

A.1 Component 2: Interconnected Surface Water Workplan Implementation

This component consists of a series of tasks designed to enhance the interconnected surface water (ISW) dataset available within the Madera Subbasin (Subbasin). The relationship between the San Joaquin River (SJR) and shallow groundwater along the southern boundary of the Subbasin is complex and data to characterize the groundwater-surface water relationship in this area of the Subbasin are limited. Implementation of the Interconnected Surface Water Workplan (Workplan) is expected to better characterize the following conditions:

- Shallow subsurface conditions,
- The relationship between streamflow and fluctuations of shallow groundwater levels, and
- The relationship between groundwater pumping and streamflow.

Shallow monitoring wells (typically less than 30 feet deep, although some extend to greater depths) installed in areas along the San Joaquin River (SJ River) as part of the San Joaquin River Restoration Program (SJRRP) provide much of the existing monitoring information related to shallow groundwater adjacent to the SJ River. Monitoring of these wells has been inconsistent since 2018, and part of implementation of this work plan will involve reengagement with well owners to restart monitoring of these wells. Additional field data collection and technical analyses will be completed at depths greater than 30 feet to better characterize the shallow subsurface along the SJ River along the southern boundary of the Subbasin, which is likely to improve overall understanding of the relationship between groundwater in the (upper 30 feet), the zone between 30 and 100 feet below ground surface (bgs), and the remaining portion of the Upper Aquifer below a depth of 100 feet where most groundwater pumping currently occurs.

This Workplan outlines potential plans and a related scope of work to compile and review existing data and reports pertaining to the study area, construct/install new monitoring facilities, collect additional field data, and conduct additional technical analyses, all of which are consistent with the Workplan developed as part of the Revised GSP. The purpose of this Workplan is to provide sufficient data and analyses to:

- Make a more informed determination of whether or not ISW is present along the SJ River at the southern boundary of the Subbasin;
- Improve understanding of the relationship between streamflow and fluctuations in shallow groundwater levels;
- Improve understanding of the relationship between shallow groundwater and regional groundwater pumping from deeper zones within the Upper Aquifer that may be separated from shallowest groundwater by intervening clay layers;
- Improve understanding of the relationship between streamflow and regional groundwater pumping; and
- Provide an improved basis for setting sustainable management criteria (SMC) if it is determined that ISW conditions exist.

Additional characterization of the relationship between groundwater and surface water along the SJ River is needed to provide an improved basis for making a final determination of the nature of the interconnection and appropriate Sustainable Management Criteria (SMC). Implementation of this Workplan is intended to provide additional field data and technical analyses as input to better characterizing ISW for the 2025 GSP Update (and beyond).

The scope of work involved in implementation of the Workplan includes seven tasks described below.

Task 1: Compile Additional Existing Data and Update Assessment of Available Data

This task includes several aspects involving compiling and reviewing of supplemental existing data for incorporation in analyses and characterization of conditions relating to ISW in the Subbasin. Additional available existing data will be compiled and reviewed from the following sources: other GSPs, specific local landowners, DWR Well Completion Reports, US Bureau of Reclamation San Joaquin River Restoration Project (SJRRP), USGS SJRRP modeling data, other reports and data, and aerial electromagnetic (AEM) surveys completed by DWR. The available data will be compiled and reviewed to inform subsequent field work and used as inputs for technical analyses. This task can be performed in coordination with similar efforts planned as part of implementation of the Subsidence Workplan proposed for the Subbasin.

Task 2: Complete Additional Field Work

Enhancements to groundwater level and surface water monitoring facilities and activities, specifically along the SJ River, are important for improving the understanding of the relationships between groundwater levels and surface water in the Subbasin. Additional field work tasks fall into two categories: instrumentation of existing wells, and new monitoring facilities and field data collection.

The monitoring frequency in Representative Monitoring Site (RMS) wells that may potentially be designated for the ISW minimum thresholds (MTs) and measurable objectives (MOs) in the upcoming revised GSP presents some limitations for characterizing groundwater level fluctuations and development of appropriate SMC. Developing continuous groundwater level monitoring at finer temporal scales and at different depths in key areas along the SJ River will support understanding of the relationship between groundwater levels at different depths and any potential associated ISW. This task involves working with the owners of key RMS wells to prioritize and implement instrumentation of wells with transducers for collecting

continuous groundwater data. As part of this task, if the assessment and monitoring of ISW would benefit from more continuous monitoring at other RMS well locations, other RMS wells could be considered and prioritized for automated monitoring.

Several key data gaps related to ISW in the Subbasin include coupled monitoring of groundwater levels at different depths within the Upper Aquifer (including very shallow groundwater and more regional groundwater zone) and stream conditions of stage, flow, and channel configuration at locations adjacent to the SJ River (shown in Att4 Fig. 1-8 through 1-10). Construction of new monitoring facilities and additional field data collection efforts are anticipated to focus on, but are not limited to: supplemental monitoring wells; stream stage and flow; stream elevation profile/thalweg profiles; and possible aquifer or well pump testing if cooperation can be obtained from landowners with wells at suitable locations near the SJ River.

Task 3: Complete Technical Analyses

In this task, technical analyses will be conducted to synthesize the available information on the potential for interconnectivity between groundwater and surface water involving construction of detailed hydrogeologic cross sections along the SJ River, evaluation of fluctuations in shallow groundwater levels and river stage/flow, and evaluating relationships between groundwater pumping and streamflow are also planned to synthesize the available information and groundwater-surface water dynamics along the River. This task will be completed in coordination with and utilizing new information from compilation of additional available data and field work related to additional monitoring and characterization of surface and subsurface conditions related to the potential for interconnectivity between groundwater and surface water. Hydrogeologic cross-sections will be constructed using geologic/lithologic logs, geophysical logs, and AEM data relating to the stratigraphy within the Upper Aquifer, with particular focus on the upper 100 feet where there is potential for interconnectivity between groundwater and surface water. Field data will be evaluated relative to the dynamic relationship between surface water and groundwater levels within the Upper Aquifer (in both the shallow and deeper zones of the Upper Aquifer). These additional technical analyses will focus on providing further assessment of the surface water-groundwater dynamics along four key profiles perpendicular to the river (at new monitoring well locations) where the SJ River forms the boundary of Madera Subbasin to improve understanding of groundwater conditions in relation to surface water.

Task 4: Perform Outreach

Implementation of the Workplan will involve outreach and coordination with key stakeholders and interested parties. A key outreach effort is needed to restart consistent monitoring of SJRRP wells along the SJ River selected as RMS wells in the GSP. Additional outreach efforts will focus on efforts related to the need and benefit from additional groundwater level or surface water monitoring and prioritization of efforts to expand monitoring. In particular, there will be outreach and coordination with the adjacent Kings Subbasin, which is expected to be performing similar efforts related to ISW. In addition, it is anticipated there will be outreach to various entities that are likely to have interest in Madera Subbasin efforts related to ISW, including National Marine Fisheries Service (NMFS), United States Bureau of Reclamation (USBR), and The Nature Conservancy (TNC). The various outreach efforts may also benefit considerations related to the feasibility of potential PMAs to achieve sustainability.

Task 5: Complete Groundwater Modeling

The groundwater model developed for the GSP (MCSim) will be updated and recalibrated as necessary as part of the 5-Year Update Report. This updated modeling will be used to further evaluate ISW conditions, both historically as well as current and expected future conditions, with the objective of characterizing groundwater-surface water interaction at a broader spatial scale within the southern part of the Subbasin. The groundwater model will be used to assist in evaluation of the potential for ISW to be present along the SJ River, and to further evaluate the potential for connection between regional groundwater pumping and surface water flows. A key aspect of additional groundwater model simulations will be to further evaluate the percentage of time connectivity between groundwater and surface water existed along the SJ River prior to 2015 compared to current and expected future conditions with implementation of projects and management actions (PMA) and the ongoing SJRRP. These analyses will directly support the evaluation and determination of appropriate SMC related to ISW (as described in the GSP) under Task 6.

Task 6: Assess the Adequacy of Revised GSP SMC

An important outcome from efforts conducted as part of this Workplan will be an assessment of the need for ISW SMC and the associated RMS network that would be needed to support ISW SMC that is likely to be included as part of updates to the Revised GSP (to be submitted April 2023). The assessment will consider data and analyses developed through implementation of Tasks 1 through 5 of the Workplan to evaluate whether ISW exists along the southern boundary of Madera Subbasin and confirm if there is a need to include SMC for ISW in the GSP for the Madera Subbasin. While this work would be conducted ahead of and/or in parallel with DWR's development of guidance related to ISW, this analysis will include review and consideration of any guidance that may be provided by DWR related to ISW to the extent possible depending on the timing of any ISW guidance that may be provided.

Establishing final SMC for ISW for inclusion in the five-year update of the Revised GSP will draw upon the most recent data and technical analyses developed through implementation of this Workplan with consideration for the complexities of the

dynamic relationship between groundwater and surface water along the SJ River in the Subbasin under conditions prior to and after initiation of SJ River flow releases from Friant Dam as part of the SJRRP. In addition, this analysis will include review of beneficial uses and users and will describe how planned SMC will be protective of beneficial uses and users relative to potential impacts that have the potential to occur.

Task 7: Prepare a Technical Memorandum or Report

A technical memorandum (TM) or report will be prepared to document all the tasks completed as part of implementation of the Workplan. An interim TM/Report deliverable will be prepared to inform the five-year GSP update efforts occurring prior to January 2025. A Final TM/Report will be prepared and submitted at the time of completion of all field work, monitoring, and analyses outlined in the Workplan.

The **goal** of this component is to enhance the characterization of ISW along the SJ River within the Subbasin. The **objectives** are to fill data gaps, improve and expand monitoring activities, and synthesize new and existing ISW data. The **needs** for this component, in addition to funding, include the dedicated GSA staff and participation by the Madera Subbasin community. The component will meet the goals, objectives and needs by implementing the scope of work, providing there is sufficient funding, based on the budget request, herein.

This component will directly affect measurable objectives (MOs) and minimum thresholds (MTs) for ISW. This component should be completed before the April 2026 and is **feasible** if funded. The component **benefits** include enhanced well and water information so the GSAs can better manage the subbasin and will assist in the GSP implementation, since it will improve characterization of ISW and provide more robust monitoring data, both surface water and groundwater, for the Subbasin. Lastly, this component would provide benefits for Underrepresented Communities (URCs) throughout the Madera Subbasin (Att4 Fig. 1-1 and 1-2). The Madera Subbasin includes URCs: Disadvantaged Communities (DACs) in Madera, Parksdale, and Parkwood, and a Severely Disadvantaged Community (SDAC) in Fairmead (Att4 Fig. 1-1 and 1-8). This component would benefit these URCs by minimizing risks and improving groundwater resources through informed decision making and robust monitoring resulting from monitoring enhancements.