool)

If the additional desktop analysis indicates that significant observed changes to SPV GDE health may be due to changing groundwater conditions, then GDE field monitoring is also recommended as part of the Five-Year Periodic Evaluation. This GDE field monitoring would include the same field data collection (i.e., stream transects, biological surveys, photographs) described above for the PT-triggered annual monitoring. Survey locations within the Cloverdale Creek and San Dieguito GDE units would capture both aquatic and riparian habitat within these willow communities and would be selected based on the location/s of observed GDE health declines, as determined by the desktop analysis. If declines were observed within close proximity of previously established PT-triggered annual monitoring locations, then these previously surveyed locations should be utilized for the Five-Year Periodic Evaluation field monitoring to allow for multi-year comparisons. If feasible, field surveys should be conducted once during spring and once during fall in the same location(s).

Monitoring of ecological conditions and trends within the SPV GDE units will inform any necessary future SMC updates and protect GDEs and groundwater-dependent species within the SPV Basin from URs due to groundwater management activities.

5.4 Degraded Groundwater Quality

This section addresses the additional analyses undertaken as part of the 5-Year Periodic Evaluation for understanding groundwater quality in the SPV Basin, new information that was collected in response to DWR Recommended Corrective Action 2, described in detail in Chapter 3, Section 3.1.2. The full groundwater quality technical memorandum is included as Appendix E.

5.4.1 Overview based on 2022 Groundwater Sustainability Plan

At the time of the 2022 GSP adoption, the SPV Basin was determined to be sustainable for the groundwater quality sustainability indicator based on the 2022 GSP definition and SGMA regulations. The 2022 GSP did not identify any data gaps and concluded that the monitoring network meets DWR density requirements for monitoring protocols and has sufficient historical data. No revisions to MOs, MTs, or interim milestones, were recommended in the DWR determination letter and attached Staff Report (DWR 2023b). However Recommended Corrective Action 2 (Chapter 3, Section 3.1.2), directed the SPV GSA to revise the definition of URs for degraded groundwater quality so that exceedances of MTs caused by groundwater extraction, whether they are a direct result of groundwater management activities or not, are considered in the assessment of undesirable results in the Basin.

5.4.2 Conditions prior to and during Periodic Evaluation Timeframe

Groundwater quality data for the 10 representative groundwater quality monitoring wells were provided by the GSA for WYs 2020-2025. Table 5-3 and Table 5-4 below summarize the available nitrate (as NO_3N) and TDS concentration data for the representative monitoring wells sampled from WYs 2020-2025.

Table 5-3 Summary of Nitrate (as NO₃N) Concentration (WYs 2020–2025)

City Well Name	SPV GSP Well Number	Well Depth (feet below grade)	Nitrate as NO ₃ N													
			Minimum Threshold (mg/L)	Measurable Objective (mg/L)	1/21/2020 (mg/L)	6/22/2020 (mg/L)	12/8/2020 (mg/L)	6/21/2021 (mg/L)	2/3/2022 (mg/L)	5/16/2022 (mg/L)	11/16/2022 (mg/L)	5/16/2023 (mg/L)	11/2/2023 (mg/L)	2/13/2024 (mg/L)	3/19/2025 (mg/L)	12/8/2025 (mg/L)
SP001	SPV GSP - 127	120	10	5	NR	2.37	2.90	3.70	1.61	4.06	3.97	3.10	NR	3.07	1.04	3.90
SP003	SPV GSP - 125	106	10	5	NR	6.91	9.00	12.30	NR	6.28	5.55	7.80	15.80	9.31	5.62	14.00
SP006	SPV GSP - 122	Unknown	10	5	NR	NR	NR	NR	21.20	21.60	19.90	20.40	23.50	NR	NR	NR
SP008	SPV GSP - 120	200	10	5	0.06	0.25	0.10	0.40	0.36	0.11	0.07	0.40	0.60	<0.09	0.57	0.40
SP010	SPV GSP - 118	Unknown	10	5	0.04	0.95	1.00	1.20	1.42	1.53	1.17	1.50	3.10	1.32	1.48	1.40
SP036	SPV GSP - 91	Unknown	10	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
SP043	SPV GSP - 85	100	10	5	23.95	27.33	NR	26.00	29.90	26.20	NR	NR	43.40	NR	40.20	39.00
SP061	SPV GSP - 67	Unknown	10	5	0.53	0.59	0.70	0.60	1.26	0.91	3.09	2.60	1.10	NR	2.63	1.00
SP065	SPV GSP - 64	80	10	5	14.37	7.39	19.20	23.70	3.21	16.90	10.20	10.70	14.50	NR	21.90	19.00
SP089	SPV GSP - 40	190	10	5	NR	0.84	5.20	2.20	NR	NR	NR	5.40	1.10	0.80	0.85	2.00
bold: sample exceeded minimum threshold																
mg/L: milligrams per liter																
NR: not reported																
<: Not detected above given concentration																

Table 5-4 Summary of TDS Concentration (WYs 2020-2025)

City Well Name	SPV GSP Well Number	Well Depth (feet below grade)	Total Dissolved Solids															
			Minimum Threshold (mg/L)	Measurable Objective (mg/L)	1/21/2020 (mg/L)	6/22/2020 (mg/L)	12/8/2020 (mg/L)	6/21/2021 (mg/L)	2/3/2022 (mg/L)	5/16/2022 (mg/L)	11/16/2022 (mg/L)	5/16/2023 (mg/L)	11/2/2023 (mg/L)	2/13/2024 (mg/L)	5/20/2024 (mg/L)	11/14/2024 (mg/L)	3/19/2025 (mg/L)	12/8/2025 (mg/L)
SP001	SPV GSP - 127	120	1,900	1,000	1530	879	957	1050	1120	726	965	NR	NR	1040	1010	1060	1210	1200
SP003	SPV GSP - 125	106	1,310	500	773	949	1010	1090	736	1200	677	994	1090	869	927	999	673	1000
SP006	SPV GSP - 122	Unknown	1,680	1,000	NR	NR	NR	NR	1140	1150	1150	1070	1150	1060	1180	NR	NR	NR
SP008	SPV GSP - 120	200	2,170	1,000	2200	2100	2140	2090	NR	1960	2040	2030	1940	1910	1910	1890	1940	2000
SP010	SPV GSP - 118	Unknown	1,270	500	778	1040	980	1220	640	1200	1110	859	1190	704	886	1100	674	870
SP036	SPV GSP - 91	Unknown	1,900	1,000	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
SP043	SPV GSP - 85	100	3,060	1,000	2990	2630	NR	2550	2120	1970	2180	2020	2390	2380	2710	3020	2900	2300
SP061	SPV GSP - 67	Unknown	1,000	500	823	842	861	868	882	1100	776	794	874	827	831	857	734	630
SP065	SPV GSP - 64	80	1,750	1,000	1830	1810	1950	2040	2045	1930	1860	1890	1920	1960	1970	1990	1990	2000
SP089	SPV GSP - 40	190	1,300	500	500	469	525	462	NR	NR	NR	647	362	366	387	372	364	420

Groundwater Quality Trends

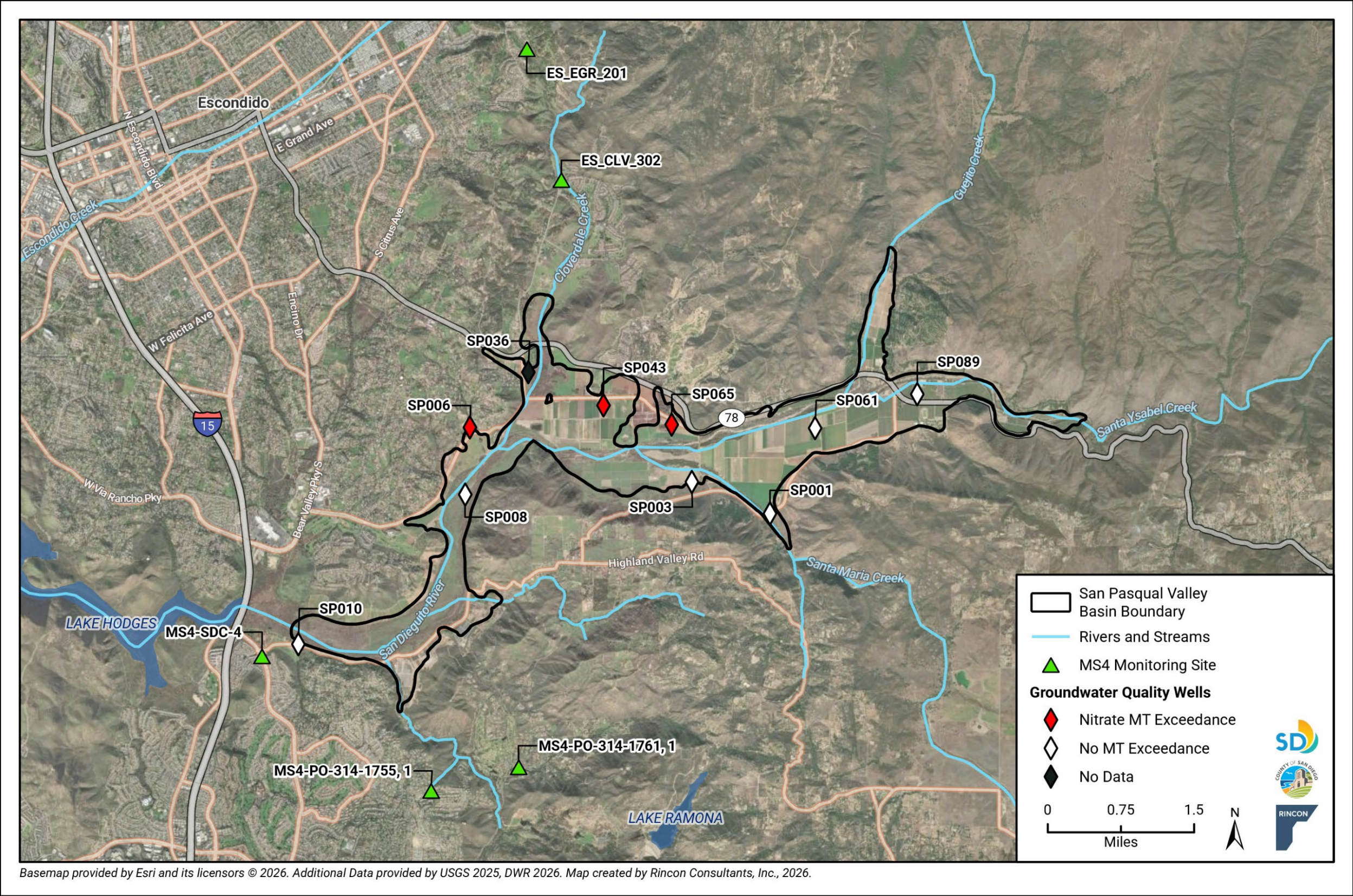
Historical groundwater quality data show that elevated nitrate and TDS concentrations were already present in portions of the SPV Basin prior to SGMA implementation. Two of the wells with current nitrate MT exceedances (SP043 and SP065) had documented nitrate concentrations above the MT prior to 2015. This indicates that groundwater quality impairment in these areas is not new, but rather long-standing and linked to land use practices and surface water influences.

Nitrate

Figure 5-2 displays the 10 representative groundwater quality monitoring locations and identifies the wells that exceed the MT for nitrate from WYs 2020–2025. Additional water quality data are incorporated through surface water monitoring data provided by the Municipal Separate Storm Sewer System (MS4) entities, and data spanning 2022-2024 can be found in Appendix C of the San Dieguito Water Quality Improvement Plan Annual Reports (San Dieguito River WMA 2023, 2024, 2025). Five MS4 monitoring locations within the San Dieguito watershed are included in. Two of these locations are monitored by the City of Escondido (ES_EGR_201 and ES_CLV_302), two are monitored by the City of Poway (PO-314-1755 and PO-314-1761), and one is monitored by the City of San Diego (SDC-4).

For the WYs 2020–2025 period, nitrate concentrations show clear distinction between wells with consistently low concentrations and those with persistent exceedances. Wells SP003, SP006, SP043, and SP065 exhibit recurring elevated nitrate, with repeated exceedances of both the MT and the MO. SP006, SP043, and SP065 also display steadily increasing concentration in nitrate levels during this period and remained above the MT for four consecutive years (WY 2022, 2023, 2024, and 2025). In contrast, SP001, SP008, SP010, and SP061 remain below the MT and MO throughout WYs 2020–2025. SP089 shows occasional spikes above the MO but does not exceed the MT. Overall, nitrate concentrations show sustained elevated values at wells SP006, SP043, and SP065. The data indicate that nitrate exceedances are not caused by groundwater management activities, which is a requirement for an undesirable result under the GSP definition (Rincon 2026d). The historical nitrate concentration charts (chemographs) for all wells are included as Attachment 1 in Appendix E.

Figure 5-2 Locations of Representative Groundwater Quality Monitoring Wells, Nitrate Exceedances, and Surrounding MS-4 Monitoring Sites



Of the five MS4 monitoring locations within the SPV Basin, four were sampled for dry weather flows as part of the Illicit Discharge Detection and Elimination (IDDE) program, and three of these locations were successfully sampled for total nitrate between 2022 and 2024. The two locations monitored by the City of Escondido (EGR-201 and CLV-302) continually exceeded the non-stormwater action level (NAL) and were investigated for illicit discharges or connections. Table 5-5 summarizes the total nitrogen results from monitoring years (MY) 2022 through 2024 and includes relevant notes on the associated IDDE investigations from the San Dieguito Water Quality Improvement Plan Annual Reports (San Dieguito River WMA 2023; 2024; 2025).

Table 5-5 Total nitrogen results from monitoring years 2022 through 2024

City	ID	date	TN (mg/L)	NAL (mg/L)	Comments
Escondido	EGR-201	6/1/2022	5.7	1	City of Escondido identified non-stormwater sources for 87 of 88 IDDE investigations, 86 of which were illicit discharges or connections. One instance of flow was investigated but unidentified. No runoff sources were investigated.
		7/12/2022	5.4	1	
	CLV-302	6/1/2022	1.8	1	
		7/12/2022	1.9	1	
	EGR-201	7/19/2023	5.9	1	2 instances of suspected unpermitted irrigation runoff, entirety of Escondido had no known or suspected groundwater seepages and had 5 suspected irrigation sources of flow. City of Escondido identified non-stormwater sources for 69 of 73 IDDE investigations, all of which were illicit discharges or connections.
		8/3/2023	6.3	1	
	CLV-302	7/19/2023	NS	1	
		8/3/2023	8.8	1	
	EGR-201	5/30/2024	4.6	1	
		6/12/2024	5.1	1	
Poway	314-1755	7/23/2024	0.94	1	* no known or suspected runoff sources identified

Source: San Dieguito River Water Management Area, 2023, 2024, 2025

The fifth MS4 location (SDC-4), monitored by the City of San Diego, is sampled during wet weather flows. No exceedances were observed between the years 2018 and 2024, indicating stable nitrogen conditions during storm events. Additional analysis of the MS4 monitoring results is provided in the Basin Conditions Section of the full 2026 groundwater quality technical memorandum (included here as Appendix E).

Total Dissolved Solids

Figure 5-3 displays the 10 representative groundwater quality monitoring locations and identifies the wells that exceed the MT for TDS from WYs 2020–2025. For WYs 2020–2025, TDS concentrations were frequently elevated relative to the MO across most representative monitoring wells. Exceedances of the MT were less common and occurred only at wells SP061 and SP065. SP061 exceeded the MT once within this time period, while SP065 exceeded the MT consistently throughout the entire WY 2020–2025 period. TDS chemographs for these wells are provided in Attachment 2 of Appendix E.

Throughout WYs 2020–2025, TDS concentrations remained relatively stable across most representative monitoring wells, except for SP065, which shows a consistent increasing trend (Figure 5-4).

Figure 5-3 Locations of Representative Groundwater Quality Monitoring Wells, TDS Exceedances, and Surrounding MS-4 Monitoring Sites

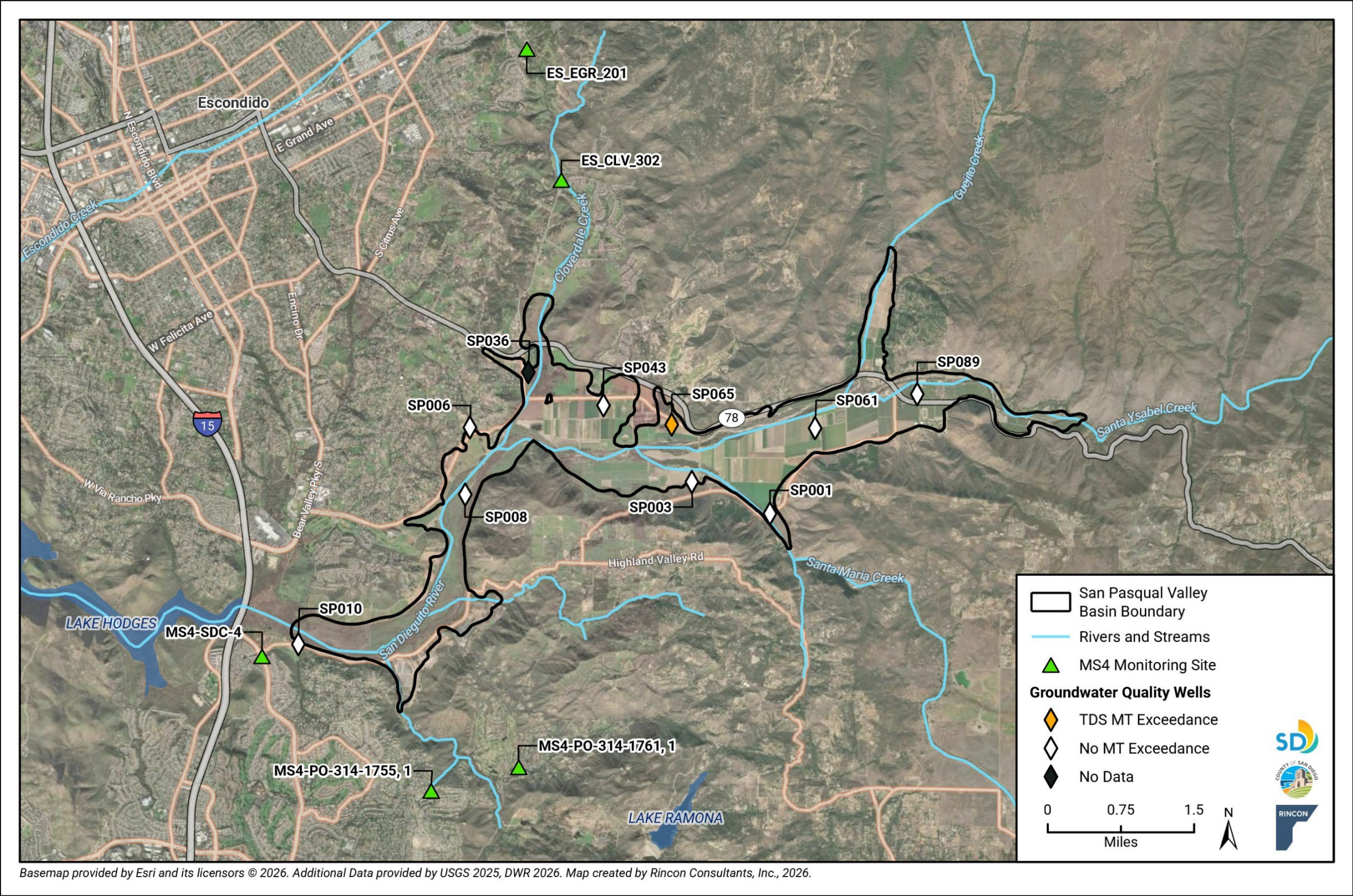
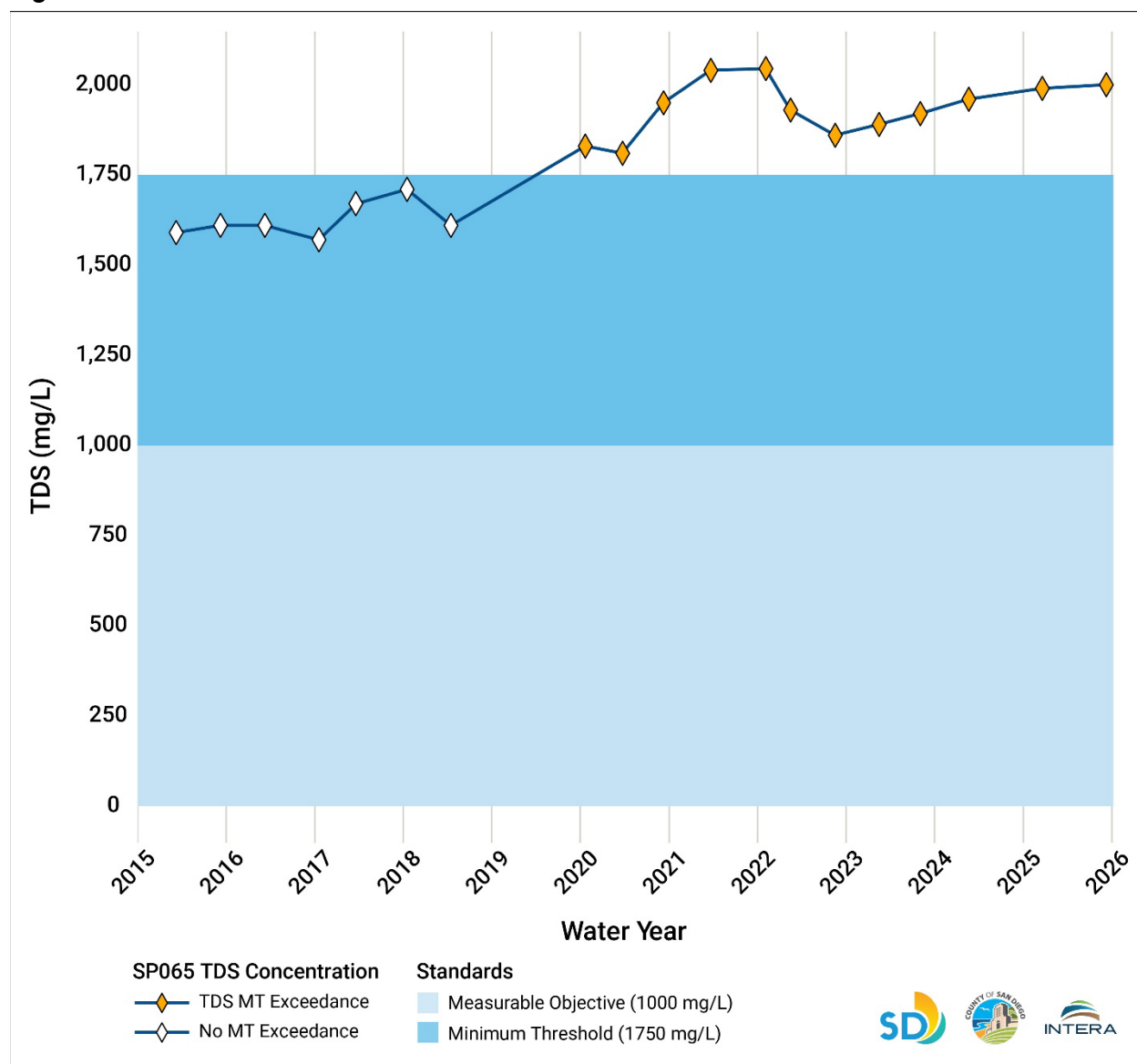


Figure 5-4 WYs 2020–2025 TDS Concentrations at Well SP065



SPV Basin Conditions Resulting in Groundwater Quality Exceedances

The SPV Basin receives recharge from stream channels, the valley floor, and the surrounding foothills, with groundwater moving from east to west through the system. Because of this cycle, groundwater quality changes slower than surface water quality. The SPV Basin is hydrologically connected to Hodges Reservoir, which captures both surface flows and groundwater from the valley. Long-term sediment and nutrient loading into the reservoir have contributed to recurring algal blooms, highlighting the need for watershed-wide reductions in sediment and nutrient transport.

As summarized in the 2022 San Pasqual Valley Resource Management Guide (City 2022a; SPV GSA 2021), nitrate levels in the SPV Basin are influenced by evapoconcentration during hot, dry periods, fertilizer application, and runoff from upstream agricultural areas. TDS accumulation is likely driven by salts introduced through irrigation, land use practices, and natural mineral dissolution. Additional pollutant sources identified in the SPV RMG include animal operations, uncovered soil and manure stockpiles, atmospheric deposition, and, potentially, improperly functioning septic systems, also known as onsite wastewater treatment systems. The San Diego Zoo Safari Park lies directly upstream of wells

SP043 and SP065, both of which exceed the nitrate MT, and SP065 also exceeds its TDS MT. Runoff from the park drains into lined lagoons located roughly half of a mile from each well. Although lagoon discharges are regulated under MS4 Permit Order No. 2013-0001-DWQ, leaks or improper maintenance could contribute to groundwater contamination. Adjacent to SP065 are Konyn Dairy and San Pasqual Valley Soils, both known contributors of nitrates and TDS, with uncovered soil and compost stockpiles visible in aerial imagery. Much of the SPV Basin consists of irrigated agricultural fields regulated under both the MS4 permit and the Agricultural Order discussed later in this memorandum.

Review of MS4 monitoring data further shows that illicit discharges and connections are contributing to elevated total nitrogen, as indicated by the dry-weather exceedances described earlier in the report.

Assessment Against SMC

In the SPV Basin, four monitoring wells exceeded the MT for nitrate (as NO_3N), and three (SP006, SP043, and SP065) displayed an overall increasing trend in nitrate concentrations. Of the remaining wells, five were sampled, and only one sample from SP089 exceeded the MO of 5 mg/L for nitrate. The other four sampled wells remained below the MO and show relatively consistent nitrate concentrations. TDS concentrations are generally more consistent across the monitoring network, although some wells still exhibit exceedances of both MOs and MTs.

Although nitrate MT exceedances have persisted in three wells (SP006, SP043, and SP065) and SP003 had infrequent exceedances, an undesirable result is not likely under the GSP definition. An undesirable result requires that exceedances be caused by groundwater management activity. In the SPV Basin, the observed contamination originating from SP003, SP043, and SP065 appears to be sources outside the GSA's authority, likely from surface water runoff, making it infeasible to improve groundwater quality without addressing those sources directly. Nitrate exceedances observed in well SP006 are less certain. Additional investigation will be required to fully trace the source of the contaminant to fully determine whether this can be determined as an undesirable result under the GSP definition. Initial preliminary desktop investigations point to residential property and agricultural land use. However, under the GSP framework, an undesirable result for degraded water quality requires (1) exceedances at approximately 30 percent of representative monitoring wells (3 of 10) sustained over two years and (2) a demonstrated link to groundwater management activities resulting in significant and unreasonable impacts to beneficial uses. Note that SP006 represents a single-well condition and, even if a source is identified, exceedances in this single well are not expected to meet these basin-scale and causation criteria or affect the overall groundwater quality sustainability determination.

The SPV Basin is subject to several regulatory programs, and the GSA continues to coordinate with other agencies as outlined in the SPV Basin GSP PMAs to support broader water quality improvements throughout the SPV Basin. These regulatory frameworks are described in the following section.

Sustainability Conclusion

Under the 2022 GSP definition and SGMA regulations, the SPV Basin remains sustainable for the groundwater quality sustainability indicator. Comparison of 2014 and current conditions shows that while groundwater quality has declined or remained impaired at several wells, these conditions do not appear to meet the criteria to classify groundwater quality degradation as an UR. Well SP006 requires further investigation to fully trace the source of the nitrate in well SP006 and to fully determine whether exceedances in this well can be considered a UR. Note that SP006 represents a single-well condition and, even if a source is identified, exceedances in this single well are not expected to meet these basin-scale and causation criteria or affect the overall groundwater quality sustainability determination. The SPV Basin appears sustainable for groundwater quality and no revisions to MOs, MTs, interim milestones, or undesirable results definition are warranted at this time.

5.4.3 Forecasted Results

The SPV Basin is expected to maintain groundwater quality sustainability under the GSP framework during the next evaluation cycle. Interim milestones and MOs are likely to be achieved or maintained for wells not currently exceeding thresholds, while existing exceedances are expected to persist but not worsen in a manner that would trigger an UR. Ongoing monitoring, infrastructure improvements, and adaptive coordination with watershed and land use regulatory programs will support continued progress toward long-term groundwater quality sustainability.

Likelihood of Achieving Sustainability and MOs

Groundwater quality conditions for nitrate and TDS are anticipated to remain generally consistent with recent trends over the next evaluation period. For wells that currently remain below applicable MTs, concentrations are expected to continue to fluctuate within historical ranges and below regulatory limits. As such, interim milestones and MOs for these wells are likely to be maintained.

For wells that currently exceed MTs or MOs, including SP003, SP006, SP043, and SP065 for nitrate and SP061 and SP65 for TDS, concentrations are not expected to decline substantially during the next evaluation cycle based on current understanding of contaminant sources and basin hydrology. However, these exceedances are also not expected to expand spatially or increase in frequency beyond observed recent conditions. Because groundwater quality impairments at these wells are not caused by groundwater extraction and largely predate SGMA implementation, the SPV Basin is expected to continue meeting the 2022 GSP definition of sustainability for the groundwater quality indicator.

Influence of Hydrologic and Climatic Conditions

Hydrologic variability and climatic extremes are expected to continue influencing groundwater quality in the SPV Basin. Periods of drought and extended dry conditions increase the likelihood of evapoconcentration, reduced dilution of recharge, and increased reliance on irrigation, all of which can contribute to elevated nitrate and TDS concentrations. Conversely, wetter years may provide increased recharge and dilution but can also mobilize nutrients and salts from the land surface and shallow soils into surface water and shallow groundwater.

Recent climatic conditions have included multi-year drought followed by episodic high-precipitation events. Despite these extremes, groundwater quality conditions have not shifted in a manner that would indicate a trajectory toward a groundwater quality UR caused by groundwater management activities.

Hydrologic and climatic extremes have not materially impeded GSP implementation related to groundwater quality because the primary drivers of observed nitrate and TDS exceedances are land use and surface water influences rather than pumping-related impacts. However, climate-driven variability underscores the importance of continued monitoring to distinguish long-term trends from short-term hydrologic responses.

5.4.4 Conclusions and Corrective Actions

Changes to the Sustainability Criteria

Water quality in the SPV Basin has declined over time for the pollutants of concern, specifically at wells SP003, SP006, SP043, SP061 and SP065. However, these trends do not appear to trigger an UR under the current GSP definition. Although three representative monitoring wells exceeded the nitrate MT for four consecutive years (SP006, SP043, and SP065), historical data for two of these wells show nitrate concentrations above the MT prior to 2015, which excludes those exceedances from meeting the GSP's definition of an undesirable result.

An UR requires that water quality degradation be caused by groundwater management activities. In the SPV Basin, contaminant sources are primarily related to land use and surface water influences, not groundwater extraction, except for SP006 which requires further investigation. Because the GSA does not have regulatory authority over these sources, and because groundwater pumping does not influence the fate and transport of nitrate or TDS in this basin, Tier 2 MAs such as pumping restrictions would not be effective. Addressing water quality concerns instead requires coordination with programs that regulate the identified pollutant sources, including animal operations, agricultural practices, irrigation practices, dry weather illicit discharges, and uncovered soil and compost stockpiles.

Evaluation of Revised Undesirable Result Definition

Although the City implemented a metered pumping program in 2019, irregular pumping records and inconsistent temporal coverage and data points from 2019 through 2025, combined with the fact that individual wells may serve multiple farms and farms may receive water from multiple wells, made direct comparison of groundwater pumping volumes and groundwater quality trends infeasible. Because of incomplete metered pumping data in the timeframe of the Periodic Evaluation, a comparative analysis of groundwater levels in representative groundwater monitoring wells against groundwater quality trends was performed, to understand if reduced groundwater level was driving increased nitrate and/or TDS levels in monitoring wells.

An evaluation of groundwater levels showed that no groundwater level monitoring wells in the SPV Basin have exceeded their respective MTs since the adoption of SGMA or in the WY 2020-2025 period. Groundwater levels in the eastern portion of the SPV Basin generally ranged between approximately 20-110 feet bgs from 2015-2025. Groundwater levels in the eastern portion of the Basin showed a steady decline from pre-2015 through fall 2016, associated with the historic 2011-2016 drought in California. Groundwater levels made a partial recovery and fluctuated from spring 2017 through fall 2020 with relative lows associated with a critically dry WY 2018. Groundwater levels again decreased from spring 2021 to fall 2022 following a critically dry WY 2021 and a dry WY 2022. This period of decreased precipitation was followed by a Wet WY in 2023, which brought the highest recorded groundwater levels in the 2015-2025 time period. These levels have again begun to decline since spring 2024, however historical monitoring results indicate that such declines are consistent with past hydrologic patterns and have been followed by recovery during wetter conditions. Groundwater levels in the western portion of the SPV Basin generally ranged between approximately 0-33 feet bgs from 2015-2025, with little fluctuation. Groundwater trends in this area follow the same patterns as in the eastern portion of the SPV Basin, however groundwater level variability in the western half of the SPV Basin is less pronounced, with less extreme groundwater level highs and lows.

Measured groundwater levels were closely correlated with WY condition (critically dry, dry, normal, above normal, wet), where groundwater levels declined in dry and critically dry years, and rebounded in above normal and wet years (Rincon 2026a), rather than any perceivable correlation between groundwater level and groundwater pumping trends. Furthermore, decreased groundwater levels did not correlate with increased nitrate and/or TDS levels observed in monitoring wells, indicating that reduction in groundwater level is not the driver behind increased nitrate and TDS concentrations.

DWR directed the GSA to revise the undesirable result definition to evaluate whether any pumping, regardless of whether it originates from GSA activities, is contributing to groundwater quality MT exceedances. Based on this revised definition, and on the comparisons between groundwater pumping, groundwater level, and groundwater quality, groundwater extraction does not appear to be causing the observed groundwater quality exceedances. Therefore, undesirable results are not occurring, and the definition does not require additional evaluation.

Regulatory Coordination

The MS4 Permit (R9-2013-0001) regulates stormwater runoff and illicit discharges across San Diego, Orange, and Riverside Counties and requires co-permittees to implement Water Quality Improvement Plans (WQIPs) and Jurisdictional Runoff Management Programs. Runoff within the SPV Basin is

managed by the relevant co-permittees under the San Dieguito River WQIP. Annual reporting under this framework documents compliance with Clean Water Act requirements for runoff entering rivers, streams, reservoirs, bays, lagoons, and the ocean.

The SPV Basin is also regulated under the County's Waste Discharge Requirements for Agricultural Operations (Orders R920160004 and R920160005), which address nutrient and salinity management, irrigation efficiency, erosion control, and pesticide management. These Orders require agricultural operators to monitor and reduce nitrate and TDS loading, prepare Water Quality Protection Plans, perform quarterly and annual self-assessments, and correct deficiencies such as leaks, overspray, or runoff routing issues.

MS4 monitoring conducted by the City of San Diego during wet weather flows shows no exceedances in nitrogen concentrations between 2018 and 2024. Elevated nitrate levels have been observed only during dry weather flows, indicating illicit discharges as the likely source rather than irrigation practices that comply with the Agricultural Order. Because only one MS4 wet weather monitoring site (MS4SDC4) exists within the SPV Basin, the City may want to consider additional locations to further evaluate the effectiveness of BMPs required under the MS4 Permit and the Agricultural Order. Potential sites could be selected based on areas of likely contribution identified through GSA monitoring.

Recommended Changes to the Sustainability Criteria

Based on the evaluation of groundwater quality conditions during WYs 2020–2025, no changes to the SMC for nitrate or TDS are recommended. Although several wells exhibit increasing concentrations and repeated exceedances of MTs, these exceedances do not constitute an undesirable result under the GSP definition because (1) they are not caused by groundwater management activities, and (2) historical data show that elevated concentrations occurred prior to 2015 at affected wells. Because the observed water quality degradation originates from land use and surface water sources outside the GSA's authority, adjustments to MTs, MOs, or the undesirable result definition would not improve basin conditions. Continued coordination with MS4 and Agricultural Order regulatory programs is the appropriate pathway for addressing water quality concerns.

The 2022 GSP identified data gaps related to (1) limited spatial coverage in areas influenced by agricultural and animal operations, (2) limited historical data for several monitoring wells, and (3) uncertainty regarding water quality conditions near the SPV Basin margins. However, these data gaps did not affect the conclusion in the 2022 GSP that the SPV Basin groundwater quality monitoring network meets density requirements as outlined in DWR's Monitoring Networks BMP (DWR 2016) for monitoring protocols and has sufficient historical data. The 2022 GSP further noted that the SPV Basin groundwater quality monitoring network may need periodic updates and improvement as the sites that are monitored by the GSA could change over time (SPV GSA 2021). The reviews and analyses conducted as part of this Periodic Evaluation indicate that updates to the SPV Basin groundwater quality monitoring network are warranted due to the need to identify a replacement well for SP036 and inconsistent groundwater quality sampling results at SP006 in 2022 and 2023.

The GSA will evaluate opportunities to coordinate with MS4 and Agriculture Order programs to establish shared or co-located monitoring points that could fill spatial data gaps without requiring new well construction. Additionally, opportunities for shallow monitoring points may be evaluated to better distinguish surface-driven loading from deeper groundwater conditions.

No changes to monitoring frequency were made during WYs 2020 through 2025. All wells, except two, were sampled in accordance with the GSP's groundwater quality monitoring schedule. Two wells (SP006 and SP036) have data gaps due to 1) SP006 having access to power source limitations and 2) SP036 appears to be collapsed. The GSA will continue to review monitoring frequency in future reporting periods to determine whether increased sampling of wells with rising nitrate and TDS concentrations would improve trend detection.

Additional power sources should be included within the groundwater quality sampling kit to ensure samples at Well SP006 can be consistently obtained. Due to the collapse of SP036, another alternative well is warranted nearby to include within the monitoring network going forward, or a new well will need to be drilled at the same location. Proposed changes to the groundwater quality representative monitoring network are further addressed in Chapter 8, Section 8.2.2.

Corrective Actions Addressed

DWR directed the SPV Basin to revise the definition of URs so that “MT exceedances caused by groundwater extraction, whether or not due to GSA projects, must be considered”. As such, the GSA must evaluate whether pumping is causing MT exceedances not just whether the GSA is responsible. The nitrate and TDS exceedances are likely driven by land use activities from animal operations, irrigated agriculture, fertilizer practices, compost and soil stockpiles, illicit discharges, and upstream runoff from the Safari Park. These are all external surface water and land use sources not related to groundwater extraction.

Although the metered pumping data available since implementation of the metered pumping program in 2019 were not sufficient to perform a statistical comparison or correlative analysis to groundwater quality trends, a comparison between groundwater levels across the SPV Basin and groundwater quality trends was possible. No correlation was found between relatively low groundwater levels and degraded groundwater quality. There is no evidence that groundwater level or groundwater pumping influences the nitrate and TDS loading patterns, and the GSA cannot control these pollutants within the SPV Basin’s hydrogeologic setting by restricting groundwater pumping. Although several representative monitoring wells exceed MT for nitrate or TDS, the exceedances are not caused by groundwater extraction, as required under the revised undesirable result definition. Therefore, groundwater quality undesirable results are not occurring, and the SPV Basin remains sustainable under SGMA.

To support long-term progress toward the sustainability goal, the GSA will continue coordination with MS4 and Agricultural Order programs, share monitoring data with partner agencies, support identification of pollutant hotspots, and evaluate opportunities for joint monitoring or BMP effectiveness studies.

5.5 Land Subsidence

This section addresses the additional analyses undertaken as part of the 5-Year Periodic Evaluation for understanding land subsidence in the SPV Basin including new information that was collected in response to DWR Recommended Corrective Actions 3 and 5a, described in detail in Chapter 3, Sections 3.1.3 and 3.1.5 respectively. The full land subsidence technical memorandum is included as Appendix H.

5.5.1 Overview Based on 2022 GSP

Land subsidence analyses performed as part of the 2022 GSP determined that subsidence has not caused undesirable results in the SPV Basin and is not anticipated to cause undesirable results in the foreseeable future, including over the planning horizon of this GSP (SPV GSA 2021). The SPV Basin is comprised of mostly coarse-grained alluvium ranging from approximately 120 to 200 feet in thickness, and clay layers are uncommon and where present are generally thin with limited continuity. Given the relatively small size of the SPV Basin, limited saturated thickness in the Basin, and the coarse-grained nature of alluvial materials, inelastic land surface subsidence is considered unlikely to occur in the Basin. Consequently, the SPV GSA determined that establishing land subsidence SMC, MOs, MTs, and PTs, and monitoring for these thresholds was not required pursuant to Title 23 CCR § 354.26(d). Therefore, SMC, thresholds, a monitoring network, and undesirable results for land subsidence were not laid out in the 2022 GSP.

However, the DWR determination letter and attached Staff Report included Recommended Corrective Actions 3 and 5a (Chapter 3, Sections 3.1.3 and 3.1.5 respectively), which directed the SPV GSA establish land subsidence SMC as required by regulations and establish a monitoring network for land subsidence that directly measures land elevation change.

5.5.2 Conditions prior to and during Periodic Evaluation Timeframe

During the initial review of subsidence for the SPV 2022 GSP, the only land surface displacement dataset available was the DWR InSAR time series. This dataset showed between 0 and -0.25 ft of displacement between June 2015 and October 2020 (Figure 4-32 in the 2022 GSP). This, coupled with the relatively small size of the SPV Basin, limited saturated thickness in the SPV Basin, and the coarse-grained nature of alluvial materials, led to the determination that inelastic (permanent) land surface subsidence was unlikely to occur in the SPV Basin (SPV GSA 2021).

Reanalysis of the InSAR data with data spanning 2015-2025, suggests that low magnitude subsidence was obscured by data artifacts. Based on DWR guidance from the determination letter (DWR 2023a) and the Land Subsidence BMPs (DWR 2025), non-zero land subsidence SMC values will be established using historical rates, while accounting for effects on beneficial uses, users, and critical infrastructure.

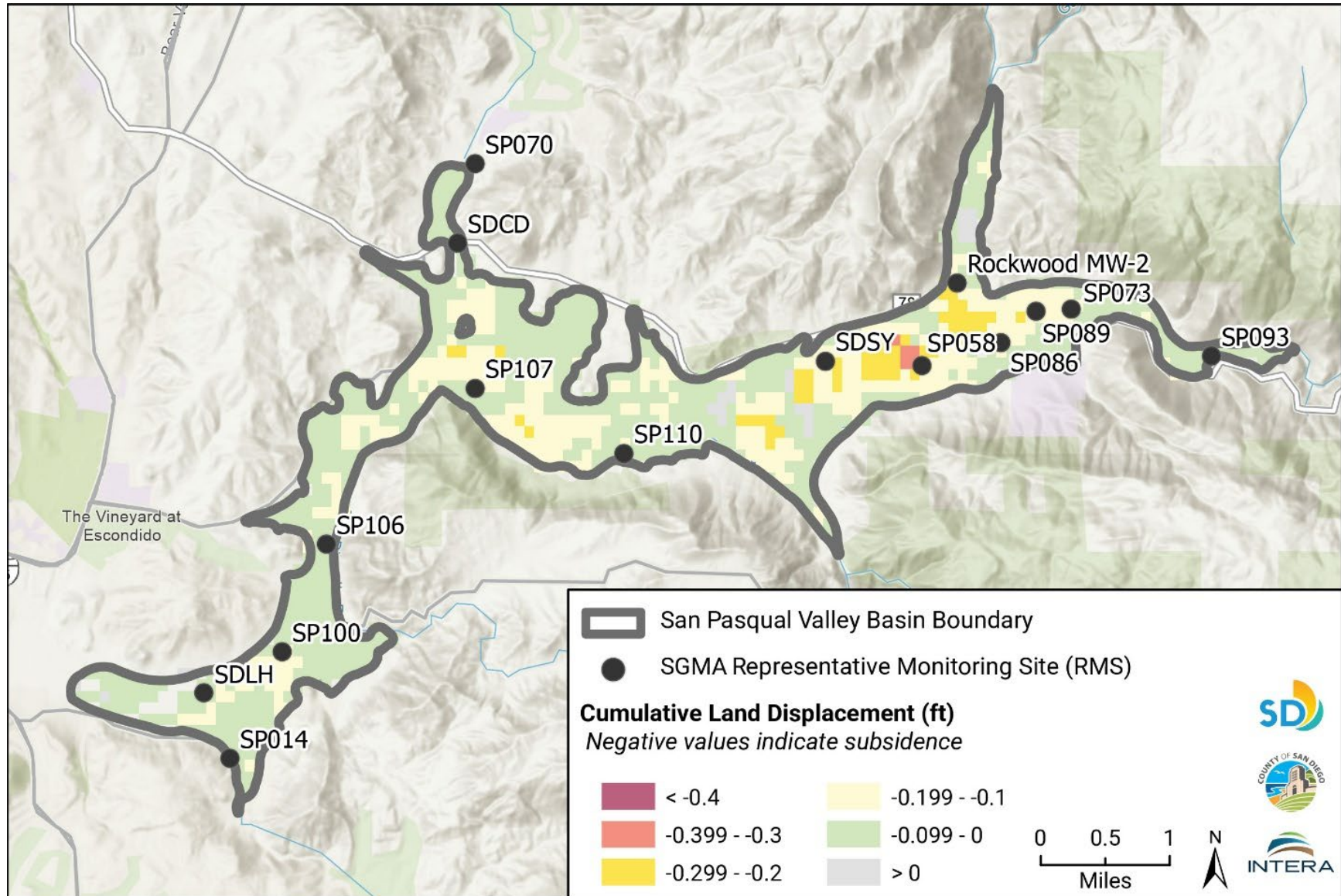
Land Subsidence Trends

Land subsidence maps reported in the SPV GSP utilized available InSAR information from the SGMA Data Viewer,¹⁰ which shows (both at GSP adoption and currently) that surface displacement since 2015 has ranged between -0.25 feet and 0.25 ft (Figure 4-32 in the 2022 GSP). However, inspection of the data revealed that these maps include locations where surface displacement resets to zero, caused by InSAR processing artifacts designed to improve spatial coverage. To address these offsets while also enhancing spatial coverage in regions with data decorrelation (i.e., data gaps), a reanalysis of the InSAR data was performed (for detailed methodology see Chapter 4 Section 4.2.5 and Appendix H). Results of this process illustrated in Figure 5-5 reveal a much more detailed subsidence pattern than what is shown by the SGMA Data Viewer and documented in the 2022 GSP, indicating that the SPV Basin has experienced slightly greater local subsidence (up to 0.4 ft) since 2015. Although the magnitude of land subsidence is low compared to other areas in the state of California, this evidence suggests it is necessary to reevaluate how land subsidence SMC are established. This includes considering potentially affected land uses and interests, setting up subsidence monitoring networks, and defining undesirable results related to the land subsidence sustainability indicator. Projected land subsidence is shown in Table 5-6.

WYs 2020-2025 Assessment Against SMC

It was not possible to perform a direct assessment for WYs 2020-2025 against land subsidence SMC, as SMC, URs, and monitoring thresholds were not established for the SPV Basin in the 2022 GSP. However, as part of the Periodic Evaluation, available subsidence datasets in the SPV Basin were investigated and reanalyzed to establish land subsidence SMC in accordance with GSP regulations.

¹⁰ Available at the California Natural Resources Agency, TRE ALTAMIRA InSAR Subsidence Data, Retrieved from <https://data.cnra.ca.gov/dataset/tre-altamira-insar-subsidence> on December 1, 2025.

Figure 5-5 Cumulative Land Subsidence between October 2015 and April 2025 following InSAR Data Reanalysis

The establishment of land subsidence SMC in the SPV Basin will be aligned with Sections 6.3 of the Land Subsidence BMPs (DWR 2025). As there is evidence of land subsidence, albeit low in magnitude, the MT, in the case it needs to be determined in future, will be a level of subsidence that does not substantially interfere with land uses/interests or infrastructure. To this aim, representative locations across the SPV Basin were selected to investigate historical subsidence (subsidence occurring prior to GSP adoption). The representative locations selected are wells already part of the groundwater levels monitoring network, shown in Figure 5-5, as these sites are sufficiently distributed across the SPV Basin. Further, these locations, at which groundwater level measurement will be taken, may enable investigations into estimating critical head, as detailed in Section 5.3 of the Land Subsidence BMPs, as more data are collected.

Sustainability Conclusion

A land subsidence sustainability indicator was not established in the 2022 SPV GSP because available data at the time indicated minimal subsidence within the margin of error of the data available at the time of SPV GSP adoption, and a low likelihood of adverse impacts. However, reanalysis of updated InSAR data (2015–2025) shows that low-magnitude, measurable, localized subsidence is occurring within the SPV Basin, though it has not resulted in impacts to infrastructure or land uses that would constitute an undesirable result. As a result, the SPV Basin continues to appear sustainable with respect to land subsidence under current conditions. To address DWR corrective actions and improve future evaluation, a planning threshold will be established to guide monitoring and trigger investigations, while measurable objectives, minimum thresholds, and quantitative undesirable results will be developed if warranted by future conditions. At this time, no exceedances or impacts indicate the need for further revisions and continued monitoring and periodic reevaluation will inform whether additional sustainability management criteria are necessary.

5.5.3 Forecasted Results

At each site, the historical rate (October 1, 2015 to January 1, 2022) and the maximum subsidence prior to GSP adoption (Pre-GSP) was estimated using the updated and corrected InSAR dataset as detailed in INTERA 2026b (Appendix H). The Pre-GSP subsidence rate provides a baseline to assess potential subsidence over the SGMA implementation horizon (through 2040). Without knowledge of critical head elevations and/or previous stress conditions in the Basin, this approach assumes that land subsidence will continue at a constant rate if groundwater level conditions follow similar trends to those during Pre-GSP activities. Results of the rate and extent estimation are shown in Table 5-6. Rates range from -0.006 ft/yr to -0.032 ft/yr resulting in cumulative extents of -0.102 ft to -0.773 ft (-0.078 ft to -0.569 ft relative to January 1, 2022).

The maximum cumulative subsidence documented by the InSAR dataset prior to GSP adoption (2015–2022) provides a value for whether future subsidence is elastic or inelastic. Any subsidence that occurs less than this value (i.e., displacement above this value) would be considered elastic (recoverable), while subsidence occurring greater than this value (i.e., additional subsidence) may have an inelastic (permanent) component. Values at the sites range from 0.061 ft to 0.235 ft with several locations near or below the reported accuracy of the InSAR data (0.066 ft)¹¹.

¹¹ Towill (2025) assessed the TRE Altamira vertical InSAR measurement data against vertical displacements from an independent set of 186 continuous GPS stations. Data was aligned temporally and spatially (<100 m difference) in order to develop a Root Mean Square Error (RMSE) for each station. RMSE values for individual stations ranged from 33.60 to 1.61 mm (with a consolidated state-wide RMSE value of 10.14 mm) leading to “strong evidence that the InSAR data accurately models change in ground elevation to an accuracy tested to be 20 mm (0.66 ft) at 95% confidence.” Assumptions/Notes: CGPS stations adequately represent the entire study area and InSAR dataset and that CGPS is an independent source of higher accuracy. Reported accuracy was last conducted for data spanning Jan 1 2015 to Oct 1 2024.

Table 5-6 Projected Land Subsidence

Representative Monitoring Site	Historical Rate (ft/yr)	Projected 2040 Cumulative Subsidence (ft relative to Oct 2015)	Cumulative Subsidence Jan 2022 (ft relative to Oct 2015)	Projected 2040 Cumulative Subsidence (ft relative to Jan 2022)	Maximum Cumulative Subsidence Pre-GSP Adoption (ft relative to Oct 2015)	Date of Maximum Cumulative Subsidence Pre-GSP Adoption (mm/dd/yyyy)
Rockwood MW-2	-0.032	-0.773	-0.204	-0.569	-0.235	8/1/2021
SDCD	-0.008	-0.190	-0.043	-0.147	-0.075	8/1/2021
SDSY	-0.027	-0.637	-0.151	-0.486	-0.189	3/1/2020
SP058	-0.018	-0.415	-0.093	-0.322	-0.130	10/1/2020
SP073	-0.015	-0.377	-0.105	-0.272	-0.131	9/1/2020
SP086	-0.026	-0.640	-0.164	-0.477	-0.179	8/1/2021
SP089	-0.024	-0.588	-0.155	-0.434	-0.175	8/1/2021
SP093	-0.006	-0.132	-0.026	-0.105	-0.065	3/1/2020
SP100	-0.005	-0.137	-0.046	-0.091	-0.089	4/1/2020
SP106	-0.004	-0.102	-0.024	-0.078	-0.061	4/1/2019
SP107	-0.013	-0.287	-0.058	-0.229	-0.100	8/1/2021
SP110	-0.012	-0.282	-0.067	-0.216	-0.098	3/1/2020

Notes:

Values in table are represented as displacements. Negative values indicate subsidence.

Influence of Hydrologic and Climatic Conditions

Hydrologic and climate conditions influence land subsidence primarily through their effects on groundwater levels, which are the principal driver of aquifer compaction. In the SPV Basin, subsidence has been evaluated in relation to historical groundwater level conditions, with projections assuming that future subsidence trends will remain consistent if similar hydrologic stresses persist. Periods of reduced recharge or increased groundwater demand could contribute to groundwater level declines and increase the potential for subsidence, while periods of enhanced recharge may help stabilize groundwater elevations. However, the available analysis indicates that subsidence magnitudes in the SPV Basin remain relatively low and localized, and current data limitations (particularly the lack of sufficient groundwater level and deformation records at representative monitoring sites) prevent a more detailed evaluation of how subsidence responds to hydrologic variability over time. As additional monitoring data are collected, the relationship between hydrologic conditions and subsidence in the SPV Basin may be further refined to support improved long-term management.

5.5.4 Conclusions and Corrective Actions

Changes to the Sustainability Criteria

Newly Established Land Subsidence SMC

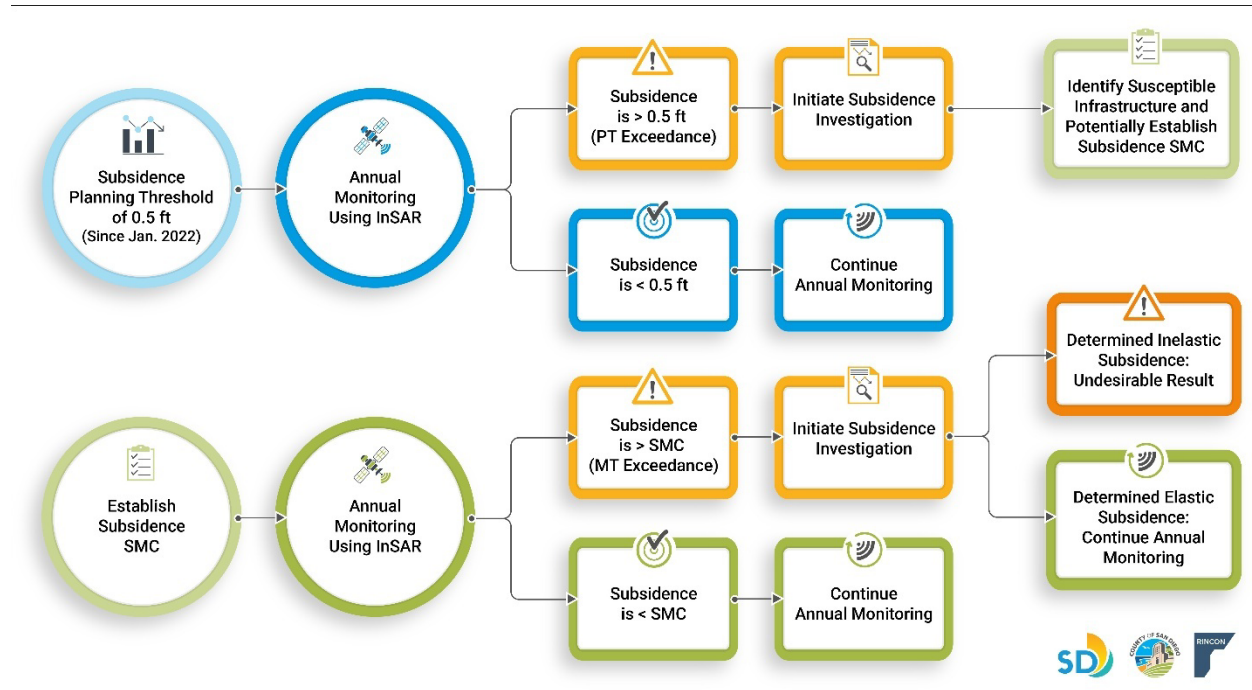
MTs for land subsidence will potentially be established to prevent the URs described below, if required. Thresholds may include cumulative subsidence limits at representative monitoring locations and/or asset-specific thresholds tied to infrastructure performance or flooding risk. Because subsidence impacts in the SPV Basin are expected to be localized, a single exceedance at a representative monitoring location associated with vulnerable infrastructure or drainage features may constitute an undesirable result, even if basin-wide averages remain low.

The site with the greatest historical subsidence rate is Rockwood MW-2 with a historical rate of -0.032 ft/yr and estimated 2040 cumulative extent of -0.569 ft relative to January 2022. When considering critical infrastructure in the SPV Basin, which primarily consists of wells, this level of subsidence is unlikely to create adverse impacts. As such, the SPV GSA will establish a land subsidence PT extent of -0.5 ft for the entire SPV basin based on the historical rate at Rockwood MW-2. This PT extent of -0.5 ft would be with respect to cumulative displacement occurring after January 2022. If any InSAR data point exhibits subsidence greater than the PT extent, a subsidence investigation will be conducted to assess the specific subsidence mechanisms and root causes. This investigation will assess the Basin infrastructure susceptible to subsidence and quantify their subsidence tolerance. Results from this investigation will inform the potential need for establishment of subsidence MOs and MTs and their respective rates/extents (Table 5-7).

Table 5-7 Land Subsidence Extent

	MT Extent	PT Extent (ft relative to Jan 2022)	MO Extent
SPV Basin	N/A	-0.500	N/A
Notes: MT and MO to be determined in future, if required, dependent upon analyses completed for Annual Reports or next 5-Year Periodic Evaluation			

The PT extent value is expected to allow for sufficient investigation and planning horizons to halt, minimize, and/or mitigate subsidence such that undesirable results are avoided. Stakeholder input will be solicited to identify relevant infrastructure and to potentially develop PMAs for mitigating SMC exceedances. Figure 5-6 details the monitoring plan, initiation of investigations and SMC establishment, and determination of URs.

Figure 5-6 Decision Tree for Annual Monitoring and Land Subsidence Sustainability Indicator

Defining Undesirable Results

The UR for land subsidence in the SPV Basin is defined as land subsidence that substantially interferes with land uses/interests or infrastructure. This includes damage to, or loss of functionality of, infrastructure or an increase in flooding risk that cannot be reasonably mitigated through routine operations or maintenance. Currently, this definition is not quantitatively described in part due to historical subsidence rates not having impacted land uses/interests or infrastructure. Locations that experience subsidence greater than the PT extent (or MT if/when established) will be monitored for two consecutive years to determine whether the exceedance is due to inelastic subsidence or seasonal variability of land surface elevations. Should these conditions occur in the SPV Basin, the GSA will initiate site-specific studies to better evaluate the cause(s) and impacts of sustained rates and magnitudes of subsidence that exceed historical conditions. In doing so, quantitative URs may be established.

Significant and unreasonable conditions may occur as a result of cumulative or differential land subsidence that alters ground surface elevations, slopes, or hydraulic capacity in a manner that adversely affects infrastructure performance or public safety. The SPV Basin includes the San Dieguito River corridor, associated floodplain areas, and valley-crossing infrastructure. Subsidence risk is expected to be localized rather than basin-wide and primarily associated with changes in ground slope or elevation that could affect infrastructure performance or surface drainage.

Subsidence-related URs will be evaluated with respect to the following receptors (if required based on an exceedance of the PT extent):

- **Infrastructure:** roadways, bridges, drainage structures, local channels, utilities, and groundwater wells
- **Flooding and Drainage:** the San Dieguito River channel, adjacent floodplain areas, and local drainage pathways where reduced slope or freeboard could increase flood risk or ponding

Land subsidence is considered significant and unreasonable if the following conditions occur and are attributable to groundwater-related subsidence as listed in Table 5-8.

Table 5-8 Undesirable Result Definitions

Receptor	Undesirable Result Condition
Roadways / Bridges / Other Linear Infrastructure	Differential subsidence that results in loss of safe operation or requires major structural repair or re-grading
Drainage Channels / Culverts	Reduction in slope, capacity, or freeboard that increases flooding or reduces conveyance and requires major structural repair or re-grading
Flood-Prone Areas	Subsidence that measurably and significantly increases flood extent, frequency, or duration
Wells / Buildings / Other Critical Infrastructure	Damage that prevents continued use and requires repair or replacement

Corrective Actions Addressed

DWR directed the SPV Basin to establish land subsidence SMC and a monitoring network capable of directly measuring land surface elevation change. In response, the GSA reanalyzed available InSAR data and applied current best practices to better characterize subsidence conditions and develop an initial SMC framework. This effort confirmed that subsidence is occurring at low magnitudes and is spatially localized, with no evidence of impacts to infrastructure or land uses that would meet the definition of an undesirable result.

Based on this analysis, the GSA proposes defining undesirable results and corresponding investigation procedures to provide a structured approach for evaluating future subsidence conditions and determining whether additional management criteria, such as minimum thresholds, are warranted. In addition, a basin-wide monitoring network utilizing the best available InSAR data was proposed to track land surface deformation and support ongoing evaluation.

Because current subsidence conditions have not resulted in significant or unreasonable impacts, there is no evidence that undesirable results are occurring, and the SPV Basin remains sustainable with respect to land subsidence under SGMA. The completed actions address Recommended Corrective Actions 3 and 5a, align with GSP regulations and DWR Land Subsidence BMPs (DWR 2025), and provide a framework for continued monitoring and adaptive management as additional data become available.

5.6 Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator in the SPV Basin because seawater intrusion is not present and not likely to occur given the Basin's distance from the Pacific Ocean, bays, deltas, or inlets. Therefore, there is no realistic possibility of an undesirable result due to seawater intrusion.

6 Basin Setting Based on New Information, Groundwater Model Updates, or Changes in Water Use

6.1 Basin Setting

This section discusses topography, surface waters, recharge, and soils in the Basin. It also describes the SPV Basin's geologic history and setting, discusses geologic formations present in and around the SPV Basin, and identifies the primary aquifer and its characteristics.

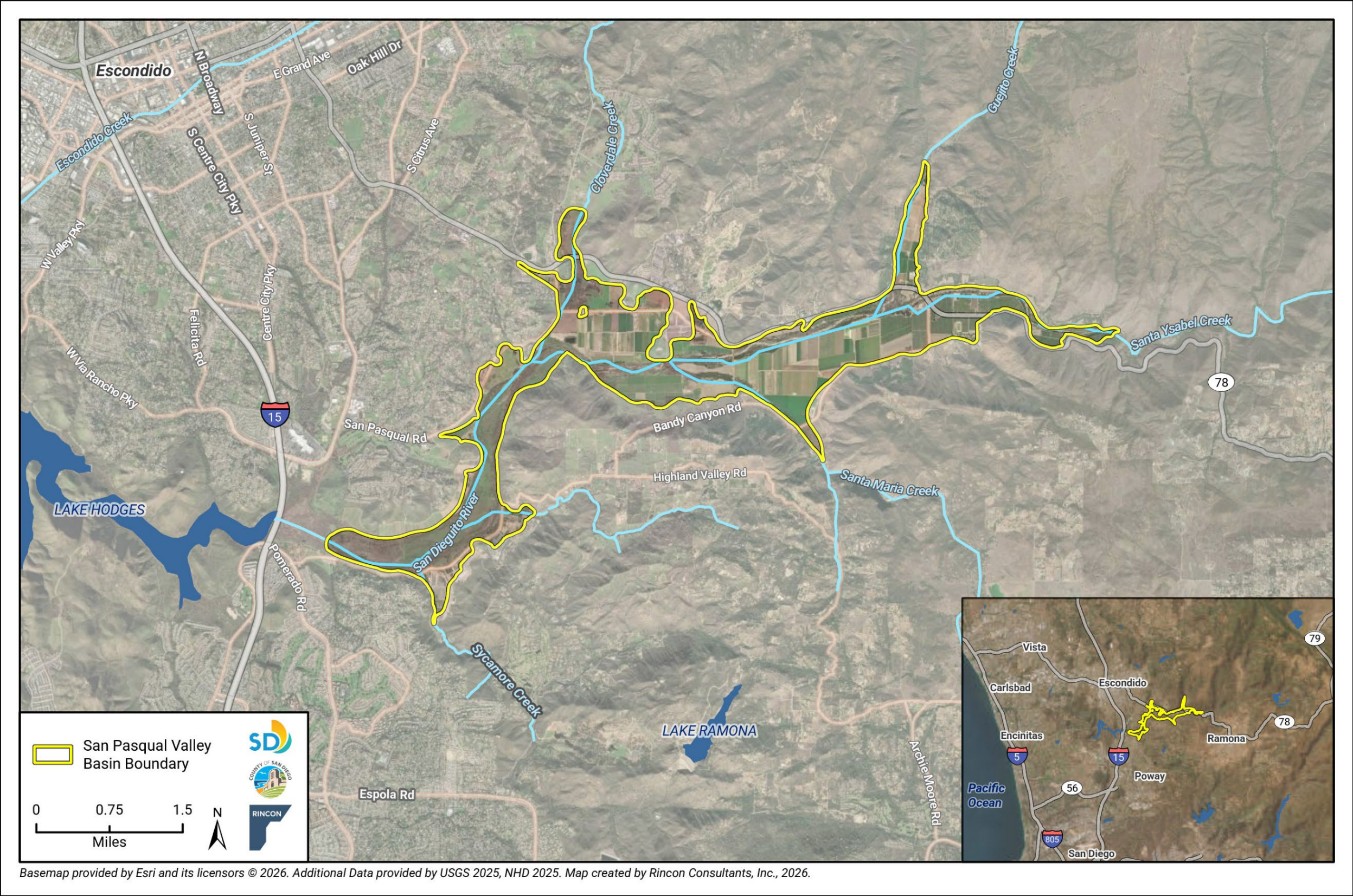
6.1.1 SPV Basin Geography and Topography

The SPV Basin is in the Peninsular Ranges Geomorphic Province and is located in the foothills east of the coastal plain. The SPV Basin, which is narrow and curved, is approximately 9 miles long east to west and bounded on all sides by hills composed primarily of Cretaceous aged granitic rocks (i.e., tonalite, monzogranite, and granodiorite). The hills surrounding the SPV Basin are 200 to 1,000 feet higher than the Basin's level. The topography of the Basin can be characterized as gently sloping with an overall topographic gradient of 0.003 feet per foot toward the west. The tributaries entering the Basin from the north and south are of a similar gradient. Surface elevations range from approximately 500 feet above mean sea level (NAVD88) where Santa Ysabel Creek enters the SPV Basin through a narrow canyon in the eastern portion of the Basin to approximately 320 feet above mean sea level in the west where the SPV Basin discharges to Hodges Reservoir.

6.1.2 Surface Water Bodies

Surface water bodies in the Basin are limited to streams. These streams are generally ephemeral in nature and typically only flow in response to rain events primarily in winter or during years of above-average precipitation. Guejito Creek flows into Santa Ysabel Creek and the confluence of Santa Maria and Santa Ysabel Creeks coincides with the start of the San Dieguito River, which flows southwest into Hodges Reservoir. Cloverdale and Sycamore Creeks from the north and south flow into the San Dieguito River, while Santa Ysabel Creek enters the Basin from the east. Figure 6-1 shows the locations of surface water bodies including streams, tributaries, and Hodges Reservoir within and surrounding the SPV Basin boundary. Santa Ysabel Creek, regulated by Sutherland Dam upstream of the Basin, flows approximately 100 days during the year with an average annual discharge of 510 acre-feet per year (AFY). Guejito Creek flows, unregulated, roughly 145 days per year with an average annual discharge of 290 AFY. Santa Maria Creek has a median discharge of 145 AFY and flows about 50 days per year; although some years it does not flow at all. Cloverdale Creek flows perennially owing to irrigation runoff from avocado groves on the surrounding hillside (USGS 1983).

Figure 6-1 Surface Water Bodies in and around the San Pasqual Valley Basin



6.1.3 Areas of Recharge, Potential Recharge, and Groundwater Discharge

Recharge to the Basin comes in the form of infiltration from precipitation, recharge of applied water, and infiltration of surface flow from Santa Ysabel Creek and the tributary streams of Guejito, Santa Maria, and Cloverdale Creeks. Additionally, groundwater flow from the surrounding bedrock into the Basin likely contributes some amount of recharge into the SPV Basin. Additional areas of potential recharge are located where the soils overlying the SPV Basin have high infiltration capacities. Most of the SPV Basin has soils with high infiltration capacities (i.e., 10–100 micrometer [μm]/second), with only the western edge of the SPV Basin near Hodges Reservoir having very low (i.e., 0–0.01 μm /second) infiltration capacities (SPV GSA 2021). Areas in the SPV Basin with the highest potential recharge include margins where bedrock meets unconsolidated materials at the edge of the SPV Basin. When rainfall occurs over bedrock, much of the water is unable to infiltrate, and flows downslope until it reaches unconsolidated material at the edge of the Basin where infiltration rates are higher. Where more permeable materials overlie bedrock around the Basin, rainfall infiltrates these permeable materials, and much of the water flows along the bedrock contact until it reaches the Basin's unconsolidated materials. No direct record of exact inflows due to precipitation over the entire SPV Basin exists, so precipitation inflows to the system were instead generated using the USGS Basin Characterization Model (BCM), further explained in Chapter 6, Section 6.3.1. The 2022 GSP provides further details and discussion of these recharge components (SPV GSA 2021).

Groundwater discharges in the SPV Basin occur through pumping, shallow groundwater uptake from plants, and discharge to streams in gaining reaches, and to a lesser extent, subsurface outflow to Hodges Reservoir. Groundwater also discharges from the alluvium and residuum to fractured bedrock where downward hydraulic gradients occur. Groundwater discharge to streams occurs primarily in the western end of the SPV Basin where the water table intersects the streambeds. Groundwater discharge to vegetation on the land surface also occurs, such as at the marsh area near the intersection of Bandy Canyon and Ysabel Creek Roads. The 2022 GSP provides further details and discussion of these discharge components (SPV GSA 2021).

6.2 Hydrogeologic Groundwater/Surface Water Conceptual Model

The SPV GSP Model is a three-dimensional numerical model originally developed in support of the SPV GSP preparation using the USGS MODFLOW¹²-OWHM platform to simulate integrated groundwater, surface water, land surface, and water-demand processes within the SPV Basin (McDonald and Harbaugh 1988). The SPV GSP Model serves as an important technical tool for evaluating historical, current, and projected groundwater conditions, as well as future management scenarios. The model was originally developed to support SPV GSP preparation using the best available data and understanding of Basin hydrologic conditions at that time and serves as a key tool for evaluating groundwater conditions within the SPV Basin.

The original SPV GSP Groundwater Model v1.0, developed in support of the 2022 GSP, was calibrated using observed hydrologic data spanning January 2004 through September 2019. For the subsequent simulation period for water years 2019–2071, the 2022 GSP relied on projected climate inputs and associated estimated stresses to simulate future SPV Basin conditions. Following submittal of the GSP in 2021, the SPV GSP Model was updated as part of Management Action No. 7 to support streambed investigation and integrated groundwater–surface water evaluation efforts (Jacobs and Woodard & Curran 2023a; Jacobs and Woodard & Curran 2023d). As part of that effort, the original model was

¹² MODFLOW is a widely used numerical groundwater model developed by the USGS for simulating the flow of groundwater in aquifer systems. Specifically, it is a modular, finite-difference computer model that solves the governing groundwater flow equations to predict how water moves through porous media under varying conditions such as pumping, recharge, and interaction with rivers or lakes.

updated to SPV GSP Model v2.0, which included refinements to stream representation and aquifer characteristics within the Basin.

As part of the DWR's determination letter and attached Staff Report (DWR 2023b), DWR identified the following recommendations relating to the SPV GSP Model:

- **Recommended Corrective Action 1** (Chapter 3, Section 3.1.1), which suggested that the SPV GSA provide "information regarding the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds."
- **Recommended Corrective Action 4c** (Chapter 3, Section 3.1.4), which states that the SPV GSA should "continue to fill data gaps," and "collect additional monitoring data," to gain a more comprehensive understanding of the groundwater environment in the Basin.
- DWR also provided a broader recommendation that the groundwater model be updated periodically as additional monitoring data become available and as understanding of the SPV Basin hydrologic conceptual model evolves, consistent with the intended role of the SPV GSP Model as an adaptive basin management tool (DWR 2023b).

As part of this Periodic Evaluation and in response to DWR's recommended corrective actions, INTERA updated the SPV GSP Model (referred to here as the SPV GSP Model v3.0) to incorporate newly available data collected between October 2019 and December 2024¹³, refined the representation of SPV Basin hydrologic conditions, and evaluated updated future climate scenario groundwater budget and storage responses. These updates provide the technical foundation for the Periodic Evaluation, including updated groundwater budgets, groundwater pumping estimates, groundwater level assessments and predictions, streamflow interaction analyses, and evaluation of SPV Basin sustainability relative to established MOs and MTs both through the long-term sustainability timeframe of 2042 and the SGMA planning horizon of 2072. To support this effort, INTERA reviewed, compiled, and analyzed available SPV Basin monitoring and hydrologic datasets to identify data gaps and support the updated SPV GSP Model v3.0. The full SPV GSP Model v3.0 Update technical memorandum, including methodology and results, is included as Appendix G (INTERA 2026a).

The SPV GSP Model serves as an important technical tool for evaluating historical, current, and projected groundwater conditions, as well as future management scenarios. The original SPV GSP Model v1.0 was developed to support SPV GSP preparation, using the best available data and understanding of SPV Basin hydrologic conditions at that time. Subsequent model updates have built upon this foundation to incorporate new data, improve representation of Basin hydrologic processes, and support ongoing technical evaluations. The spatial extent of the SPV GSP Model includes not only the SPV Basin boundary, but also the surrounding stream network and contributing watershed areas that influence inflows and outflows to the SPV Basin, referred to as the numerical model domain (Figure 6-2).

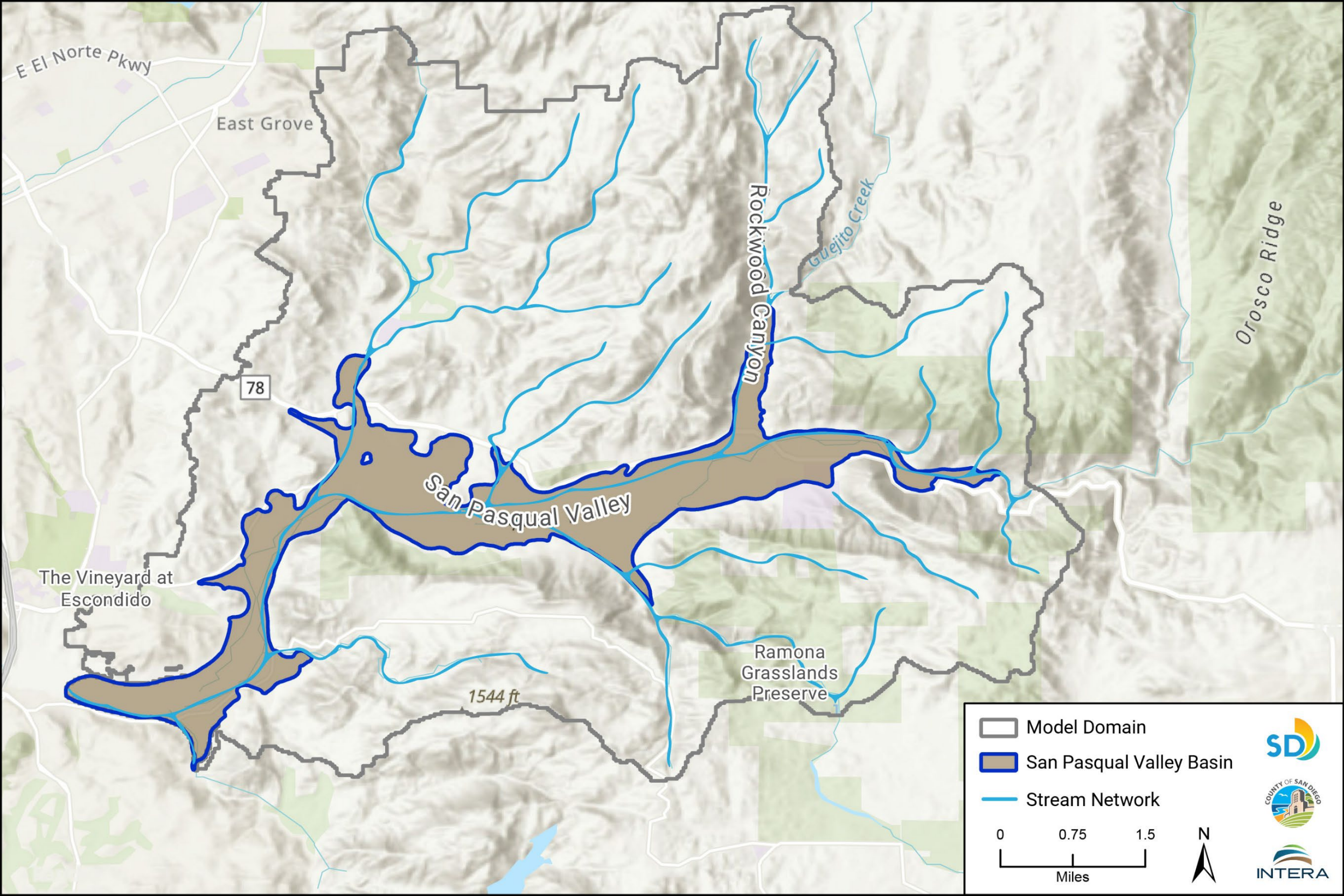
6.2.1 Groundwater/Surface Water Model Updates

The original SPV GSP Groundwater Model v1.0, was developed in support of the 2022 GSP and was calibrated using observed hydrologic data spanning January 2004 through September 2019 (SPV GSP, 2021). For the subsequent simulation period for water years 2019–2071, the SPV GSP relied on projected climate inputs and associated estimated stresses to simulate future SPV Basin conditions.

Following submittal of the GSP in 2021, the SPV groundwater model was updated as part of Management Action No. 7 (see Chapter 7 Section 7.2.7) to support streambed investigation and integrated groundwater–surface water evaluation efforts (Jacobs and Woodard & Curran, 2022; 2023b). As part of that effort, the original model was updated to SPV GSP Model v2.0, which included refinements to stream representation and aquifer characteristics within the Basin. The updated SPV GSP Model v2.0 retained a combination of daily and monthly stress periods, which created a substantial computational burden when extending the simulation period through the historical period and future climate projection.

¹³ Although the timeframe of this 5-Year periodic Evaluation is Water Year 2020 through 2025, at the time this model update was initiated, the necessary curated, publicly available data were only available for download and incorporation through December 2024.

Figure 6-2 San Pasqual Valley Groundwater Basin Boundary, Stream Network, and Numerical Model Domain



As part of this 5-Year Periodic Evaluation model update, the historical simulation period was extended through the end of calendar year 2024 by incorporating observed data collected since completion of the 2022 GSP. Specifically, observed hydrologic inputs for the period from October 2019 through December 2024 (hereafter referred to as the historical update period) were compiled and incorporated into the model in place of the previously projected or estimated inputs. This update extended the model's historical simulation period from the original 2004–2019 calibration period to 2004–2024, replacing previously projected inputs with observed hydrologic data to improve substantially the model's ability to represent SPV Basin conditions over the recent historical period. In summary, groundwater model updates to SPV GSP Model v3.0 included reviewing and incorporating newly available hydrologic and monitoring datasets, extending the historical simulation period through December 2024, evaluating the existing agricultural demand framework, and implementing model refinements to support updated historical and future scenario analysis.

6.2.2 Newly Incorporated Data into SPV GSP Model v3.0

The first phase of the 5-Year Periodic Evaluation model update consisted of a comprehensive review and compilation of publicly available data relevant to the SPV GSP. Data sources included the SGMA Data Viewer, City of San Diego Public Utilities records, the San Diego Regional Data Warehouse, the USGS National Water Dashboard, the California Open Data Portal, and publicly available technical reports and supporting documentation relevant to Basin conditions and groundwater management.

To support this data gathering effort, available SPV Basin monitoring and hydrologic datasets were reviewed, compiled, and evaluated to inform model input updates, assess recent SPV Basin conditions, and evaluate iterative model performance. Although substantial information was available from public sources, the usefulness of many datasets for quantitative model refinement was limited by factors such as inconsistent temporal coverage over the timeframe of the Periodic Evaluation, irregular measurement frequency, incomplete metadata, or data that were primarily qualitative. The GSA compiled and reviewed additional SPV Basin-specific datasets, including groundwater level records for local wells, Hodges Reservoir stage data, and metered groundwater pumping information. The resulting datasets included groundwater level observations from the established SPV Basin groundwater level monitoring network, including the representative groundwater level monitoring wells established for SGMA implementation, as well as additional monitoring wells maintained by the GSA.

The representative groundwater level monitoring well network used for model validation is shown in Figure 6-3. Some of these wells are equipped with pressure transducers (Figure 6-4). Transducer data are typically transmitted and recorded at 15-minute intervals that provide high-frequency groundwater level measurements, improving the temporal resolution available for evaluation of recent SPV Basin conditions and updated model performance over the historical update period. Transducer (HydroVu) datasets were downloaded and reviewed for quality assurance and quality control (QA/QC). Following QA/QC review and any necessary corrections or data transformations, the groundwater level datasets were incorporated into model evaluation and used to assess updated model performance over the extended historical simulation period.

As part of the model update, the GSA reviewed observed Hodges Reservoir water-surface elevation data through December 2024. These data replaced the previously projected portion of the record and extended the historical boundary-condition dataset through the updated validation period. Reservoir elevations have remained lower since 2022 because repairs to Hodges Dam require Hodges Reservoir to be capped at a maximum operating level of 280 feet under an order from the California Division of Safety of Dams (DSOD).

Figure 6-3 Representative Monitoring Wells in the Model Validation Well Network

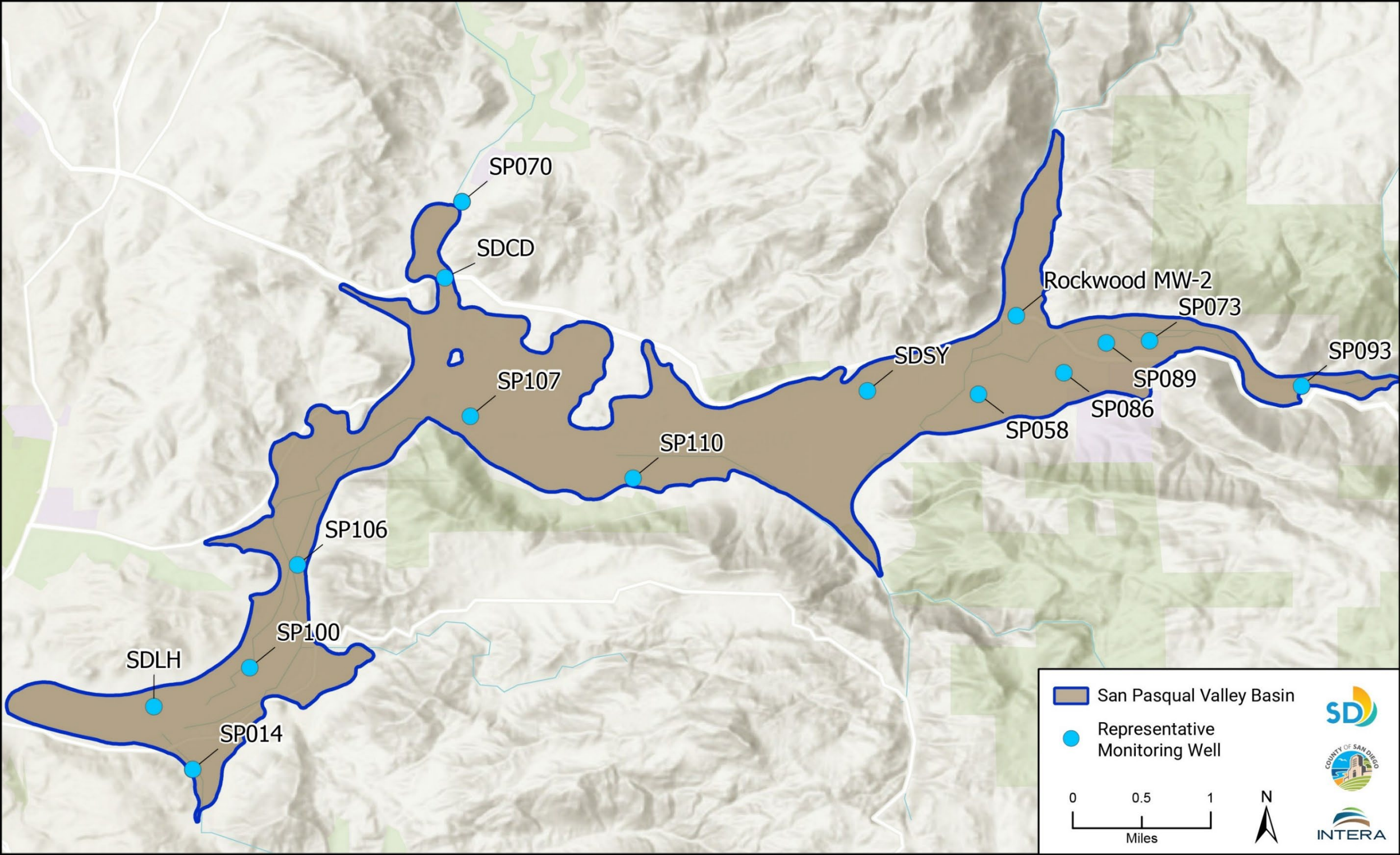
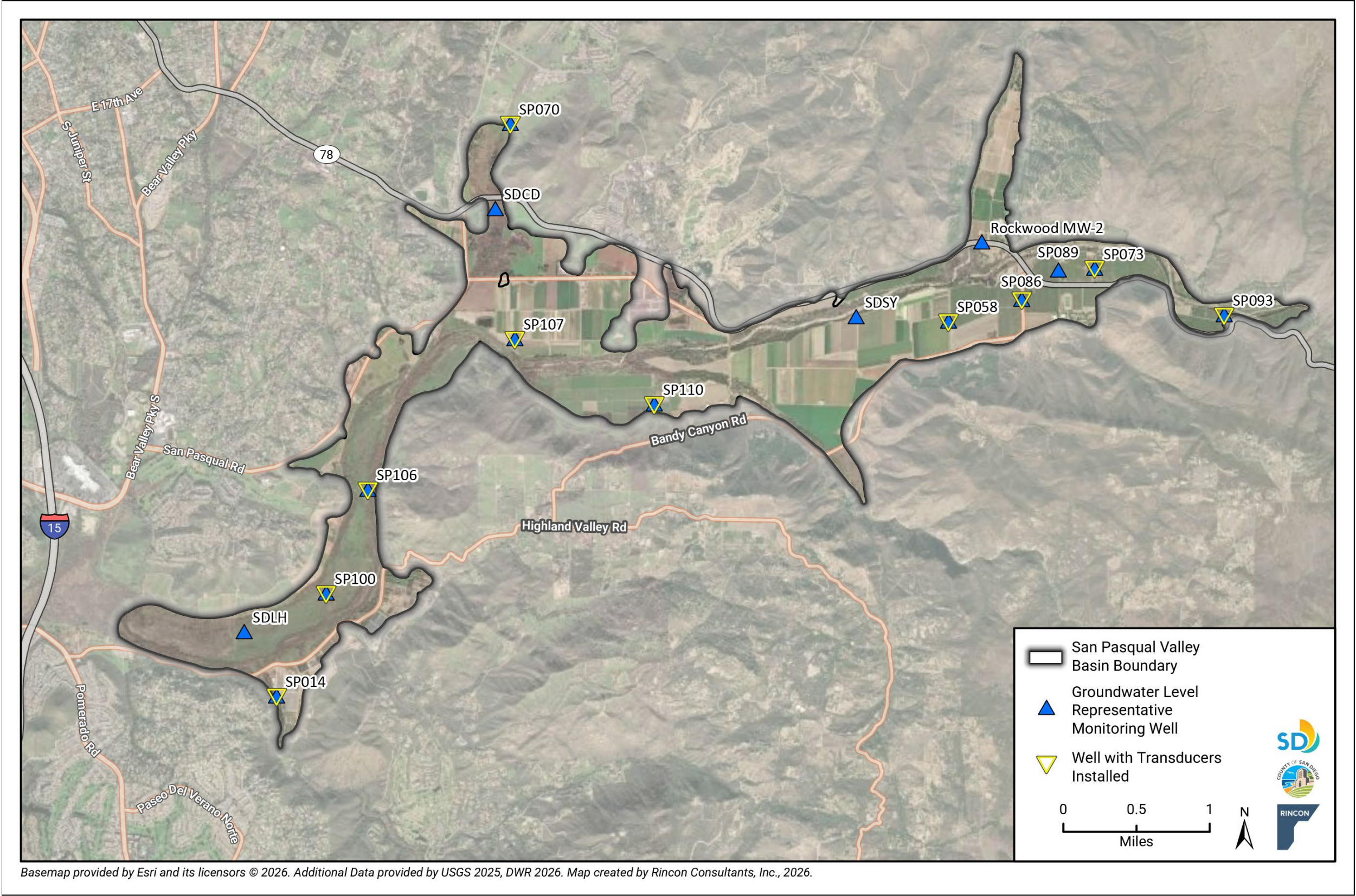


Figure 6-4 SPV Basin Representative Groundwater Level Monitoring Network and Locations of Installed Transducers



6.3 Groundwater Conditions Based on New Information and Data

6.3.1 SPV Basin Inflows and Outflows

Precipitation Inflow

As no direct record of exact precipitation over the entire model domain exists, the inflows to the system were instead generated using the USGS Basin Conceptual Model (BCM). The BCM is a regional water balance model that uses gridded climate data to solve the water balance for each cell in the model and estimate baseflow, streamflow, and potential recharge to the groundwater system for watersheds at each cell. These estimates were then used as inputs to the groundwater model. The climate data used as the inputs to the BCM for the update period were Parameter-elevation Regressions on Independent Slopes Model (PRISM) data, which use thousands of recorded climate datasets to interpolate continuous-cover climate data, even over areas for which data could not be recorded. This interpolated estimated climate data was then incorporated into the BCM model to create estimated inflows to the model (INTERA 2026a).

Stream Inflow

The SPV GSP model includes the Streamflow-Routing (SFR) package to simulate streamflow within the SPV Basin and stream-aquifer interactions. Because significant contributing catchments upstream of the San Pasqual Valley lie outside the model domain, stream inflows from these watersheds are represented as boundary conditions. Stream inflow boundary conditions are developed using a combination of measured USGS streamflow records for gaged contributing watersheds and BCM-simulated runoff for ungauged contributing watersheds. For ungauged watersheds, BCM runoff is aggregated over the contributing catchment areas at a monthly time step and routed to the appropriate inflow locations within the model domain.

For this SPV GSP Model v3.0 update, the SFR inflow boundary conditions were revised using newly available USGS BCM historical datasets through 2024 and corresponding future BCM climate scenario outputs. BCM-simulated runoff from the upstream contributing catchments was aggregated and routed to the corresponding stream inflow locations for Santa Ysabel Creek, Guejito Creek, Santa Maria Creek, Cloverdale Creek, and Sycamore Creek, providing internally consistent, climate-driven streamflow boundary conditions for both the updated historical simulation and future climate scenarios.

Imported Water Non-Routed Delivery Inflow

Imported water delivered from nearby water retailers, including the City of Escondido, City of Poway, Ramona Municipal Water District, and Rincon Del Diablo Municipal Water District, is represented in the SPV model using the Non-Routed Delivery (NRD) component of the MODFLOW Farm Process (FMP) package. The NRD inputs represent monthly imported water volumes available to Water Balance Subregions (WBSs) and were originally developed using available imported water supply information during the GSP model development and calibration. Within the FMP package, NRD values represent the maximum imported water available to a WBS, while actual imported water use is determined dynamically based on simulated demand.

A review of existing NRD inputs relative to simulated imported water use during the updated historical simulation period confirmed that the currently specified NRD volumes remain substantially greater than the imported water volumes required by the model. Because imported water availability remains non-limiting under the existing configuration, updating the NRD inputs to reflect revised delivery estimates would not materially affect simulated model behavior or groundwater budget results. Therefore, the original NRD inputs were retained for this model update.

Agricultural Pumping Outflow

The GSP SPV Model v1.0 estimated agricultural pumping through the MODFLOW FMP package, which simulated agricultural water demand and groundwater pumping through an integrated supply-and-demand framework that dynamically balances consumptive use requirements with available water supplies (SPV GSA 2021). This provides a defensible method for estimating pumping where direct pumping records are unavailable. At the time of original model development, a consistent SPV Basin-wide metered pumping dataset was not available. The City implemented a new metered pumping program beginning in 2019, providing an opportunity to evaluate how well the FMP-based simulated pumping estimates align with the metered pumping and whether model pumping assumptions warrant refinement.

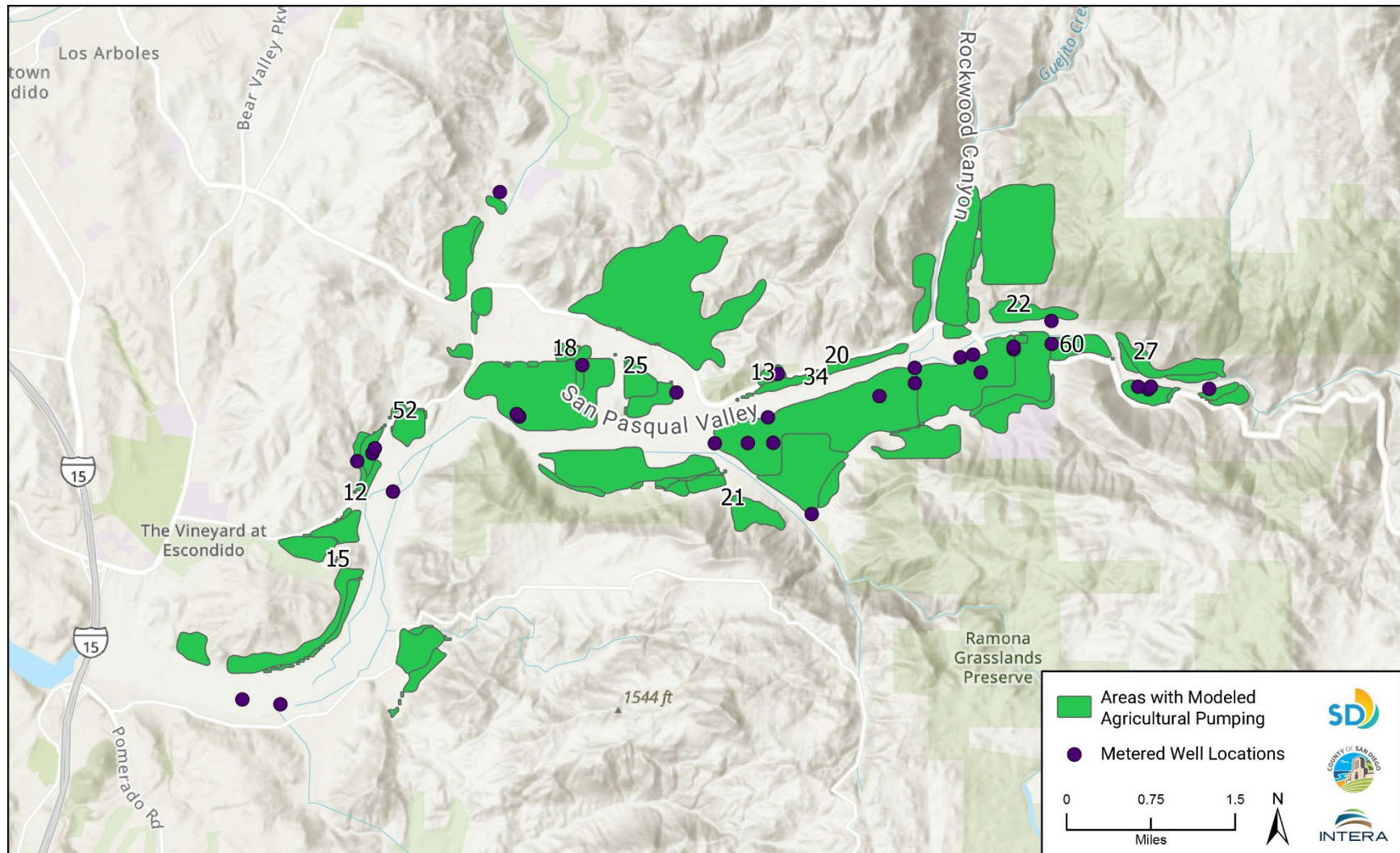
Initial evaluation efforts focused on direct comparison of simulated and metered pumping at the individual well level. However, because agricultural demand in the model is represented at WBS scale through the FMP framework, direct one-to-one correspondence between individual physical wells and modeled demand areas does not exist. Figure 6-5 shows the modeled agricultural demand areas that receive groundwater pumping allocations under the FMP supply-and-demand framework, totaling 54 WBSs (i.e. farms). As shown, the modeled pumping framework extends beyond the Bulletin 118 Basin boundary, reflecting the broader SPV model domain used to represent integrated agricultural water demand. A single agricultural well may supply multiple farms, and individual farms may be served by multiple wells. Combined with irregular metered pumping records and inconsistent temporal coverage, these limitations made direct well-to-well comparison difficult to interpret (INTERA 2026b).

Open ET, Farm Demand, and Metered Pumping

Given the limitations of the available metered pumping data, an additional comparison using consumptive use estimates derived from OpenET was conducted to evaluate whether modeled agricultural demand is reasonably consistent with independent field-scale estimates of crop consumptive water use. OpenET is a satellite-based platform that provides estimates of actual ET using remotely sensed imagery and energy balance methods (OpenET, 2025).

Comparison with OpenET required evaluating modeled agricultural demand at the farm scale, consistent with the FMP framework used in the SPV GSP Model v3.0. Because individual agricultural wells may supply multiple modeled farm demand areas, and individual modeled farm demand areas may be served by multiple wells, direct comparison between individual well pumping and field-scale ET estimates is not appropriate. Instead, modeled agricultural demand was aggregated across the modeled agricultural framework to provide a Basin-scale comparison with independently derived agricultural water use estimates from OpenET. Total basin-wide modeled agricultural demand generally tracks the interannual variability and overall magnitude of the OpenET-derived agricultural demand estimates, indicating that the historical FMP demand framework provides a reasonable Basin-scale representation of agricultural water demand. Differences between modeled demand and OpenET estimates for individual years likely reflect uncertainty in assumptions about effective precipitation, irrigation efficiency, land-use conditions, operational practices, and inherent differences between modeled irrigation demand and satellite-derived consumptive use estimates (INTERA 2026a).

Figure 6-5 Distribution of the 54 Modeled Farms with Allocated Agricultural Pumping Under the Farm Process (FMP) Supply-and-Demand Framework



6.4 Water Use Changes and Associated SPV Basin Water Budget

Groundwater budget analyses were developed for the updated SPV GSP Model v3.0 groundwater flow model to evaluate historical SPV Basin water balance conditions and projected future responses under the Model for Interdisciplinary Research on Climate, Version 5 (MIROC5) climate scenarios (Watanabe et al. 2010).¹⁴ Historical groundwater budgets for the updated model were compared to the original SPV 2022 GSP groundwater budget values (Table 4-8, SPV GSA, 2021) for the historical simulation period to assess consistency in simulated SPV Basin-scale hydrologic behavior following model updates.

6.4.1 Historical and Projected Groundwater Levels for the SPV Basin

Future groundwater levels were modeled within the SPV Basin by INTERA as part of this Periodic Evaluation. The modeling results indicated that two monitoring wells (SDLH and SP014) were expected to fall below their MTs during the WY 2020–2025 period; however, observed groundwater level data collected during this time demonstrate that MT exceedances did *not* occur in these groundwater monitoring wells. WYs 2021 and 2022 were Critically Dry and Dry, respectively (Rincon 2026f). Using MIROC5 as the climate scenario, the groundwater model predicted that these years of low precipitation in the SPV Basin would cause monitoring wells SDLH and SP014 to fall below their respective MTs (INTERA 2026a; included here as Appendix G). However, groundwater lowering below their MTs was not observed (Appendix I). This discrepancy indicates that, while the model provides a useful planning and risk-assessment tool, the projections are not fully predictive of actual site groundwater level conditions.

6.4.2 Historical and Projected Water Budgets for the SPV Basin

A comparison of the historical average groundwater budget indicates that the updated SPV GSP Model v3.0 produces SPV Basin-scale inflow and outflow magnitudes that are generally comparable to those presented in the 2022 GSP, although redistribution among the individual budget components is evident (Table 6-1). Total simulated inflow increased from approximately 8,329 acre-feet (AF) in the 2022 GSP to 9,399 AF in the updated model (+13%), while total outflow increased from approximately 8,574 AF to 9,589 AF (+12%). Simulated agricultural and domestic groundwater pumping is consistent between the two model versions (6,016 AF in the updated model vs. 5,861 AF in the 2022 GSP), indicating that the model update did not materially alter the overall representation of groundwater demand.

¹⁴ MIROC5 was selected as the most useful contrasting scenario because it represents a comparatively more moderate future climate trajectory relative to HadGEM2-ES, with generally lower evaporative demand and a narrower range of projected climate variability across key hydrologic metrics.

Table 6-1 Comparison of Historical Groundwater Budget Components (WYs 2005–2019)

Historical Groundwater Budget (WYs 2005-2019)	Current Model (AF)	GSP Table 4-8 (AF)	Difference (AF)
GW Recharge from Precipitation, Applied Water, and Septic	2,764	3,052	-288
GW Recharge from Streams	3,639	2,276	1,363
Subsurface Inflow from Hodges Reservoir Area	294	18	276
Subsurface Inflow from Adjacent Rock	2,701	2,983	-282
Total Inflow	9,399	8,329	1,070
GW Discharge to Land Surface / ET of Shallow GW	2,128	1,226	902
GW Discharge to Streams + Surface Runoff / Return Flow to Streams	299	921	-622
Agricultural GW Pumping + GW Pumping for Domestic	6,016	5,861	155
Subsurface Outflow to Hodges Reservoir Area	567	98	469
Subsurface Outflow to Adjacent Rock	579	468	111
Total Outflow	9,589	8,574	1,015
Change in Groundwater Storage	-139	-245	106
Cumulative Storage Change	-844	-1935	1,091

Differences between the original SPV GSP Model v1.0 groundwater budgets and the updated GSP Model v3.0 water budgets should be interpreted in the context of the underlying model framework, as the current update was based on the SPV GSP Model v2.0 model rather than the original SPV GSP Model v1.0. The most notable differences occur in stream-aquifer exchange and boundary flow components. The updated model simulates greater groundwater recharge from streams (3,639 AF compared to 2,276 AF in the 2022 GSP) and increased groundwater discharge to land surface and shallow groundwater evapotranspiration (2,128 AF compared to 1,226 AF), while simulated groundwater discharge to streams and return flow components are lower than those reported in the 2022 GSP. Simulated exchange with the Hodges Reservoir boundary also differs from the original 2022 GSP budget. These differences are consistent with updates to the numerical model framework, including conversion from daily to monthly stress periods, implementation updates associated with the model platform migration, and refinements to boundary condition representation. Head-dependent flux components, such as stream interactions and lateral boundary exchanges, are particularly sensitive to the timestep structure and numerical implementation; therefore, some redistribution among the individual budget terms is expected even when overall basin-scale budget magnitudes remain comparable.

The historical groundwater budget results reflect the SPV Basin's strong sensitivity to hydrologic conditions and water year type (Figure 6-6). Groundwater remains the dominant water supply source within the Basin, with pumping demands increasing during dry and critically dry periods when precipitation, streamflow, and associated recharge are reduced. While surface water is not generally used directly as a managed supply source within the SPV Basin, streamflow provides an important source of groundwater recharge that helps offset groundwater demand during wetter periods. Historical model results show that wetter years are characterized by increased stream recharge and recovery of groundwater storage, whereas drier periods are associated with reduced recharge, increased groundwater pumping demand, and declining groundwater storage. Groundwater storage in the SPV Basin is strongly influenced by the timing, duration, and severity of dry and wet periods. Simulated cumulative storage change over the historical period indicates less net depletion in the updated model relative to the original 2022 GSP groundwater budget comparison, likely due to changes in the underlying model framework that affect the timing and distribution of simulated inflows and outflows.

Projected groundwater budget results show that the SPV Basin's sensitivity to hydrologic variability persists under future climate conditions, with annual fluctuations in recharge, pumping demand, stream interaction, and groundwater storage closely tracking projected climate variability (Figure 6-7).

Figure 6-6 Historical Annual Groundwater Budget and Cumulative Groundwater Storage Change for the SPV Basin (WY 2005–2024)

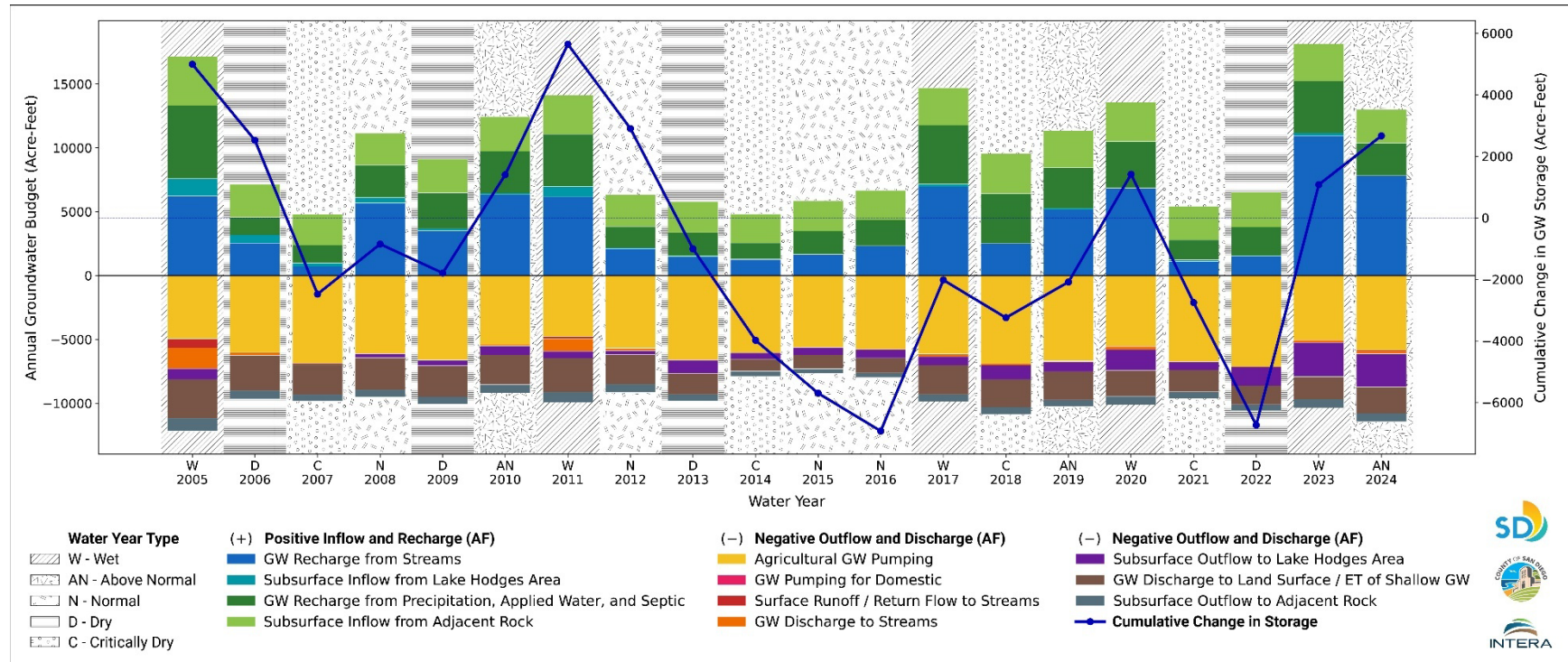
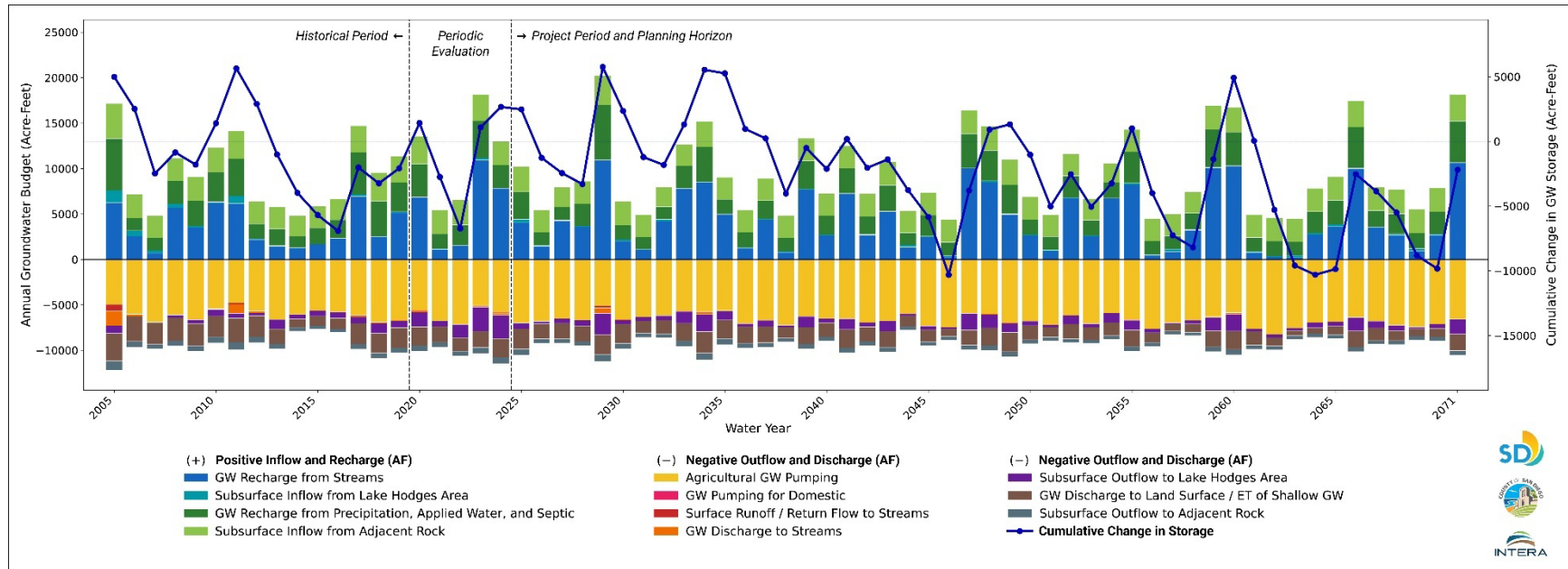


Figure 6-7 Historical and Projected Annual Groundwater Budget Components and Cumulative Groundwater Storage Change for the SPV Basin (WYs 2005-2071)



The MIROC5 climate scenario projections are characterized by relatively short dry periods, generally on the order of 5 years, followed by wetter periods that allow partial or substantial recovery of SPV Basin groundwater storage. As a result, although the MIROC5 climate scenario exhibits pronounced interannual variability, long-term groundwater storage conditions remain relatively stable over the SGMA planning horizon. These results demonstrate that the SPV Basin is particularly sensitive to the duration and sequencing of hydrologic conditions, with prolonged multi-year droughts producing substantially greater long-term groundwater stress than shorter dry periods interrupted by hydrologic recovery.

6.5 Updated Model Performance and Forecasted Results

The SPV GSP Model v3.0 was updated as part of the 5-Year Periodic Evaluation to incorporate newly available hydrologic and monitoring data, extend the historical simulation period through 2024, and evaluate future Basin response under multiple climate scenarios. The update also incorporated structural model improvements implemented in SPV GSP Model v2.0, as well as modifications to improve computational efficiency for long-term scenario evaluation. Model performance evaluation indicates that the updated model continues to reproduce SPV Basin-scale historical groundwater conditions reasonably and remains appropriate for comparative evaluation of groundwater trends, Basin water budgets, and future scenario response. Overall, the available monitoring network provided sufficient spatial and temporal coverage to support model validation and evaluation of SPV Basin-scale groundwater conditions. However, opportunities remain to improve future model updates through more standardized monitoring data management, including greater consistency in well naming conventions, improved continuity in groundwater level monitoring records, and broader availability of SPV Basin-wide metered pumping data. Expanded access to observed pumping data would provide an additional line of model verification by allowing direct comparison between simulated and measured groundwater extraction, thereby improving confidence in future model calibration and predictive simulations. Comparison of simulated and observed groundwater levels shows that the model captures the general timing, magnitude, and direction of groundwater level response, including drought-related declines and recovery during wetter periods, without evidence of a strong Basin-wide spatial bias.

Updated historical groundwater budgets confirm that the Basin remains highly responsive to hydrologic variability, with wetter periods characterized by increased stream recharge and groundwater storage recovery, and drier periods associated with reduced recharge, increased groundwater reliance, and declining storage. While individual budget components differ from those reported in the original GSP due to model framework updates and revised hydrologic inputs, overall SPV Basin-scale budget behavior remains broadly consistent. Evaluation of the agricultural demand framework indicates that the existing FMP-based pumping representation remains reasonable for SPV Basin-scale simulation. Available metered pumping data were not sufficiently complete or consistent to support rigorous validation or direct refinement of historical pumping assumptions. Comparison with OpenET-derived consumptive use estimates generally supports the reasonableness of modeled Basin-scale agricultural demand.

Future scenario results indicate that long-term SPV Basin response remains highly sensitive to the duration and sequencing of hydrologic conditions. Climate scenario projections show continued interannual variability. These results reinforce the SPV Basin's vulnerability to extended drought conditions and the importance of continued monitoring and adaptive management.

Several opportunities were identified to support future model refinement and Basin management. Continued improvement of the SPV Basin's metered pumping program would substantially reduce uncertainty in future groundwater demand evaluation. Current metered pumping records were limited by inconsistent monitoring frequency, incomplete temporal coverage, uncertainty associated with meter resets, and incomplete documentation linking pumping wells to specific agricultural parcels or modeled demand areas. More consistent data collection, routine meter calibration, improved documentation of maintenance and reset events, and clearer well-to-parcel attribution would improve future model

validation and refinement. As metered pumping data quality improves, future comparison with OpenET-derived consumptive use estimates could provide a useful basis for constraining agricultural demand assumptions and refining the modeled agricultural demand framework during future model updates.

Continued maintenance and QA/QC of the groundwater monitoring network is also recommended. Improved consistency in groundwater level monitoring records, pressure transducer QA/QC, metadata documentation, and long-term monitoring continuity would strengthen future model evaluation and improve confidence in observed Basin condition assessments. The updated SPV GSP Model provides an improved technical foundation for continued adaptive groundwater management in the Basin and future periodic evaluations. In addition to supporting required SGMA analyses, the model may continue to serve as a useful tool for evaluating future management scenarios, refining Basin understanding, supporting annual reporting needs, and informing future technical evaluations as additional data become available.

DRAFT

7 Status of Projects and Management Actions

Section 9 of the 2022 GSP described the PMAs that would be developed and implemented in the SPV Basin to attain sustainability in accordance with §354.42 and §354.44 of the SGMA regulations (SPV GSA 2021). As discussed in the 2022 GSP, the SPV Basin is currently operated within its sustainable yield, and no projects or management actions are required to achieve sustainability. Monitoring conducted during the Periodic Evaluation timeframe demonstrated that groundwater levels, groundwater storage, interconnected surface waters, TDS concentrations, and land subsidence are within management thresholds, thus, indicating the SPV Basin is sustainable related to these sustainability indicators. While nitrate (as nitrogen) concentrations have reached the MT as defined in the GSP (10 mg/L) in at least three of the 10 groundwater quality monitoring wells, the current nitrate conditions reflect long-term pre-SGMA conditions, and it was determined that these nitrate exceedances do not meet the conditions of an undesirable result (Rincon 2026a). Nonetheless, the GSA is continuing to implement the established PMAs to manage groundwater quality in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

The SPV Basin is currently operating within its sustainable yield, and sustainability indicators generally remain within management thresholds over the timeframe of this Periodic Evaluation.¹⁵ Therefore, no projects or management actions are necessary to achieve the sustainability criteria identified in the 2022 GSP. However, projects and management actions can still provide value by enhancing management capacity, improving understanding of the groundwater system, providing opportunities for adaptive SPV Basin management, and supporting continued sustainable operations over the planning horizon. The suite of projects and management actions included in the SPV GSP offers flexible options that can be implemented if conditions change in the future. Many of the PMAs are Tier 0, which means that they could potentially be implemented by the GSA regardless of sustainability conditions in the SPV Basin. The decision-making flow chart for how and when Tier 1 and Tier 2 Management Actions (MAs) are evaluated and implemented is shown in Figure 7-1.

The 2022 GSP projects and management actions are grouped into tiers that correlate with different SPV Basin conditions and thresholds for implementation. Groundwater quality is addressed in Tier 0, and groundwater levels are addressed in all three tiers.

- **Tier 0** – These projects and management actions may be implemented by the SPV GSA at any time.
- **Tier 1** – These projects and management actions could be implemented if PTs for groundwater levels (as described in Section 8 of the 2022 GSP) are exceeded. Tier 1 actions can potentially be initiated when at least five wells in the Basin exceed their PT.
- **Tier 2** – These projects and management actions could be implemented if MTs for groundwater levels (as described in Section 8 of the 2022 GSP) are exceeded. Tier 2 actions could potentially be initiated when at least five wells in the Basin exceed their MT for two or more consecutive years

¹⁵ All sustainability indicators have remained at or below management thresholds with the exception of nitrate concentrations exceeding the MT in monitoring wells SP006, SP043, and SP065 for two or more consecutive years during the timeframe of the Periodic Evaluation.

Figure 7-1 Tier 1 and Tier 2 Management Actions

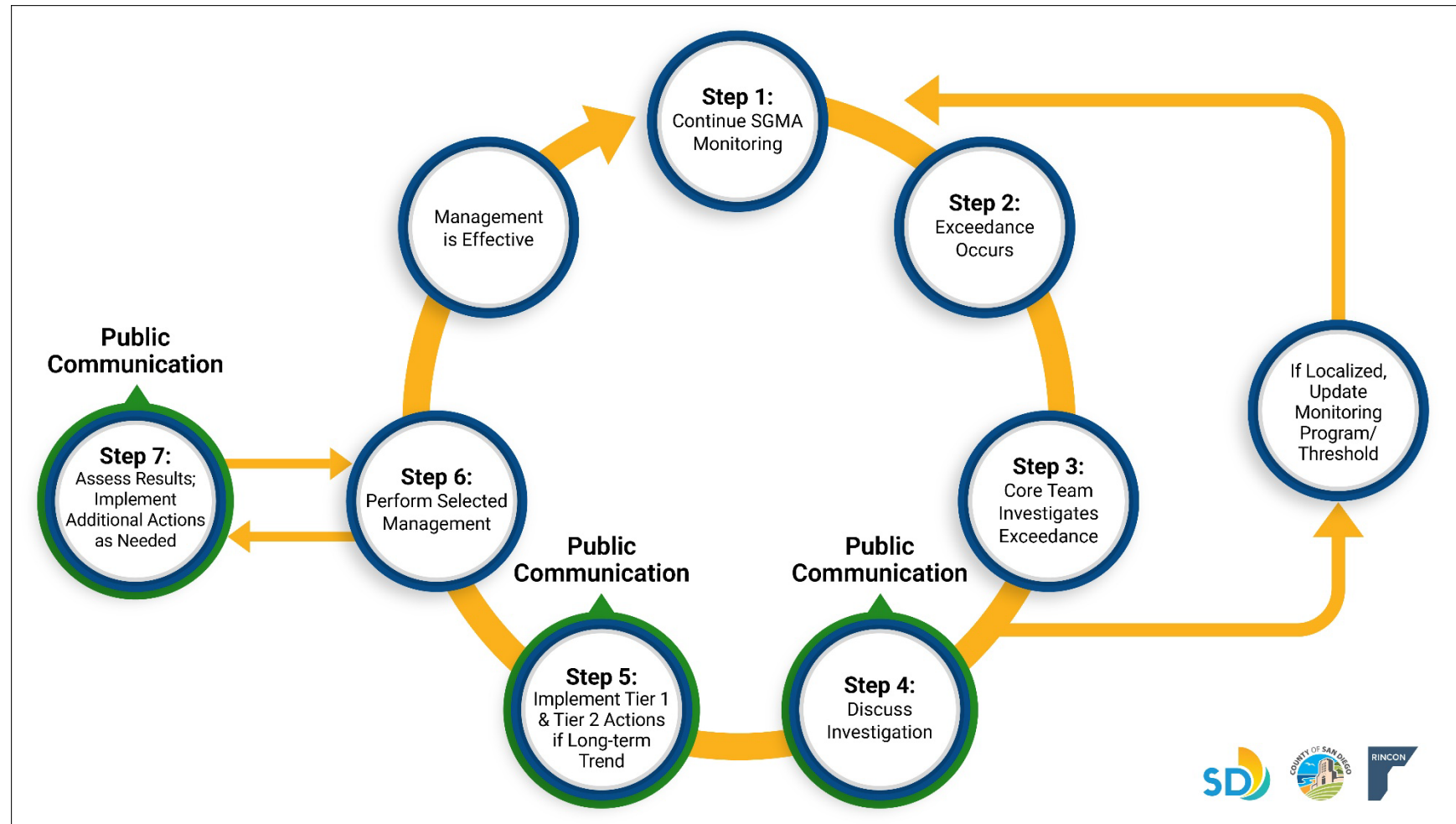


Table 7-1 lists the potential PMAs that were screened, prioritized, and described in the 2022 GSP, along with their implementation tier and current status. The sections following this table provide a detailed description of each project and management action, and any progress made toward that project or management action during the timeframe of the Periodic Evaluation.

Table 7-1 Status of Projects and Management Actions

PMA	Tier	Status	Section
Projects			
Project 1 – Coordinate with the City on Constructing Infiltration Basins at San Pasqual Union Elementary School	0	No action taken	7.1.1
Project 2 – Coordinate on the Implementation of Invasive Species Removal	0	Completed; in post-implementation phase	7.1.3
Management Actions			
Management Action 1 – Farming Best Management Practices	0	Completed; in post-implementation phase	7.2.1
Management Action 2 – Education and Outreach to Encourage Demand Softening	0	Continuous	7.2.2
Management Action 3 – Support WQIP Actions	0	Continuous	7.2.3
Management Action 4 – Coordinate and Collaborate Regionally with Other Entities to Perform Monitoring and Implement Regional Projects	0	Continuous	7.2.4
Management Action 5 – Education and Outreach for TDS and Nitrate	0	Initial outreach completed in 2022 and 2023	7.2.5
Management Action 6 – Coordinate with City on Hodges Watershed Improvement Project	0	Completed; in post-implementation phase	7.2.6
Management Action 7 – Initial Surface Water Recharge Evaluation	0	Completed	7.2.7
Management Action 8 – Study GDEs	1	Completed	7.2.8
Management Action 9 – Well Inventory	1	Not planned – Tier 1 trigger conditions have not occurred	7.2.9
Management Action 10 – Basin-wide Metering Program	1	Not planned – Tier 1 trigger conditions have not occurred	7.2.10
Management Action 11 – Pumping Reduction Plan	1	Not planned – Tier 1 trigger conditions have not occurred	7.2.11
Management Action 12 – Pumping Restrictions and Enforcement	2	Not planned – Tier 1 and 2 trigger conditions have not occurred	7.2.12
Management Action 13 – Pumping	1	Not planned – Tier 1 and 2 trigger conditions have not occurred	7.2.13
Management Action 14 – Pumping	2	Not planned – Tier 1 and 2 trigger conditions have not occurred	7.2.14

7.1 Projects

This section describes two Projects selected for inclusion in the 2022 GSP that could be implemented to help maintain SPV Basin sustainability. Both of the Projects included in the 2022 GSP are in Tier 0, which means that they could potentially be implemented by the GSA regardless of sustainability conditions in the SPV Basin.

7.1.1 Project 1- Coordinate with the City on Constructing Infiltration Basins at San Pasqual Union Elementary School (Tier 0)

The draft San Dieguito River Watershed Management Area Water Quality Improvement Plan (2021 Update) (WQIP) (City of Del Mar et al., 2021) was released in September 2020. The WQIP lists several potential jurisdictional strategies. One of the identified projects involves constructing infiltration and detention basins at San Pasqual Union Elementary School, sited directly north of the Basin adjacent to Cloverdale Creek. If this project were initiated and implemented by the City's Stormwater Department through the WQIP, the SPV GSA would support its implementation. This project would construct, operate, and maintain an infiltration basin that would treat a total drainage area of 5,818 acres on 19 acres of available space (on assessor's parcel number [APN] 241-060-11-00). According to the WQIP, the exact location of the infiltration basin would be determined via a detailed site assessment.

As described in the WQIP, this project may only be initiated and implemented if all the following conditions are met:

- WQIP interim load reduction goals are not met
- Funding to address municipal separate storm sewer system discharges is identified and secured
- City staff resources are identified and secured

Detailed information on legal authority, supply reliability, technical justification, SPV Basin uncertainty, and California Environmental Quality Act (CEQA) considerations are provided in the 2022 GSP (SPV GSA 2021).

Public Notice and Outreach

If this project were initiated and implemented through the WQIP, public notice and outreach would not be required beyond what is necessary for approval at a City Council meeting or through applicable CEQA requirements. Public notice and outreach would be completed by the City's Internal Departments.

Permitting and Regulatory Process

The City's Internal Departments would be responsible for project implementation and for securing any required permits for the project. The GSA would not be responsible for project implementation.

Project Benefits

Constructing infiltration basins near San Pasqual Union Elementary School could improve groundwater quality through additional infiltration prior to reaching the Basin. Specifically, the western portion of the Basin historically has high concentration of TDS and nitrate; the new infiltration basins would help reduce bacteria, nitrate, metals, trash, and sediment prior to entering this area of the Basin. Through coordination with the City's Internal Departments, Basin groundwater quality would be improved.

Project Implementation

If initiated via the WQIP, the following resources, funds, time, and steps are needed for the City's Internal Departments to implement this strategy:

- Identify project locations (3 to 6 months)
- Secure funds in the form of general funds, bonds, or grants (6 months to 2 years)
- Obtain City Council approval of capital improvement projects budget (occurs annually in May)
- Initiate preliminary engineering to narrow project scope (6 months; approximately \$30,000 per capital improvement project)

- Hire design consultant to develop detailed construction plans and construction cost estimates (2 years; approximately \$500,000 per capital improvement project)
- Complete construction contractor bid and award process for construction phase (6 months)
- Construct project (4 months to 1 year; project construction costs must be determined)
- Operation and maintenance in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.

7.1.2 Project Implementation in the Timeframe of the Periodic Evaluation

Construction of infiltration basins at or near San Pasqual Union Elementary School was identified in the San Dieguito River Watershed Management Area WQIP as an optional, contingency structural BMP, rather than a required or scheduled implementation action. The WQIP applies an iterative and adaptive management framework, under which large structural BMPs such as infiltration basins are only advanced if monitoring demonstrates that existing non-structural and programmatic strategies are insufficient to achieve interim or final water quality goals. For the San Dieguito River above the Hodges Reservoir subwatershed, available monitoring data did not establish a direct, measurable linkage between stormwater discharges from the school site and exceedances of receiving water quality objectives, nor did results indicate that Municipal Separate Storm Sewer System (MS4) discharges from this area were the primary driver of nutrient or bacteria impairments. Structural BMPs like infiltration basins were therefore reserved as future implementation options, to be triggered only if interim load-reduction goals were not met and if sufficient funding, staff resources, site feasibility, and long-term maintenance capacity could be secured (City of Del Mar et al., 2021). As a result, immediate construction of infiltration basins at the San Pasqual Union Elementary School site was not justified during the timeframe of this Periodic Evaluation.

7.1.3 Project 2—Coordinate on the Implementation of Invasive Species Removal (Tier 0)

The primary and overarching objective for management of land in the SPV Basin is the protection of water resources. Beyond this, and in cooperation with other entities and partners, the GSA strives to protect all of the Valley's natural resources and community values. As part of this effort, the City's Public Utilities Department (PUD) has multiple on-going invasive species removal projects and multiple partners. The City PUD has partnered with the San Dieguito River Valley Conservancy (a member of the GSP Advisory Committee) and the San Dieguito River Park Joint Powers Authority (JPA). The City PUD has found by working together to pool resources, the result is the best possible outcome for the SPV Basin.

The WQIP includes information about the Northern San Diego County Invasive Non-Native Species Control Program. This Program, funded by the San Diego Integrated Regional Water Management (IRWM) Program and the San Diego Association of Governments, began in 2012 and is located in the SPV. The Program is implemented through partnerships with the City's PUD, the Mission Resource Conservation District, and the San Diego County Water Authority (Water Authority). As this Program continues to be implemented, the GSA is coordinating with existing partners, the San Dieguito River Valley Conservancy and the JPA, to support invasive non-native plant removal in the SPV Basin.

The San Pasqual Valley Integrated Weed Management Plan (City 2013) is an adaptive, comprehensive plan that locates, identifies, quantifies, prioritizes, and provides recommendations for invasive weed species management within the approximately 7,405-acre San Pasqual Valley Weed Management Area. The SPV Basin boundary is entirely inside the weed management area. The City PUD continues to implement the San Pasqual Valley Integrated Weed Management Plan throughout the weed management area.

Additionally, the San Diego Association of Governments (SANDAG) began the TransNet Environmental Mitigation Program (EPM) Land Management Grant Program in 2013. The grant is allocated and distributed through a competitive process to maintain the integrity of existing regional habitat preserves through enhanced land management. The City PUD applied for and was awarded funding for the San Pasqual Cactus Wren Project. The City's San Pasqual Cactus Wren Project is ongoing and would enhance and restore approximately 100 acres of habitat for the endangered Coastal cactus wren along the north side of San Pasqual Valley.

Detailed information on legal authority, supply reliability, technical justification, SPV Basin uncertainty, and CEQA considerations are provided in the 2022 GSP (SPV GSA 2021).

Public Notice and Outreach

As an ongoing project, partner agencies including the City and the County plus the Cities of Del Mar, Escondido, Poway, and Solana Beach, working directly with local, state, federal and private landowners to obtain right-of-entry permission for invasive species removal. The GSA coordinates with existing partners to continue to maximize stakeholder and community involvement and stewardship.

Permitting and Regulatory Process

The GSA is not be responsible for project implementation and would coordinate with existing partners on the project (i.e., City's PUD, Mission Resource Conservation District, and the Water Authority).

Project Benefits

Invasive non-native plant removal protects and enhances habitat, reduces displacement of native species by invasive species, conserves water resources, protects water delivery and storage systems by reducing flood risk and damage, improves water quality by reducing erosion, and reduces risk of fire. Reducing wildfire fuels would reduce the likelihood of needing to use precious water for wildfire suppression. Giant reed (*Arundo donax*) and pampas grass (*Cortaderia selloana*), in particular, use large volumes of water. Eradication of these invasive species in SPV Basin reduces groundwater use and increases groundwater supply.

Project Costs

This project has been ongoing in the Basin since 2012. Project costs for the Proposition 50, San Diego IRWM grant totaled to approximately \$3.3 million to eradicate 374 acres of invasive nonnative plant species. The project currently monitors and re-treats invasive non-native plants at project sites primarily using regional Natural Community Conservation Planning funds dispersed through the San Diego Association of Governments TransNet program.

7.1.4 Project Implementation in the Timeframe of the Periodic Evaluation

Since 2020, invasive species removal implementation activities in the SPV Basin have been documented under the Hodges Watershed Improvement Project and have provided direct, SGMA-relevant actions that support groundwater sustainability objectives for the SPV Basin. Although funded through Proposition 84 IRWM rather than SGMA, these efforts address key SGMA sustainability indicators, particularly degraded water quality, interconnected surface waters, and land subsidence risk drivers, by reducing sediment and nutrient loading to both surface waters and the underlying groundwater basin. The 2021 Proposition 84 IRWM grant amendment to the project marked a transition from conceptual planning to watershed-scale implementation aligned with long-term SPV Basin management needs.

In parallel, large-scale riparian and watershed restoration conducted between 2022 and 2024 along Santa Ysabel Creek within the SPV Basin provides indirect but important support for SGMA sustainability goals. Restoration and invasive species removal across approximately 18 acres, with an additional ~20 acres treated using surplus funds, improved channel stability, reduced sediment mobilization, enhanced riparian

vegetation, and supported natural attenuation of nutrients. These actions strengthen the functional connection between surface water and groundwater recharge areas, helping mitigate risks to interconnected surface waters identified under SGMA while also reducing long-term maintenance burdens associated with unmanaged sediment and invasive species vegetation.

Critically for SGMA implementation, both the agricultural BMPs and habitat restoration invasive species removal projects funded under the IRWM grant program include structured post-implementation monitoring extending through at least 2028. While groundwater quality monitoring was not feasible due to episodic flow conditions, the adopted monitoring framework including BMP integrity inspections, vegetation performance standards, and long-term maintenance demonstrates active management and adaptive capacity consistent with SGMA's emphasis on ongoing implementation rather than one-time project delivery. These Project efforts support sustainability objectives, reduce reliance on future corrective actions, and provide a foundation for adaptive management in the SPV Basin. Implementation actions undertaken as part of Project 2 are also directly relevant to Management Actions 1, 3, and 6, described in further detail in the following sections.

7.2 Management Actions

This section describes the MAs selected for inclusion in the 2022 GSP. The majority of these MAs are in Tier 0, which means that they could potentially be implemented by the GSA at any time after the GSP is adopted. There are four Tier 1 MAs, which could potentially be implemented if monitoring wells exceed PTs, MTs, and/or MOs. There is one Tier 2 management action that could potentially be implemented if five or more groundwater level monitoring wells exceed their respective MTs for two consecutive years. Tier 1 and Tier 2 MAs would be implemented using the implementation process as described below and shown above in Figure 7-1 Management actions are administrative in nature and are based on locally implemented actions that the GSA could take to affect and maintain groundwater sustainability. Most MAs do not require outside approvals, nor do they involve capital projects.

7.2.1 Management Action 1—Farming Best Management Practices (Tier 0)

When implementing this MA, the GSA would support changes in irrigation practices to encourage sustainability, including irrigation efficiency or sustainable agriculture practices to reduce groundwater quality impacts. Sustainable agriculture practices may include crop rotation, planting cover crops, reducing or eliminating tillage, applying integrated pest management, or adopting agroforestry practices. Because the GSA has limited authority to implement these BMPs, the GSA would encourage use of BMPs through education and outreach or encourage collaboration with other entities in the region, including the Farm Bureau and the Water Authority as needed. Participation in the program would be optional.

As an example, the Water Authority received a San Diego IRWM grant to implement an agricultural efficiency program in the region. The Agricultural Irrigation Efficiency Program offers agricultural incentives to growers that invest in improving irrigation system efficiency. The Agricultural Irrigation Efficiency Program provides farmers with technical assistance and cost sharing as reimbursement for recommended irrigation system equipment retrofits that improve distribution uniformity and efficiency, such as drip irrigation systems and flow monitoring. The SPV GSP website shares resources for these types of regional programs to encourage water use efficiency. This management action is an education and outreach program to encourage use of BMPs. Ultimately, participation in this type of program is voluntary. Success of a program like this would depend on cooperation from water users and requires extensive outreach to agricultural stakeholders.

Management Action Implementation in the Timeframe of the Periodic Evaluation

A summary of the planning, actions, and implementation of MA No. 1 in the SPV Basin during the timeframe of this 5-Year Periodic Evaluation is shown in Figure 7-2. Implementation of the San Pasqual Valley Resource Management Guide (SPVRMG), which was published and made publicly available in May of 2022 (City 2022a) represents the first basin-specific agricultural BMPs actions tied to groundwater protection within SPV Basin. Following field assessments and stakeholder engagement in 2021 and adoption of the 2022 GSP (SPV GSA 2021), the City developed and finalized BMP guidance for agricultural and non-agricultural land uses and implemented five priority BMPs at the Three C Growers operation in 2023. These measures, vegetated and rock-lined swales and erosion control through mulching, directly reduce sediment-bound nutrient transport and stormwater runoff to Santa Ysabel Creek and downstream recharge areas (Figure 7-3). From a SGMA perspective, these actions constitute implemented management actions contributing to water quality protection and reduction of nonpoint source impacts to groundwater, even where quantitative groundwater quality trends are difficult to isolate.

Figure 7-2 Best Management Practices Planning and Implementation Timeframe of the Periodic Evaluation

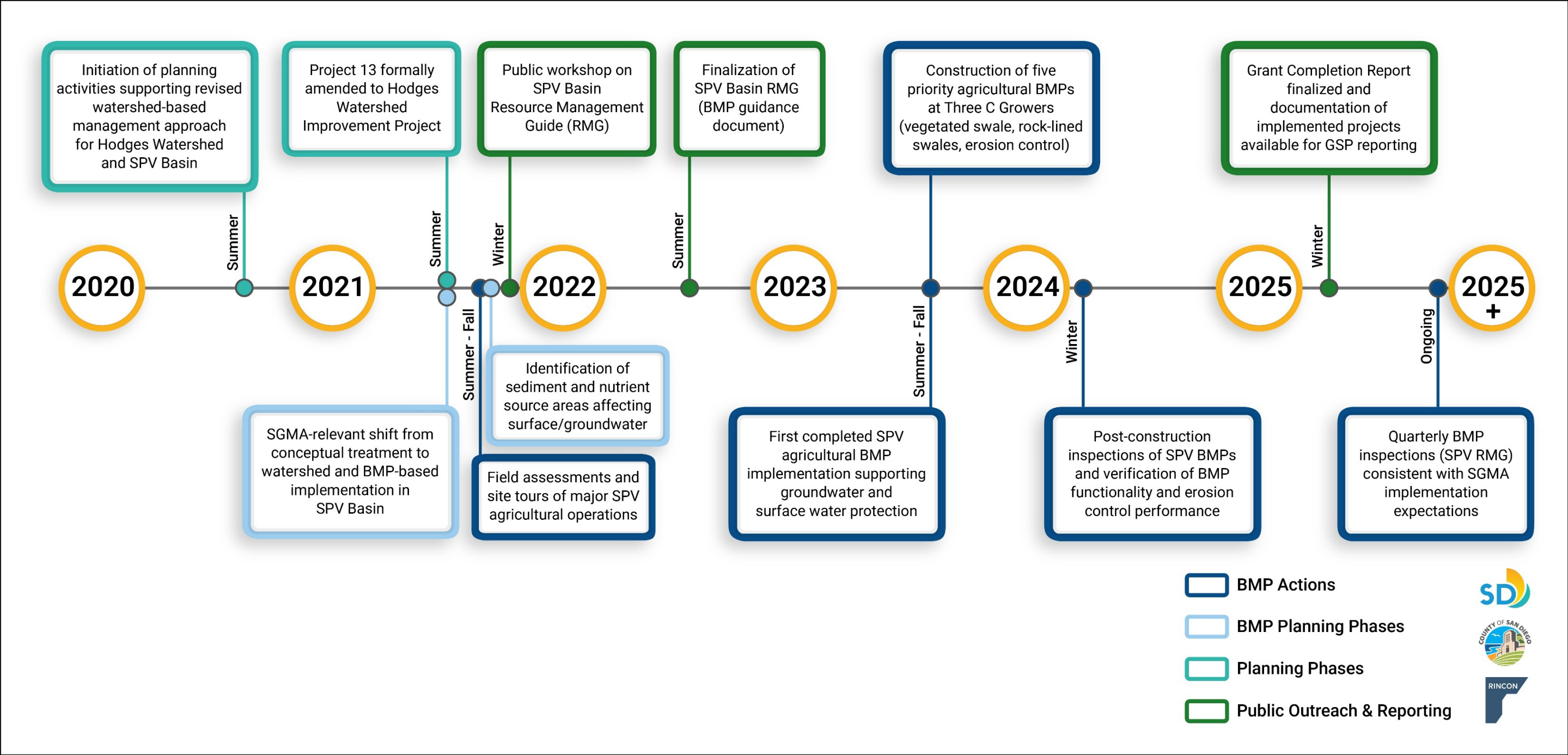


Figure 7-3 Best Management Practices Photos



7.2.2 Management Action 2—Education and Outreach to Encourage Demand Softening (Tier 0)

To encourage water-use efficiency in the Basin, the GSA would conduct education and outreach to water users in the Basin. The outreach program would encourage landowners to reduce acreage of permanent crops or encourage converting high water use crops to low water use crops. Participation in the program would be voluntary. The GSA would coordinate with the Escondido Farm Bureau and the Water Authority, which has existing outreach programs in place. This management action is an education and outreach program. This voluntary program would aim to reduce groundwater extraction in the SPV Basin without implementing pumping restrictions or enforcement (i.e., Management Action 11—Pumping Restrictions and Enforcement). The success of this voluntary program would depend on cooperation among water users and would require extensive outreach to agricultural stakeholders.

Management Action Implementation

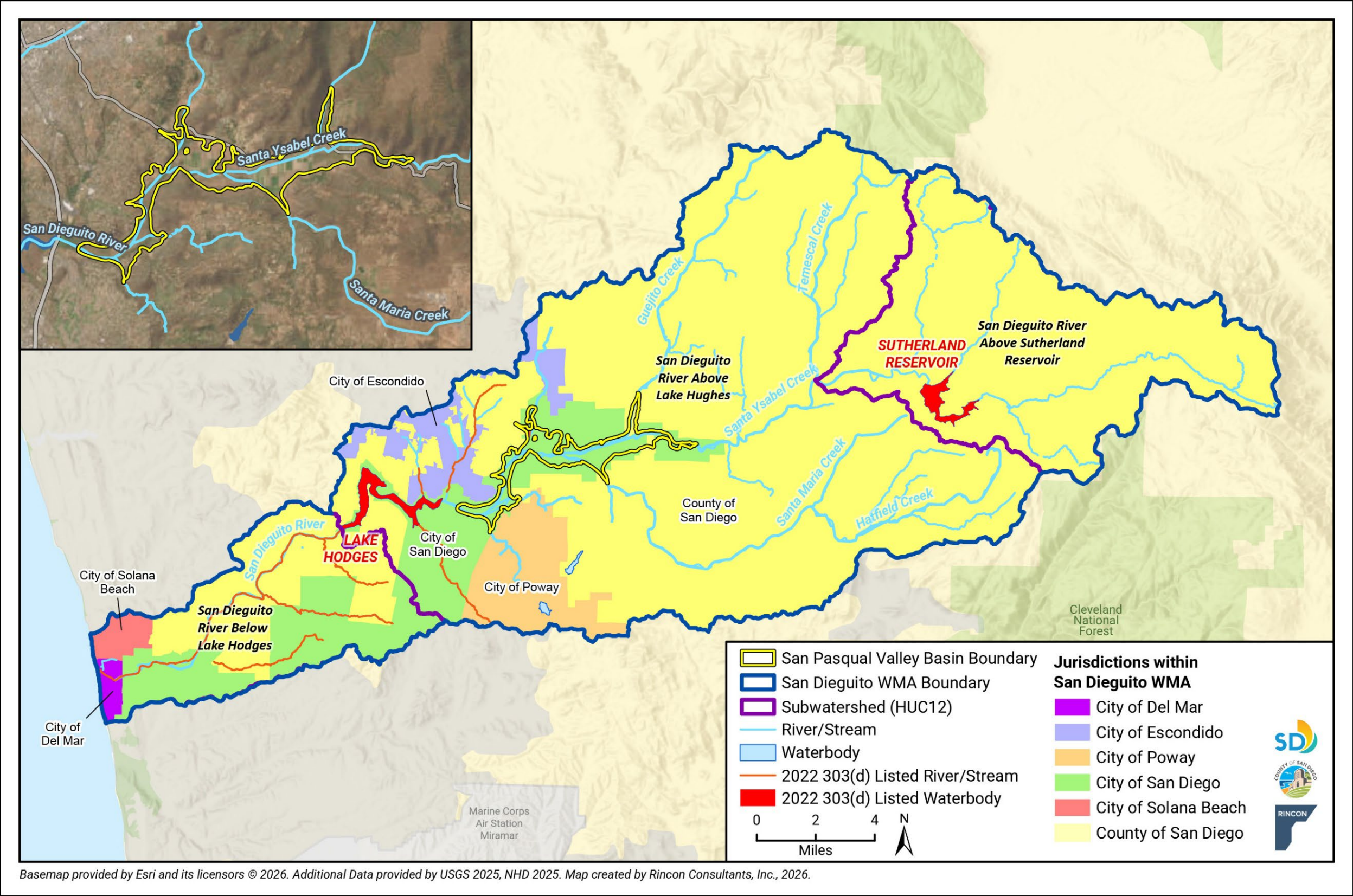
The GSA has no updates on implementation of this MA during the timeframe of the Periodic Evaluation, WYs 2020-2025 WYs.

7.2.3 Management Action 3—Support WQIP Actions (Tier 0)

The SPV Basin is part of the larger surrounding San Dieguito River Watershed Management Area (WMA) and is managed by the City as the lead agency in coordination with other Responsible Agencies (RAs) including the County, and the incorporated cities of Del Mar, Escondido, Poway, and Solana Beach (Figure 7-4). In the San Dieguito River WMA WQIP (City of Del Mar, et. Al. 2021) the SPV GSA identified a combination of structural and non-structural management actions to protect water quality in the upstream San Dieguito watershed, particularly in the subwatershed above Hodges Reservoir in the SPV Basin, where nutrient impairment is a highest-priority concern. These actions focus on reducing pollutant loads, especially nutrients and bacteria, entering the reservoir through stormwater runoff, non-stormwater discharges, and diffuse sources. Key approaches include implementing source control measures such as enhanced inspection and enforcement programs, illicit discharge detection and elimination (IDDE), septic system and sanitary sewer management, and agricultural oversight in coordination with regulatory agencies. In addition to identifying illicit connections, illegal discharges, and other potential pollutant discharges, inspectors also look for evidence of improper BMP implementation related to manure management in rural residential areas with equestrian and livestock activities. The jurisdictions also emphasize land-use and watershed controls, including outreach and BMPs for residential, commercial, and agricultural activities to limit fertilizer use, irrigation runoff, and other nutrient sources. Public notice and outreach would be completed by the City's Internal Departments as needed.

In addition, City agencies rely on green infrastructure and treatment-based strategies to intercept and treat runoff before it reaches receiving waters. These include stormwater capture and treatment systems such as bioretention basins, infiltration facilities, permeable pavements, and multi-benefit treatment projects, as well as restoration of natural systems that can improve water quality. For the Hodges Reservoir area specifically, efforts include nutrient source investigations, enhanced monitoring programs, and development of watershed-scale or upstream treatment concepts to reduce nutrient loading to the reservoir. The WQIP also highlights interagency collaboration, including coordination with water utilities, agricultural operators, and regional programs, to address sources outside direct GSA authority, such as groundwater inflows, agricultural runoff, and recycled water discharges. Overall, these actions are implemented through an adaptive management framework that combines monitoring, evaluation, and iterative refinement to ensure continued progress toward protecting the reservoir's municipal and domestic water supply beneficial use and overall watershed health.

Figure 7-4 San Dieguito River Watershed Management Area



Management Action Implementation in the Timeframe of the Periodic Evaluation

Since the adoption of the 2022 GSP, the City and County, in conjunction with other RAs in the San Dieguito River WMA, have continued to implement long-standing monitoring and assessment programs, and reporting activities in support of the WQIP including annual reports published each January on the Project Clean Water website.¹⁶ Other activities in support of the WQIP include regional MS4 monitoring, watershed monitoring, and targeted studies like the Hodges Reservoir Nutrient Source Investigation, which are used to identify pollutant sources and track trends in nutrients and bacteria over time. The GSA has also implemented IDDE programs, dry-weather screening, and complaint response systems to identify and remove unauthorized discharges entering the storm drain system. Additionally, in fiscal year 2023, 93 non-stormwater discharges were reported to the City of San Diego, 89 illicit discharges or illicit connections were eliminated, 45 enforcement actions were issued, and 31 escalated enforcement actions were issued in the San Dieguito River WMA in and surrounding the SPV Basin. Rebates programs in fiscal year 2023 supported the replacement of 13,875 square feet of lawn with water-wise landscapes to promote water conservation (San Dieguito River WMA Responsible Agencies, 2023).

In addition, the GSA has carried out extensive inspection, regulatory, and outreach programs under their stormwater permits, including inspections of commercial, industrial, and municipal facilities, enforcement of best management practices, and public education campaigns aimed at reducing pollutant-generating behaviors such as improper fertilizer use, pet waste disposal, and irrigation runoff. They have also coordinated with agricultural operators, water agencies, and regulatory bodies to improve compliance with agricultural orders and to address non-municipal sources of nutrients and bacteria (San Dieguito River WMA Responsible Agencies, 2023).

In fiscal year 2023-2024, the GSA undertook several new or expanded, highly targeted water quality protection and improvement actions, with a clear emphasis on managing nutrient inputs, especially from agriculture and septic systems, and improving inspection and outreach coverage. In the PSV Basin, the GSA expanded its nutrient-focused programs by increasing both outreach and inspection intensity tied directly to land uses in the upper watershed. The GSA delivered targeted nutrient outreach to more than 10 percent of homeowner associations and to 100 percent of inspected commercial facilities in the upper WMA, many of which are located in or influence the SPV Basin agricultural corridor. At the same time, the GSA exceeded its inspection commitments by inspecting 17 percent of commercial agricultural sites representing a meaningful increase in direct oversight of potential nutrient sources such as fertilizer use, irrigation runoff, and agricultural operations.

The GSA also continued to refine its inspection program framework specific to this subwatershed, including evaluating its inventory of agricultural sites and residential management areas (RMAs) to identify where inspections can be further enhanced in future years. This reflects a shift toward more spatially targeted and adaptive inspection strategies in the SPV Basin area rather than uniform watershed-wide efforts.

New and expanded WQIP actions in fiscal year 2023–2024 were even more directly focused on the SPV Basin/ Hodges Reservoir upstream area in the San Dieguito WMA, particularly addressing septic systems and rural land uses, which are key nutrient sources in the SPV Basin. The GSA significantly expanded its septic system outreach program, sending direct mailers to approximately 1,801 parcels (about 21% of septic properties in the subwatershed), a targeted effort to influence maintenance practices and reduce nutrient leaching. The direct mailing materials delivered consisted of a postcard that included a quick response (QR) code directing septic system users to the County of San Diego Septic Rebate Program website and associated septic system user educational resources. In addition, the County continued and scaled its septic pump-out rebate program, issuing dozens of rebates to incentivize proper system maintenance, which represents a concrete new investment in source control relative to prior efforts (San Dieguito River WMA 2025).

¹⁶ The WQIP and all Annual Reports are publicly available at: https://projectcleanwater.org/document_category/watershed-management-area-reports/

The GSA also continued and intensified on-the-ground inspection activities in the SPV Basin, including conducting inspections of 50 percent of RMAs (nine of 18 in the San Dieguito River above Hodges Reservoir subwatershed), including after-hours inspections specifically designed to identify pollutant-generating activities contributing to dry-weather flows. These after-hours inspections are a notable enhancement, reflecting a more targeted approach to identifying irrigation runoff and other intermittent sources typical of agricultural and rural residential areas in SPV Basin (San Dieguito River WMA 2023).

In addition, the GSA expanded incentive-based water quality improvements within the SPV Basin, including installation of rain barrels, irrigation efficiency upgrades, and turf replacement projects. While modest individually, these projects collectively represent a new or growing emphasis on distributed, parcel-level practices to reduce runoff and nutrient transport into the San Dieguito River system just before it enters Hodges Reservoir (San Dieguito River WMA 2025)

To reduce pollutant loads directly, the GSA has implemented and continues to plan structural and watershed-scale projects, including green infrastructure, stormwater treatment facilities, and habitat or channel restoration projects that capture, infiltrate, or treat runoff before it reaches receiving waters in the Pacific Ocean. The agencies have also contributed to regional studies, data sharing efforts, and collaborative watershed planning initiatives to improve scientific understanding and coordinate actions across jurisdictions (San Dieguito River WMA 2025)

7.2.4 Management Action 4—Coordinate and Collaborate Regionally with Other Entities to Perform Monitoring and Implement Regional Projects (Tier 0)

Collaboration with other entities in the region would benefit the SPV Basin. This management action would involve coordinating with other monitoring entities or encouraging the implementation of regional projects. To encourage collaboration and implement regional projects in the watershed, the GSA may collaborate with regional entities such as the San Diego IRWM Program. The San Diego IRWM Program is an interdisciplinary effort led by water retailers, wastewater agencies, stormwater and flood managers, watershed groups, the business community, Native American tribes, the agricultural community, and nonprofit stakeholders to improve water resources planning in the San Diego IRWM Region. IRWM as a practice is aimed at developing long-term water supply reliability, improving water quality, and protecting natural resources. Both the City and County staff serve on the San Diego IRWM Regional Advisory Committee. Through collaboration among participating agencies, the SPV GSA could encourage regional projects that would improve SPV Basin conditions. This MA consists of coordination among the SPV GSA and with other entities in the region. Public participation would be determined on a case-by-case basis.

Management Action Implementation in the Timeframe of the Periodic Evaluation

The SPV GSA has continued to coordinate and collaborate regionally with other entities to perform monitoring and implement regional projects in the SPV Basin watershed. Immediately after the completion of the 2022 GSP, the GSA published and distributed the IRWM fact sheet (San Diego Regional Water Management Group, 2021). The SPV GSA has also been coordinating and collaborating with other San Dieguito WMA Responsible Agencies¹⁷ to support compliance with the National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirement for Discharges from the Municipal Separate Storm Sewer Systems Draining the Watersheds Within the San Diego Region, monitoring the storm water and non-storm water discharges from the MS4 outfalls in the San Dieguito River WMA, many of which surround and influence the SPV Basin watershed (Figure 7-5). To carry out monitoring, the City and County implement coordinated field screening and sampling programs alongside the other

¹⁷ The San Dieguito WMA Responsible Agencies include: City of San Diego, which acts as the lead agency for the WQIP, the County of San Diego, and the incorporated cities of Del Mar, Escondido, Poway, and Solana Beach. These agencies collaborate as copermittees under the San Diego Regional Water Quality Control Board to manage regional stormwater programs, water quality, and conservation.

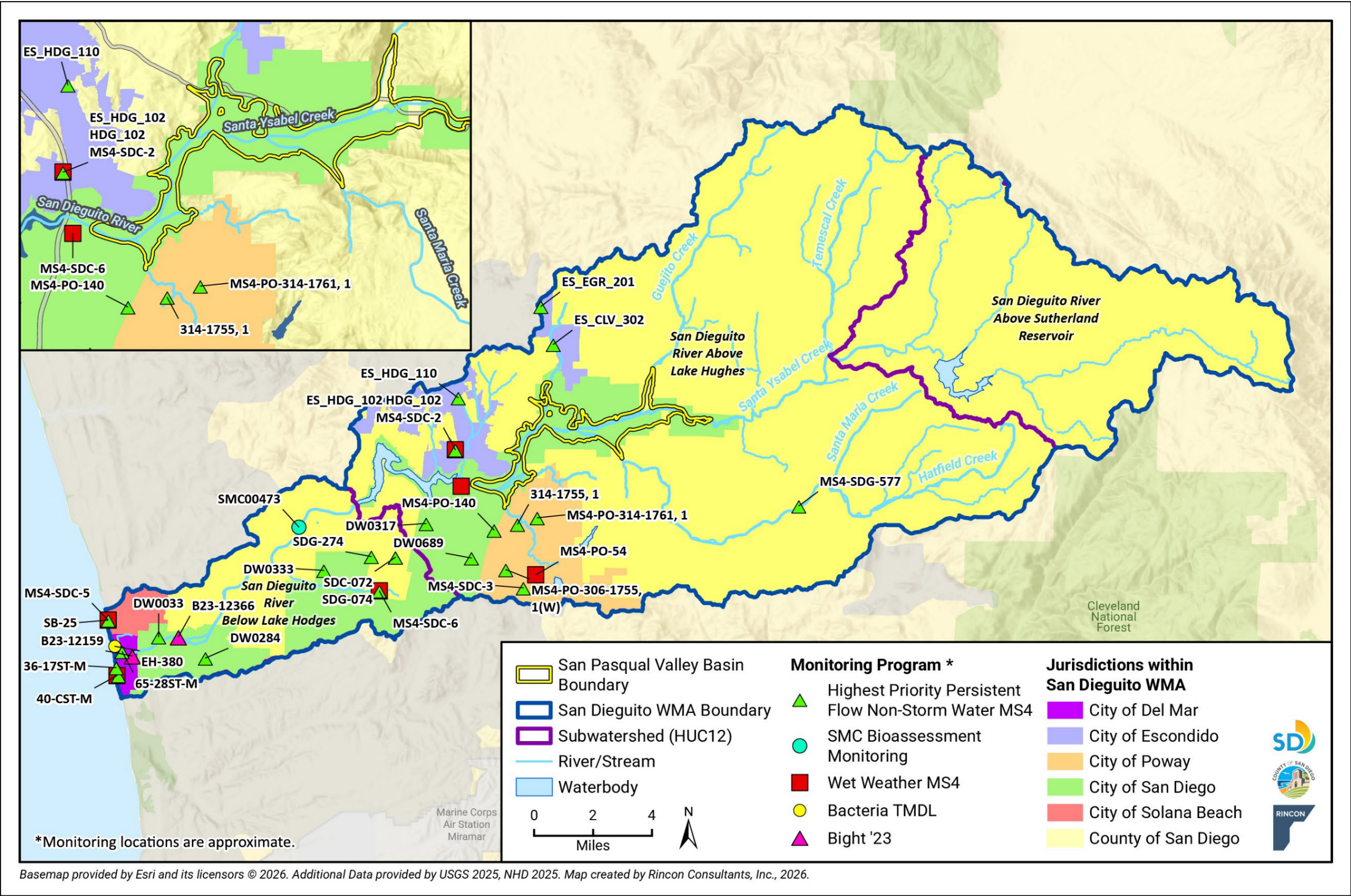
Responsible Agencies, following consistent permit-driven requirements. This includes joint scheduling and execution of dry-weather inspections, persistent flow monitoring, and wet-weather storm event sampling, with aligned frequencies and selection criteria across jurisdictions. Monitoring locations, including those upstream of Hodges Reservoir in the SPV Basin, are prioritized collaboratively based on shared criteria such as land use, known impairments (e.g., nutrients, bacteria), historical data, and threat to receiving waters, ensuring that efforts are collectively focused on the most critical sources affecting the reservoir (San Dieguito River WMA 2025).

The GSA also coordinates closely with other Responsible Agencies on pollutant source identification and elimination, particularly through the IDDE framework, which uses shared monitoring data and field observations to identify cross-jurisdictional sources of non-storm water flows. Investigations may incorporate data from multiple agencies, public reports, and inspections, reflecting a coordinated approach to tracing pollutants that may originate in one jurisdiction (for example, upstream portions of the SPV Basin) and impact downstream waters such as Hodges Reservoir.

A major component of regional coordination performed by the GSA is standardized data management and sharing across all Responsible Agencies. The City and County contribute to a common, watershed-wide dataset that is compiled annually using shared templates and made compatible with the California Environmental Data Exchange Network (CEDEN). This ensures that monitoring results from the SPV Basin upstream areas are directly comparable across jurisdictions and integrated into regional analyses, supporting unified assessment of trends, pollutant loads, and compliance with water quality objectives (San Dieguito River WMA 2025)

Beyond data collection coordination, the GSA and Responsible Agencies also coordinate in assessment, reporting, and adaptive management through the annual WQIP reporting process, described in Section 7.2.3, above, and permit-term evaluations. In these joint efforts, the City and County work with other agencies to identify sources of pollution, rank and reprioritize outfalls, estimate pollutant loads entering receiving waters (including those flowing into Hodges Reservoir), and evaluate the effectiveness of implemented control measures. They also collectively identify data gaps and adjust monitoring locations and strategies, allowing management approaches upstream and within the SPV Basin to evolve based on shared findings.

Figure 7-5 San Dieguito River WMA Monitoring Programs



7.2.5 Management Action 5—Education and Outreach for TDS and Nitrate (Tier 0)

As discussed in Chapter 5, degraded water quality from TDS and nitrate concentrations is the result of a number of factors, many of which are beyond SPV GSA control. However, residents in the SPV Basin who rely upon groundwater for their potable supply would benefit from increased information about potential water quality issues in the Basin. The GSA would conduct outreach and education to water users in the SPV Basin to provide an update on water quality monitoring results and to provide a forum to discuss potential water quality issues and options. The SPV GSA intends on utilizing components of the *Framework for a Drinking Water Well Impact Mitigation Program* (Self-Help Enterprises et al. 2022) to guide GSA outreach activities and potential corrective action recommendations. This management action is an education and outreach program. This program objective is to educate about SPV Basin conditions, communicate the importance of water quality testing, and discuss potential options and implications of degraded water quality for TDS and nitrate.

Management Action Implementation in the Timeframe of the Periodic Evaluation

In support of this MA, the GSA published the Fact Sheet: Nitrate and Total Dissolved Solids in Groundwater pamphlet (City 2022b). The Fact Sheet was finalized and published in August 2022, and was distributed via email and posted to the SPV GSP website in Q1 of 2023. The fact sheet was highlighted and presented to interested parties during the May 2024 stakeholder meeting, which also presented material pertaining to the SPV Basin WY 2023 Annual Report.

7.2.6 Management Action 6—Coordinate with City on Hodges Watershed Improvement Project (Tier 0)

The Hodges Watershed Improvement Project consists of two subprojects 1) creation and publication of the SPVRMG and associated BMP implementation (City 2022a), and 2) San Dieguito Watershed Habitat Restoration (SDWHR) for ecosystem enhancement. The SPVRMG is a voluntary, watershed-based framework designed to reduce sediment and nutrient loading to both Hodges Reservoir and the San Pasqual Valley Groundwater Basin, while simultaneously preserving agricultural viability, habitat, and cultural resources. The SPVRMG emphasizes long-term protection of groundwater quality (particularly nitrate and TDS concerns), improvement of surface water quality, reduction of erosion and runoff, and enhancement of operational efficiency for agricultural and land-based uses. By promoting feasible physical and operational BMPs, the SPVRMG supports compliance with regulatory programs and aligns with the SPV Basin Salt and Nutrient Management Plan (SNMP)¹⁸ and the 2022 GSP, ultimately aiming to sustain water supplies, protect sensitive habitats, and maintain productive land use in the Valley. The primary benefit of the SDWHR project is the restoration of a minimum of 17 acres of habitat in the SPV Basin. This management action would use habitat restoration and BMPs to improve water quality and reduce soil salinity by removing invasive salt cedar and reducing sediment and nutrient loading in SPV Basin and downstream in Hodges Reservoir.

- **Subproject 1 SPVRMG:** The SPVRMG includes guidance for agricultural lessees, non-agricultural lessees, and the City to prioritize, select, and implement BMPs to reduce stormwater runoff from agricultural and non-agricultural sites. Implementation of the SPVRMP would result in the reduction of erosion from agricultural and non-agricultural sites and an improvement to downstream water quality through the implementation of self-selected BMPs by the City and agricultural lessees.

¹⁸ The San Pasqual Valley Groundwater Basin Salt and Nutrient Management Plan can be found online at: https://www.sandiego.gov/sites/default/files/final_snmp_may_2014.pdf

- **Subproject 2 SDWHR:** The SDWHR consists of habitat restoration in the San Dieguito Watershed above Hodges Reservoir. Habitat restoration would involve the removal of invasive species and replanting with native species, where appropriate. Habitat restoration is primarily in the eastern portion of San Pasqual Valley and would focus on the removal of salt cedar (*Tamarix* sp.), gum tree (*Eucalyptus* sp.), and giant reed (*Arundo donax*). Removal of invasive species reduces water uptake by notorious water consumptive species. Enhanced native vegetation would uptake nutrients that would otherwise reach the SPV Basin and the reservoir waters. Other ecosystem services that are expected to be enhanced include improved habitat for wildlife and erosion control. A minimum of 17 acres would be restored.

Management Action Implementation in the Timeframe of the Periodic Evaluation

The Hodges Watershed Improvement Project is being managed by the City's PUD as part of an IRWM grant in coordination with the Water Authority. Public notice and outreach has been, and continues to be, completed by the City's PUD as needed. A stakeholder workshop to gather feedback on drafts of the SPVRMG and the SDWHR's conceptual habitat restoration plan was held on July 8, 2021 (Chapter 9 Section 9.2.1). The City adopted and published both the SPVRMG (City 2022a) and the San Dieguito Watershed Habitat Restoration for Ecosystem Service Enhancement Project Conceptual Habitat Rehabilitation and Enhancement Plan (City 2023) in 2022. In addition, the City completed the Hodges Watershed Improvement Project in October 2024 and has submitted both the Project Completion Report and the year one Hodges Watershed Improvement Project Post Performance Report, which are currently under review by the San Diego County Water Authority (SDCWA).

San Pasqual Valley Resource Management Guide

From WY 2020 through 2025, implementation of SPVRMG BMPs progressed from planning and prioritization to targeted on-the-ground construction and long-term monitoring within the Hodges watershed (Figure 7-2). Early efforts (2020 through 2021) focused on development of the SPVRMG document itself, including outreach to agricultural and non-agricultural lessees, site tours of high-priority operations, and identification and scoring of feasible BMPs to reduce nutrient and sediment loading to Hodges Reservoir and the SPV Basin. Following adoption of the SPVRMG in 2022, the City advanced implementation through selecting and constructing a minimum of five priority BMPs at the Three C Growers nursery, a high-risk site for erosion and nutrient transport. After review for feasibility and effectiveness, the five BMPs chosen to be implemented as part of this MA were:

- **Soil stabilization and revegetation:** which reduce erosion from bare soils, thereby decreasing sediment-bound nutrient transport to downstream waters while also improving soil moisture retention and supporting habitat.
- **Riparian buffers and filter strips:** providing vegetated zones along waterways and field edges that slow runoff, trap sediment and nutrients, stabilize streambanks, and enhance wildlife corridors.
- **Sediment traps and basins:** intended to capture sediment and associated nutrients from concentrated runoff before it reaches creeks or reservoirs, protecting downstream water quality and reducing maintenance needs for infrastructure.

Nutrient management through soil and water testing helps operators tailor fertilizer application rates to actual crop needs, reducing excess nitrogen inputs, lowering nitrate leaching to groundwater, and improving fertilizer efficiency. Finally, efficient irrigation systems and irrigation scheduling reduce excess runoff and deep percolation, conserve water and energy, limit nutrient leaching, and support sustainable groundwater management by aligning water applications with crop demand.

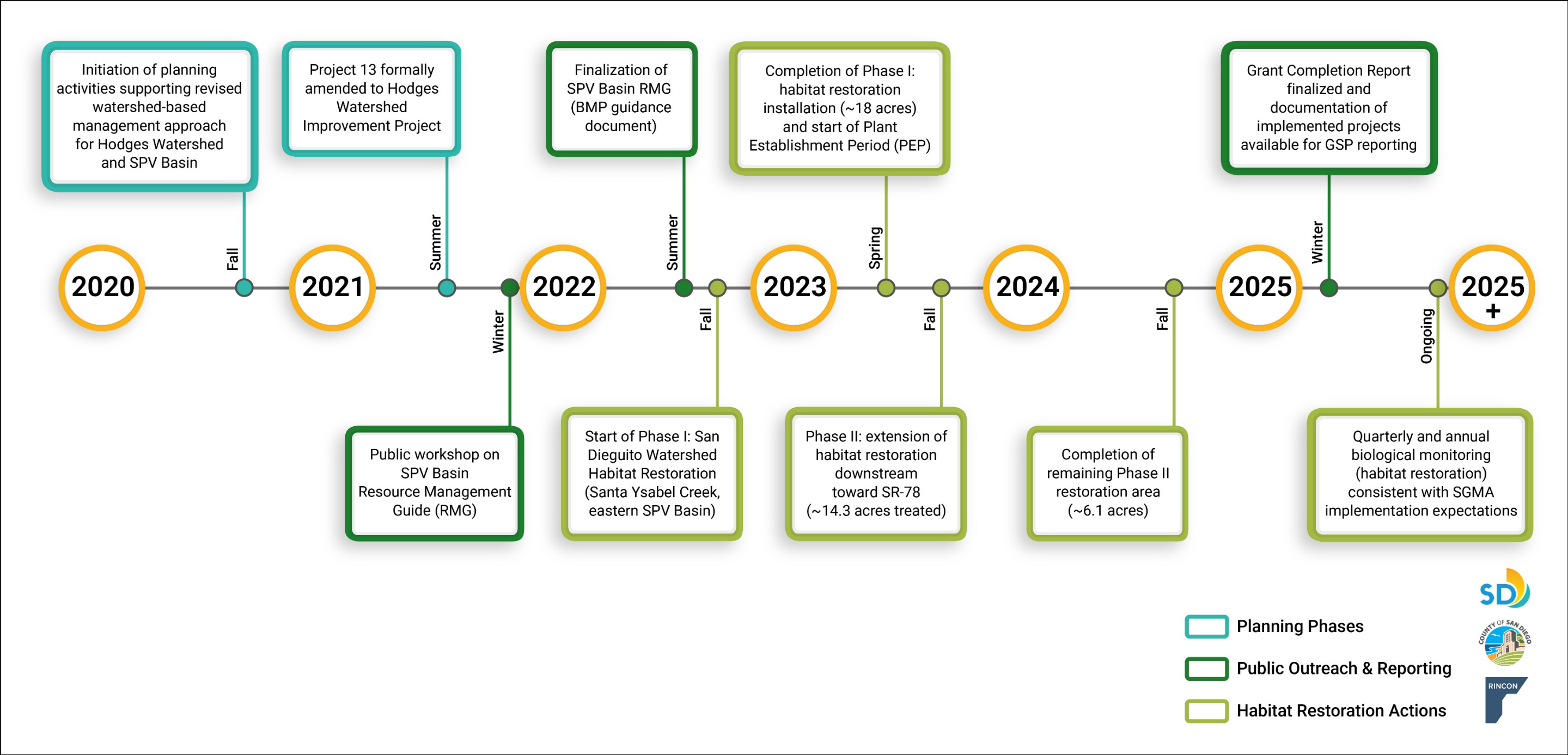
These BMPs were installed in 2023 and included replacement of an existing discharge swale with a vegetated swale, construction of three rock-lined swales to stabilize drainage and prevent gully formation, and application of mulch ground cover in high-traffic areas to reduce erosion (Figure 7-3). By 2024 and into 2025, implementation transitioned into a post-construction phase, with annual and quarterly visual inspections of installed BMPs, initiation of a three-year monitoring and maintenance period, and integration of BMP performance tracking into ongoing reporting. Collectively, these actions

operationalized the SPVRMG by translating its guidance into constructed BMPs, sustained maintenance commitments, and improvements that reduce sediment and nutrient transport to Hodges Reservoir while supporting long-term water quality and resource protection goals.

San Dieguito Watershed Habitat Restoration

From WYs 2020- 2025, implementation of the SDWHR project progressed from planning and site selection to long-term monitoring and maintenance, consistent with the objectives of the Hodges Watershed Improvement Project (Figure 7-6). Early efforts (2020 through 2021) focused on planning, environmental compliance, and evaluation of restoration opportunities, including selection of priority reaches along Santa Ysabel Creek based on invasive species presence, feasibility of restoration, and coordination with agricultural lessees and stakeholders. Implementation began in October 2022 with Phase I restoration activities, which included large-scale removal and treatment of invasive non-native vegetation, installation of temporary irrigation systems, and extensive native revegetation through container plantings, willow cuttings, and hydroseeding across approximately 18 acres. These actions were designed to improve riparian function, reduce erosion, and decrease sediment and nutrient loading to downstream waters. Following initial construction, a Plant Establishment Period (PEP) extended through late 2023, during which maintenance activities such as irrigation management, invasive species control, and replacement planting were conducted to promote establishment success.

Figure 7-6 Habitat Restoration Planning and Implementation in the Timeframe of the Periodic Evaluation



Building on the success of Phase I, the project expanded in 2023–2024 using surplus funds to implement Phase II restoration, extending treatment downstream and adding approximately 20 additional acres of invasive species removal and habitat enhancement, with the final portions completed in fall 2024. Across both phases I and II, restoration actions collectively included removal or treatment of large areas of invasive vegetation (*Tamarix* sp., *Eucalyptus* sp., and *Arundo donax*), installation of native vegetation and erosion control measures, and improvements to riparian structure and ecological function along a 2.75-mile reach of Santa Ysabel Creek. Figure 7-7 depicts a portion of the Phase I habitat restoration area, with photographs a), b), and c) taken in October 2022 before Phase I implementation, and photographs d), e), and f) taken in November 2023, approximately one year into Phase I implementation. The implementation portion of the SDWHR project was completed in October 2024 and the City submitted the Project Completion Report to the SDCWA in February 2025 (City 2025). In 2025, the project transitioned fully into a three-year, long-term monitoring and maintenance period, which includes quarterly monitoring, invasive species management, irrigation adjustments, and annual quantitative assessments of vegetation performance and habitat conditions (City 2026). These efforts are designed to promote sustained restoration success, including achievement of performance standards such as elimination of target invasive species and establishment of native vegetation. Overall, the SDWHR actions implemented during this WYs 2020-2025 period represent a comprehensive, watershed-scale restoration effort that enhances ecological function, reduces sediment and nutrient transport, and supports long-term water quality protection within the SPV Basin and downstream Hodges Reservoir.

7.2.7 Management Action 7—Initial Surface Water Recharge Evaluation (Tier 0)

This management action involves completing an initial investigation to identify potential surface water recharge projects that warrant further analysis, and a preliminary feasibility analysis study.

If benefits and feasibility for a recharge project are determined to be acceptable by the GSA, the GSP will be updated to identify next steps and associated Tier 0, Tier 1, and/or Tier 2 management actions. To the extent that the GSA identifies a recharge project that relies on a surface water supply controlled by a third-party (including the City or neighboring jurisdictions), the third-party must agree that the project is feasible and consent to implementation of the project. A preliminary assessment (Appendix N of the 2022 GSP) of Sutherland Reservoir, a reservoir owned and operated by the City upgradient of the SPV Basin, as a surface water supply was conducted as part of the development of MA No. 7. Public outreach included posted notices, emailed announcements, and public workshops/meetings to engage community members in the investigation of surface water recharge options. Community outreach performed in support of MA No. 7 in the timeframe of the Periodic Evaluation is summarized in the following Section. The GSA is using the Initial Surface Water Recharge Evaluation to determine the benefits to the SPV Basin, and feasibility of implementation, of a potential recharge project, including but not limited to feasibility related to the avoidance of the unreasonable waste of water. In addition, potential impacts to existing users of this water source were evaluated. Based on an assessment of these factors, if the GSA determines that a project warrants inclusion in the GSP, the GSP may be updated to identify next steps and include associated Tier 0, Tier 1, and/or Tier 2 management actions. The GSA does not presently intend to implement any of the potential water recharge management actions identified and evaluation in the Initial Surface Water Recharge Evaluation, but management actions resulting from MA No. 7, Initial Surface Water Recharge Evaluation that are implemented will be supported by the best available information and science. Following the review and publication of the final surface water recharge evaluation feasibility study (Jacobs and Woodard & Curran 2024) the GSA determined that two new MAs would be added to the 2022 GSP. These MAs are discussed in more detail in Section 7.2.13 and 7.2.14.

Figure 7-7 Habitat Restoration – Before and After Photographs



Management Action Implementation in the Timeframe of the Periodic Evaluation

The Initial Surface Water Recharge Evaluation involved completing a feasibility study to identify and evaluate options for surface water recharge. Development of the Initial Surface Water Recharge Evaluation was completed over two calendar years, from 2021 through 2023. The evaluation included six technical memoranda and a final groundwater recharge feasibility report (publicly available on the County of San Diego website at <https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html>), the findings of which were presented in a series of four public workshops held between June 2022 and August 2023. These technical memoranda were provided for public comment, and a final public workshop regarding the Initial Surface Water Recharge Evaluation was held in December 2023 to review and address public comments.

The first technical memorandum identified four candidate recharge strategies for evaluation: (1) forecast-informed releases from Sutherland Reservoir to optimize recharge timing, (2) stormwater detention in small drainages to increase infiltration, (3) installation of check dams in tributary creeks to slow flows and enhance recharge, and (4) stream channel modifications to improve infiltration capacity. These strategies chosen and designed to leverage available surface water flows, especially during storm events, to increase groundwater recharge in the SPV Basin, particularly in upstream areas of the watershed that contribute flow toward the SPV Basin (Jacobs and Woodard & Curran 2022).

The second and third technical memoranda evaluated potential surface water sources that could support groundwater recharge projects in the SPV Basin. The study identified three primary candidate sources: natural stream flows in Santa Ysabel Creek and tributaries, controlled releases from Sutherland Reservoir, and untreated imported water supplied through the Ramona Municipal Water District (RMWD) (Jacobs and Woodard & Curran 2023a and 2023b). The third memorandum concluded that while each source has potential, all are constrained by hydrologic variability, infrastructure capacity, operational rules, and water quality considerations (Jacobs and Woodard & Curran 2023b). Building upon the first three studies, the fourth memorandum evaluated and screened potential surface water recharge strategies for the SPV Basin to enhance groundwater resilience under future hydrologic variability. Building on prior analyses of recharge criteria, stream conditions, and available water sources, the study developed 15 conceptual strategies that combined different water supplies (stormwater, Sutherland Reservoir releases, and imported water from RMWD), conveyance systems, and recharge methods (e.g., streambed infiltration, infiltration basins, injection wells, and in-lieu recharge). These strategies were evaluated using screening criteria such as yield, cost, reliability, environmental impacts, and implementation complexity to identify the most promising options.

The final technical memorandum evaluated four potential recharge strategies intended to enhance SPV Basin resilience under drought conditions. Using SPV GSP Model v2.0, four recharge strategies were simulated and assessed against criteria including groundwater storage, depth to water, threshold exceedances, recharge efficiency, water quality (TDS), and drought resilience. These strategies were 1) in-stream modifications, 2) controlled releases from Sutherland Reservoir, 3) streamflow augmentation using Ramona Municipal Water District (MWD) supplies, and 4) direct aquifer injection wells. Results indicated that the injection well strategy would provide the greatest overall benefit to groundwater levels and storage, followed by RMWD streamflow augmentation, while the in-stream modification strategy would yield minimal benefit despite high efficiency due to limited recharge volume (Jacobs and Woodard & Curran 2023d).

Although Initial Surface Water Recharge Evaluation determined that all four recharge strategies would improve conditions relative to baseline, none would individually achieve long-term groundwater sustainability under projected severe drought conditions, suggesting that combined strategies, adaptive timing, and/or demand reductions may be necessary over the 50-year SGMA planning horizon (Jacobs and Woodard & Curran 2023d).

7.2.8 Management Action 8—Study Groundwater Dependent Ecosystems (Tier 1)

GDEs are defined in the SGMA regulations as “ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.” SGMA does not require establishing additional sustainable management criteria to specifically manage GDEs but rather includes GDEs as a beneficial user of water to be considered when developing other sustainable management criteria. Because GDEs are considered a potential beneficial user of groundwater in the SPV Basin, it is important to confirm the presence of GDEs and understand trends in plant health related to groundwater conditions. This MA would entail developing a detailed GDE Study for this purpose. As discussed in Section 2, Plan Area, of the 2022 GSP, the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset is used to estimate GDE location. Because the NCCAG dataset includes a number of estimates, DWR recommends that a biologist verify NCCAG-identified GDE locations. For this MA and GDE study, a wetland biologist would identify locations from the NCCAG dataset and 2020 GDE Technical Memorandum prepared for the 2022 GSP (Woodard and Curran 2020) using remote sensing techniques and would then verify the GDE locations in the field. The GDE Study would evaluate access to groundwater supplies based on depth to groundwater, subsurface flows, and adjacency to agricultural return flows, and will integrate remote sensing indices of the plant health to assess potential adverse effects of declining groundwater levels on the potential GDEs, which may be then incorporated into future SPV Basin monitoring plans.

Management Action Implementation in the Timeframe of the Periodic Evaluation

In its 2023 determination letter, the DWR instructed the SPV GSA to conduct the GDE study as described in MA 8 (per Recommended Corrective Action 6) prior to the first periodic evaluation of the 2022 GSP (see Section 3.1.6). To that end, the GSA carried out Management Action 8 and addressed Recommended Corrective Action 6 from the DWR staff report (DWR 2023b). The GDE study built on the GDE technical memorandum included as Appendix J in the 2022 GSP (Woodard and Curran 2020), as well as the technical memorandum prepared as part of a Preliminary Feasibility Study to evaluate potential benefits to GDEs from surface water recharge within the Basin (Jacobs and Woodard & Curran 2023e). The GDE study identified and characterized GDEs within the SPV Basin and analyzed their condition and susceptibility to changing groundwater conditions. A review of the SMC and undesirable results related to GDEs within the SPV Basin, as well as recommendations for GDE monitoring, were also included in the GDE study report, which is included with this Report as Appendix C.

7.2.9 Management Action 9—Well Inventory (Tier 1)

This management action may be initiated following the exceedance of the planning thresholds in at least five representative groundwater level monitoring wells. The GSA would inventory wells that may produce more than two-acre feet of water per year (i.e., non-de minimis extraction wells) and are potentially in the Basin, to improve its ability to manage the SPV Basin. The well inventory would identify and compile information about wells that are potentially located in the Basin. Additional studies may be completed to help further the understanding of the Basin. Compilation of the well inventory may include the following:

- Review records to obtain well construction information
- Coordinate with landowners/leaseholders
- Complete field visits to verify well location and size
- Conduct video logging of selected wells with unknown well construction
- Determine which wells are in the Basin
- Investigate well interaction with surface water in the Basin
- Compile estimates or meter readings of water pumped

Completion of this management action would require cooperation from water users, landowners, and leaseholders to identify all wells and determine if the wells are within Basin boundaries. Implementation of this management action would require extensive coordination with well-owners and cooperation on water use.

Management Action Implementation

This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.

7.2.10 Management Action 10—Basin-wide Metering Program (Tier 1)

This management action may be initiated following the exceedance of the planning thresholds in at least five representative groundwater level monitoring wells. To improve measurement of groundwater use and to improve the GSA's understanding of pumping in the Basin, this management action would install meters on non-de minimis extraction wells. Installed meters could be upgraded meters with encoder receiver transmitters if needed. The encoder receiver transmitters and new meters would allow for remote reading of flow via a radio signal to a radio receiver inside a vehicle or at a fixed location. The implementation of this management action would require extensive coordination with well owners and the GSA will reach out directly to impacted stakeholders.

Management Action Implementation in the Timeframe of the Periodic Evaluation

This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.

7.2.11 Management Action 11—Pumping Reduction Plan (Tier 1)

This management action may be initiated following the exceedance of planning thresholds in at least five representative groundwater level monitoring wells. A plan for implementation of pumping reductions would be developed as the GSA continues to monitor groundwater levels below the planning thresholds as follows:

- Evaluate current and historic groundwater use for each non-de minimis groundwater user in the SPV Basin
- Evaluate area(s) in the SPV Basin that may benefit from focused reductions or limits on increased groundwater use
- Develop recommended reductions or limits
- Develop implementing rules and regulations
- Develop a timetable for implementation

As the Basin is sustainable at current pumping levels, it is expected that users would not be required to reduce pumping over time but may be limited in how much pumping could be increased in the future. Developing a Pumping Reduction Plan would require substantial public input to help inform the GSA about the potential impacts of pumping restrictions on groundwater users in the Basin. Public outreach could include posted notices, email announcements, and public workshops/meetings.

Management Action Implementation

This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.

7.2.12 Management Action 12—Pumping Restrictions and Enforcement (Tier 2)

This management action may be initiated following the exceedance of minimum thresholds in at least five representative groundwater level monitoring wells. A plan for implementation of this action would first be developed following the exceedance of planning thresholds in at least five wells (refer to Management Action 11—Pumping Reduction Plan). Under this action, the GSA could implement pumping restrictions to limit groundwater use in accordance with the Pumping Reduction Plan. Enforcement would be through fee assessments and/or penalties. Implementing pumping restrictions would require substantial public input to help communicate the need for reductions/limitations and to notify groundwater users of specific restrictions.

Management Action Implementation in the Timeframe of the Periodic Evaluation

This Management Action has not yet been implemented as the triggers that would initiate it have not occurred, including implementation of Management Action 11—Pumping Reduction Plan during the timeframe of the Periodic Evaluation.

7.2.13 Management Action 13—Sutherland Reservoir Release Plan (Tier 1)

This management action may be initiated following the exceedance of groundwater level PTs in at least five representative groundwater level monitoring wells. Under this action, the GSA would develop a Sutherland Reservoir Release Plan to establish the operational, hydrologic, climatic, and regulatory criteria under which controlled releases from Sutherland Reservoir could be used to enhance groundwater recharge within the SPV Basin. The plan would identify release timing and volumes, implementation procedures, monitoring requirements, coordination protocols with the City of San Diego, and decision criteria for initiating, adjusting, or discontinuing releases.

Development of a Sutherland Reservoir Release Plan would require coordination with the City of San Diego regarding reservoir operations, water availability, and operational constraints. Public outreach could include posted notices, email announcements, and public workshops/meetings to inform groundwater users, landowners, and other interested parties regarding the purpose and potential implementation of controlled reservoir releases.

Management Action Implementation in the Timeframe of the Periodic Evaluation

This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.

7.2.14 Management Action 14—Sutherland Reservoir Controlled Releases for SPV Basin Groundwater Recharge (Tier 2)

This management action may be initiated following the exceedance of groundwater level MTs in at least five representative groundwater level monitoring wells. A plan for implementation of this action would first be developed following the exceedance of planning thresholds in at least five wells (refer to Management Action 13—Sutherland Reservoir Release Plan).

Under this action, controlled releases from Sutherland Reservoir would be implemented in accordance with the Sutherland Reservoir Release Plan to increase streamflow in Santa Ysabel Creek and enhance groundwater recharge through streambed infiltration within the SPV Basin. Release timing and volumes would be selected to maximize groundwater recharge benefits while minimizing excess streamflow beyond the intended recharge area. Implementation of controlled releases would require coordination with the City of San Diego regarding reservoir storage conditions, water availability, operational constraints, and other applicable requirements. Public outreach could include posted notices, website updates, email announcements, and public workshops/meetings to notify stakeholders regarding planned release activities and monitoring results.

Management Action Implementation in the Timeframe of the Periodic Evaluation

This Management Action has not yet been implemented as the triggers that would initiate it have not occurred, including development of Management Action 13—Sutherland Reservoir Release Plan during the timeframe of the Periodic Evaluation.

7.3 Status of Plan Implementation

Since 2021, implementation activities in the San Pasqual Valley documented under the Hodges Watershed Improvement Project constitute completed and ongoing projects and management actions that support multiple SGMA sustainability indicators evaluated by DWR. Funded through Proposition 84 IRWM, these actions are directly relevant to GSP implementation because they address degraded water quality, interconnected surface water, and land-use drivers that contribute to long-term groundwater sustainability risks in the San Pasqual Valley Groundwater Basin. The July 2021 project amendment marked a transition from conceptual planning to on-the-ground implementation consistent with SGMA's requirement to demonstrate active management rather than reliance on future actions.

Although no implementation of PMAs is necessary since the SPV Basin is sustainable, implementation of the San Pasqual Valley Resource Management Plan (SPV RMP) is noted as a completed management action that helps protect recharge areas and avoid potential future water quality impacts. Following basin-specific field assessments and stakeholder engagement in 2021, five priority agricultural BMPs were constructed in 2023 at the Three C Growers operation on City-owned land. These BMPs, including vegetated swales, rock-lined conveyance swales, and erosion control measures, are designed to reduce sediment and nutrient transport to Santa Ysabel Creek and downstream recharge areas. From a SGMA perspective, these actions directly support the degraded water quality sustainability indicator by reducing nonpoint source pollutant loading and represent implemented measures that help avoid future undesirable results, even where groundwater quality trends are influenced by episodic hydrologic conditions.

In addition, large-scale riparian restoration implemented between 2022 and 2024 along Santa Ysabel Creek within the San Pasqual Valley supports the ISWs sustainability indicator evaluated by DWR. Restoration activities, including invasive species removal and native revegetation across approximately 18 acres, with an additional ~20 acres treated using surplus funds, improve channel stability, reduce sediment mobilization, and enhance riparian function. These actions contribute to maintaining surface water conditions that support groundwater recharge processes and reduce sediment-related impacts that can impair channel connectivity and infiltration, consistent with SGMA's requirement to consider surface water–groundwater interactions.

Consistent with DWR's emphasis on monitoring and adaptive management, both the agricultural BMP installations and the habitat restoration projects include defined post-implementation monitoring and maintenance commitments extending through at least 2028. While quantitative groundwater quality monitoring was not feasible due to infrequent, rainfall-dependent flows, the adopted monitoring framework (BMP functionality inspections, vegetation performance standards, and long-term maintenance) demonstrates implementation capacity and ongoing evaluation of project effectiveness. These elements satisfy DWR expectations that GSPs document not only planned actions, but also how projects are tracked, maintained, and adapted over time to support achievement of sustainability goals and adaptive management in the SPV Basin and surrounding watershed. As such, they strengthen the GSP's alignment with DWR evaluation criteria related to project implementation, avoidance of undesirable results, and demonstration of long-term basin management commitment.

Table 7-2 Project and Management Actions Summary

Number	Project or Management Action Name	Tier	Description	Targeted Sustainability Indicator(s)	Project Status	Expected Schedule	Benefits Accrued in the Timeframe of the Periodic Evaluation
Projects							
1	Coordinate with the City on Constructing Infiltration Basins at San Pasqual Union Elementary School (Tier 0)	0	Coordinate with the City to design and implement stormwater infiltration basins to enhance groundwater recharge.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage	No action taken	Implementation via WQIP is a multi-year effort involving site identification (3–6 months), funding (6 months–2 years), annual City Council approval, and phased engineering and design (about 2.5 years total. Construction follows bidding (approx.. 6 months) and lasts about 4 months to 1 year, with ongoing operations and maintenance requiring perpetual funding and staffing approved annually by the City Council.	Planning and coordination have advanced opportunities to enhance groundwater recharge.
2	Coordinate on the Implementation of Invasive Species Removal (Tier 0)	0	Support removal of invasive vegetation to reduce evapotranspiration and improve watershed hydrologic function.	Chronic Lowering of Groundwater Levels, Depletions of Interconnected Surface Waters, Impacts to Groundwater-Dependent Ecosystems	Completed; in post-implementation phase	Ongoing	Removing invasive non-native plants improves habitat and water quality, reduces fire and flood risks, and increases groundwater supply by eliminating high water-use species like giant reed and pampas grass.
1	Farming Best Management Practices	0	Promote agricultural best management practices to improve irrigation efficiency and reduce groundwater demand.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage, Degraded Water Quality	Completed; in post-implementation phase	Ongoing	Implementation of BMPs has improved irrigation efficiency and reduced water use in some areas.
2	Education and Outreach to Encourage Demand Softening	0	Conduct outreach to encourage water conservation and reduce groundwater pumping.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage, Degraded Water Quality	Continuous	Ongoing	Outreach efforts have increased awareness of water conservation and reduced demand among some users.
3	Support WQIP Actions	0	Support implementation of regional Water Quality Improvement Plan actions to improve groundwater quality.	Degraded Water Quality	Continuous	Ongoing	Ongoing coordination has supported watershed-based pollutant reduction efforts.
4	Coordinate and Collaborate Regionally with Other Entities to Perform Monitoring and Implement Regional Projects	0	Coordinate with local and regional entities to support monitoring, data sharing, and project implementation.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage, Degraded Water Quality, Depletions of Interconnected Surface Waters, Impacts to Groundwater-Dependent Ecosystems, Land Subsidence	Continuous	Ongoing	Coordination has improved data sharing and regional collaboration on monitoring and projects.
5	Education and Outreach for TDS and Nitrate	0	Provide targeted outreach to reduce sources of total dissolved solids and nitrate in groundwater.	Degraded Water Quality	Initial outreach completed in 2022 and 2023	Ongoing	Outreach has increased understanding of sources contributing to TDS and nitrate.
6	Coordinate with City on Hodges Watershed Improvement Project	0	Coordinate with the City on watershed improvement projects that enhance recharge and watershed function.	Chronic Lowering of Groundwater Levels, Depletions of Interconnected Surface Waters, Impacts to Groundwater-Dependent Ecosystems	Completed; in post-implementation phase	Ongoing	Coordination has supported planning and early implementation of watershed improvements.
7	Initial Surface Water Recharge Evaluation	0	Evaluate the feasibility of surface water recharge opportunities within the basin.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage	Completed	Completed	Evaluation has improved understanding of recharge opportunities and feasibility within the basin.

Number	Project or Management Action Name	Tier	Description	Targeted Sustainability Indicator(s)	Project Status	Expected Schedule	Benefits Accrued in the Timeframe of the Periodic Evaluation
8	Study Groundwater Dependent Ecosystems	1	Conduct a study to evaluate groundwater-dependent ecosystems and their relationship to groundwater conditions.	Impacts to Groundwater-Dependent Ecosystems, Depletions of Interconnected Surface Waters	Completed	Completed	The completed study has improved understanding of GDE distribution and groundwater relationships.
9	Well Inventory	1	Complete a basin-wide inventory and assessment of wells to improve monitoring and data quality.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage, Degraded Water Quality, Depletions of Interconnected Surface Waters, Impacts to Groundwater-Dependent Ecosystems, Land Subsidence	Not planned – Tier 1 trigger conditions have not occurred	This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.	N/A
10	Basin-wide Metering Program	1	Develop a program to measure groundwater extraction and improve tracking of basin pumping.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage	Not planned – Tier 1 trigger conditions have not occurred	This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.	N/A
11	Pumping Reduction Plan	1	Establish a framework to reduce groundwater pumping if needed to maintain sustainable conditions.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage	Not planned – Tier 1 trigger conditions have not occurred	This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.	N/A
12	Pumping Restrictions and Enforcement	2	Implement regulatory measures to restrict groundwater pumping if necessary to avoid undesirable results.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage	Not planned – Tier 1 and 2 trigger conditions have not occurred	This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.	N/A
13	Sutherland Reservoir Release Plan	1	Develop a plan to time releases from Sutherland Reservoir to increase streamflow in Santa Ysabel Creek and enhance groundwater recharge through streambed infiltration within the eastern portion of the SPV Basin.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage	Not planned – Tier 1 and 2 trigger conditions have not occurred	This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.	
14	Sutherland Reservoir Controlled Releases for SPV Basin Groundwater Recharge	2	Implementation of controlled releases from Sutherland Reservoir to Santa Ysabel Creek in accordance with the Sutherland Reservoir Release Plan developed under Management Action 13.	Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage	Not planned – Tier 2 and 2 trigger conditions have not occurred	This Management Action has not yet been implemented as the triggers that would initiate it have not occurred during the timeframe of the Periodic Evaluation.	
Notes: N/A							

7.4 Enforcement Actions

No enforcement actions were implemented or required by the GSA since the adoption of the 2022 GSP or in the timeframe of the Periodic Evaluation.

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8 Monitoring Networks

The 2022 GSP established monitoring networks for the SPV Basin related to groundwater level, groundwater quality, and interconnected surface waters sustainability indicators. These monitoring networks track seasonal, annual, and long-term groundwater conditions and measure applicable sustainable management criteria to support identification of potential exceedances and evaluation of basin conditions. See Chapter 2, Section 2.1 for details on these sustainability indicators and associated sustainable management criteria.

In the DWR's determination letter received by the GSA on October 26, 2023 (DWR 2023b), the DWR issued Recommended Corrective Action 5b (Chapter 3, Section 3.1.5) directing the GSA to improve the understanding of well construction details of monitoring sites in the existing representative monitoring networks. This Recommended Corrective Action 5b requested the GSA to conduct a reconciliation between the details of the monitoring networks provided in the 2022 GSP with the requirements of the data and reporting standards and representative monitoring in the GSP Regulations and include the required information in this Periodic Evaluation.

This Section addresses the additional analyses, surveys, and data mining undertaken as part of the 5-Year Periodic Evaluation to improve the understanding of representative monitoring networks and their wells in the SPV Basin, including new information that was collected in response to DWR Recommended Corrective Action 5b. The full monitoring network technical memorandum is included as Appendix D (Rincon 2026c).

8.1 Regulatory Context for Representative Monitoring Networks

SGMA requires GSAs to establish and maintain monitoring networks sufficient to characterize basin conditions over time and to evaluate groundwater sustainability indicators in accordance with established Sustainable Management Criteria (SMC). The SPV GSA covers 100 percent of the SPV Basin and is designated by DWR as an exclusive multi-agency GSA. Pursuant to DWR's *California's Groundwater Bulletin 118—Update 2003* (Bulletin 118) (DWR 2003), the Basin is designated Groundwater Basin 9-10 (09-010).

GSP requirements for data and reporting standards are provided in Title 23, CCR, § 354.26(b)(2) and state that monitoring sites shall include the following information:

- 1) A unique site identification number and narrative description of the site location;
- 2) A description of the type of monitoring, type of measurement taken, and monitoring frequency;
- 3) Location, elevation of the ground surface, and identification and;
- 4) A description of the standards used to install the monitoring site. Sites that do not conform to best management practices shall be identified and the nature of the divergence from best management practices described.

GSP requirements for representative monitoring are provided in Title 23, CCR, Section 23 CCR § 354.36 and state that wells used to monitor groundwater conditions shall be constructed according to applicable construction standards, and shall provide the following information:

- 1) CASGEM well identification number. If a CASGEM well identification number has not been issued, appropriate well information shall be entered on forms made available by the Department, as described in CCR Section 353.2;
- 2) Well location, elevation of the ground surface and reference point, including a description of the reference point;

- 3) A description of the well use, such as public supply, irrigation, domestic, monitoring, or other type of well, whether the well is active or inactive, and whether the well is a single, clustered, nested, or other type of well;
- 4) Casing perforations, borehole depth, and total well depth;
- 5) Well completion reports, if available, from which the names of private owners have been redacted;
- 6) Geophysical logs, well construction diagrams, or other relevant information, if available;
- 7) Identification of principal aquifers monitored;
- 8) Other relevant well construction information, such as well capacity.

8.2 Assessment of GSP Monitoring Networks

The SPV Basin representative monitoring networks for groundwater level, groundwater quality, and interconnected surface waters were established through the 2022 SPV GSP to track seasonal, annual, and long-term groundwater conditions and to measure applicable sustainable management criteria to support evaluation of basin conditions and identification of potential exceedances of sustainable management criteria including MTs, MOs, and PTs.

The representative monitoring networks are focused on the principal alluvial aquifer underlying the San Pasqual Valley, which consists of unconsolidated to semi-consolidated Quaternary sands, gravels, silts, and clays and represents the Basin's primary water-bearing unit. This aquifer is generally unconfined to semi-confined and is hydraulically connected to surface water features within the valley (DWR 2011; USGS 1983). Monitoring wells were screened within this alluvial aquifer to provide data representative of active groundwater conditions relevant to groundwater quality, groundwater level, groundwater storage, and interconnected surface waters.

The existing monitoring networks are described and summarized below, presented in greater detail in the 2022 GSP (SPV GSA 2021), and in the Monitoring Network technical memorandum (Rincon 2026c), included here as Appendix D, and are available in the SGMA Portal¹⁹.

8.2.1 Groundwater Level and Interconnected Surface Waters Monitoring Networks

Groundwater level monitoring in the SPV Basin is conducted using a total of 15 City, USGS, and private landowner wells used for monitoring groundwater levels within the SPV Basin as well as for monitoring groundwater storage and interconnected surface waters by proxy. MTs for groundwater levels are the depths to groundwater in representative wells that may indicate URs if sustained exceedances occur in multiple wells for a specified duration. PTs are a non-regulatory threshold that serve as an "early warning" signal for implementation of the GSP's projects and PMAs to avoid MT exceedances. MOs are goals for the maintenance or improvement of groundwater conditions in the Basin.

The groundwater level monitoring network wells serve to represent groundwater level conditions in the SPV Basin, and wells are set in locations that allow monitoring to indicate long-term, basin-wide changes. Representative monitoring wells also have sustainable management criteria assigned to them. Representative groundwater level sites in the Basin were selected using several criteria, including the following:

- **Adequate Spatial Distribution:** Representative monitoring network for groundwater levels does not require the use of all wells that are spatially grouped together in a portion of the Basin. Inclusion of tightly grouped wells as representative monitoring wells would result in collection of redundant data. Adequately spaced wells will provide greater Basin coverage with fewer monitoring sites.

¹⁹ <https://sgma.water.ca.gov/portal/gsp/preview/75>

- **Robust and Extensive Historical Data:** Representative monitoring network sites for groundwater levels with longer and more robust collections of historical data provide insight into long-term trends; these trends can provide information about groundwater conditions through varying climatic periods, such as droughts and wet periods. Historical data may also show changes in groundwater conditions from anthropogenic activities. While some sites chosen for the network may not have extensive historical data, they may still be selected because there are no other wells nearby with longer data records.
- **Professional Judgment:** Professional judgment is employed to make a final decision about each monitoring well, particularly when more than one suitable well exists in an area of interest.

Groundwater levels at six of these 15 wells have also been used as a proxy metric to monitor for depletions of ISW. Groundwater levels are measured using a combination of manual measurements and automated transducer data loggers, depending on well configuration and access. Measurements are collected on a semi-annual basis (spring and fall), consistent with the monitoring schedule established in the 2022 GSP and reported through Annual Reports submitted to the DWR by April 1st of each year.

8.2.2 Groundwater Quality Representative Monitoring Network

Groundwater quality monitoring in the SPV Basin is conducted using a network of 10 wells distributed across the basin, comprised of representative monitoring wells and select production wells. The wells are located throughout the SPV Basin and provide adequate spatial coverage for groundwater quality monitoring. Table 1 provides available well construction information and other well metadata. DWR's Monitoring Networks BMP (DWR 2016) states "The spatial distribution must be adequate to map or supplement mapping of known contaminants." Using this guidance, professional judgment was used to identify representative wells in the SPV Basin. The 2022 GSP determined that this network of 10 wells in the SPV Basin groundwater quality monitoring network meets density requirements as outlined in DWR's Monitoring Networks BMP (DWR 2016) for monitoring protocols.

After evaluating the historical presence of constituents in the SPV Basin's groundwater, the SPV GSA determined that total dissolved solids (TDS) and nitrate are the two constituents that must be monitored to support sustainable management in the SPV Basin (SPV GSA 2021). Groundwater quality samples and trends over time are analyzed for constituents of concern identified in the 2022 GSP, specifically nitrate (as NO₃N) and TDS. Sampling is conducted on a semi-annual basis (spring and fall), consistent with the monitoring schedule established in the 2022 GSP and reported through Annual Reports submitted to the DWR by April 1 of each year.

8.2.3 Land Subsidence Monitoring Network

Land subsidence analyses performed as part of the 2022 GSP determined that subsidence has not caused undesirable results in the SPV Basin and is not anticipated to cause undesirable results in the foreseeable future, including over the planning horizon of this GSP (SPV GSA 2021). Consequently, the SPV GSA determined that establishing land subsidence SMC, MOs, MTs, and PTs, and monitoring for these thresholds was not required pursuant to Title 23 CCR § 354.26(d). Therefore, a monitoring network for land subsidence was not laid out in the 2022 GSP.

However, the DWR determination letter and attached Staff Report included Recommended Corrective Action 5a (Chapter 3, Section 3.1.5), which directed the SPV GSA to "establish a monitoring network for land subsidence that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations" (DWR 2023b).

8.3 Summary of Suggested Changes to Monitoring Networks

Following the October 2025 well survey and additional evaluations of the SPV Basin representative monitoring networks as part of this Periodic Evaluation (see Chapter 4, Section 4.1), several changes are proposed to rectify issues with existing monitoring well inaccessibility, inability to sample, or a determination that a well would provide data that are more directly representative of conditions influencing SPV Basin and more accurate tracking of sustainability indicators.

8.3.1 Groundwater Level Monitoring Network

The representative monitoring network for groundwater levels was evaluated to determine whether it continues to provide adequate spatial and temporal coverage for assessing groundwater level conditions relative to the SMC. The 2022 GSP did not identify any data gaps at the time of adoption and concluded that the monitoring network exceeds DWR density requirements for monitoring protocols and has sufficient historical data (SPV GSA 2021). To date, there have been no additions, removals, or structural changes to the groundwater level monitoring network since adoption of the GSP.

There were no issues accessing and sampling representative groundwater level monitoring wells in WYs 2020 through 2025, and therefore there are no recommended updates or changes to the SPV Basin groundwater level monitoring network.

Groundwater levels will continue to be measured in accordance with the monitoring frequency established in the 2022 GSP (SPV GSA 2021). The monitoring network and data collection strategy will be reviewed during future reporting periods to ensure continued effectiveness in tracking groundwater level trends, supporting compliance with MTs, and informing potential PMAs.

8.3.2 Interconnected Surface Waters Monitoring Network

The monitoring network for depletion of ISW defined in the 2022 GSP includes the following groundwater wells: SDCD, SP107, SP106, SP100, SDLH, and SP014. Based on the results of the SPV Basin GDE Study (Rincon 2026e), it is recommended that SP070 replace SP014 as a representative well within the ISW monitoring network.

Well SP070 is located approximately 500 feet north of the Cloverdale Creek Willow Communities GDE Unit and provides groundwater level data that are more directly representative of conditions influencing shallow groundwater, interconnected surface water, and groundwater dependent riparian vegetation. As such, inclusion of SP070 would enhance the ability of the monitoring network to assess potential impacts to GDEs and ISWs in the western portion of the Basin.

Well SP014 is located along Sycamore Creek near the confluence with the San Dieguito River. The GDE Study determined that this area does not support a groundwater dependent ecosystem and does not provide suitable aquatic habitat for special-status species. While SP014 is not considered representative of ISW or GDE conditions, it continues to provide useful groundwater level data for evaluating broader Basin-wide trends. Accordingly, SP014 will be retained in the groundwater level monitoring network, but not the ISW monitoring network.

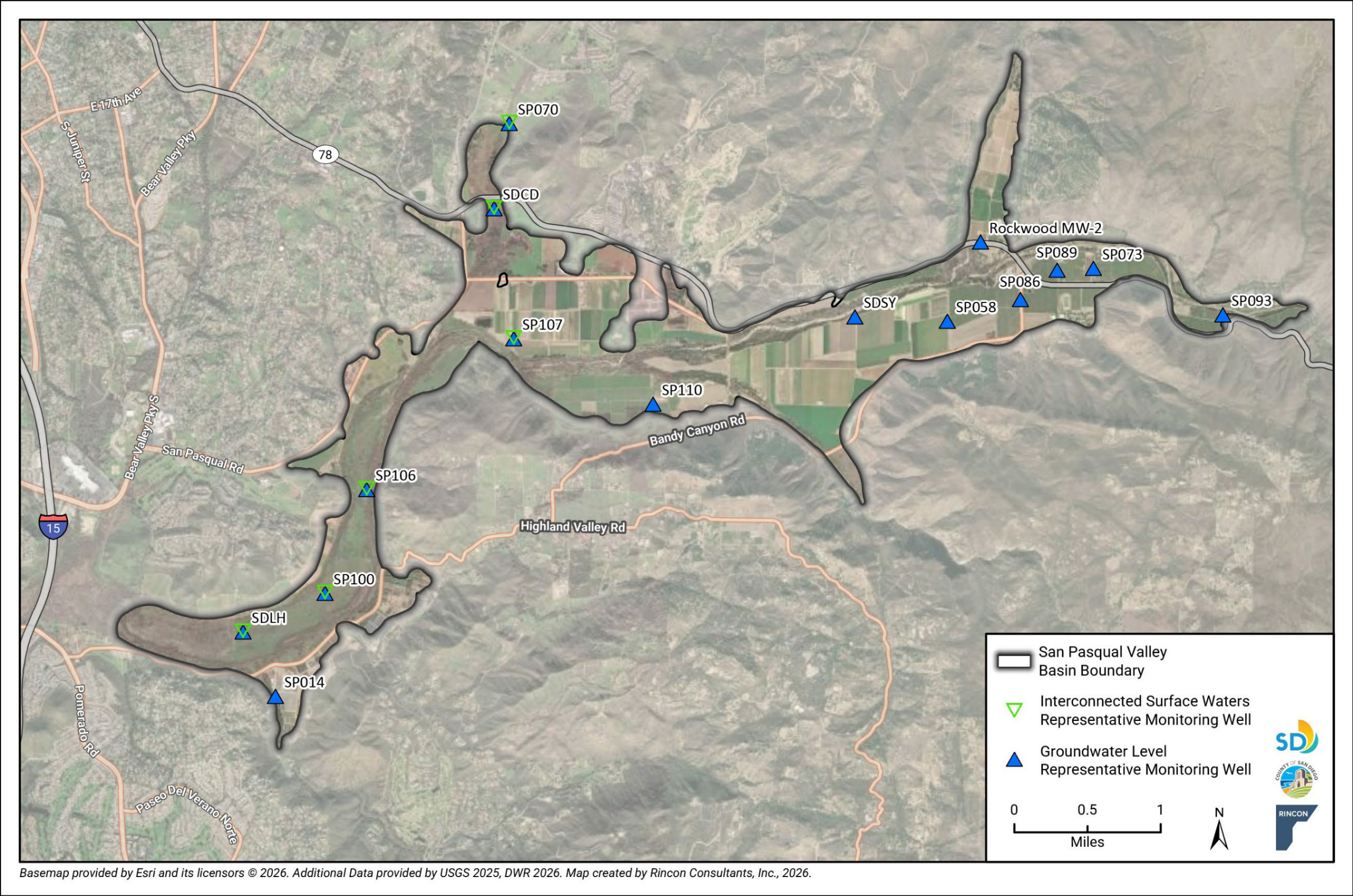
Groundwater levels will continue to be measured at all monitoring wells in accordance with the monitoring frequency established in the 2022 GSP. The representativeness and effectiveness of the ISW monitoring network will continue to be evaluated during future reporting periods as additional groundwater level, ISW, and GDE data are collected, and adjustments to the network may be considered if warranted.

The monitoring network for depletion of ISW was evaluated to determine whether it continues to provide adequate spatial and temporal coverage for assessing conditions relative to the SMC. A more detailed discussion of this evaluation can be found in the interconnected surface waters and Groundwater Dependent Ecosystems Technical Memorandum (Rincon 2026b). To date, there have been no additions, removals, or structural changes to the ISW monitoring network since adoption of the GSP. However, based on the results of the SPV Basin GDE Study (Rincon 2026b), it is recommended that SP070 be added to the interconnected surface waters monitoring network as a representative monitoring well and that well SP014 be removed from the ISW monitoring network.

Well SP070 is located approximately 500 feet north of the Cloverdale Creek Willow Communities GDE Unit and likely provides groundwater level data that are more directly representative of conditions influencing shallow groundwater, ISWs, and groundwater dependent riparian vegetation than well SP014. As such, it is recommended that well SP070 be included in the ISW representative monitoring network moving forward, as its inclusion would enhance the ability of the interconnected surface waters monitoring network to assess potential impacts to GDEs and interconnected surface waters in the western portion of the SPV Basin (Rincon 2026a; Rincon 2026b). Figure 8-1 presents an updated map of the groundwater level and ISW monitoring network which includes Well SP070 as part of the interconnected surface waters monitoring network.

Groundwater levels will continue to be measured at all monitoring wells in accordance with the monitoring frequency established in the 2022 GSP. The representativeness and effectiveness of the ISW monitoring network will continue to be evaluated during future reporting periods as additional groundwater level, interconnected surface waters, and GDE data are collected, and further adjustments to the network may be considered if warranted.

Figure 8-1 Map of Existing Representative Groundwater Level and Updated Interconnected Surface Waters Monitoring Networks



8.3.3 Groundwater Quality Monitoring Network

The monitoring network for groundwater quality was evaluated to determine whether it continues to provide adequate spatial and temporal coverage for assessing nitrate and TDS conditions relative to the SMC. A more detailed discussion of this evaluation can be found in the Groundwater Quality Technical Memorandum (Rincon 2026d). To date, there have been no additions, removals, or structural changes to the groundwater quality monitoring network since adoption of the 2022 GSP. However, the following was noted during the October 2025 well survey:

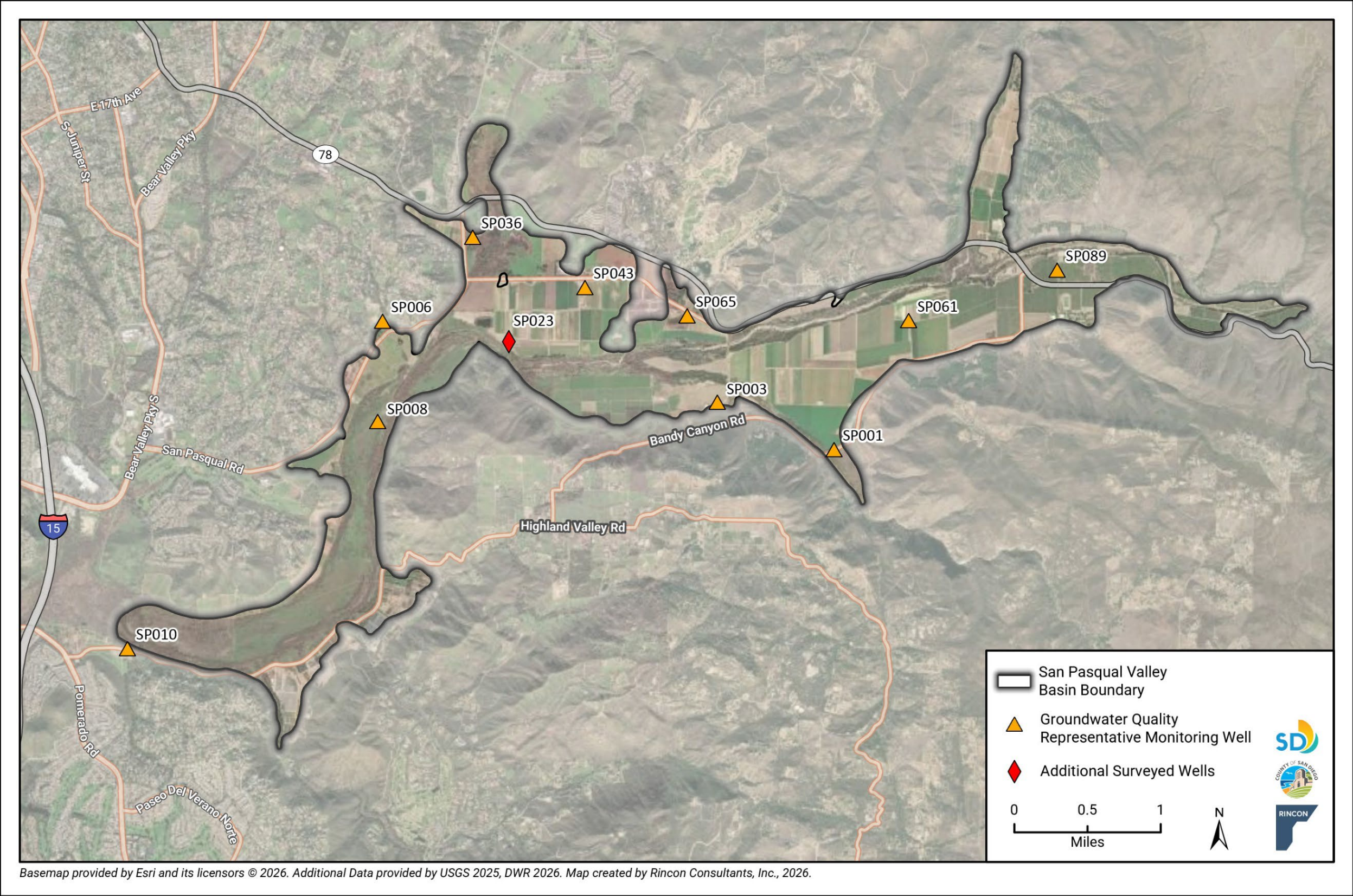
- Well SP036 has caved in and cannot be sampled for groundwater quality.
- Well SP006 has been unreliable for groundwater quality sampling during WYs 2020-2025 due to the lack of continuous leasing of land serviced by that well; when the surrounding acreage is not leased, the power source for pumping the well is shut off, and appropriate purging and sampling of the well for groundwater quality cannot occur.

All other wells previously designated as representative monitoring wells remained active and accessible during WYs 2020-2025.

In coordination with the GSA, well SP023 was identified as a potential candidate well to replace SP036 for future groundwater quality monitoring due to its spatial proximity to SP036 (Figure 8-2). SP023 will be included in the spring 2026 groundwater quality sampling event with the intention of using this well to permanently replace Well SP036 in the monitoring network.

The SPV GSA will continue to review monitoring frequency in future reporting periods to determine whether increased sampling of wells with rising nitrate and TDS concentrations would improve understanding of nitrate and TDS MT exceedances.

Figure 8-2 Map of Representative Groundwater Quality Monitoring Network and Potential Candidate Monitoring Wells



8.4 Corrective Actions Addressed or to Address

In response to DWR's Recommended Corrective Action 5b to improve understanding of well construction details for monitoring sites, the SPV GSA conducted a comprehensive evaluation of available well construction information for wells included in the SPV Basin representative monitoring networks. This effort included an October 2025 field well survey and a desktop database review of multiple state, federal, and local databases that contain information on groundwater wells. Where available, previously missing construction details and other metadata were noted, included in this technical memorandum, and will be updated in the DWR SGMA Portal Monitoring Network Module.

Despite these field and desktop efforts, detailed WCRs (noting screened intervals, gravel pack depths, and seal configurations) could not be located for most of the representative monitoring wells. This outcome reflects common constraints associated with long-standing agricultural and municipal wells, including incomplete historical records and limits on access to confidential WCRs. While the absence of detailed construction data introduces some uncertainty regarding screened depth intervals, the affected wells have long and consistent groundwater level and/or water quality records and continue to demonstrate reliable performance for groundwater level and groundwater quality trend assessment at the basin scale.

The GSA has determined that the existing monitoring networks remain suitable for meeting SGMA objectives, as monitoring wells are evaluated and selected based on data consistency, spatial representativeness, and demonstrated responsiveness to basin conditions rather than well construction details alone. Importantly, trends identified through the networks are corroborated across multiple wells and monitoring locations, reducing reliance on any single data point.

8.4.1 Data Gaps Addressed

GSP requirements for data and reporting standards for monitoring sites include the following information narrative descriptions of site locations, reference point locations, and total well depths. Many of these data for representative monitoring wells in the SPV Basin were missing from the DWR SGMA Portal. Through completion of the October 2025 well survey and a comprehensive desktop database review of publicly available information, site locations, reference point locations, and total well depths were identified and presented in Chapter 4, Section 4.1.

8.4.2 Remaining Data Gaps

The remaining data gaps identified through this monitoring network evaluation are due to the limited availability of WCRs for wells in the representative monitoring network. Despite the October 2025 well survey and a comprehensive desktop database review of publicly available groundwater well information, detailed construction information—such as screened intervals, seal depths, and gravel pack specifications—could not be identified for a majority of the SPV Basin representative monitoring wells.

The remaining data gaps are largely attributable to factors outside the GSA's control, including:

- For wells for which additional archival records were located, they were typically incomplete and;
- There was limited availability of documentation from previous well owners or operators.

These limitations are common for long-standing agricultural and municipal wells and do not reflect deficiencies in the SPV Basin monitoring network design, spatial and temporal coverage, or implementation. Primary data gaps include:

- Well depth at time of drilling
- Screening interval
- Well completion report number
- Reference point elevation (not found for groundwater quality monitoring wells only)

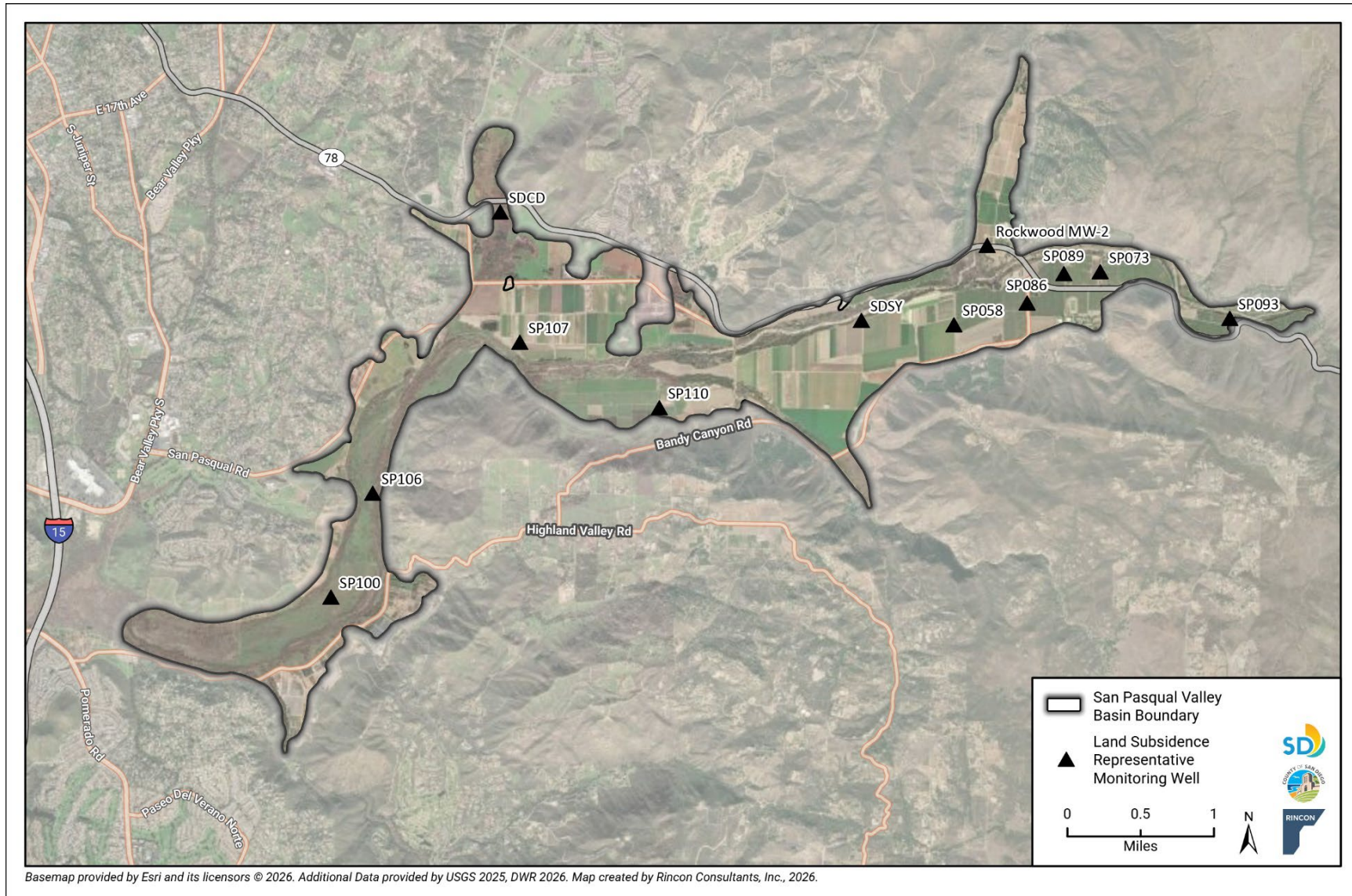
Rincon recommends that the SPV GSA completes a thorough down-hole video log of wells missing the required screening interval data. These wells are: SP006, SP008, SP043, SP065, SP110, SP107, SP106, SP100, SP093, SP086, SP073, SP070, and SP014. Additionally, several discrepancies were noted between previously recorded well depths and well depths surveyed in the October 2025 well survey. While a lower priority, Rincon also recommends that the SPV GSA completes a thorough video log of these wells, which include SP001, SP058, SP061, and SP070.

While the absence of complete construction details introduces some uncertainty regarding the specific depth intervals being monitored, the affected wells have demonstrated consistent performance and long-term data reliability (with the exception of two groundwater quality monitoring wells SP006 and SP036, discussed in more detail below). As a result, the GSA has determined that the existing monitoring networks remain suitable for basin-scale groundwater level and groundwater water quality trend evaluation and continue to meet the intent of representative monitoring under the GSP Regulations. The GSA will continue to seek additional construction information and will incorporate improved documentation for existing, new, or revised monitoring wells in future Annual Reports and Periodic Evaluations, with all monitoring network updates or changes reflected in the DWR SGMA Portal Monitoring Network Module, as required.

8.4.3 Land Subsidence Monitoring Network

To address Recommended Corrective Action 5a relating to the land subsidence monitoring network, available subsidence datasets in the SPV Basin were investigated, QA/QC, and reanalyzed. Estimates of land surface subsidence in the SPV Basin are based on available InSAR time series data as the SPV Basin does not have continuous GPS stations, public record of campaign GPS surveys, or sufficient benchmark locations.

To make use of best available data, the GSA proposes that the land subsidence monitoring network consists of all InSAR time series data made publicly available by DWR across the SPV Basin. This will facilitate observance, measurement, and tracking of localized instances of subsidence in the SPV Basin. Data will be assessed and reported in Annual Reports submitted to the DWR by April 1 of each year. Special attention will be given to subsidence values at/near the network RMS locations used for the chronic lowering of groundwater levels sustainability indicator in order (Figure 8-3) to potentially estimate critical head values following best practices outlined in Section 5.3 of the Land Subsidence BMPs (DWR 2025).

Figure 8-3 Map of Representative Land Subsidence Monitoring Network

8.4.4 DWR SGMA Portal Monitoring Network Module Update

As opportunities arise (such as installation of new wells, acquisition of additional documentation, or incorporation of surveyed wells with known construction data) the GSA will continue to improve documentation and update the monitoring networks accordingly. Any revisions to, updates to, or additional metadata available for groundwater level wells in the representative monitoring network will be reflected in the DWR SGMA Portal Monitoring Network Module consistent with GSP Regulations and reporting requirements. It is noted that DWR does not require other representative monitoring networks to be uploaded to the SGMA Portal, as there is no module to support that information. Changes made to other representative monitoring networks are identified and summarized in Annual Reports. At this time, there are no suggested revisions to the groundwater level representative monitoring network.

Timely updates to the SGMA Portal are necessary so that groundwater level (for interconnected surface waters) and groundwater quality data collected during the Spring 2026 monitoring events are appropriately associated with the refined representative monitoring networks. Updating the SGMA Portal will also ensure that DWR has an accurate representation of the SPV Basin's monitoring network when reviewing this Periodic Evaluation and evaluating implementation of the 2022 GSP.

9 GSA Public Outreach, Engagement, and Coordination with Other Agencies

The SPV GSA has maintained robust and continued public outreach, stakeholder engagement, and inter-agency coordination to support implementation and long-term basin sustainability. Outreach efforts have included stakeholder and community workshops, distribution of fact sheets and targeted mailers, and ongoing communication through digital platforms, ensuring that stakeholders and the public remain informed of basin conditions, management actions, and project implementation. During the Periodic Evaluation timeframe, the SPV GSA has conducted multiple workshops both prior to and following 2022 GSP adoption to communicate key technical information, report on implementation progress, and gather stakeholder input. These efforts have been complemented by coordination with local, regional, state, and non-governmental partners through programs such as the WQIP and IRWM Program, supporting a comprehensive and collaborative approach to groundwater management over the long-term sustainability timeframe of 2042 and the SGMA planning horizon of 2072.

9.1 Responsibilities of GSA Boards

As described in Chapter 1.1.3, the SPV GSA is a multi-agency GSA, comprised of the City and the County through their respective Governing Bodies (City Council and County Board of Supervisors) which retain ultimate authority over adoption, amendment, and implementation of the 2022 GSP. Consistent with the City and County MOU, the Governing Bodies are responsible for reviewing and approving the GSP and any subsequent amendments prior to submission to DWR. Oversight of 2022 GSP implementation is supported through regular reporting by the Core Team and Executive Group (as described in Chapter 1.3.3), which provide updates on progress toward sustainability goals, implementation of projects and management actions, emerging issues requiring policy direction, and ensuring that 2022 GSP implementation remains consistent with SGMA requirements. The Core Team and Executive Group are also responsible for making determinations regarding the need for amendments based on Periodic Evaluation findings and for resolving policy or management decisions necessary to maintain progress toward basin sustainability. These governance processes are supported by stakeholder engagement, public meetings, and coordination with interested persons consistent with SGMA requirements (23 CCR §351(p); Water Code §§10723.2, 10723.4, 10723.8, and 10727.8). A description of SPV GSA public meetings held during the Periodic Evaluation period is provided below, which identifies the various stakeholder workshops, interested party and/or community workshops held by the SPV GSA.

9.2 Public Outreach and Engagement

Public outreach and stakeholder engagement are key components of the 2022 GSP, its ongoing implementation, and this Periodic Evaluation. The SPV GSA has conducted regular stakeholder workshops, and community workshops to inform stakeholders, present technical findings, and incorporate feedback into decision-making processes. Outreach efforts have also included development and distribution of educational materials such as fact sheets, targeted mailers, and website resources to provide information on groundwater quality, best management practices, and available programs to basin stakeholders. These materials support broader communication beyond formal meetings and help improve awareness of groundwater conditions and management strategies. Table 9-1 below describes the public outreach and engagement activities conducted by the SPV GSA during the timeframe of the

Periodic Evaluation. All meeting recordings, meeting agendas with attendee lists, and meeting minute summaries can be found on the County website²⁰.

Table 9-1 SPV GSA Public Outreach and Engagement Activities

Date	Type of Outreach	Description
January 12, 2022	Board of Supervisors Meeting	County of San Diego Board of Supervisors meeting; included multiple agenda items, with one focused on adopting the SPV GSP, authorizing implementation actions with the City of San Diego, and supporting funding for long-term groundwater sustainability.
Post-GSP Adoption	San Diego Integrated Regional Water Management Fact Sheet	Fact sheet developed to inform stakeholders about regional Integrated Regional Water Management programs and opportunities for collaboration to improve water supply reliability, water quality, and resource management in the SPV Basin.
April 6, 2022	Stakeholder Workshop	Presented results from the first SPV GSP Annual Report, including groundwater conditions, water budgets, and implementation progress, with stakeholder input on data, modeling assumptions, and management actions.
May 2022	San Pasqual Valley Resource Management Guide	Resource management guide that provides guidance on BMPs for agricultural and non-agricultural land uses to reduce sediment, nutrient loading, and runoff, supporting groundwater and surface water quality protection in the SPV Basin.
June 8, 2022	Stakeholder Workshop	Reviewed progress on the Initial Surface Water Recharge Evaluation (associated with MA No. 7), including draft of the Task 1 Technical Memorandum, proposed evaluation framework, and preliminary recharge strategies.
August, 2022	Nitrate and Total Dissolved Solids Fact Sheet	Fact Sheet developed to educate stakeholders on groundwater quality conditions, potential sources of contamination, and recommended actions for domestic well users in the SPV Basin.
January 31, 2023	Stakeholder Workshop	Reviewed progress on the Initial Surface Water Recharge Evaluation, including revised evaluation criteria (Task 1 Technical Memorandum) and updates on streambed investigations (Task 2 Technical Memorandum) and potential recharge water sources (Task 3 Technical Memorandum)
May 24, 2023	Stakeholder Workshop	Reviewed progress on the Initial Surface Water Recharge Evaluation with focus on potential recharge strategies (Task 4 Technical Memorandum) and modeling approach (Task 5 Technical Memorandum), along with an update on the Annual Report.
August 29, 2023	Stakeholder Workshop	Reviewed recharge evaluation progress as part of the Initial Surface Water Recharge Evaluation, including groundwater model updates and simulation results (Task 5 Technical Memorandum) and evaluation of potential benefits to groundwater dependent ecosystems (Task 6 Technical Memorandum)

²⁰ <https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html>

Date	Type of Outreach	Description
December 12, 2023	Stakeholder Workshop	Presented the draft Preliminary Feasibility Study for the Initial Surface Water Recharge Evaluation, including evaluation results, strategy ranking, and next steps for recharge planning.
May 30, 2024	Stakeholder Workshop	Reviewed results from the 2023 SPV GSP Annual Report, including groundwater conditions, threshold performance, and water quality findings, with discussion of ongoing implementation and monitoring.
December 10, 2025	Community Workshop	Reviewed SPV GSP implementation progress and initiated the Periodic Evaluation, including DWR recommendations, groundwater model updates, and future analysis priorities.
March 25, 2026	Community Workshop	Presented preliminary findings of the 5-Year Periodic Evaluation, including updates on sustainable management criteria, groundwater conditions, and SPV GSP Model validation
August 12, 2026	Community Workshop	Presentation of final findings of the 5-Year Periodic Evaluation, as well as summary of findings of the WY 2025 Annual Report
October 28, 2026	Community Workshop	Response to Public Comments on Periodic Evaluation Report findings and conclusions (Public Comment period held from August 3 rd to September 4 th , 2026)

9.2.1 Public Outreach Post-GSP Adoption and in The Timeframe of This Periodic Evaluation

Following adoption of the 2022 GSP, outreach shifted toward implementation and reporting, including communication of Annual Report results, monitoring data, and progress on PMAs. Outreach expanded beyond meetings to include educational materials and targeted communications, such as fact sheets, website resources, and direct mailers. These activities were often coordinated through broader WQIP and watershed programs, which incorporated public education, inspections, enforcement actions, and stakeholder engagement to address nutrient loading, runoff, and groundwater quality concerns.

- Post-GSP Adoption in 2021 – San Diego Integrated Regional Water Management Fact Sheet:** The IRWM Fact Sheet (San Diego Regional Water Management Group 2021) was prepared as part of MA No. 4 and distributed following GSP adoption to increase stakeholder awareness of regional IRWM programs and partnerships (Chapter 7, Section 7.2.4). The fact sheet highlights opportunities for collaboration among water agencies, agricultural stakeholders, and local jurisdictions to support groundwater sustainability through coordinated regional planning. It provides information on IRWM program goals, including improving water supply reliability, enhancing water quality, and protecting natural resources across the broader watershed. By communicating available resources and funding mechanisms, the fact sheet encourages stakeholder participation in regional projects that support SPV Basin sustainability objectives.

- **April 6, 2022 – Stakeholder Workshop #2:**²¹ This stakeholder workshop focused on summarizing the first Annual Report developed following adoption of the SPV GSP, including groundwater conditions, production estimates, water use, and progress toward implementation. The consultant team presented hydrologic conditions for water years 2020 and 2021, highlighting variability between wet and critically dry conditions, associated groundwater level trends, and corresponding changes in basin storage. Monitoring results indicated that groundwater levels remained above planning and minimum thresholds, while limited exceedances of water quality thresholds for total dissolved solids and nitrate were identified in several wells. Discussion also addressed data limitations, including reliance on estimated pumping in the absence of comprehensive metering, and ongoing development of monitoring programs. Stakeholder input focused on improving data accuracy, clarifying management actions related to water quality and recharge, and confirming that adaptive management strategies would guide implementation as needed.
- **May 2022 – San Pasqual Valley Resource Management Guide:** The SPVRMG (City 2022a) is a watershed-based guidance document developed as part of the Hodges Watershed Improvement Project under MA No. 6, Subproject 1, and supports implementation of BMPs identified in MA No. 1 (Chapter 7, Sections 7.2.6 and 7.2.1 respectively). The SPVRMG provides practical recommendations for agricultural operators, landowners, and the City to reduce erosion, nutrient loading, and runoff from land uses within the SPV Basin, thereby improving water quality and protecting groundwater resources while maintaining productive land use. Outreach associated with the SPVRMG included dissemination of guidance materials, site coordination, and direct engagement with stakeholders to encourage voluntary adoption of BMPs such as erosion control, nutrient management, and efficient irrigation practices.
- The SPVRMG (City 2022a) is a watershed-based guidance document developed as part of MA No. 1 and MA No. 6 to support implementation of BMPs that reduce erosion, nutrient loading, and runoff from land uses within the SPV Basin (Chapter 7, Section 7.2.1). It provides practical recommendations for agricultural operators, landowners, and the City to improve water quality and protect groundwater resources while maintaining productive land use. Outreach associated with the SPVRMG included dissemination of guidance materials and coordination with stakeholders to encourage voluntary adoption of BMPs such as erosion control, nutrient management, and efficient irrigation practices. Implementation of the SPVRMG translates planning-level recommendations into on-the-ground improvements that support both watershed health and groundwater sustainability objectives.
- **June 8, 2022 – Stakeholder Workshop #2:**²² This stakeholder workshop focused on the Initial Surface Water Recharge Evaluation associated with MA No. 7, including review of the draft Task 1 Technical Memorandum (Jacobs and Woodard & Curran 2022) and the broader framework for evaluating recharge opportunities. The Task 1 Technical Memorandum established the evaluation criteria and ranking approach that will be used to assess recharge alternatives, forming the foundation for subsequent tasks in the study. The consultant team also reviewed the full scope of the evaluation, including Tasks 1-6 covering criteria development, field investigations of streambed conditions, identification of water sources, development of recharge strategies, model simulations, and assessment of benefits to groundwater dependent ecosystems. Preliminary recharge concepts, such as reservoir releases, stormwater detention, and channel modifications, were introduced within this framework to illustrate how strategies will be evaluated rather than finalized. Stakeholder input emphasized the need to refine the evaluation methodology, incorporate feasibility and regulatory constraints, and use transparent modeling approaches, and was used to update the Task 1 Technical

²¹ The agenda for the stakeholder workshop held on April 6, 2022 can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Stakeholder-Workshop-06Apr2022-Agenda.pdf>, and the meeting summary can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Stakeholder-Workshop-06Apr2022-Summary.pdf>

²² The agenda for the stakeholder workshop held on June 8, 2021 can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Stakeholder-Workshop-08Jun2022-Agenda.pdf>, and the meeting summary can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Stakeholder-Workshop-08Jun2022-Summary.pdf>

Memorandum and guide related analyses and the development of the Surface Water Recharge Feasibility Study.

- **August 2022 – Nitrate and Total Dissolved Solids Fact Sheet:** The Nitrate and TDS Fact Sheet (City 2022b) was developed to provide clear, accessible information on groundwater quality conditions in the SPV Basin, with a focus on nitrate and total dissolved solids (Chapter 7, Section 7.2.6). The document explains potential sources of contamination, health considerations, and the importance of groundwater quality monitoring for domestic well users. It also outlines recommended actions such as water quality testing and available resources for addressing potential impacts. Continually distributed via email, website posting, and stakeholder engagement efforts, the fact sheet supports public awareness and encourages informed decision-making related to groundwater use and protection.
- **January 31, 2023 – Stakeholder Workshop #3:**²³ This stakeholder workshop focused on continued development of the Initial Surface Water Recharge Evaluation, including review of multiple technical memoranda and progress across early study tasks. The consultant team presented revisions to the Task 1 Technical Memorandum (Jacobs and Woodard & Curran 2022), which refines the evaluation criteria and weighting approach used to compare recharge alternatives, and introduced the Task 2 Technical Memorandum (Jacobs and Woodard & Curran 2023a), which details streambed investigations and infiltration testing used to improve model representation of recharge processes. The Task 3 Technical Memorandum (Jacobs and Woodard & Curran 2023b) was also introduced, which evaluates potential water sources such as stormwater capture, Sutherland Reservoir releases, and imported water, along with associated constraints related to variability, infrastructure, and feasibility. Stakeholder input focused on improving technical assumptions, considering operational and regulatory constraints, and refining recharge location strategies, and will be used to guide subsequent tasks including development of recharge alternatives and model simulations.
- **May 24, 2023 – Stakeholder Workshop #4:**²⁴ This stakeholder workshop focused on continued development of the Initial Surface Water Recharge Evaluation by presenting progress on the Task 4 Technical Memorandum (Jacobs and Woodard & Curran 2023c) which details potential recharge strategies and the Task 5 Technical Memorandum (Jacobs and Woodard & Curran 2023d) which provides SPV GSP Model updates and simulations. The consultant team reviewed how all technical memoranda collectively form a Preliminary Feasibility Study, with each Technical Memorandum building on prior work including evaluation criteria, streambed investigations, and water source identification. For Task 4, a structured screening and ranking process was presented to define and prioritize recharge strategies based on factors such as efficiency, cost, feasibility, permitting, and environmental considerations, resulting in a subset of selected strategies for further analysis. Task 5 introduced the modeling framework that will simulate these selected strategies using updated groundwater models to evaluate impacts on storage, water levels, and system performance. The meeting also included a summary of the 2022 Annual Report and ongoing GSP implementation, reinforcing that recharge evaluation is part of a long-term adaptive management approach to maintain basin sustainability.

²³ The agenda for the stakeholder workshop held on January 31, 2023 can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Stakeholder-Workshop-31Jan2023-Agenda.pdf>, and the meeting summary can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Stakeholder-Workshop-31Jan2023-Summary.pdf>

²⁴ The agenda for the stakeholder workshop held on May 24, 2023 can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Stakeholder-Workshop-24May2023-Agenda.pdf>

- **August 29, 2023 – Stakeholder Workshop #5:**²⁵ This stakeholder workshop focused on continued development of the Initial Surface Water Recharge Evaluation by presenting results from later-stage technical memoranda, including the Task 5 Technical Memorandum (Jacobs and Woodard & Curran 2023d) which provides SPV GSP Model updates and simulations and Task 6 Technical Memorandum (Jacobs and Woodard & Curran 2023e) which includes an evaluation of benefits to GDEs. The consultant team described updates to the SPV GSP Model v2.0, incorporating improved representation of stream processes, recharge conditions, and basin responses based on earlier field investigations and data collection. Model simulations were used to evaluate a set of selected recharge strategies, including enhanced stream infiltration, reservoir releases, and imported water options, and to quantify their effects on groundwater levels and system performance. The results of these simulations provide key inputs to the evaluation criteria framework and support assessment of potential impacts on GDEs.
- **December 12, 2023 – Stakeholder Workshop #6:**²⁶ This stakeholder workshop focused on presenting the draft Preliminary Feasibility Study, which represents the culmination of the Initial Surface Water Recharge Evaluation associated with MA No. 7. The Preliminary Feasibility Study integrates findings from all six technical memoranda, including evaluation criteria development, streambed investigations, water source assessments, recharge strategy formulation, groundwater model simulations, and evaluation of benefits to groundwater dependent ecosystems. The consultant team presented four primary recharge strategies—enhanced stream infiltration, reservoir releases, imported water deliveries, and injection wells—and summarized their modeled performance, feasibility, and cost-effectiveness. A structured ranking approach was used to compare strategies based on both basin benefits (e.g., groundwater levels, storage, water quality) and implementation considerations (e.g., cost, feasibility, infrastructure complexity), identifying tradeoffs among alternatives rather than a single preferred option. The workshop emphasized that the Preliminary Feasibility Study is intended as a planning tool to inform future adaptive management and will be incorporated into this Periodic Evaluation, supporting decision-making if recharge projects become necessary.
- **May 30, 2024 – Stakeholder Workshop #7:**²⁷ This stakeholder workshop focused on outcomes from the 2023 Annual Report following implementation of the SPV GSP, including groundwater levels, water quality conditions, and progress toward sustainability objectives. The consultant team presented hydrologic conditions for water year 2023, highlighting above-average precipitation, increases in groundwater storage, and stable groundwater levels that remained above planning and minimum thresholds, indicating no undesirable results for groundwater levels. Groundwater quality monitoring identified continued nitrate and limited total dissolved solids exceedances in several wells, though these were determined to be largely attributable to historical conditions and sources outside of GSA authority, and therefore did not trigger undesirable results under SGMA criteria. The meeting also discussed how monitoring data and threshold evaluations are used to guide adaptive management, including potential refinement of monitoring networks and continued public outreach regarding water quality. Next steps include ongoing annual reporting, preparation for future GSP periodic evaluation, and continued coordination with stakeholders to support adaptive management and long-term basin sustainability.

Educational materials developed during this time including the SPVRMG (City 2022a), and the Nitrate and TDS Fact Sheet (City 2022b) remain active outreach tools supporting ongoing GSP implementation and stakeholder engagement, while the IRWM Fact Sheet (San Diego Regional Water Management Group 2021) continues to provide relevant background information on regional programs and collaboration opportunities. Additionally, public outreach conducted in support of the WQIP under MA No. 3 (Chapter 7, Section 7.2.3) is an ongoing and data-driven component of watershed-scale water quality management in

²⁵ The agenda for the stakeholder workshop held on August 29, 2023 can be found at this link:

<https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SGMA-August-29-23-Agenda.pdf>

²⁶ The agenda for the stakeholder workshop held on December 12, 2023 can be found at this link:

https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Agenda_Stakeholder_Wkshp_12Dec23.pdf

²⁷ The agenda for the stakeholder workshop held on May 30, 2024 can be found at this link:

https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-genda_Stakeholder-Wkshp_30May24.pdf, and the meeting summary can be found at this link:

https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV_Workshop_Notes_30May24v2_summary.pdf

the SPV Basin. Outreach efforts, implemented through MS4 permit programs by the City and partner agencies, include targeted septic system mailers distributed to approximately 1,800 parcels (about 21% of septic system properties), as well as focused communications reaching more than 10% of homeowner associations and 100% of inspected commercial facilities in priority watershed areas. These outreach activities are integrated with broader watershed programs that in Fiscal Year 2023 identified 93 non-stormwater discharges, eliminated 89 illicit discharges or connections, and issued 45 enforcement actions and 31 escalated enforcement actions. Public education efforts also promote improved fertilizer use, irrigation practices, and septic system maintenance, complemented by incentive programs such as turf replacement.

9.2.2 Public Outreach Conducted in Support of This 5-Year Periodic Evaluation

During the Periodic Evaluation phase, outreach has focused on communicating basin performance and incorporating stakeholder input into updated analyses and modeling efforts. Although technically outside of the timeframe of this Periodic Evaluation (WYs 2020-2025), a series of four community workshops will be held to present preliminary findings on sustainable management criteria, groundwater conditions, and model updates, while soliciting feedback on key topics such as groundwater quality, GDEs, and climate variability.

- December 10, 2025 – Community Workshop #1:**²⁸ This stakeholder workshop focused on the next phase of SPV GSP implementation, specifically initiation of the required Periodic Evaluation to assess basin conditions and progress toward sustainability. The project team presented key recommendations from the DWR, including improving monitoring networks, refining sustainability criteria, and expanding evaluation of groundwater-dependent ecosystems and interconnected surface waters. An overview of planned groundwater model updates was provided, including incorporation of approximately five years of new data, recalibration, and development of future projection scenarios to evaluate groundwater levels, water budgets, and potential undesirable results. Discussion also addressed model uncertainty, climate impacts, and ongoing groundwater quality monitoring, along with continued use of management triggers to guide adaptive responses. Action items include continued stakeholder engagement, additional data collection and field verification, and preparation of the Periodic Evaluation report for submittal in 2027.
- March 25, 2026 – Community Workshop #2:**²⁹ This community workshop advanced the Periodic Evaluation by presenting preliminary findings on basin conditions and performance relative to SMCs. The project team reviewed groundwater levels, storage trends, and water quality data, noting that groundwater levels remain above minimum thresholds, storage reflects expected wet and dry cycle variability, and observed nitrate and TDS exceedances are largely attributable to historical or external sources rather than groundwater management. Additional updates were provided on interconnected surface waters, groundwater-dependent ecosystems, and land subsidence, with findings indicating stable conditions and no current undesirable results. The meeting also included presentation of groundwater model validation results, demonstrating good agreement between simulated and observed conditions and supporting use of the model for future scenario analysis. Action items include continued model refinement, evaluation of future climate scenarios, and presentation of detailed results at subsequent workshops leading up to completion of the Periodic Evaluation in 2026.

²⁸ The agenda for the community workshop held on December 10, 2025 can be found at this link:

<https://www.sandiegocounty.gov/content/dam/sdc/sustainability/docs/SPV-Community-Workshop-10Dec2025-Agenda.pdf>, and the meeting summary can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/sustainability/docs/SPV-Community-Workshop-Meeting-Summary-12.10.2025.pdf>

²⁹ The agenda for the stakeholder workshop held on March 25, 2026 can be found at this link:

<https://www.sandiegocounty.gov/content/dam/sdc/sustainability/docs/SPV-Community-Workshop-25March2026-Agenda.pdf>, and the meeting summary can be found at this link: <https://www.sandiegocounty.gov/content/dam/sdc/sustainability/docs/SPV%20nd%20Community%20Workshop%20Minutes%2003.25.2026.pdf>

- **August 12, 2026 – Community Workshop #3:**³⁰ Presentation of final findings of the 5-Year Periodic Evaluation, as well as summary of findings of the WY 2025 Annual Report. Summaries of these meetings will be incorporated in the final Periodic Evaluation.
- **October 28, 2026 – Community Workshop #3:** Response to Public Comments on Periodic Evaluation Report findings and conclusions (Public Comment period held from August 3rd to September 4th, 2026). Summaries of these meetings will be incorporated in the final Periodic Evaluation.

9.3 GSA Coordination and Collaborations with Other Agencies

Implementation of the 2022 GSP requires ongoing coordination among multiple agencies and stakeholders with responsibilities related to land use, water quality, watershed management, and groundwater sustainability. As described in Chapter 7, the SPV GSA has engaged in extensive inter-agency collaboration at the local, regional, and watershed scales to support implementation of management actions and achievement of sustainability objectives during the timeframe of the Periodic Evaluation.

9.3.1 Coordination within the Basin and Local Jurisdictions

The SPV GSA operates within the WMA and coordinates with the County of San Diego and the cities of Del Mar, Escondido, Poway, and Solana Beach through implementation of the WQIP (Chapter 7, Section 7.2.3). This coordination includes joint monitoring, inspection and enforcement programs, public outreach, and watershed-scale assessment and reporting conducted under MS4 permit requirements.

These efforts are supported through annual WQIP reporting, which documents monitoring results, inspection and enforcement activities, outreach programs, and progress toward water quality objectives. Through this coordinated framework, agencies address nutrient loading, illicit discharges, agricultural runoff, and septic system impacts affecting both surface water and groundwater resources in the SPV Basin.

Coordination with land use planning and well permitting authorities occurs through existing regulatory programs, including MS4 permit compliance, septic system management, and agricultural oversight, ensuring that land use practices and pollutant sources influencing groundwater quality are addressed in a consistent and coordinated manner.

9.3.2 Regional and Watershed-Scale Collaboration

The GSA collaborates with regional partners through the IRWM Program (Chapter 7, Section 7.2.4), which brings together water agencies, municipalities, watershed groups, and other stakeholders to support integrated water resource planning. Through IRWM and related partnerships, the GSA contributes to regional monitoring, data sharing, and implementation of projects that improve water quality, enhance water supply reliability, and protect natural resources.

A key example of watershed-scale coordination is the Hodges Watershed Improvement Project, implemented through collaboration between the City's Public Utilities Department and the San Diego County Water Authority. This project integrates BMPs and habitat restoration, including implementation of the SPVRMG (Chapter 7, Section 7.2.6). The project was completed in October 2024, followed by submission of the Project Completion Report and year one Hodges Watershed Improvement Project Post-Performance Report, which are currently under review by the San Diego County Water Authority (SDCWA).

³⁰ The agenda for these upcoming community workshops will be posted at least 30 days prior to the date and will be posted at this link: <https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html>

9.3.3 Coordination Through Management Actions and Supporting Plans

Several GSP management actions rely on coordination with existing watershed and land management initiatives. The SPVRMG serves as a key coordination and outreach tool guiding BMP implementation for agricultural and non-agricultural land uses (Chapter 7, Section 7.2.5).

In addition, the GSA coordinates invasive species management under Project 2 through implementation of the San Pasqual Valley Integrated Weed Management Plan (City 2013). This long-standing plan identifies and prioritizes invasive species removal across approximately 7,400 acres within the SPV and is implemented in coordination with regional agencies and partners. These efforts reduce water consumption by high-water-use invasive species, improve habitat conditions, and reduce risks associated with erosion, sediment transport, and wildfire, thereby supporting groundwater and watershed sustainability objectives.

9.3.4 Monitoring, Data Sharing, and Adaptive Management

Inter-agency coordination is further supported through shared monitoring programs, data management systems, and reporting frameworks. Under WQIP and MS4 permit programs, the City collaborates with Responsible Agencies to conduct coordinated stormwater and non-stormwater monitoring, prioritize sampling locations, and evaluate trends in nutrients, bacteria, and other pollutants. In accordance with SGMA requirements, the SPV GSA also prepares GSP Annual Reports. These reports provide a basin-wide evaluation of groundwater conditions, including groundwater levels, storage, water quality, and water use, and incorporate data from regional monitoring programs, including WQIP and MS4 efforts.

Monitoring data are compiled using standardized methods and integrated into regional datasets, enabling consistent analysis across jurisdictions. Annual WQIP and GSP reporting, and project-specific documentation such as the Hodges Watershed Improvement Project Completion Report and Post-Performance Report, support adaptive management by identifying pollutant sources, evaluating control measures, and refining implementation strategies based on observed conditions and performance. These efforts ensure that inter-agency coordination is not only maintained but also used to inform adaptive management and continuous improvement of watershed and groundwater management practices.

9.3.5 Inter-Agency Agreements and Basin Governance

Implementation during the Periodic Evaluation timeframe has relied on existing coordination frameworks, including WQIP implementation structures, MS4 permit programs, and IRWM partnerships. These programs provide established mechanisms for collaboration, monitoring, reporting, and adaptive management, and no new SGMA-specific inter-agency agreements were established during this period.

The SPV Basin is managed under a single GSA composed of the City and County of San Diego; therefore, no GSA Coordination Agreement is required. Existing governance structures remain unchanged and continue to support effective coordination and implementation.

10 Other Information

10.1 Other Information

This Chapter includes any other information collected or considered as part of this Periodic Evaluation, including adjacent basin considerations, implementation challenges, or any other legal challenges experienced by the GSA.

10.1.1 Consideration of Adjacent Basins

SGMA requires the GSA 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 (Water Code § 10733(c)). 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 (CCR § 354.28(b)(3)).

The SPV Basin is in the South Coast Hydrologic Region within the San Dieguito Drainage Basin, which starts in the Volcan Mountain at the headwaters of the Santa Ysabel Creek and flows west-southwest to the Pacific Ocean. The SPV Basin is not directly adjacent to any other Bulletin 118-identified basin or subbasin (Figure 10-1). Therefore, the SPV Basin GSA has not taken into consideration other basins when implementing its 2022 GSP and/or PMAs and is not required to coordinate with other basins' GSAs during GSP implementation or when considering influences on the SPV Basin sustainability indicators.

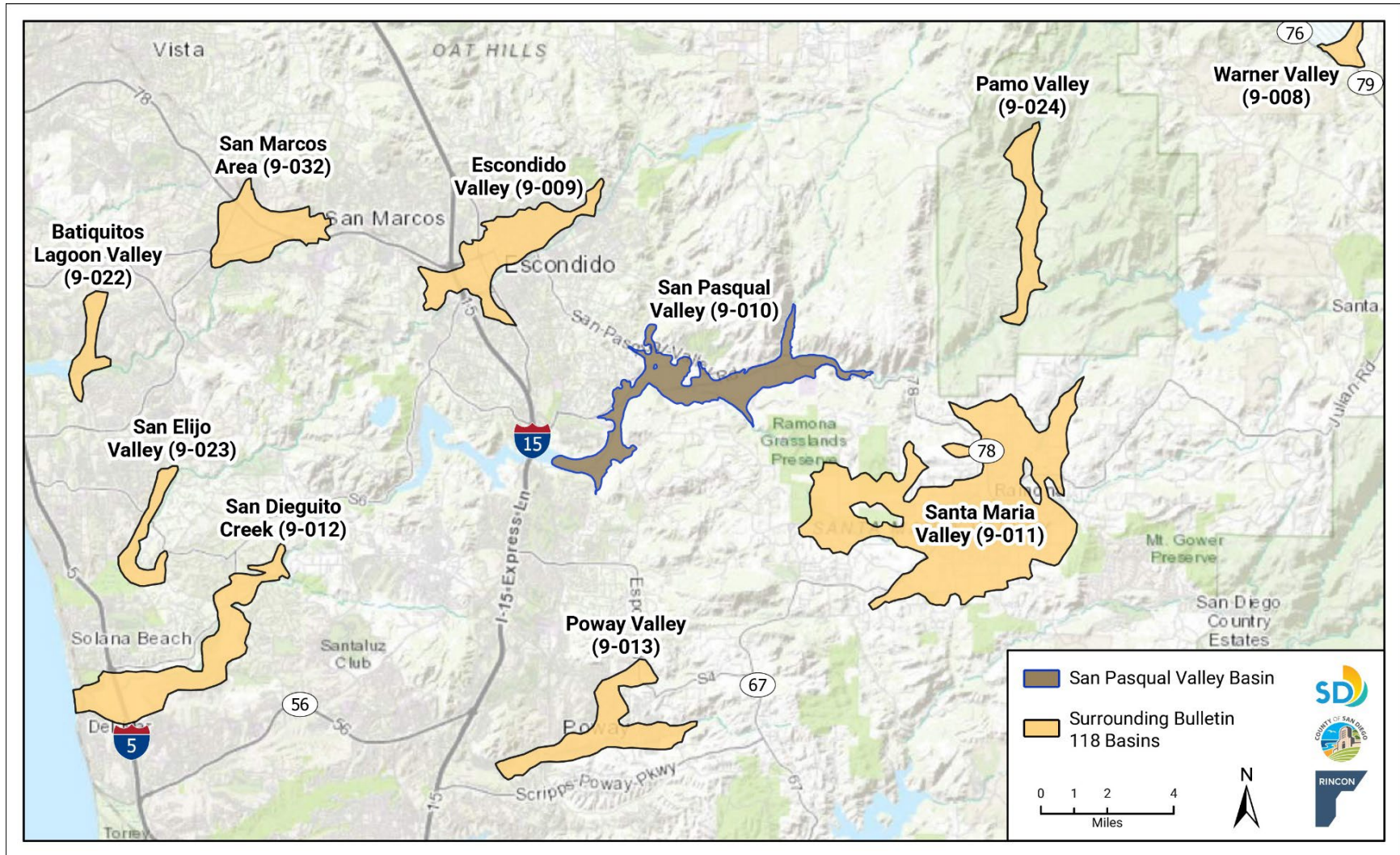
10.1.2 Challenges Not Previously Discussed

Since the adoption of the 2022 GSP, the SPV Basin has remained sustainable, the SPV Basin's 2022 GSP and PMAs have been or are being implemented, and interested parties have been involved through public outreach and community workshops throughout the timeframe of this Periodic Evaluation. The GSA has no major challenges to report with respect to 2022 GSP implementation or SPV sustainability at this time.

10.1.3 Legal Challenges

No legal challenges have occurred since adoption of the 2022 GSP during the Periodic Evaluation timeframe.

Figure 10-1 SPV Basin and Surrounding Bulletin 118 Basins



11 Summary of Proposed or Completed Revisions to Plan Elements

As highlighted in Chapter 1 of this Periodic Evaluation Report, SGMA requires GSPs to be evaluated in the form of a Periodic Evaluations every five years and whenever a GSP is amended. GSAs must assess whether implementation of the GSP is achieving the sustainability goal, evaluate groundwater conditions relative to sustainable management criteria, and identify any necessary adjustments to plan elements based on monitoring data, new information, and implementation progress. The purpose of this Periodic Evaluation Report is to provide an update to DWR, interested parties, and the public, on the progress the GSAs have made on implementing the 2022 GSP. The Periodic Evaluation Report includes updates to activities implemented by GSAs, recent groundwater conditions, GSA progress towards maintaining SMCs, new information collected and used by the GSAs, and progress on the SPV Basin PMAs.

This chapter summarizes the changes discussed in this Periodic Evaluation Report during the Periodic Evaluation period (WYs 2020–2025) and outlines revisions to 2022 GSP plan elements in response to DWR Recommended Corrective Actions. In addition, it provides a brief overview of next steps identifying how the SPV GSA intends to use this evaluation to support maintaining the SPV Basin sustainability goal.

11.1 Summary of Changes

This section provides a summary of key changes identified through the Periodic Evaluation period. These changes reflect implementation progress under the 2022 GSP, incorporation of new information, and actions taken to address DWR Recommended Corrective Actions, as described in Chapters 3 through 8.

As demonstrated in Chapter 5, groundwater conditions remain within the range of SMC, and no undesirable results have occurred during the evaluation period. Accordingly, the changes summarized herein primarily represent refinements, clarifications, and expanded technical understanding of SPV Basin conditions and GSP implementation, rather than fundamental changes to the 2022 GSP framework.

Changes identified during this Periodic Evaluation include:

- Completion of analyses to address all six DWR Recommended Corrective Actions
- Incorporation of significant new data and technical studies
- Improved understanding of groundwater conditions relative to sustainability indicators and SMC
- Updates to the basin setting, model, and water budget based on new information
- Progress in implementing Tier 0 and select Tier 1 PMAs
- Addition of new MAs 13 (Tier 1) and 14 (Tier 2) for controlled releases of Sutherland Reservoir for groundwater recharge in the SPV Basin
- Enhancements to representative monitoring networks and associated datasets

These changes collectively improve the technical basis and implementation of the 2022 GSP while confirming that the SPV Basin remains on track to maintaining achievement of its sustainability goal. Table 11-1 provides an overview of the changes identified during the Periodic Evaluation.

Table 11-1 Summary of Changes Identified During the Periodic Evaluation

Category	Summary of Change	Relevant PER Chapter
DWR Corrective Actions	All six DWR Recommended Corrective Actions have been addressed through additional analyses, updated datasets, and expanded technical evaluations; no formal GSP amendment required	Chapter 3; Chapter 5
Groundwater Conditions	Groundwater levels, storage, water quality, and ISW conditions remain within SMC; no minimum threshold exceedances constituting undesirable results observed	Chapter 5
New Information	Incorporation of expanded monitoring datasets (WYs 2020–2025), GDE Study, ISW evaluation, recharge feasibility studies, and updated land subsidence analysis	Chapter 4
Basin Setting and Model Updates	Updated groundwater model (Version 3.0) and refined water budget using new hydrologic and monitoring data; improved understanding of basin dynamics	Chapter 6
PMAs	Continued implementation of Tier 0 PMAs (e.g., BMPs, outreach, watershed improvements); supporting studies completed; addition of new MAs 13 (Tier 1) and 14 (Tier 2) for controlled releases of Sutherland Reservoir for groundwater recharge in the SPV Basin; no triggers for Tier 1 or Tier 2 MAs to date	Chapter 7
Monitoring Networks	Updated well inventory and metadata; removal or replacement of non-functional wells; minor adjustments to groundwater quality and ISW monitoring networks; implementation of land subsidence monitoring using InSAR	Chapter 8
SMC Framework	SMC remain appropriate; clarifications to undesirable results definitions and supporting analyses improve consistency with DWR guidance	Chapter 5
Overall GSP Status	GSP implementation remains effective; SPV Basin continues to operate within sustainable conditions; no plan amendment required at this time	Chapter 5; Chapter 11

11.1.1 Summary of Key Findings

The following high-level findings summarize the changes documented in this Periodic Evaluation:

- **Sustainability Status:** the SPV Basin continues to meet its sustainability goal, with groundwater conditions remaining within established SMC and no occurrence of undesirable results.
- **Technical Improvements:** new datasets and studies, including the GDE Study, ISW evaluation, groundwater model update, and land subsidence analysis, have improved the understanding of basin conditions and system dynamics.
- **Monitoring Enhancements:** monitoring networks have been refined through updated metadata, field verification, and identification of replacement wells, resulting in improved data quality and spatial representation.
- **Implementation Progress:** PMAs continue to be implemented effectively, with no need to initiate additional management measures at this time.
- **Regulatory Alignment:** actions taken to address DWR Recommended Corrective Actions have strengthened alignment with SGMA requirements and DWR guidance, particularly with respect to undesirable results definitions and monitoring approaches.

The changes summarized in this section provide the basis for the more detailed discussion of proposed or completed revisions to plan elements presented in Chapter 11.2 below. While many of the changes described above involve refinements to data, analyses, or documentation, they generally do not constitute substantive changes to the 2022 GSP.

11.2 Revisions to Plan Elements

With the exception of land subsidence, which represents expanded plan element information, the changes identified through this Periodic Evaluation primarily consist of refinements, clarifications, or confirmation that existing plan elements remain appropriate and do not require revision. As such, revisions to the 2022 GSP are anticipated in response to several DWR Recommended Corrective Actions 3 and 5a, as discussed in Chapter 3, Sections 3.1.3 and 3.1.5, which include development of a SMC framework and establishment of a monitoring network.

The following table outlines the proposed revisions for each section of the 2022 GSP as summarized from relevant chapters detailed above. For all GSP revisions, the SPV GSA determined that an amendment was not necessary as findings indicate that the existing 2022 GSP remains functionally adequate as these revisions guide implementation towards maintenance of sustainability in the SPV Basin to support SGMA flexibility of adaptive management through lessons learned.

The SPV GSA has prepared an erratum to the 2022 GSP that includes plan element revisions and are posted on the SPV Basin's website at <https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html>. The erratum outlines the information presented for each revision made to 2022 GSP chapters and the revisions are summarized below in Table 11-2. The erratum is attached as an appendix to this PER (Appendix J).

Table 11-2 Summary of 2022 GSP Plan Elements and Revisions

2022 GSP Plan Element Section	2022 GSP Subsection and Page Number(s)	Section Title	Revisions Summary
Section 4: Groundwater Conditions	4.5, 4-40:4-41	Land Subsidence	Includes reanalysis of extended InSAR data (2015–2025), which shows measurable but low-magnitude and localized land subsidence (up to approximately 0.4 feet) that was previously obscured by data artifacts. The revised discussion will clarify that land subsidence is occurring but remains limited in extent and has not resulted in impacts to infrastructure or land uses, and will incorporate improved interpretation of land subsidence patterns, rates, and uncertainty, along with updated context on the potential for elastic versus inelastic subsidence. The section will also acknowledge data limitations, describe the use of InSAR as the primary monitoring dataset, providing a more robust and technically supported evaluation of land subsidence conditions in the SPV Basin.
Section 6: Undesirable Results	6.3.5, 6-7	Land Subsidence	• Established UR Definition for Land Subsidence: Land subsidence that substantially interferes with land uses/interests or infrastructure. • Established Significant and Unreasonable Conditions for Land Subsidence: Significant and unreasonable conditions may occur as a result of cumulative or differential land subsidence that alters ground surface elevations, slopes, or hydraulic capacity in a manner that adversely affects infrastructure performance or public safety.
Section 7: Monitoring Networks	7.10, 7-29	Land Subsidence	Established Monitoring Network for Land Subsidence: Created a Subbasin-wide network based on publicly available DWR InSAR time-series data, enabling improved detection and tracking of localized land subsidence. Monitoring results will be evaluated annually at existing RMS locations and integrated with groundwater level indicators to support estimation of critical head thresholds consistent with DWR BMP guidance.
Section 8: Minimum Thresholds and Measurable Objectives	8.6, 8-17	Land Subsidence	Established SMC Framework for Land Subsidence: SMC framework includes establishment of a PT and process for development of MOs and MTs if warranted by future conditions. The SPV GSA will use reanalyzed InSAR data and site-specific investigations, triggered by exceedance of the PT, to evaluate land subsidence impacts and inform future quantitative MT and MO development tied to infrastructure performance and land use protection. This adaptive approach allows MTs and MOs to be refined over time based on improved monitoring data, estimated critical head relationships, and observed land subsidence trends.
Section 8: Minimum Thresholds and	8.7, 8-17:8-18	Depletions of Interconnected Surface Water	Established Field Monitoring Trigger for ISW Network and GDE Units: Annual field monitoring will be initiated when multiple representative wells (two of six ISW monitoring network wells) fall below PTs simultaneously for two consecutive sampling events (spring/fall or fall/spring), and that annual field monitoring continue while groundwater conditions remain below those PT thresholds. PT

2022 GSP Plan Element Section	2022 GSP Subsection and Page Number(s)	Section Title	Revisions Summary
Measurable Objectives			exceedances (and the need for annual field monitoring) could be determined during the annual reporting process. Field surveys should be conducted at a minimum of two locations within the SPV GDE units, each within stream reaches near the representative wells where PT exceedances are occurring.
Section 8: Minimum Thresholds and Measurable Objectives	8.7, 8-17:8-18	Depletions of Interconnected Surface Water	Established Desktop Monitoring of ISW Network and GDE Units as Part of 5-Year Periodic Evaluations: Desktop monitoring will be performed every five years, as part of each Periodic Evaluation. This will include review of aerial imagery to document any changes in the extent or greenness of vegetation over the five-year period, as well as any significant changes in the composition of dominant plant species. The desktop review of NDVI/NDMI values and aerial imagery would determine whether any significant changes in vegetative health, extent, and/or composition within SPV GDE units have occurred. If significant declines in GDE health are observed, then additional analysis is recommended to determine whether these changes could be attributed to depletions of ISW.
Section 9: Projects and Management Actions	9.8, 9-18		Established New Management Actions for Supplemental Groundwater Recharge in the SPV Basin: Addition of new MAs 13 (Tier 1) and 14 (Tier 2) for controlled releases of Sutherland Reservoir for groundwater recharge in the SPV Basin. Groundwater recharge from Sutherland Reservoir releases was evaluated as part of MA 7 Initial Surface Water Recharge Evaluation, and releases from Sutherland Reservoir were determined to be the most viable option for groundwater recharge in the SPV Basin. These additional adaptive management MAs were added to the existing PMAs.

11.3 Conclusion

This PER demonstrates that implementation of the 2022 GSP has progressed effectively and in accordance with the requirements of SGMA and the GSP Regulations. As evaluated in Chapters 3 through 8, the SPV Basin remains in a sustainable condition, and current data indicate that the SPV Basin continues to be operated within its sustainable yield.

Groundwater levels, groundwater storage, water quality, and ISW conditions have remained within the range of established SMC during WYs 2020 through 2025. No undesirable results have occurred, and groundwater conditions have remained stable and responsive to climatic variability, consistent with the findings presented in the Executive Summary and Chapter 5. These results indicate that 2022 GSP implementation is on track to continue to achieve the SPV Basin's sustainability goal throughout the SGMA compliance horizon.

The SPV GSA has adequately addressed all six DWR Recommended Corrective Actions through the incorporation of new data, completion of technical studies, and refinement of analytical approaches. These efforts have strengthened the understanding of basin conditions, including groundwater and surface water interactions, groundwater quality trends, land subsidence, and GDEs, while improving alignment with DWR guidance.

New information collected during this evaluation cycle, including expanded monitoring datasets, completion of the GDE Study and ISW evaluation, land subsidence analysis using InSAR data, and updates to the integrated groundwater/surface water model, has enhanced the technical basis for groundwater management in the SPV Basin. Consistent with the Executive Summary, this information has been used to reassess basin conditions, improve confidence in monitoring and modeling results, and support adaptive management. However, it does not indicate a need for substantial modification of the 2022 GSP framework. Existing SMC, monitoring networks, and PMAs remain appropriate and effective.

Based on the findings of this PER, the SPV GSA has determined that a formal amendment to the 2022 GSP is not warranted at this time. The updates identified in Chapter 11 represent refinements, clarifications, and enhancements to implementation and documentation that will be incorporated through ongoing adaptive management and future reporting.

Next Steps

Moving forward, the SPV GSA will continue to implement the 2022 GSP using an adaptive management framework supported by ongoing monitoring, data collection, and technical evaluation. Key next steps include:

- Continued collection and evaluation of groundwater level, groundwater quality, and surface water data to support annual reporting and trend analysis
- Implementation of the revised land subsidence management approach, including annual InSAR-based monitoring, evaluation of subsidence trends and potential impacts, and development of quantitative sustainability criteria if warranted by future conditions
- Maintenance and refinement of representative monitoring networks, including incorporation of updated well metadata and potential replacement wells
- Ongoing implementation of PMAs, particularly Tier 0 actions related to BMPs, outreach, and regional coordination
- Integration of new data and findings into future groundwater model updates and technical evaluations
- Continued coordination with local, state, and federal agencies and alignment with related regulatory programs (e.g., MS4, WQIP) to support comprehensive watershed management
- Evaluation of future DWR guidance, particularly related to ISW and sustainability criteria, and incorporation as appropriate

The SPV GSA will document progress through Annual Reports and will conduct the next Periodic Evaluation in accordance with CCR §356.4. Through continued implementation, monitoring, and coordination, the SPV GSA will maintain a proactive and adaptive approach to groundwater management to ensure long-term sustainability of the SPV Basin.

DRAFT

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