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Santa Clarita Valley Water Agency

Santa Clara River Valley East Groundwater Basin Management Actions and Projects

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SCV WATER

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Abbreviations and Acronyms

AFY	acre-feet per year
Basin	Santa Clara River Valley East Groundwater Basin
BMP	best management practice
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
City	City of Santa Clarita
DDW	Division of Drinking Water
DMS	Data Management System
DWR	California Department of Water Resources
ET	evapotranspiration
Five Point	Five Point Holdings, LLC
GDE	groundwater-dependent ecosystem
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
I-5	Interstate 5
InSAR	Interferometric Synthetic Aperture Radar
LA County	Los Angeles County
LACFCD	Los Angeles County Flood Control District
PVC	polyvinyl chloride
RWQCB	California Regional Water Quality Control Board
SCV Water	Santa Clarita Valley Water Agency
SGMA	Sustainable Groundwater Management Act
SNMP	Salt and Nutrient Management Plan
SWRCB	California State Water Resources Control Board
TNC	The Nature Conservancy
USFWS	U.S. Fish and Wildlife Service
WRP	water reclamation plant

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SECTION 9: Management Actions and Projects

9.1 Introduction

This section describes the management actions that will be developed and implemented in the Santa Clara River Valley East Groundwater Basin (Basin) to attain and maintain sustainability in accordance with §§ 354.42 and 354.44 of the Sustainable Groundwater Management Act (SGMA) regulations. Management actions described herein are intended to optimize local groundwater use to avoid undesirable results, consistent with SGMA regulations. The management actions described in this section include:

- Addressing data gaps
- Monitoring, reporting, and outreach
- Promoting best water use practices
- Actions if minimum thresholds are reached or undesirable results confirmed
- Actions if groundwater-dependent ecosystem (GDE) Action Triggers are reached
- Other management actions to promote sustainable groundwater management

This section also describes optional projects that in concept involve new or improved infrastructure to make new water supplies available to the Basin. These optional projects may be implemented to improve the resiliency of Basin groundwater resources to extended drought. The optional projects are based on previous and ongoing feasibility studies conducted by the Santa Clarita Valley Water Agency (SCV Water) and its predecessor agencies.

The need for the management actions that are discussed in this section is based on the following:

- Data gaps exist in the Basin, including groundwater levels within the GDE area, elevation control of well heads and river bottom, domestic well water quality, and subsidence benchmarks. Addressing data gaps will improve the understanding of the basin and reduce uncertainty regarding decision making.
- Monitoring, in addition to existing programs, is necessary, including for domestic well water quality and water levels, groundwater levels supporting GDEs, subsidence, and non-*de minimis* pumping. This monitoring will improve the understanding of the basin and reduce uncertainty regarding decision making.
- Best water use practices should be promoted for municipal, rural domestic, and agricultural groundwater users to reduce any waste and increase water use efficiency.
- Procedures are needed for evaluating and addressing conditions if minimum thresholds are reached.
- Procedures are needed for evaluating and responding to groundwater levels approaching and/or dropping below trigger levels in GDE areas.

Section 354.44 of the SGMA regulations requires that management actions described in a Groundwater Sustainability Plan (GSP) include a discussion about:

- Relevant measurable objectives that would be addressed by a management action or project
- The expected benefits of the action or project
- The circumstances under which management actions or projects will be implemented
- How public notice will be provided
- Relevant regulatory and permitting considerations

- Implementation schedules
- Legal authority required to take the actions
- Estimated costs and how they will be funded
- How pumping and recharge will be managed to ensure recovery of water levels from drought

Groundwater management actions are intended to improve the understanding of groundwater use in the Basin, improve monitoring of groundwater conditions, avoid undesirable results, and address all sustainability indicators described in Section 8. If groundwater levels are sustained without chronic decline, many of the associated undesirable results described in Section 8 will be avoided.

The management actions identified in this GSP will achieve groundwater sustainability by avoiding undesirable results. This GSP makes no determination of water rights. GSP management actions undertaken to achieve sustainability under SGMA will not result in or be construed as a forfeiture of or limitation on groundwater rights under common law.

9.2 Implementation Approach and Criteria for Management Actions

The amount of groundwater pumping in the Basin has not exceeded (and is not expected to exceed) the estimated sustainable yield of about 52,200 acre-feet per year (AFY) on a long-term (multi-decadal) basis (see Section 6), and groundwater levels have been and are expected to remain stable on a long-term basis. Accordingly, the Groundwater Sustainability Agency (GSA) intends to begin implementation of management actions soon after GSP adoption to ensure that data gaps are addressed and that the improved monitoring program continues to demonstrate that the basin is being managed sustainably. The effect of the management actions will be reviewed annually, and additional management actions will be implemented as necessary to avoid undesirable results.

The approach to funding implementation of the GSP and any optional actions will be developed by the GSA and its member agencies in accordance with all State laws and applicable public process requirements. Input from the public, interested stakeholders, and groundwater pumpers will be considered and incorporated into the decision-making process.

The GSA will periodically assess the need for required projects and other additional actions in the future should the potential for significant and unreasonable effects be identified. At a minimum, the reassessment process would be conducted as part of the 5-year GSP review and report.

9.3 Authorities Provided to the GSA

Using authorities outlined in §§ 10725 to 10726.9 of the California Water Code, the GSA will exercise local control and flexibility consistent with this GSP to commence management actions. The Department of Water Resources has provided broad authorities to GSAs to manage their respective groundwater basins. GSAs may use provided authorities to manage the basin and authorities include requiring well registration, installation of flowmeters, extraction reporting, paying of extraction fees, monitoring groundwater conditions, limitations on extractions. In addition, SCV Water, whose boundaries encompass most of the basin, has authority to undertake management actions and projects under the Santa Clarita Valley Water Agency Act, including the power of eminent domain.

9.4 Current Understanding of Groundwater Well Operations

Municipal groundwater extractors include SCV Water and Los Angeles County Waterworks District Number 36. These extractors operate wells in the Alluvial Aquifer and Saugus Formation, and extractions from these wells varies, for example in 2014 extractions are estimated at 70 percent of total annual groundwater

extraction. The Municipal entities measure and report extractions as required. Municipal entities conduct a significant amount of groundwater quality testing throughout each year.

Privately owned and operated wells include agricultural supply, irrigation (agricultural or other), and industrial use. Extractions from these wells varies, for example in 2014 extractions are estimated at 29 percent total annual groundwater extraction. The GSA understands from well operators that, for the most part, extractions from these wells are metered and reported (for example, they are reported for SCV Water's Annual Water Report and/or to the State Water Resources Control Board). Less is known about water quality testing from these well operators.

Privately owned and operated *de minimis* extractors (2 acre-feet or less groundwater extraction per year) are generally domestic wells. Extractions from these wells is estimated at 1 percent total annual groundwater extraction. The GSA believes that most *de minimis* extractors do not measure extraction volumes. Less is known about water quality testing from these well operators.

9.5 Basin-Wide Management Actions

The following subsections outline the various basin-wide management actions. The information in Sections 9.5.1 through 9.5.5 is required by § 354.44 of the SGMA regulations. Basin-wide management actions will be implemented with input from stakeholders. Basin-wide management actions include:

- Addressing data gaps
- Monitoring, reporting, and outreach
- Promoting best water use practices
- Actions if minimum thresholds are reached
- Actions if GDE Action Triggers are reached
- Other management actions and projects

9.5.1 Addressing Data Gaps

SGMA regulations require identification of data gaps and a plan for filling them (§ 354.38). Monitoring data will be collected and reported for each of the five sustainability indicators that are relevant to the Basin: chronic lowering of groundwater levels, reduction in groundwater storage, degraded water quality, land subsidence, and depletion of interconnected surface water. As noted in Section 7, the approach for establishing the monitoring networks was to leverage existing monitoring programs and, where data gaps existed, incorporate additional monitoring locations that have been made available by Basin landowners and stakeholders. Data gaps that have been identified thus far include:

- Water levels within the GDE area
- Reference point elevation for all monitoring locations, including the riverbed in selected areas by GDE monitoring wells
- Domestic well water quality
- Subsidence benchmarks for monitoring land surface elevation

Installation of Piezometers within the GDE Area

As described in Section 7, GDE monitoring sites are needed within the GDE area (see Figure 8-2 in Section 8) to allow the GSA to monitor groundwater levels and assess whether groundwater pumping has or will cause impacts to GDEs related to lowered groundwater levels and depleted surface water. Eight GDE monitoring sites have been tentatively identified. These sites will consist of shallow (less than 50 feet deep) 2-inch diameter polyvinyl chloride (PVC) piezometers completed within the alluvium, with six of the piezometers located in proximity to the existing Santa Clara River channel, one piezometer located along Castaic Creek, and one piezometer located along San Francisquito Creek, as shown in Figure 8-2. These locations were selected to provide meaningful groundwater level data in reaches of the river and tributaries that are connected to surface water. Exact locations will be determined after consultation with landowners, the California Department of Fish and Wildlife (CDFW), and the Los Angeles County Flood Control District (LACFCD). Six of these locations along the Santa Clara River were previously identified by SCV Water, and funding for their installation has been provided by the 2017 Proposition 1 Sustainable Groundwater Planning Grant from the California Department of Water Resources (DWR).

Reference Point Elevation Survey

A survey of the reference point elevations is needed for all existing and planned new wells that are part of the Basin monitoring program. This is needed because not all wells in the program have been surveyed and because different datums have been used in the past. The planned reference point survey will ensure that all groundwater level data are referenced to the same vertical datum in the future. Further, some elevation surveys in the riverbed near GDE monitoring wells will be needed to better determine depth to groundwater beneath the riverbed.

Domestic Well Water Quality

Domestic wells are presently not included in existing groundwater quality monitoring programs. Because this group of groundwater users may be affected by groundwater management actions initiated by the GSA in some areas of the basin, it will be necessary to establish (1) where there are domestic wells that could be affected by groundwater management actions and (2) a water quality sampling program for selected wells to establish a baseline data set for domestic well water quality. Once the baseline has been established, specific need for future water quality sampling will be better understood.

The GSA will develop a plan that includes the following elements:

- Identifying general areas on a map where domestic wells may be located that could provide useful data and/or be affected by groundwater management actions,
- Outreach to landowners in these areas to solicit domestic well owner participation in the groundwater monitoring,
- Identification of domestic wells for the groundwater monitoring program that will be sampled,
- Selection of water quality constituents for testing,
- Conducting one round of sampling at the selected wells,
- Preparation of a summary report documenting the results, without disclosing specific sampling locations,
- Transmittal of laboratory testing results to individual well owners who participated in the program, and
- Any plan for future monitoring will be prepared with stakeholder input.

Subsidence Benchmarks

Section 7 describes the planned subsidence monitoring program for the Basin. A combination of Interferometric Synthetic Aperture Radar (InSAR) data and measured land surface elevation data at selected benchmarks comprise the monitoring locations. As described in Section 7, the GSA intends to use a set of benchmarks that have previously been used by Los Angeles County (LA County to monitor land surface elevations in the Basin (at an approximately 6-year recurring survey cycle). The GSA intends to monitor subsidence on an annual basis at locations where future groundwater level declines could cause subsidence and damage critical infrastructure. Because these benchmarks have not yet been specifically identified, it will be necessary to work with LA County to select the benchmark sites that will provide the best information for this purpose and establish monitoring protocols that the GSA will follow. In addition, it will be necessary to correlate historical ground surface elevations that have been obtained in the past by LA County with elevations to be obtained annually by the GSA so that the two datasets are consistent.

9.5.1.1 Relevant Measurable Objectives

Addressing data gaps would help achieve measurable objectives for chronic decline in water levels, chronic depletion of storage, degradation of water quality, subsidence, and depletion of interconnected surface water by providing data needed by the GSA to track and monitor sustainability in the basin so that undesirable results are avoided.

9.5.1.2 Expected Benefits and Evaluation of Benefits

The primary benefit of addressing data gaps is increasing the understanding of basin conditions and how Basin management affects those conditions. Addressing the data gaps will result in (1) an improved understanding of groundwater levels in the GDE area, (2) improved accuracy in water level elevations and an improved ability to correlate measurements between measuring sites, (3) an improved understanding of domestic well water quality, (4) and improved monitoring of land surface elevations and subsequent identification of potential land subsidence that could result from groundwater pumping.

9.5.1.3 Circumstances for Implementation

Addressing data gaps will begin upon adoption of the GSP. No other triggers are necessary or required.

9.5.1.4 Public Noticing

Public noticing will not be required for addressing data gaps. Information associated with the monitoring program, which the elements relating to the data gaps are associated with, will be presented on the GSA website and in annual reports.

9.5.1.5 Permitting and Regulatory Process

Siting the GDE monitoring wells requires permission from landowners (the City of Santa Clarita [City] and Five Point Holdings, LLC [Five Point]). The GSA will consult with the CDFW to identify sites with the most efficient environmental permitting steps. An agreement has been signed between the City and SCV Water for installation of piezometers on City property. A permit has been granted by LACFCD for installation of piezometers within the floodway. Approval is being sought from Five Point to site and install piezometers on its property.

9.5.1.6 Implementation Schedule

Efforts to address data gaps will begin upon GSP adoption.

9.5.1.7 Legal Authority

The legal authority to address data gaps is included in SGMA. For example, Water Code § 10725.8 authorizes GSAs to require, through their GSPs, that the use of every groundwater extraction facility (except those operated by *de minimis* extractors) be measured. SGMA also requires that a monitoring program be implemented for each sustainability indicator. Addressing data gaps is integral to meeting this requirement.

9.5.1.8 Estimated Cost

The total estimated cost for addressing the data gaps described above for fiscal year 2021/22 and 2022/23 is described in Table 9-1.

Table 9-1. Cost Estimate for Addressing Data Gaps

	FY 2021/22	FY 2022/23
Costs under development		

9.5.2 Monitoring, Reporting, and Outreach

Monitoring, reporting, and outreach are core functions that the GSA will provide to comply with SGMA regulations. The GSA will direct the monitoring programs outlined in Section 7 to track Basin conditions related to the five applicable sustainability indicators. Data from the monitoring programs will be routinely evaluated to ensure progress is being made toward sustainability or to identify whether undesirable results are occurring. Data will be maintained in a Data Management System (DMS) operated by SCV Water. Data from the monitoring program will be used (1) by the GSA to guide decisions on management actions and to prepare annual reports to Basin stakeholders and DWR, and (2) by individual entities to guide decision-makers. SGMA regulations require that (1) the reports comply with DWR forms and submittal requirements, and (2) all transmittals are signed by an authorized party. Data will be organized and available to the public to document Basin conditions relative to sustainable management criteria established for the Basin (see Section 8).

9.5.2.1 New Monitoring

As described in Section 7, monitoring of groundwater levels, water quality, and land subsidence has been conducted under several existing programs in the Basin. SCV Water is monitoring groundwater levels, pumping rates and volumes, and water quality at its municipal supply wells in accordance with requirements under existing Division of Drinking Water (DDW) programs. Five Point is conducting monitoring at its agricultural irrigation wells and provides its annual pumping and water use volumes to the LA County Department of Regional Planning. Five Point also provides its annual pumping volumes and its groundwater level measurement data to SCV Water on an annual basis. Monitoring that is necessary to comply with SGMA, but which is not being fully conducted under an existing program includes:

- Domestic water quality monitoring
- GDE monitoring
- Subsidence monitoring
- Receiving extraction data from non-*de minimis* well owners.

Domestic Well Water Quality Monitoring

As discussed previously, one round of groundwater sampling will be conducted at selected domestic wells in accordance with a domestic well selection and monitoring plan to establish a baseline water quality for these groundwater users. Future monitoring will be evaluated after the baseline data is reviewed.

GDE Monitoring

Monitoring of groundwater levels specifically for evaluating potential impacts to GDEs has not previously been conducted in the GDE area. Section 7 describes the proposed monitoring program for groundwater levels within the GDE area. In addition to groundwater level monitoring, Section 7 describes the ongoing evaluation of groundwater level data within the GDE area and describes the process for assessing the potential for impacts to occur to GDEs should minimum thresholds and trigger levels be approached in the future.

Subsidence Monitoring

Prior to development of this GSP, land subsidence data had not been compiled and evaluated to assess the effects of groundwater extraction on land surface elevations. Land surface elevation data are available from satellite-based data sources (i.e., InSAR) and from LA County for elevation benchmarks located in the Basin (see Section 5 for a discussion of these data). In the future, the GSA will conduct additional monitoring of land surface elevations at selected key locations on an annual basis (see Section 7). InSAR data, land surface elevation data previously collected by LA County, and the additional subsidence benchmark data will be assessed annually for indications that subsidence is occurring.

Groundwater Extraction Reporting from Non-*De Minimis* Well Owners

For basin management purposes, it is necessary to measure the quantity of groundwater extractions that are occurring in the basin. Municipal water providers and some private agricultural groundwater users have water meters and report metered information. Other users may employ electrical/pump performance tests to calculate pumping rates and report annual water use from wells. Non-*de minimis* users not already reporting extractions will need to be identified so that a metering or extraction reporting program can be implemented for these wells. For this reason, it will be necessary to inventory and categorize all active wells in the Basin.

Non-*De Minimis* Metering and Reporting Program

This GSP calls for a program that will require all non-*de minimis* extractors to report extractions annually and use a water-measuring method satisfactory to the GSA in accordance with Water Code § 10725.8. Non-*de minimis* extractors include, but may not be limited to agricultural wells, golf course wells, and other non-municipal supply wells. It is anticipated that the GSA will develop a policy to implement this program. The information collected will be used to account for pumping, to analyze projected Basin conditions, and to complete annual reports and 5-year GSP assessment reports.

Groundwater Extraction Reporting from *De Minimis* Well Operators

Some well operators are considered *de minimis extractors* (meaning a person who extracts, for domestic purposes, 2 acre-feet or less per year) and these wells may be excluded from extraction reporting in the basin if the total number of wells and extraction does not become significant.

De Minimis Self-Certification Program

The number of *de minimis extractors* in the Basin is not known with a high degree of accuracy, but is estimated at approximately 500 AFY. If the GSA determines additional information is needed for groundwater management from *de minimis* extractors, it may develop a self-certification program for *de minimis* extractors.

Annual Reports

Annual reports will be submitted to DWR starting on April 1, 2022, to provide required monitoring data, such as for water levels, water quality, extraction volumes and trend analysis. Annual reports will be available to Basin stakeholders. Monitoring data also allows the GSA to evaluate trends, compare monitoring data to the sustainable management criteria, and to report management actions and projects implemented to achieve sustainability. Annual reports allow promotion of best water use practices.

9.5.2.2 5-Year GSP Updates and Amendments (SGMA Regulation § 356.2)

In accordance with SGMA regulatory requirements (§ 356.4), 5-year GSP assessment reports will be provided to DWR starting in 2027. The GSA will update the GSP at least every 5 years to assess whether it is achieving the sustainability goal in the Basin. The assessment will include a description of significant new information that has been made available since GSP adoption or amendment and whether the new information or understanding warrants changes to any aspect of the plan.

Although not required by SGMA regulations, the GSA may amend the GSP within any 5-year period through the 20-year planning horizon to integrate new information. Updates may include incorporating additional monitoring data, updating the sustainable management criteria, documenting any projects that are being implemented, and facilitating adaptive management.

9.5.2.3 Relevant Measurable Objectives

Monitoring, reporting, and outreach will help achieve measurable objectives by improving the understanding of basin conditions and by keeping Basin groundwater users informed so that actions can be taken to avoid undesirable results.

9.5.2.4 Expected Benefits and Evaluation of Benefits

The primary benefit from monitoring, reporting, and outreach is increasing the understanding of basin conditions and how Basin management affects those conditions. Over time, data and analysis is expected to result in fine tuning of sustainable management criteria including potential modifications to minimum thresholds and GDE Action Triggers. Outreach, public education, and associated community wide increases in knowledge about groundwater sustainability will take place, but exact benefits are difficult to quantify.

Groundwater pumping will be measured directly through the metering and reporting program and recorded in the DMS. Changes in groundwater elevation will be measured with the groundwater level monitoring program. Ground surface elevations collected to monitoring for subsidence will be measured using InSAR data and the additional land surface elevation benchmarks. Changes in groundwater storage will be estimated using changes in groundwater levels (via proxy). Changes in depletion of interconnected surface water will be estimated using changes in groundwater levels (via proxy). Information about the monitoring programs is provided in Section 7. Isolating the effect of monitoring, reporting, and outreach on groundwater levels will be challenging because these additional monitoring programs together comprise only one of several management actions that may be implemented concurrently in the Basin.

9.5.2.5 Circumstances for Implementation

Monitoring, reporting, and outreach will begin upon adoption of the GSP. No other triggers are necessary or required.

9.5.2.6 Public Noticing

Monitoring information and annual reports will be posted on the GSA website to inform the groundwater pumpers and other stakeholders about Basin conditions and the need to address undesirable results, if

observed. On the GSA website and at regular GSA meetings, groundwater pumpers and interested stakeholders will have the opportunity to provide input and comments regarding how monitoring, reporting and outreach are being implemented in the Basin.

9.5.2.7 Permitting and Regulatory Process

If necessary for groundwater basin management, the GSA may adopt policies governing *de minimis* self-certification, and flowmeter and extraction reporting for non-*de minimis* extractors.

9.5.2.8 Implementation Schedule

Monitoring, reporting, and outreach efforts will begin upon GSP adoption.

9.5.2.9 Legal Authority

The legal authority to conduct monitoring, reporting, and outreach is included in SGMA. For example, Water Code § 10725.8 authorizes GSAs to require, through their GSPs, that the use of every groundwater extraction facility (except those operated by *de minimis* extractors) be measured.

9.5.2.10 Estimated Cost

The total estimated cost for monitoring, reporting, and outreach in fiscal year 2021/22 and 2022/23 is described in Table 9-2.

Table 9-2. Cost Estimate for Monitoring, Reporting, and Outreach

	FY 2021/22	FY 2022/23
Costs under development		

9.5.3 Promoting Best Water Use Practices

Seventy percent of groundwater extraction in the basin is by municipal agencies with strong preexisting conservation programs with clear metrics. The GSA's governing Board also includes seats for the two municipal pumper agencies. This GSP anticipates that the strong municipal water conservation programs already implemented by municipal agencies are sufficiently conservative so as not to require the GSA develop separate municipal water conservation programs. This is not to say however that the GSA Board of Directors would not encourage additional conservation from municipal agencies if the GSA Board of Directors determined it appropriate. Examples of existing municipal water conservation programs include community education and engagement, rebates and incentives, and regulatory mechanisms. In addition to its standing water conservation and water use efficiency communication efforts, SCV Water provides child and adult education supporting water quality, conservation, and water use efficiency practices. Further, the agency supports a water use efficiency program portfolio that includes, but is not limited to, rebates and incentives for turf conversion, smart irrigation controllers, irrigation distribution system efficiency upgrades, home and business check-ups, rebates for plumbing fixture upgrades, and water efficiency kits. As needed, the agency may implement enforcement critical to curbing wasteful use of water practices.

Because municipal agencies do not do specific outreach to private well operators regarding water conservation, the GSA will work with private well operators to facilitate workshops or other programs designed to communicate best water use practices for private wells. This GSP calls for the GSA to encourage private pumpers to implement the most effective water use efficiency methods applicable, often referred to as best management practices (BMPs). Effective BMPs could include:

- Efficient irrigation practices in urban and rural areas.
- Implementation of a recycled water program to reduce reliance on groundwater for irrigation.
- Achievement of more optimal irrigation practices by monitoring crop water use with soil and plant monitoring devices and by tying monitoring data to evapotranspiration (ET) estimates.

SCV Water and private pumpers such as agricultural users already use BMPs, but improvements can be made. The goals for promoting BMPs are to (1) increase awareness of how water savings can maintain supplies to manage water use through droughts, and (2) broaden the application of BMPs to more groundwater users in the Basin.

De minimis groundwater users will be encouraged to use BMPs as well. Promoting BMPs will include broad outreach to groundwater pumpers in the Basin to emphasize the importance of utilizing BMPs and help groundwater pumpers understand the positive benefits of BMPs for water conservation to help with sustainability.

9.5.3.1 Relevant Measurable Objectives

Conservation programs and BMPs would help achieve the measurable objectives for groundwater elevation, groundwater storage, land subsidence, and interconnected surface water and reduce the potential to impact GDEs.

9.5.3.2 Expected Benefits and Evaluation of Benefits

The primary benefit from continuing conservation programs and initiating BMPs is water conservation which helps manage groundwater supplies so the basin is better prepared for drought and to improve sustainability. Conservation metrics for municipal water use are well known and regularly reported by municipal agencies, it is unknown how much groundwater conservation will occur from promoting BMPs for private well operators. It is difficult to quantify the expected benefits for private well operators at this time.

Benefits associated with water conservation BMPs are already measured and reported by municipal users. Water conservation benefits from private well operators will be reported as BMPs are incorporated into private well operations.

Changes in groundwater elevation will be measured with the groundwater level monitoring program. Any subsidence will be measured with the satellite-based InSAR monitoring system and an on-the-ground land surface elevation monitoring network. Changes in groundwater storage, and depletion of interconnected surface water, will be estimated using the groundwater level proxy. Information about these monitoring programs is provided in Section 7. Isolating the effect of BMPs on groundwater levels will be challenging because the promotion of best water use practices is only one of several management actions that may be implemented concurrently in the Basin.

9.5.3.3 Circumstances for Implementation

BMPs and related outreach will be promoted soon after adoption of the GSP. No other triggers are necessary or required.

9.5.3.4 Public Noticing

Information about BMPs and programs designed to promote BMPs will be posted on the GSA website and included in mailers to inform groundwater users and pumpers and other stakeholders about Basin conditions and the need for BMPs. Groundwater pumpers and interested stakeholders will have the opportunity to provide input and comments on how the BMPs are being implemented in the Basin through the website and at regular GSA meetings. The BMPs will also be promoted through annual GSP reports.

9.5.3.5 Permitting and Regulatory Process

No permitting or regulatory process is needed for promoting BMPs.

9.5.3.6 Implementation Schedule

The GSA envisions that BMPs will be promoted within a year of GSP adoption.

9.5.3.7 Legal Authority

No legal authority is needed to promote BMPs.

9.5.3.8 Estimated Cost

The estimated cost for promoting BMPs and understanding the extent to which they are being implemented in the Basin is primarily included in existing SCV Water programs. The GSA would do additional outreach regarding BMPs in line with its outreach budget.

9.5.4 Actions if Minimum Thresholds are Reached or Undesirable Results Confirmed

The GSA anticipates that if minimum thresholds are exceeded, the GSA will evaluate the cause. If that evaluation indicates the minimum thresholds were exceeded due to groundwater extraction and/or the trend of the data indicate undesirable results are imminent, then management actions would be called upon. If minimum thresholds are exceeded in the representative number of monitoring points over the specified timeframes described in Section 8, the GSA will take management actions as set forth in the diagram below.

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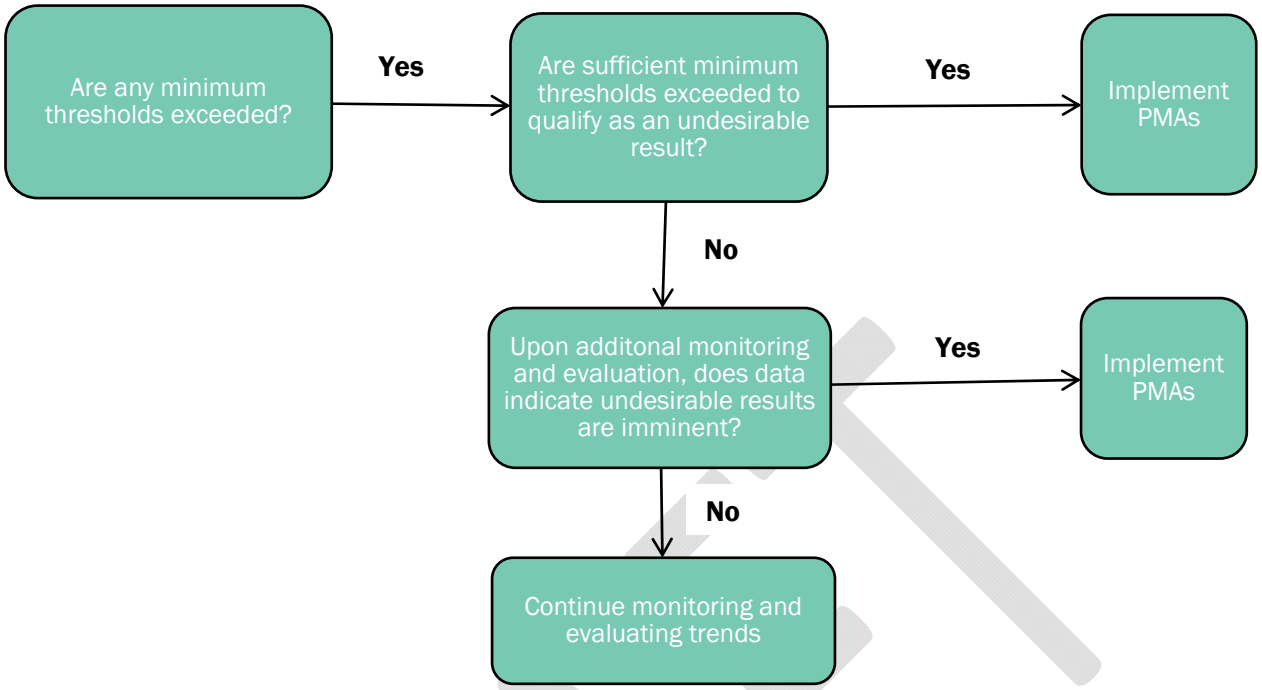

9.5.4.1 Chronic Lowering of Groundwater Levels and/or Chronic Reduction in Storage

Because these two sustainability indicators are inter-related, the possible responses to reaching the minimum thresholds as well as evaluation of undesirable results are shared. If minimum thresholds are reached in a number of wells less than that required to make a determination of undesirable results, there still may be a potential for undesirable results and so evaluation may be necessary.

Undesirable results related to declining water levels may also be manifested for other indicators, including water quality degradation, depletion of interconnected surface water, and subsidence. For these reasons, the evaluation of what is significant and unreasonable for chronic lowering of groundwater levels and chronic reduction in storage should also consider these other indicators.

The evaluation of what may lead to an undesirable result if minimum thresholds are reached includes the following:

- **Evaluate whether the decline is due to pumping, drought, or both.** Pumping effects upon groundwater elevations should be evaluated in concert with considering if the cumulative departure from mean rainfall indicates a drought condition. Other evaluation steps may include conducting aquifer tests (by pumping or not pumping certain wells) and monitoring water level responses in adjacent wells to determine if the observed water level trend is primarily related to pumping. In addition, the groundwater model can be used to evaluate the relative influences of pumping versus drought conditions on observed water level declines.
- **Evaluate whether the declining water levels are likely to continue.** Historical water level monitoring has shown that water levels go up and down in response to annual and multi-year variations in rainfall across the basin. This is particularly true in the Alluvial Aquifer. This step of the evaluation involves examining

the rate at which water levels have declined compared with historical water levels and whether the trend will likely continue or get worse.

- **Evaluate whether other sustainability indicators are likely to be affected.** Monitoring data associated with the other sustainability indicators should be reviewed to assess whether declining water levels are also showing potential undesirable effects in the other indicators.

If after performing evaluations it appears likely that there will be an undesirable result if water levels decline below minimum thresholds, then one or more of the following management actions will be taken until monitoring data indicate water levels have recovered so that undesirable results have been eliminated.

1. Redistribute pumping away from the affected area.
2. Reduce pumping in nearby wells.
3. Conduct additional releases from Castaic Lake if there is a benefit of doing so.
4. Bring in additional State Water Project water or other imported banked water to make up for reduced groundwater supply.
5. Implement tiered water conservation measures for the basin.
6. Reduce pumping in the most affected aquifer.

9.5.4.2 Degraded Water Quality

If minimum thresholds for degraded water quality are reached in groundwater, the GSA will perform an evaluation to help determine the cause of degraded groundwater quality and whether it is likely to cause an unreasonable result. Evaluations may include:

1. Reviewing local land use information and activities (e.g., state records of groundwater contamination),
2. Evaluating of groundwater extraction information to understand if it may cause migration of poor-quality groundwater associated with a contaminant plume or poor-quality groundwater residing in geologic formations toward other wells,
3. Reviewing effect of drought and lower water elevations on water quality constituents,
4. Reviewing groundwater quality monitoring information, and or conducting additional groundwater quality analysis
5. Considering the role of implementation of a recycled water program upon groundwater quality, or
6. Considering other water management actions not associated with the GSA (e.g., groundwater recharge projects developed by SCV Water, or others, that would have the potential to mobilize degraded groundwater).

The GSA will collaborate with the State regulatory agencies to determine the extent to which groundwater management actions can be used to avoid unreasonable results. The GSA will also collaborate with the California Regional Water Quality Control Board (RWQCB) regarding implementation of the Salt and Nutrient Management Plan (SNMP) for the Basin to ensure that groundwater quality with respect to salts and nutrients does not jeopardize the future ability to use recycled water consistent with the SNMP.

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If it is determined that GSA activities or basin pumping affect the groundwater quality degradation, the GSA may take one or more of the following steps to address the issue:

1. Review alternatives for improving groundwater quality in the affected area,
2. Work with affected groundwater users to deploy well head treatment systems,
3. Arrange for alternate water supply,
4. Shift pumping to other locations, and/or
5. Reduce or stop pumping near the affected area.

9.5.4.3 Subsidence

Minimum thresholds for subsidence have been established to avoid damage to critical infrastructure and land uses. As noted in Section 5, subsidence can be caused by activities stemming from groundwater pumping, tectonics, and oil and gas production. Each of these take place in the Basin. While significant and unreasonable subsidence caused from the whole of these activities has not been observed, groundwater pumping may temporarily cause groundwater level declines of up to 150 feet in the future. It is believed the geologic framework in this basin has limited susceptibility to subsidence resulting from groundwater extraction, but there are data gaps. If the rate of subsidence and the total amount of subsidence exceed minimum thresholds in the future, then an evaluation will first be performed to assess the likely cause. Because reduced groundwater levels are one potential cause of subsidence, this evaluation will be similar to the evaluation described in Section 9.5.3.1 for chronic water level decline. If it is determined that groundwater pumping is the likely cause of the observation and there is likely to be an undesirable result (e.g., damage to critical infrastructure or land uses), then the management actions listed in Section 9.5.3.1 will be implemented until the rate of subsidence is reduced. These management actions may be directed to certain regions of the basin that are most affected.

9.5.4.4 Depletion of Interconnected Surface Water

Because significant and unreasonable surface water depletion has not been observed within the Basin and no other beneficial uses of surface water other than GDEs exist in the basin, the thresholds for avoiding depletion of interconnected surface water are set to avoid impacts to GDEs. As discussed in Section 8, the minimum threshold for this sustainability indicator has been established for a maximum allowable amount of surface water depletion that corresponds to the future predicted water level in GDE area monitoring wells completed in the Alluvial Aquifer near the Santa Clara River and in certain locations along Castaic Creek and in San Francisquito Canyon. It is not known if future groundwater levels below the historical low level could cause an impact to GDEs. For this reason, at each GDE monitoring well an Action Trigger level has been established that is equal to the historical low groundwater level at the well site (as derived from historical data at two existing GDE monitoring well sites and from groundwater modeling analyses at the planned sites for six other GDE monitoring wells). The Action Triggers, evaluations, and associated management actions (if needed to avoid undesirable results), will avoid impacts to GDEs. In the vicinity of the Interstate 5 (I-5) Bridge, an additional trigger level has been established using groundwater levels as a proxy that maintains surface water flow that is necessary to protect sensitive aquatic species in this area. The steps for evaluating whether future changes in observed groundwater levels within the GDE area are significant and unreasonable are described in the next section. Likewise, management actions that will be taken if undesirable results are likely to occur are also described in the next section.

9.5.5 Actions if GDE Action Triggers are Reached

9.5.5.1 Evaluation Process when Action Triggers are Reached

Section 8 states that when an Action Trigger (a historical low groundwater level in GDE monitoring wells) is reached, an evaluation process will be initiated to determine whether the lowered groundwater levels are a result of pumping and could result in a significant and unreasonable effect to GDEs. The Monitoring Plan presented in Section 7 includes a process to report the trigger event to the GSA Board as needed with an accompanying Evaluation Report that evaluates the need for management actions to be implemented. Management actions would be implemented if the lowering groundwater levels could result in permanent loss of GDEs. Several questions have been identified below that may shed light on the significance of lowered groundwater levels. Refer to Figure 13 in Section 7 for the locations of the river segments and GDE monitoring sites.

Questions that will be addressed as part of this evaluation process include, but are not limited to, the following:

1. Is the affected river segment supported by surface flow from water reclamation plant (WRP) discharges? (Surface water may support habitats during temporary periods of lower-than-normal groundwater levels.)

   Surface water is generally persistent from the Valencia WRP to the basin boundary. The Evaluation Report may document that streamflows are persistent even with lowered groundwater levels. If streamflows are not present downstream of the location of the Valencia WRP outfall, then the Evaluation Report would conclude that surface flows are not sustaining vegetation during the historically low groundwater period, and further evaluation of the following questions may lead to management actions.

2. Is the historically low groundwater level already below the tree/shrub root depths? (If so, further declines in the same year may not affect GDEs.)

   The Evaluation Report may rely on topographic data and depth-to-groundwater data from recent monitoring well readings to determine whether groundwater levels are below tree/shrub root depths. The existing vegetation may not be relying on groundwater in areas where temporary drawdowns of the water table to depths of 15 feet or more occur regularly. An elevation survey of the thalweg may be helpful to estimate root zone areas in the affected reach. In areas where groundwater is lowered more than 2 or 3 feet below historically low levels, GDEs may be disconnected from their water source to an unprecedented degree. In these areas, management actions may be warranted.

3. Will the GDEs survive the temporary loss of access to groundwater? (Depending on the season, groundwater levels may be expected to rise above historically low levels within a month or two, avoiding permanent loss of habitat. When groundwater levels are restored sufficiently quickly in the winter months, effects to GDEs may not be significant.)

   The Evaluation Report should provide a qualitative assessment of the duration that lower groundwater levels may occur during a specific season, if water levels will recover initially with cooler temperatures in the fall and then more substantially following rain events. If Action Triggers are reached early in the year, then the GDEs may experience more stress than if the triggers are reached late in the hot weather season. The Evaluation Report may recommend initiating vegetation monitoring to assess whether drought stress is visible in the river segment. If vegetation is showing signs of stress that are attributable to historically low groundwater levels, then the Evaluation Report will be updated, and management actions may be warranted. For the aquatic habitat in Segment 1, any temporary loss of surface flow is to be avoided with management actions before it occurs.

4. Has the Action Trigger been reached often in recent years? Droughts that lower groundwater levels are a natural occurrence, but do not occur every year. To sustain GDEs over the long term, groundwater levels affected by drought conditions must recover sufficiently quickly and remain higher during most years in order to support healthy, sustainable habitats over the long term.

   The Evaluation Report should report the frequency with which the Action Triggers have been reached. If the Action Triggers have been reached more than two or three times within a 10-year period, the Evaluation Report may recommend initiating vegetation monitoring to assess for recurring stress and gradual degradation of habitat. If a gradual decline in habitat quality is seen because of pumping that may lead to undesirable results, then the Evaluation Report will be updated, and management actions may be warranted.

5. Are the declines in groundwater levels resulting from pumping?

   The analysis described in Section 9.5.3.1 will be performed to assess the effect of pumping versus drought conditions. Pumping data from wells that are known to be pumping in the basin will be compiled. Historical pumping rates will be compared to current pumping rates recorded for the recent past (i.e., in previous months). If current pumping rates are less than or equal to historical pumping rates, then the Evaluation Report may conclude that further reductions in current pumping rates are not warranted because GDEs have survived during historical droughts when higher pumping rates and/or historically lower low water levels were observed. If unprecedented drought conditions or other changes in the water balance of the basin are contributing to the condition, then the GSA may consider actions that could be taken to further ensure that undesirable results are avoided.

6. Has new information been obtained that can be used to refine the Action Trigger levels presented in Section 8?

   The Evaluation Report should provide the context for developing recommendations on future evaluation, monitoring, and action items. If new information becomes available regarding the resilience or sensitivity of the GDEs and the special status species that rely on the habitat values, then the Evaluation Report should identify this updated information and recommend management actions as needed to avoid undesirable results. This may include refining the Action Trigger level over time to better correlate with the potential for undesirable results.

9.5.5.2 Evaluation Report

The information gathered for Section 9.5.4.1 will be discussed in an Evaluation Report. The report will include recommendations for ongoing monitoring, or implementation of management actions and will include justification for the conclusions.

9.5.5.3 Presentation to the GSA Board

Evaluation Reports will be presented to the GSA Board quarterly, or more frequently if necessary.

9.5.5.4 Possible Management Actions if GDE Action Triggers are Reached

The Evaluation Report may conclude that the lowered groundwater levels do not represent significant and unreasonable effects to GDEs in areas where GDEs are resilient and where sensitive species would be expected to persist during the drought and fully recover with the return of wet weather. However, there are priority areas in the river system that may not be resilient to future unprecedented drought conditions. If these areas are threatened with temporary loss of surface flows for any duration, then management actions would be necessary.

If during future unprecedented multi-year droughts that were not simulated during development of this GSP reduction of pumping does not avoid significant effects to priority GDEs, then the GSA will consult with the U.S. Fish and Wildlife Service (USFWS) and CDFW to develop emergency measures to avoid significant effects to sensitive species.

If significant and unreasonable effects are anticipated, then any necessary management actions would be implemented in a timely manner as described below:

1. The GSA in coordination with groundwater pumpers may assess the potential to:

   - Shift pumping to another location to reduce impact on GDEs, and/or
   - Stop pumping in wells near the GDEs, and/or
   - Increase the quantity of imported water into the basin

   Should any of the above be a consideration, the groundwater flow model may also be used to determine optimum pumping locations/aquifer most likely to avoid undesirable results.

2. The GSA may coordinate with SCV Water to consider implementing a mandatory water conservation program so that overall pumping in the basin can be reduced.

3. If the evaluation shows that non municipal production wells are contributing to the problem, then the GSA will conduct outreach up to and including meetings with private well owners and stakeholders to discuss how to best respond to the concern. Ideally, this would occur prior to the time when significant and unreasonable impacts to GDEs are observed.

4. If monitoring data and weather predictions indicate that undesirable results are likely to persist into the following year and the above actions are not likely to mitigate the impacts, then it may be necessary to develop additional projects designed to increase the amount of water in the river system as described in Section 9.6.3.

9.6 Other Groundwater Management Actions and Projects

Although not specifically funded or managed as part of implementing this GSP, several associated actions will be encouraged by the GSA as part of good groundwater management practices.

9.6.1 Agency Coordination

Groundwater resources within the Basin are an integral part of the upper Santa Clara River watershed and maintaining the health of the Santa Clara River is part of the GSAs Sustainability Goal. In order to effectively manage the groundwater resources within the Basin, there will be an ongoing need to coordinate with various State and local agencies that have authority over land use, water supply, and water quality in the watershed, including CDFW, the RWQCB, DWR, California Department of Transportation (Caltrans), the California State Water Resources Control Board (SWRCB), LA County, and the City (refer to Section 3.3 for more details). Other opportunities for coordination also exist between the GSA and the Upper Santa Clara River Integrated Regional Water Management process, and the GSAs role as a member of LA County's Safe Clean Water Program. It is anticipated that GSA staff and Board members will maintain regular communication with these entities to discuss issues affecting the watershed and groundwater resource quality and quantity.

9.6.2 Removal of Invasive Species

Invasive plant species, consisting primarily of *Arundo donax* (*Arundo*), have become established within the riparian area along the Santa Clara River and some of its tributaries. A literature review by The Nature

Conservancy (TNC) (2019)[1] identified 12 studies of water use by *Arundo*, which together provide water use estimates ranging between 1.8 and 48 AF/acre/year, with mean and median and mean values of 8.3 and 12.3 AF/acre/year, respectively. While not required, the GSA will continue to support efforts by others to raise money for invasive species removal projects.

9.6.3 Optional Managed Aquifer Recharge Projects

Principal aquifers in the groundwater basin are the Alluvial Aquifer and Saugus Formation. Each aquifer accepts natural groundwater recharge in different ways. The Alluvial Aquifer is exposed at the ground surface in the Santa Clara River and its tributaries, but alluvial sediments are also present outside of these areas (aka "off stream"). The Saugus aquifer is exposed throughout much of the valley where not covered by alluvial sediments. Existing groundwater recharge to these aquifers is provided naturally from precipitation, and from urban processes including dry weather runoff, irrigation, and water reclamation plant discharges.

Managed groundwater recharge can utilize water sources such as stormwater, excess imported water, and/or recycled water to meet multiple goals within the watershed including reducing stormwater runoff, increasing the use of recycled water, and augmenting groundwater supplies for drought. Recharge can be accomplished by distributing water to infiltration areas where it drains by gravity into the soils, or through injection wells where water is pumped to aquifer zones below. Efforts to characterize additional groundwater recharge opportunities in the basin have been under way for many years and in recent years some field studies have been implemented to test areas for recharge capability.

In 2015, a Water Resources Reconnaissance Study was commissioned by Castaic Lake Water Agency and performed by Carollo Engineers. This study conducted screening of numerous potential recharge areas within the valley. It identified areas with geology suitable for additional groundwater recharge, and it also identified areas that did not have sufficient aquifer material to accept meaningful amounts of recharge.

Informed by this work, additional work has taken place ranging from defining initial concepts to looking at specific sites, conducting environmental review, test well installation, infiltration testing, and monitoring to develop a baseline.

Because undesirable results from over-pumping have not been identified, implementation of these kinds of projects is not required and thus are considered optional. A description of these optional projects is presented below.

9.6.3.1 Old Castaic School Site Recharge and/or Potential Eastern Recharge

In response to the findings in the Water Resources Reconnaissance Study, the former Newhall County Water District commissioned Geosyntec, Trussell Technologies, and GSI Water Solutions, Inc. to conduct a focused groundwater recharge feasibility studies in the eastern portion of the valley and near the Castaic Lagoon (completed in 2016/17). Based on the water quality and hydrogeological considerations presented in the feasibility studies, the reports concluded that groundwater recharge using surface spreading in the Upper Santa Clara River Watershed showed promise and warranted further field investigation. In July of 2019, SCV Water contracted GSI Water Solutions, Inc. to assess these potential recharge sites.

Work at the Castaic site to date includes a review for environmental contamination, infiltration testing, aquifer parameter estimates, installation of an observation well, data collection, and estimation of potential recharge amounts, and travel time of infiltrated water to a nearby well. Work in the Eastern part of the basin

[1] TNC. 2019. *Enhancing Water Supply through Invasive Plant Removal: A Literature Review of Evapotranspiration Studies on Arundo Donax.* Prepared by The Nature Conservancy (TNC). 6 pp. February 11, 2019.

has included field reconnaissance, a review for environmental contamination, and review of "off stream" locations.

9.6.3.2 Recharge Using Potable Water in the Vicinity of the Placerita Nature Center

SCV Water operates a potable water supply line delivering water to residents in Placerita Canyon. This water supply is within the right of way of Placerita Canyon nearby Placerita Nature Center. Due to past concerns raised by stakeholders about drought stress and drought caused die off of oak trees in a limited area of the Nature Center property, SCV Water is considering providing excess potable supply through a pipe and delivery structure to limited areas during drought to mitigate drought effects.

9.6.3.3 Off Stream Recharge Using Recycled Water

In 2016 Castaic Lake Water Agency prepared a draft Recycled Water Master Plan that among other things, considered use of recycled water for groundwater recharge at multiple locations within the valley. A number of sites adjacent to the Santa Clara River were evaluated, including off stream storage south of the river near Via Princessa, and further east in the basin. The role of recharge with recycled water should continue to be evaluated.

9.6.3.4 Aquifer Storage and Recovery

Injection wells can be used to inject water into aquifers to help recharge aquifers, and also provide water for recovery at a later date. No such projects are under evaluation at this stage, but they may be evaluated in the future by municipal water suppliers. Water for injection could come from excess state water, or banked water.

9.7 Demonstrated Ability to Maintain Sustainability

To demonstrate the ability to maintain sustainability, the groundwater model was used to simulate future pumping, future land use at full build-out, and climate conditions (including climate change) through the years 2042 and 2072 (see Section 6). Based on this analysis, the modeling results demonstrated that undesirable results relating to chronic reduction in groundwater levels and chronic reduction of groundwater in storage have not occurred historically and are unlikely to occur in the future under the groundwater operating plan, given the current understanding and assumptions involving future land uses, the water demands for those land uses, and future climate. Groundwater modeling was not used to assess the potential for subsidence. While subsidence is not expected to be significant and unreasonable in the future, a subsidence monitoring program is included in this GSP.

Because the groundwater and river systems are highly interconnected, surface water depletion occurring because of groundwater levels in the Alluvial Aquifer falling below historical levels has the potential to impact GDEs in some areas. For these reasons, the GSP is implementing a robust GDE monitoring and assessment program. Should the monitoring and assessment program indicate that impacts to GDEs are imminent and could be significant, then a series of timely management actions are planned to avoid impacts.

9.8 Management of Groundwater Extractions and Recharge to Ensure Sustainability

This GSP has established processes for monitoring basin conditions, assessing whether potential impacts are significant and unreasonable, and establishing management actions that are intended to avoid undesirable results associated with each of the sustainability indicators. The GSP also identifies and proposes actions to address data gaps and related uncertainties that may affect decision-making.

Addressing these data gaps and uncertainties over time will improve the current understanding of basin conditions and improve the basis for decision-making.

9.9 Definitions

"*de minimis* extractor" means a person who extracts, for domestic purposes, 2 acre-feet or less per year.

"operator" means a person operating a groundwater extraction facility.

"owner" means a person owning a groundwater extraction facility or an interest in a groundwater extraction facility other than a lien to secure the payment of a debt or other obligation.

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