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Salinas Valley: 180/400-Foot Aquifer Subbasin Groundwater Sustainability Plan

VOLUME 3

Chapter 9. Projects and Management Actions

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Prepared for:

Salinas Valley Basin Groundwater Sustainability Agency

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9 PROJECTS AND MANAGEMENT ACTIONS

9.1 Introduction

This chapter describes the projects and management actions that will allow the Subbasin to attain sustainability in accordance with §354.42 and §354.44 of the SGMA regulations. This chapter includes a description of a water charges framework, proposed groundwater management actions, and proposed projects. In this GSP, the term groundwater management actions generally refers to activities that support groundwater sustainability without infrastructure; projects are activities supporting groundwater sustainability that require infrastructure.

The water charges framework, management actions, and projects in this GSP are designed to achieve a number of outcomes including:

- Achieving groundwater sustainability by meeting Subbasin-specific sustainable management criteria by 2040
- Providing equity between who benefits from projects and who pays for projects
- Providing a source of funding for project implementation
- Providing incentives to constrain groundwater pumping within limits

The management actions and projects included in this chapter outline a framework for achieving sustainability, however many details must be negotiated before any of the projects and management actions can be implemented. Costs for implementing projects and actions are in addition to the agreed-upon funding to sustain the operation of the GSA, and the funding needed for monitoring and reporting. The collection of projects and management actions included in this chapter demonstrate that sufficient options exist to reach sustainability. Not all projects and actions have to be implemented to attain sustainability, and they have not yet all been agreed-upon by stakeholders. Therefore, the projects and management actions included here should be considered a list of options that will be refined during GSP implementation.

This GSP is developed as part of an integrated sustainability plan that is being developed by the SVBGSA to achieve groundwater sustainability in all six of the Salinas Valley Groundwater Basin subbasins under its authority. Therefore, the projects and actions included in this GSP are part of a larger set of integrated projects and actions for the entire Salinas Valley Groundwater Basin. All of the integrated projects and management actions for the Salinas Valley Groundwater Basin are included in this GSP, although the benefit may be limited in this Subbasin.

The negotiations and discussions regarding specific projects will occur while the GSPs for the five remaining subbasins in the Valley are being drafted. The discussions will likely continue during the early years of GSP implementation. Members of the SVBGSA and stakeholders in the

Subbasin should view the list of projects and management actions as a starting point for more detailed discussions. Where appropriate, details that must be agreed upon are identified for each management action or project. The projects and management actions included in this chapter are supported by the best available information and best available science; however, further information may need to be collected in the implementation period to refine projects and management actions.

As a means to compare projects, this chapter estimates the cost per acre-foot for each project or action as appropriate. The cost per acre-foot is the amortized cost of the project divided by the annual yield. It is not the cost of irrigation. Because most growers will be allowed to pump some groundwater and irrigate with that groundwater, water supplied by the projects in this chapter represent only a portion of each grower's irrigation water. Therefore, actual costs seen by growers are proportional to the grower's individual need for project water.

The approach to implementing the water charges framework, management actions, and projects will provide individual landowners and public entities flexibility in how they manage water and how the Subbasin achieves groundwater sustainability. All groundwater pumpers will be allowed to make individual decisions on how much groundwater they pump based on their perceived best interests.

9.2 Water Charges Framework

The proposed water charges framework is the fundamental structure for managing groundwater pumping and funding projects. This framework is designed to achieve two important outcomes:

1. Promote voluntary pumping reductions; and
2. Fund new water supply projects by charging fees for various levels of pumping.

Many details of the water charges framework will be developed through negotiations during the first three years of GSP implementation. Depending on the outcome of the negotiations, long-term GSP implementation may be funded by the water charges framework, other financing method as permitted by SGMA and other state law, or a combination thereof.

If implemented as outlined in this chapter, a similarly structured water charges framework with a tiered structure of charges will be applied in all subbasins of the Salinas Valley Groundwater Basin. However, details such as pumping allowance quantities and tier charges will be different for each subbasin, because the demand and sustainable yield varies by subbasin. Each subbasin's water charges framework will reflect the specific hydrogeology and conditions of that subbasin.

The water charges framework includes the following components, described further below.

- **Exempt Groundwater Pumpers** may include *de-minimis* pumpers or other classes of pumpers that are not managed by this GSP.
- **Sustainable Pumping Allowances** are a base amount of groundwater pumping assigned to each non-exempt groundwater pumper. The sum of all sustainable pumping allowances and exempt groundwater pumping is the sustainable yield of the Subbasin. The sustainable yield will be regularly reassessed based on improved data and tools.
- **Transitional Pumping Allowances** are the difference between current assumed pumping and the sustainable pumping allowance. These transitional pumping allowances may be reduced over time to move from current pumping practices to sustainable pumping.
- **Supplementary Pumping** is all groundwater pumping above the sustainable and transitional pumping allowance.
- Sustainable and transitional pumping allowances are quantified for every non-exempt groundwater pumper. These allowances are not water rights. Instead, they are pumping amounts that form the basis of a financial fee structure to both implement the regulatory functions of the SVBGSA and fund new water supply projects.
- Pumping is recorded annually for all non-exempt pumpers.
- All pumpers are charged based on a tiered rate structure. Groundwater pumped within the sustainable pumping allowance is charged a base rate called Tier 1 – Sustainable Pumping Charge. Groundwater pumped in excess of the sustainable pumping allowance is charged a rate called Tier 2 – Transitional Pumping Charge. This charge is for any pumping above the sustainable pumping allowance but within their transitional allowance. Any groundwater pumped above the transitional pumping allowance is subject to Tier 3 - Supplementary Pumping Charge. This charge is for the excess amount that is pumped above the Tier 1 and Tier 2 charges.
- Tier 1 funds are used to implement the regulatory functions of implementing SGMA. This may include developing and implementing an improved water metering program, regular data collection and monitoring, negotiating program details, acquiring water rights or contracts, conducting feasibility studies for projects, and permitting and developing one or more of the management actions or projects described in this chapter.
- Tier 2 and Tier 3 funds are used to build projects and pay annual costs of purchasing and treating water supplies that have a defined benefit to individuals or groups.
- Transitional pumping allowances are phased out over 10 to 15 years to encourage pumping within the sustainable yield.

The fee structure in the water charges framework is designed to promote conservation and voluntary pumping reductions. Individual groundwater pumpers may choose to switch to less water-intensive crops, implement water use efficiencies, fallow a portion of their land, or transition to non-groundwater sources. Alternatively, if reducing pumping is not the best economic option, a pumper may instead opt to pay the overproduction Tier 2 and Tier 3 charges.

The tiered fee structure and allowances will not be uniform across the subbasins of the Salinas Valley Groundwater Basin in the final water charges framework agreement. The fee structures and pumping allowances in each subbasin will be developed in accordance with, or acknowledging, all existing laws, judgments, water management agreements, and established water rights.

The following sections detail the components of the suggested water charges framework outlined above.

9.2.1 Well Registration and Metering

All groundwater production wells, including wells used by *de-minimis* pumpers, must be registered with the SVBGSA. If the well has a meter, the meter must be calibrated on a regular schedule in accordance with manufacturer standards and any programs developed by the SVBGSA or MCWRA. Well registration is intended to establish a relatively accurate count of all the active wells in the Subbasin. Well metering is intended to improve estimates of the amount of groundwater extracted from the Subbasin. SGMA does not allow metering of *de-minimis* well users, and therefore well metering is limited to non-*de minimis* wells. The details of the well registration program, and how it integrates with existing ordinances and requirements, will be developed during the first 2 years of GSP implementation.

9.2.2 Pumping Allowances

Pumping allowances are established to enable development of the tiered pumping charge system, and calculation of over-pumping surcharges and supplemental charges. Pumping allowances are not a water right. The proposed process for establishing initial pumping allowances is as follows. This process may be modified based on negotiations during the first three years of implementation:

- **Sustainable Pumping Allowances**: All land parcels located outside of the service area of a municipal water provider, and land parcels located within the service area of a municipal water provider that are actively farmed as of 2017, will receive a sustainable yield pumping allowance based on a pro-rata share of their subbasin's sustainable yield. The methodology for determining pro-rata shares will be developed during the first three years of GSP implementation. The pro-rata shares may be based on some combination of land acreage, historical crop types grown on the parcel, standardized crop duties for the particular subbasin, historical groundwater use, or other factors. Because the sustainable pumping allowances are designed to limit pumping to the Subbasin's sustainable yield, it is likely that in the 180/400-Foot Aquifer Subbasin, the pro-rata sustainable allowances will be less than the current groundwater use in the Subbasin.

Sustainable allowances for municipal and industrial groundwater pumpers will be addressed when sustainable pumping allowances are being developed for agricultural pumpers. Because these allowances are not water rights, municipal and industrial water users will be able to pump groundwater even without a quantified sustainable allowance. However, if municipal and industrial groundwater pumpers are not provided a sustainable allowance, any groundwater pumping by these entities will be subject to the Tier 2 Transitional Pumping Charge and Tier 3 Supplemental Pumping Charge.

- **Transitional Pumping Allowances**: In addition to any sustainable pumping allowance that may be assigned, agricultural, municipal, industrial, and other groundwater pumpers will receive a transitional pumping allowance. The transitional pumping allowance will be quantified based on the difference between a groundwater user's actual historical pumping amounts (estimated or measured) and their sustainable allowance. The purpose of this transitional allowance is to ensure that no pumper is required to immediately reduce their pumping, but rather pumpers have an opportunity to reduce their pumping over a set period of time. Maximum annual pumping between 2012 and 2017 will be used to determine transitional pumping allowances. These years are chosen for general consistency with the future water budget calculations which is based on current land use.
- **Transitional Pumping Allowance Phase-out**: Transitional pumping allowances will be phased out until total pumping allowances in each subbasin are less than or equal to the calculated sustainable yield. The phase-out may occur over a time span of 10 to 15 years. The extent and timing of the phase-outs will vary by subbasin to achieve sustainability. The specific phase-out amounts and timing will be determined in negotiations during the first three years of GSP implementation and may be periodically modified by the SVBGSA.
- ***De minimis* Pumpers**: Notwithstanding the foregoing, *de minimis* pumpers are exempt from the fees under the water charges framework.
- **CSIP Water Users**: Some of the projects proposed below will decrease groundwater pumping through additional CSIP deliveries. CSIP water users may have separate allowances that promote CSIP use and acknowledge limitations on the ability to pump groundwater in the CSIP area.

Figure 9-1 shows an example of how the sustainable allowance, transitional allowance, and supplemental charges work together for pumpers not relying on CSIP. In this example, a parcel is assigned a sustainable allowance of 100 AF/yr., which is shown in blue. The SVBGSA will apply the Tier 1 Sustainable Pumping Charge to any pumping within that allowance. The example parcel shown on Figure 9-1 currently pumps 128 AF/yr. Therefore, the initial transitional pumping allowance is 28 AF/yr., which is shown in yellow. This transitional allowance will be phased out over 10 years. The SVBGSA will apply the Tier 2 Transitional Pumping Charge to any pumping within the transitional allowance. Any pumping above the transitional allowance will be subject to the Tier 3 Supplemental Pumping Charge. This is shown by the dark orange bars. Beginning in year 10, any pumping above the sustainable allowance will be subject to the Tier 3 Supplemental Pumping Charge because there is no transitional allowance beginning in that year.

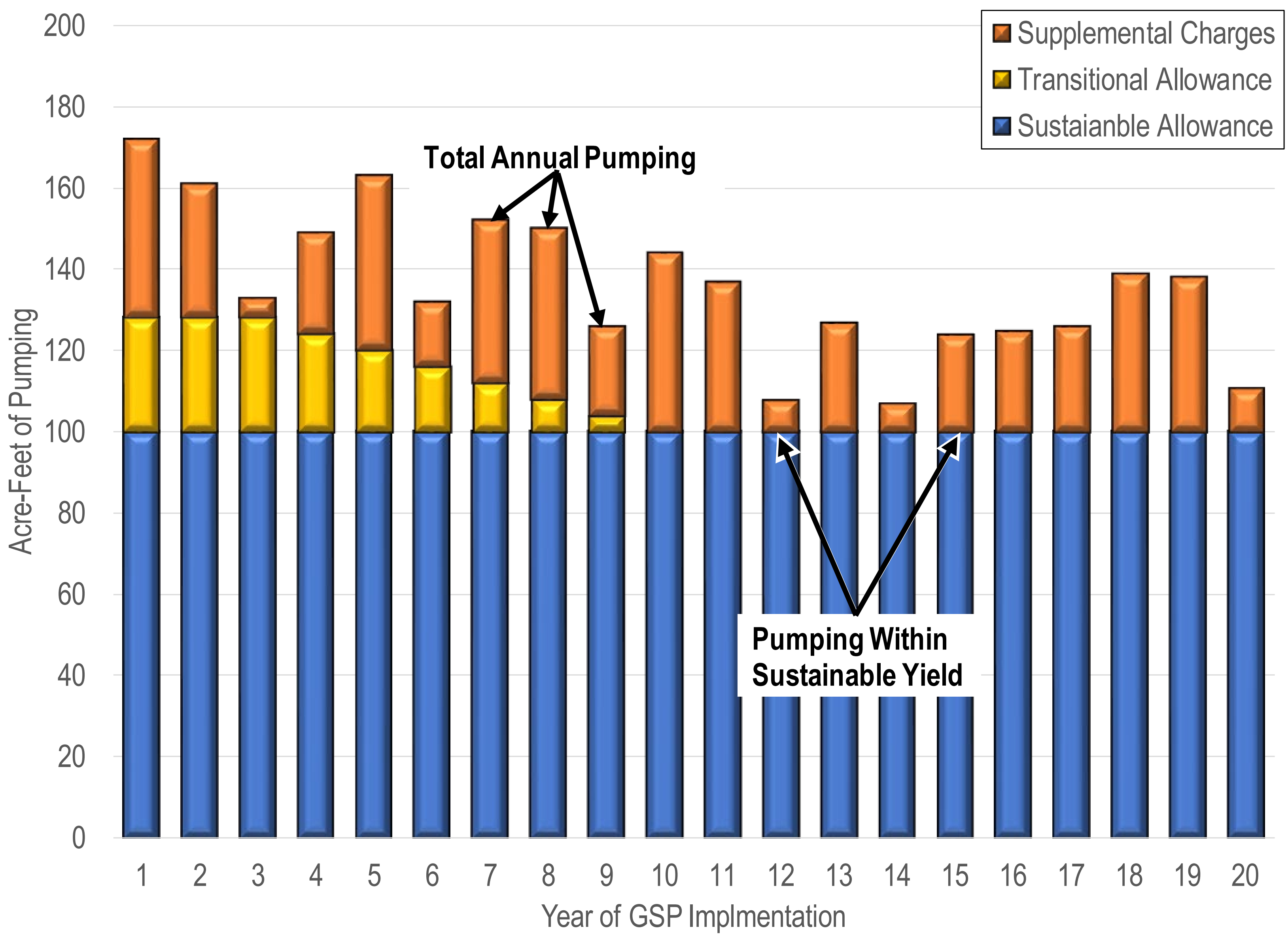


Figure 9-1. Example Pumping Allowances

9.2.3 Carryover and Recharge

To provide pumpers the flexibility to pump more during dry years and less during wet years, the unused portion of a pumping allowance for a given year may be carried over for use in subsequent years. The maximum amount a pumper can carryover is limited to an amount equal to that pumper's current, single year, sustainable pumping allowance. The SVBGSA may elect to impose an annual loss factor that reduces a pumper's carryover credits due to natural hydrogeologic losses from the Subbasin. The exact loss percentage will be agreed to in the final water charges framework.

The carryover element of pumping allowances allows groundwater pumpers to pump more water only if they have previously banked pumping credits. This prevents a pumper from pumping carryover credits that they assume may occur in the future, and directly addresses the requirements of the SGMA regulations §354.44(b)(9) which requires that, "chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods" (CCR, 2016).

Water intentionally recharged by an individual or entity will be recognized by award of recharge credit to the recharging individual or entity on a 1 AF for 1 AF basis, subject to losses that the SVBGSA may elect to impose. Recharge credit balances will be reduced or debited when the recharged water is recovered. The SVBGSA will develop a system of confirming and accounting for recharge credits and debits as discussed in Section 9.2.6.

9.2.4 Relocation and Transfer of Pumping Allowances

Pumping allowances may be moved between properties temporarily or permanently within the Subbasin. Such re-location of pumping allowances is subject to review by the SVBGSA to ensure that such relocation or transfer does not prevent the sustainability goal from being met. The SVBGSA will model the effects of the relocation to assess any significant and unreasonable impacts from the proposed relocation. Relocating pumping allowances provides pumpers with flexibility to manage their land, water resources, and finances as they desire. Pumping allowances could also be permanently or temporarily transferred between different owners and could be used for another pumping purpose.

9.2.5 Non-Irrigated Land

Although much of the land in the 180/400-Foot Aquifer Subbasin is either currently under irrigation or is supplied by municipalities, there is some land that may be currently fallow. The GSP recognizes that owners of such land may wish to begin pumping in the future consistent with their overlying rights. Such pumping is not limited by this GSP. The SVBGSA may wish to provide sustainable allowances to all landowners, effectively diminishing the allowance of current irrigators. Optionally, non-exempt pumpers who do not receive an initial pumping allowance may:

1. Acquire pumping allowance from willing sellers subject to SVBGSA approval, and/or
2. Pay the surcharges associated with pumping above their pumping allowance.

The final approach to addressing allowances for fallow land will be developed in the first three years of GSP implementation.

9.2.6 Administration, Accounting, and Management

The SVBGSA will administer the water charges program. Administrative duties will include developing initial pumping allowances; tracking pumping allowance ownership; accounting for water use; accounting for carryover credits and recharge credits; calculating, assessing, and collecting fees; and reviewing proposed re-location and transfer of pumping allowances. The SVBGSA would use water charges revenues to fund projects that develop new water supplies for the benefit of the 180/400-Foot Aquifer Subbasin.

9.2.7 Details to be Developed

The sections above present an initial structure for the water charges framework; however, stakeholders must agree to a number of details before the SVBGSA initiates the water charges framework. An initial list of details that must be negotiated are presented below to provide SVBGSA members and stakeholders an understanding of the range of specifics that are open for negotiation during the first three years of implementation.

- Are *de-minimis* pumpers that pump less than 2 AF/yr. for domestic purposes exempt from the water charge framework and other management actions?
- Are any class of pumpers other than *de-minimis* pumpers exempt from the water charge framework and other management actions?
- How are sustainable pumping allowances set?
- How are transitional allowances phased out in the Subbasin? Over what time frame are pumping allowances ramped down?
- What is the Tier 1 Sustainable Pumping Charge?
- What is the Tier 2 Transitional Pumping Charge?
- What is the Tier 3 Supplemental Pumping Charge?

- What is an equitable balance between the Tier 1 Sustainable Pumping Charge collected in the 180/400-Foot Aquifer Subbasin and the Tier 1 Sustainable Pumping Charge collected in other subbasins?
- What is an equitable balance between the Tier 2 Transitional Pumping Charge collected in the 180/400-Foot Aquifer Subbasin and the Tier 2 Transitional Pumping Charge collected in other subbasins?
- What is an equitable balance between the Tier 3 Supplemental Pumping Charge collected in the 180/400-Foot Aquifer Subbasin and the Tier 3 Supplemental Pumping Charge collected in other subbasins?
- How is currently non-irrigated (e.g., fallowed) land addressed?
- How are municipalities addressed?
- What are the limits and parameters of the carryover and recharge options?
- What is involved in approving relocation or transfer of pumping credits?

9.3 Management Actions

Management actions are new or revised non-structural programs or policies that are intended to reduce or optimize local groundwater use. Management actions will be implemented only if they are deemed cost effective or necessary to achieve sustainability.

9.3.1 All Management Actions Considered for Integrated Management of the Salinas Valley Groundwater Basin

This GSP is part of an integrated plan for managing groundwater in all six subbasins of the Salinas Valley Groundwater Basin that are managed by the SVBGSA. The projects and management actions described in this GSP constitute an integrated management program for the entire Valley. The program's projects and management actions were selected from a larger set of potential actions. Appendix 9A includes the full list of potential management actions that were considered for the Valley-wide integrated management program.

The SVBGSA assessed the potential management actions listed in Appendix 9A for effectiveness in achieving sustainability throughout the Basin. It selected five management actions as the most reliable, implementable, cost-effective, and acceptable to stakeholders. The first three management actions benefit the entire Salinas Valley Groundwater Basin; the last three management actions are specific to the 180/400-Foot Aquifer Subbasin. The sections below describe how the SVBGSA will implement each management action, if stakeholders decide to pursue them.

9.3.2 Priority Management Action 1: Agricultural Land and Pumping Allowance Retirement

The SVBGSA may use water charges revenues to acquire and retire irrigated land and/or pumping allowances (potentially including carryover credits and recharge credits) to reduce pumping. If pursued, the SVBGSA will complete all acquisitions on a voluntary basis from willing sellers at negotiated market prices. The SVBGSA would cease irrigation on acquired land to reduce pumping. The SVBGSA will coordinate with other local agencies and stakeholders to determine beneficial uses of the acquired land, such as establishing native vegetation or converting to other habitat.

Landowners selling pumping allowances to the SVBGSA separate from land will be permitted to convert their land to other uses in compliance with the County of Monterey's General Plan. The number of *de-minimis* wells authorized on converted land will be based on the amount of pumping allowance sold to the SVBGSA. The final ratio of sold pumping allowance to the number of *de-minimis* wells allowed will be agreed to in the final water charges framework. For illustrative purposes, one *de-minimis* well could be authorized for every 20 to 40 AF of pumping allowance sold to the SVBGSA. The details of how much pumping must be retired for every *de-minimis* pumper allocation will be developed during the first three years of GSP implementation.

9.3.2.1 Relevant Measurable Objectives

The measurable objectives benefiting from land retirement include:

- Groundwater elevation measurable objectives, depending on the location of the land retirement. Less pumping will result in higher groundwater elevations.
- Groundwater storage measurable objective. This measurable objective is based on total pumping in the Subbasin, therefore land retirement with reduced pumping contributes to meeting this objective and will help achieve the goal of reducing total extractions to the long-term sustainable yield.
- Land subsidence measurable objectives, depending on the location of the land retirement. Land retirement will reduce the pumping stress on the local aquifer(s) and thereby reduce the potential for subsidence.
- Seawater intrusion measurable objective, depending on the location of the land retirement. Land retirement near the coast will reduce the pumping stress that causes groundwater elevations to drop below levels that cause seawater intrusion.

9.3.2.2 Expected Benefits and Evaluation of Benefits

The primary benefit from land retirement is reduced Subbasin pumping. A second benefit is either halting the decline of or raising groundwater elevations. Depending on the location of the land retirement, ancillary benefits of shallower groundwater elevations may include avoiding subsidence, reducing surface water depletion rates, and reducing seawater intrusion rates. Because it is unknown how many landowners will willingly enter the land retirement program, it is difficult to quantify the expected benefits at this time.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater elevation monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. A direct correlation between agricultural land retirement and changes in groundwater elevations is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.3.2.3 Circumstances for Implementation

Agricultural land retirement relies on willing sellers. No other triggers are necessary or required. The circumstance for implementation is for willing sellers to contact the SVBGSA.

9.3.2.4 Public Noticing

Any agricultural land retirement achieved through a land sale will be recorded with the County of Monterey Office of the Tax Assessor. All agricultural land retirement, whether through sale of land or pumping allowance, will be recorded in the publicly accessible portion of the water charges framework database.

9.3.2.5 Permitting and Regulatory Process

No permitting or regulatory processes are necessary for buying land or pumping allowances.

9.3.2.6 Implementation Schedule

The option for land retirement will begin immediately after the water charges framework is finalized and adopted. Although the land retirement program is ongoing, it is reliant on willing sellers and will likely be implemented intermittently.

9.3.2.7 Legal Authority

California Water Code §10726.2 provides GSAs the authority to purchase, among other things, land, water rights, and privileges.

9.3.2.8 Estimated Cost

Market values for agricultural land eligible for sustainable yield and transitional pumping allowances are reported to range from $26,000 per acre to $70,000 per acre (American Society of Farm Managers and Rural Appraisers, 2019). While some vineyards have sold for higher prices, it is unlikely that the SVBGSA will seek to acquire and retire the Subbasin's highest-quality vineyard land due to cost considerations.

As an example, assuming that retiring one acre of eligible land would reduce pumping by 3 AF and that the SVBGSA can acquire and retire land for $26,000 per acre to $70,000 per acre, the cost per acre-foot of pumping reduction will range from approximately $8,700 per acre-foot to $23,300 per acre-foot. If amortized over 25 years at a 6% interest rate, these one-time capital expenditures are equivalent to annualized costs of approximately $680 per acre-foot to $1,820 per acre-foot.

9.3.3 Priority Management Action 2: Outreach and Education for Agricultural BMPs

Priority Management Action 2 advances outreach and education programs that support innovative irrigation and agricultural practices across the Salinas Valley Groundwater Basin. These programs will educate farmers, promote water conservation, crop sustainability, and crop advancements. They will include improving data collection for agricultural efficiency. These programs will help minimize the impacts of potentially reduced groundwater supplies to the agricultural community.

Outreach and education for agricultural BMPs will provide funding to farmers for outreach and education on new technologies, potential pilot programs, and other innovative ideas that support the overall advancement of the farming community and ultimately provide an overall benefit to the sustainability of the groundwater basin. Outreach and education may include education on GDEs and surface water depletions to promote overall water management in the Valley.

9.3.3.1 Relevant Measurable Objectives

The measurable objectives benefiting from outreach and education include:

- Groundwater elevation measurable objectives. Outreach and education will focus on reducing pumping and water conservation methods. Less pumping will result in higher groundwater elevations.

- Groundwater storage measurable objective. This measurable objective is based on total pumping in the Subbasin; therefore, the education and outreach will focus on identifying best management practices that will reduce pumping and will help achieve the goal of reducing total extractions to the long-term sustainable yield.

- Land subsidence measurable objectives. Outreach and education will focus on reducing pumping and water conservation methods, thereby reducing the pumping stress on the local aquifer(s) and reducing the potential for subsidence.

- Seawater intrusion measurable objective, depending on the location. Decreased water use near the coast will reduce the pumping stress that causes groundwater elevations to drop below the level that causes seawater intrusion.

- Depletion of interconnected surface water measurable objective. Education on GDEs and interconnected surface water may result in reduced surface water depletions.

9.3.3.2 Expected Benefits and Evaluation of Benefits

The primary benefit of implementing an outreach and education program is to provide the latest technologies and opportunities to farmers, allowing them to reduce pumping while realizing the same crop yields. This program could also be a mechanism for grant opportunities, funded through the SVBGSA to identify pilot programs and other innovative technological advancements that could provide an overall groundwater basin benefit.

9.3.3.3 Circumstances for Implementation

The circumstance for implementation is for willing farmers to participate in an education and outreach program and to work with the SVBGSA to identify conservation opportunities. No other triggers are necessary or required.

9.3.3.4 Public Noticing

There will be public noticing of education and outreach programs.

9.3.3.5 Permitting and Regulatory Process

No permitting or regulatory processes are necessary for an education and outreach program.

9.3.3.6 Implementation Schedule

The option for an outreach and education program will begin immediately after the water charges framework is finalized and adopted. This program will be ongoing.

9.3.3.7 Legal Authority

No authority is needed to promote outreach and education.

9.3.3.8 Estimated Cost

The Outreach and Education Program would be an annual program that would be implemented. The SVBGSA would set aside approximately $100,000 each year to promote opportunities for education seminars, grant writing tasks, etc. focused on best management practices in the agricultural industry.

9.3.4 Priority Management Action 3: Reservoir Reoperation

Reservoir reoperation entails working closely with MCWRA, National Marine Fisheries Service, and other stakeholders on developing a revised HCP, and a related plan for managing Nacimiento and San Antonio Reservoir flows into the Salinas River. The purpose of this management action is to operate the reservoirs to achieve two goals:

1. Allow surface flow releases to recharge groundwater in the various subbasins of the Salinas Valley Groundwater Basin almost every winter
2. Allow river flows to better reach the SRDF diversion when needed

Reservoir reoperations would more tightly integrate environmental flows with sustainable groundwater management activities in the Valley to improve water availability for agricultural users and other groundwater users. The major beneficiaries of this management action would be the Upper Valley and Forebay Subbasins, as they receive most of the river percolation. There is limited benefit for the 180/400-Foot Aquifer Subbasin, primarily to allow enough water to flow to the SRDF for CSIP operations.

Reservoir operations are controlled by MCWRA, and therefore the SVBGSA cannot directly modify reservoir operations. Over the next few years, MCWRA will develop an HCP that establishes the reservoir operating rules for the Nacimiento and San Antonio Reservoirs. The HCP offers an opportunity for reservoirs to be explicitly operated for improved groundwater management as well as environmental flows and flood control. The SVBGSA will participate in developing the HCP to implement the reservoir operations in a way that promotes this management action.

9.3.4.1 Relevant Measurable Objectives

The measurable objectives benefiting from reservoir reoperation include:

- Groundwater elevation measurable objectives. Re-operating the Salinas River reservoirs will allow for more surface water to percolate to groundwater, primarily in the Upper Valley and the Forebay Subbasins, and would recharge groundwater subbasins and raise groundwater elevations.

- Groundwater storage measurable objective. Increased groundwater recharge near the Salinas River will help improve groundwater storage.
- Land subsidence measurable objectives. Increased groundwater recharge near the Salinas River will help reduce or prevent subsidence.
- Seawater intrusion measurable objective. By allowing additional surface flows to reach the SRDF, more surface water will be used in the CSIP area with reduced pumping which would result in lower seawater intrusion potential.
- Interconnected surface water measurable objective. By allowing more flows to stay in the Salinas River year-round, the areas that are interconnected would stay connected to groundwater and benefit all beneficial users on the river.

9.3.4.2 Expected benefits and evaluation of benefits

The primary benefit from reservoir reoperation is additional groundwater recharge in the subbasins and more flexible use of the groundwater in storage. A second benefit is the availability of water at the SRDF diversion to allow for greater surface water use in the CSIP area. HCP development will also assess and likely enhance environmental benefits.

Because of the pending HCP on the Salinas River, the details of the future reservoir operations are unknown. The SVBGSA will work collaboratively with MCWRA to make sure the reservoirs are operated in a manner to benefit groundwater recharge and help with the sustainable management of the Salinas Valley Groundwater Basin.

9.3.4.3 Circumstances for implementation

The San Antonio and Nacimiento Reservoirs are currently operated by MCWRA to satisfy multiple beneficial uses. This management action will be implemented when MCWRA develops the HCP. The pending HCP will prescribe additional criteria for reservoir operations. As part of these new rules, the SVBGSA will work with MCWRA to work winter flow releases into the criteria for operations.

9.3.4.4 Public noticing

This management action is part of the MCWRA HCP process, and the public noticing will occur as part of the HCP development.

9.3.4.5 Permitting and Regulatory Process

This management action will follow the ongoing permitting and regulatory process used by MCWRA for reservoir operations.

9.3.4.6 Legal Authority

The SVBGSA does not have any authority over surface water management or reservoir operations. Thus, the SVBGSA will work collaboratively with MCWRA on developing appropriate reservoir operation rules that benefit groundwater recharge.

9.3.4.7 Implementation Schedule

The reservoir reoperation management action schedule will be contingent upon the development and finalization of the HCP and other reservoir operations criteria. The implementation schedule will start as soon as new reservoir operations criteria are developed in collaboration with MCWRA. The HCP is scheduled to be completed within the next three to five years.

9.3.4.8 Estimated Cost

The estimated costs are related to SVBGSA participation in the HCP process. This will include attending meetings and providing comments to the HCP. MCWRA will fund the completion of the HCP, therefore, the costs for development of the HCP are not included in the cost estimate. For costing purposes, we have assumed the HCP is a three-year process. SVBGSA participation will cost approximately $50,000 per year, for a total cost of $150,000.

9.3.5 Priority Management Action 4: Restrict Pumping in CSIP Area

A number of the priority projects included in Section 9.4 are designed to ensure a reliable, year-round supply of water to growers in the CSIP area. These projects will remove any need for groundwater pumping in the CSIP area. To promote use of CSIP water, the SVBGSA will pass an ordinance preventing any pumping for irrigating agricultural lands served by CSIP. To ensure adequate water supplies for CSIP, the CSIP supplementary wells will be exempt from the restrictions in this ordinance.

9.3.5.1 Relevant Measurable Objectives

The measurable objectives benefiting from pumping restriction in the CSIP Area include:

- Groundwater elevation measurable objectives. Restricting pumping will limit drawdowns that may lead to significant and unreasonable groundwater elevations.
- Groundwater storage measurable objective. Reducing pumping will directly help the SVBGSA reach the pumping goals in the groundwater storage measurable objective.
- Land subsidence measurable objectives. Reduced groundwater pumping yields higher groundwater elevations, helping reduce or prevent subsidence.

- Seawater intrusion measurable objective. Reducing pumping may reduce landward gradients that induce seawater intrusion. This will lower seawater intrusion potential.

9.3.5.2 Expected benefits and evaluation of benefits

The primary benefit from the CSIP pumping restrictions is controlling Subbasin pumping. A secondary benefit is either halting the decline of, or raising, groundwater elevations from the reduced pumping. An ancillary benefit from shallower groundwater elevations may include avoiding subsidence and reducing seawater intrusion.

Reductions in groundwater pumping will be measured directly through the improved metering program and recorded in the data management system. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using DWR’s InSAR maps as detailed in Chapter 7. Seawater intrusion will be measured using MCWRA’s existing mapping approach as detailed in Chapter 7. A direct correlation between the CSIP pumping restrictions and changes in groundwater elevations is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.3.5.3 Circumstances for implementation

CSIP pumping restrictions will only be implemented after the CSIP optimization projects are implemented, providing a reliable supply of water to growers in the CSIP area.

9.3.5.4 Public Noticing

Public meetings will be held to inform groundwater pumpers and other stakeholders that the CSIP pumping reduction program is being developed. The CSIP pumping reduction program will be developed in an open and transparent process. Groundwater pumpers and other stakeholders will have the opportunity at these meetings to provide input and comments on the process and the program elements.

9.3.5.5 Permitting and Regulatory Process

The CSIP pumping reduction program is subject to CEQA. The CSIP pumping reduction program would be developed in accordance with all applicable groundwater laws and respect all groundwater rights.

9.3.5.6 Legal Authority

California Water Code §10726.4 (a)(2) provides GSAs the authorities to control groundwater extractions by regulating, limiting, or suspending extractions from individual groundwater wells or extractions from groundwater wells in the aggregate (CWC, 2014).

9.3.5.7 Implementation Schedule

CSIP pumping restrictions will be implemented within 1 year of substantially completing the CSIP projects (Priority Projects 2, 3, 4, and 5).

9.3.5.8 Estimated cost

The SVBGSA will support the development of a mandatory pumping reduction program. The implementation of the program will be through MCWRA and is estimated to take 2 years to develop. The support of the implementation program will be $50,000 for 2 years or a total of $100,000. This does not include the cost of the CEQA permitting or any ongoing program oversight.

9.3.6 Priority Management Action 5: Support and Strengthen Monterey County Restrictions on Additional Wells in the Deep Aquifers

Monterey County Ordinance 5302 temporarily restricts drilling new wells in the Deep Aquifers in portions of the 180/400-Foot Aquifer Subbasin: generally northwest of Davis Road. In the portions of the Subbasin southeast of Davis Road, it is the intent and purpose of the ordinance to require testing to ensure new wells do not extract water from the Deep Aquifers. Exceptions are made for replacement wells, domestic wells, and municipal supply wells. This is a temporary urgency ordinance pending development of permanent regulations.

SVBGSA will work with Monterey County to extend this ordinance to prevent any new wells from being drilled into the Deep Aquifers until more information is known about the Deep Aquifers' sustainable yield. MCWRA plans to complete this study of the Deep Aquifers over the next three years, when funding becomes available. SVBGSA will comment on the MCWRA study of the Deep Aquifers to ensure that the study and the resulting permanent regulations will promote groundwater sustainability as defined in this GSP.

9.3.6.1 Relevant Measurable Objectives

The measurable objectives benefiting from Deep Aquifers pumping restrictions include:

- Groundwater elevation measurable objectives. Restricting the number of pumping wells will limit groundwater drawdown that may lead to significant and unreasonable groundwater elevations.

- Groundwater storage measurable objective. Restricting the number of pumping wells will directly help the SVBGSA reach the pumping goals in the groundwater storage measurable objective.

- Land subsidence measurable objectives. Restricting the number of pumping wells yields higher groundwater elevations, helping reduce or prevent subsidence.
- Seawater intrusion measurable objective. Restricting the number of pumping wells may reduce landward gradients that induce seawater intrusion. This will lower seawater intrusion potential. Restricting the number of pumping wells in the Deep Aquifers will also reduce the likelihood of vertical migration of impaired groundwater from overlying aquifers.

9.3.6.2 Expected benefits and evaluation of benefits

The primary benefit from the Deep Aquifers pumping restrictions is reduced Subbasin pumping in an aquifer with limited data. A second benefit is either halting the decline or raising groundwater elevations from the restricted pumping. An ancillary benefit from shallower groundwater elevations may include avoiding subsidence and reducing seawater intrusion.

Restrictions in groundwater pumping will be measured directly through the improved metering program and recorded in the data management system. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using DWR’s InSAR maps as detailed in Chapter 7. Seawater intrusion will be measured using MCWRA’s existing mapping approach as detailed in Chapter 7. A direct correlation between the Deep Aquifers pumping restrictions and changes in groundwater elevations is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.3.6.3 Circumstances for implementation

SVBGSA will support extension of Ordinance 5302 immediately. Deep Aquifers pumping will only be allowed after MCWRA completes its study of the Deep Aquifers’ sustainable yield.

9.3.6.4 Public Noticing

Public meetings will be held to inform groundwater pumpers and other stakeholders that the Deep Aquifers study is being developed, and that additional pumping restrictions may result from this study. The Deep Aquifers pumping restriction program will be developed in an open and transparent process. Groundwater pumpers and other stakeholders will have the opportunity at these meetings to provide input and comments on the process and the program elements.

9.3.6.5 Permitting and Regulatory Process

The pumping restriction program would be developed in accordance with all applicable groundwater laws and respect all groundwater rights.

9.3.6.6 Legal Authority

California Water Code §10726.4 (a)(2) provides GSAs the authorities to control groundwater extractions by regulating, limiting, or suspending extractions from individual groundwater wells or extractions from groundwater wells in the aggregate (CWC, 2014).

9.3.6.7 Implementation Schedule

SVBGSA will support extension of Ordinance 5302 immediately.

9.3.6.8 Estimated cost

The Deep Aquifers study and subsequent regulations will be developed by MCWRA. SVBGSA will supply oversight and support. The estimated cost for this oversight and support is $40,000 per year for 4 years for a total of $160,000.

9.3.7 Priority Management Action 6: Seawater Intrusion Working Group

SVBGSA will develop and coordinate a working group to address the issues associated with seawater intrusion. The working group will develop consensus on the current understanding of seawater intrusion in the Subbasin and adjacent subbasins subject to seawater intrusion, identify data gaps, and develop a broad-based plan for controlling seawater intrusion. The working group will include local agencies, landowners, stakeholders, and technical experts. The preliminary goal of the working group will be to develop consensus on the science of seawater intrusion in the Salinas Valley Groundwater Basin. The ultimate goal of the working group is to develop a comprehensive set of projects and management actions that control seawater intrusion while providing cost effective water supplies for the region.

9.3.7.1 Relevant Measurable Objectives

The measurable objective benefiting from a seawater intrusion working group includes:

- Seawater intrusion measurable objective.

9.3.7.2 Expected benefits and evaluation of benefits

The primary benefit from this seawater intrusion working group is to pull together the best available science, data, and understanding of local seawater intrusion causes and potential resolutions. The outcome of this working group is an agreed-to approach for managing seawater intrusion.

9.3.7.3 Circumstances for implementation

The working group will be implemented within one year of GSP adoption. No additional circumstances are needed. SVBGSA will lead the formation of such a working group and identify interested parties. In addition, SVBGSA will schedule and lead the meetings and outcomes of this group.

9.3.7.4 Public Noticing

Meetings and outcomes of this working group will be made publicly available.

9.3.7.5 Permitting and Regulatory Process

No permitting and regulatory processes apply to this Management Action.

9.3.7.6 Legal Authority

No authority is needed to develop a working group.

9.3.7.7 Implementation Schedule

SVBGSA will start the working group in 2020.

9.3.7.8 Estimated Cost

The estimated cost for consultant support to this working group is $125,000 per year for two years for a total of $250,000.

9.4 Projects

Projects involve new or improved infrastructure that are intended to help the SVBGSA meet SMCs in the Subbasin. Several potential projects that are currently being pursued by other agencies are included in this GSP. These projects are considered sufficiently established and will be constructed independently of, or in cooperation with, this GSP.

Projects fall into two categories:

- **Priority Projects**: The priority projects are the generally more cost-effective projects that could be implemented under the GSP. However, not all Priority Projects may be required depending on final benefit of each project.

- **Alternative Projects**: The alternative projects are the generally less cost-effective projects. Depending on the efficacy of the priority projects, one or more of the alternative projects may be implemented to meet the SMCs.

An overview of the project types and process through which all projects were considered are described in Sections 9.4.1 and 9.4.2. Priority Projects and Alternative Projects are described in Sections 9.4.3 and 9.4.4. General project provisions for all projects are listed together in Section 9.4.5, including permitting and regulatory processes, public noticing, and legal authority required for projects.

9.4.1 Overview of Project Types

There are four major types of projects that can be developed to supplement the Subbasin's groundwater supplies or limit seawater intrusion:

1. In-lieu recharge through direct delivery of water to replace groundwater pumping
2. Direct recharge through recharge basins or wells
3. Indirect recharge through decreased evapotranspiration or increased infiltration
4. Hydraulic barrier to control seawater intrusion

9.4.1.1 Project Type 1: In-Lieu Recharge through Direct Delivery

Direct delivery projects use available water supplies in lieu of groundwater. This option offsets the use of groundwater, allowing the groundwater basin to recharge naturally. Direct delivery projects rely on the construction of a pipeline to deliver the water to agricultural or municipal users, as well as pump stations and storage facilities to handle supply and demand variations. Direct delivery is a highly efficient method to reduce groundwater pumping because it directly offsets and decreases the amount of water pumped from the aquifer, allowing the principal aquifer groundwater elevations to rebound through natural recharge. One of the drawbacks of direct delivery is that the delivered water must be available during the dry season, a time period when water supplies are less likely to be available, especially during a dry year.

9.4.1.2 Project Type 2: Direct Recharge through Recharge Basins and Wells

Direct recharge of aquifers can be done through recharge basins or injection wells. Intentional, direct recharge is commonly referred to as Managed Aquifer Recharge (MAR), or Flood-Managed Aquifer Recharge (Flood-MAR) if recharge is done with flood water. Several of the projects listed in this chapter fall into this project type.

Recharge basins are large artificial ponds that are filled with water that seeps from the basin into the groundwater system. Recharge efficiencies can range greatly and the recharge efficiency of a recharge basin is contingent on the properties of the underlying soil, losses to evaporation, and potential seepage into streams or shallow sediments before it can recharge the deeper aquifers. Recharge efficiencies are difficult to measure without sophisticated subsurface monitoring.

Recharge through recharge basins can occur year-round; although efficiency might be lower during the rainy seasons if underlying soils are already saturated. Recharge basins have the advantage of generally being less expensive to build and operate than in-lieu distribution systems or injection systems.

Injection wells are used to inject available water supplies directly into the groundwater basin. Injection can occur year-round, including during the rainy season. Injection wells are typically more efficient at raising groundwater elevations than recharge basins because they target specific aquifers; although a well's recharge ability is affected by the surrounding aquifer properties. The injected water typically flows through the aquifer from the injection location to locations with lower groundwater elevations. The rate of travel depends on the hydraulic conductivity of the aquifer. Although they have a very high efficiency, injection wells are generally more expensive to operate than recharge basins. Additionally, injection wells require higher quality water than recharge basins.

9.4.1.3 Project Type 3: Indirect Recharge through Decreased Evapotranspiration or Increased Percolation

Increased groundwater supply can be achieved through either a decrease in evapotranspiration or an increase in rainfall percolation. Example projects include removal of invasive species from riparian corridors (decreased evapotranspiration) and stormwater capture (increased percolation).

Stormwater capture projects are typically relatively low yield per acre compared to direct recharge basins (Section 9.4.1.2), however they can cover relatively large areas without negative impacts to land use. Stormwater capture may additionally provide water quality benefits. Removal of invasive species in riparian corridors may provide multiple benefits such as flood control benefits. Implementation costs for these projects are typically capital intensive with only minor long-term maintenance costs. Thus, the water supply benefit/cost ratio can increase significantly over the long term.

9.4.1.4 Project Type 4: Hydraulic Barrier to Control Seawater Intrusion

A proposed hydraulic barrier would consist of a network of wells drilled a short distance inland from the coast and aligned approximately parallel to the coastline, across the width of the Subbasin. A hydraulic barrier can be operated as a recharge barrier, wherein water is injected into the wells and the resulting groundwater level mound creates the hydraulic barrier; Or the barrier can be operated as an extraction barrier, wherein the wells are pumped and the resulting groundwater level trough creates the hydraulic barrier. Recharge barriers require a source of water for recharge; extraction barriers require an end-use for the pumped water. Either configuration would require conveyance piping and may require water treatment.

9.4.2 All Projects Considered for Integrated Management of the Salinas Valley Groundwater Basin

This GSP is part of an integrated plan for managing groundwater in all six subbasins of the Salinas Valley Groundwater Basin under the jurisdiction of the SVBGSA. The projects listed in this GSP constitute an integrated management program for the entire Valley. The SVBGSA selected these projects from a larger set of potential projects. Appendix 9B lists the potential projects that were considered for the Valley-wide integrated management program.

The SVBGSA assessed potential projects listed in Appendix 9B for cost effectiveness in achieving sustainability throughout the Basin. It selected thirteen projects for further consideration based on the projects being the most reliable, implementable, cost-effective, and acceptable to stakeholders. These 13 projects were separated into priority projects and alternative projects. The priority projects are generally the most cost effective, and some subset of the priority projects will be implemented in the Salinas Valley Groundwater Basin as part of the six Salinas Valley GSPs. Alternative projects may be implemented in the Basin based on further analysis of the effectiveness of the priority projects, water availability, and refined cost estimates.

9.4.3 Selected Priority Projects for Integrated Management of the Salinas Valley Groundwater Basin

This GSP includes nine projects as priority projects. Some subset of these priority projects will be implemented as part of the six Salinas Valley Groundwater Subbasin GSPs. The priority projects may need to be supplemented by additional alternative projects in each subbasin to achieve sustainability. The alternative projects are described in Section 9.4.4 of this GSP. The nine priority projects are summarized in Table 9-1.

Table 9-1. Priority Projects

Priority Project #	Project Name	Water Supply	Project Type
1	Invasive Species Eradication	N/A	Indirect Recharge
2	Optimize CSIP Operations	Recycled Water	In Lieu Recharge
3	Modify M1W Recycled Water Plant	Recycled Water	In Lieu Recharge
4	Expand Area Served by CSIP	Recycled Water	In Lieu Recharge
5	Maximize Existing SRDF Diversion	Salinas River	In Lieu Recharge
6	Seawater Intrusion Pumping Barrier	N/A	SWI Barrier
7	11043 Diversion Facilities Phase I: Chualar	Salinas River	Direct Recharge
8	11043 Diversion Facilities Phase II: Soledad	Salinas River	Direct Recharge
9	SRDF Winter Flow Injection	Salinas River	Direct Recharge

Short descriptions of each priority project are included below. Generalized costs are also included for planning purposes. Components of these projects, including facility locations, pipeline routes, recharge mechanisms, and other details may change in future analyses. Therefore, each of the projects listed below should be treated as a generalized project representative of a range of potential project configurations.

9.4.3.1 Project Cost Assumptions and Analysis Tools

Assumptions that were used to develop project cost estimates are provided in Appendix 9C. Assumptions and issues for each project need to be carefully reviewed and revised during the pre-design phase of each project. Project designs, and therefore costs, could change considerably as more information is gathered.

The cost estimates included below are order of magnitude estimates. These estimates were made with little to no detailed engineering data. The expected accuracy range for such an estimate is within +50% or –30%. The cost estimates are based on our perception of current conditions at the project location. They reflect our professional opinion of costs at this time and are subject to change as project designs mature.

Capital costs include major infrastructure, such as pipelines, pump stations, customer connections, turnouts, injection wells, recharge basins, and storage tanks. Capital costs also include 30% contingency for plumbing appurtenances, 15% increase for general conditions, 15% increase for contractor overhead and profit, and 8.75% for sales tax. Engineering, legal, administrative, and project contingencies were assumed to be 30% of the total construction cost and included within the capital cost. Land acquisition at $45,000/acre was also included within capital costs.

Annual operations and maintenance (O&M) fees include the costs to operate and maintain new project infrastructure. O&M costs also include any pumping costs associated with new infrastructure. O&M costs do not include O&M or pumping costs associated with existing infrastructure, such as existing Salinas Valley Reclamation Plant (SVRP) costs, because these are assumed to be part of water purchase costs. Water purchase costs are assumed to include repayment of loans for existing infrastructure; however, these purchase costs will need to be negotiated. The terms of such a negotiation could vary widely.

Capital costs were annualized over 25 years and added with annual O&M costs and water purchase costs to determine an annualized dollar per acre-foot ($/AF) cost for each project.

Because the SVIHM was not available to SVBGSA, a simplified groundwater model was developed to assess the approximate benefits of each project. While the simplified model is not as accurate as the SVIHM, it is adequate for comparing projects and actions. A description of the groundwater model is included in Appendix 9D.

9.4.3.2 Preferred project 1: Invasive Species Eradication

The SVBGSA will support and enhance existing programs eradicating *arundo donax* and other invasive species along the Salinas River in partnership with the Resource Conservation District of Monterey County. This project will reduce evapotranspiration from these invasive plants, leaving more water in the Salinas River and increasing aquifer recharge or reducing the amount of water required to be released from Nacimiento and San Antonio Reservoirs.

The Salinas River watershed has a significant population of the invasive weed *arundo donax* and a smaller population of tamarisk, mostly from Gonzales to King City. The Salinas River watershed has the second-largest infestation of non-native *arundo donax* in California: approximately 1,500 to 1,800 acres. The Resource Conservation District of Monterey County is the lead agency on an estimated 15 to 20-year effort to fully eradicate *arundo donax* from the Salinas River Watershed. Concurrent with this program, *arundo donax* is also removed by landowners participating in the Salinas Stream Maintenance Program. The Salinas River Stream Maintenance Program is managed by the Salinas River Management Unit Association and the Monterey County Water Resource Agency. The two programs complement one another with regards to goals and eradication techniques for *arundo donax* and tamarisk within the Salinas River.

Demonstration efforts beginning in 2014 included removal of *arundo donax* from approximately 75 acres in the Chualar and Gonzales areas. Additional phases, which have or are being funded through grants by the Wildlife Conservation Board and USDA and with support from other agencies and voluntary landowners, are removing *arundo donax* from an additional 425 acres between Gonzales and Soledad and to re-treat other areas as necessary to prevent re-growth. An estimated 1,000 to 1,300 acres of invasive species still remains in the river channel and removal is currently unfunded.

This preferred project proposes continuing the efforts of clearing all invasive species throughout the entire Salinas River channel. Although the aerial imagery and ground surveys show the largest infestations between King City and Chualar, there are patches upstream of King City and downstream of Chualar. The proposed project would include three distinct phases: initial treatment, re-treatment, and on-going monitoring and maintenance treatments.

The initial treatment phase includes mechanical and/or chemical treatment of the remaining 1,000 to 1,300 acres of invasive species removal in all areas of the river that have yet to be treated. The re-treatment phase includes re-treatment of the initial 500 acres that have already had an initial treatment and re-treatment of all 1,500 to 1,800 acres over a 3-year period. The final phase is the on-going monitoring and maintenance treatment phase. This phase requires annual monitoring for re-growth of the invasive species or new invasive species and chemical treatment every three to five years.

9.4.3.2.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective

9.4.3.2.2 Expected Benefits and Evaluation of Benefits

This project is included here as part of the complete Valley-wide groundwater management program. The primary benefit from this project is increased groundwater recharge due to reduced evapotranspiration in the southern Salinas Valley subbasins. Based on currently available data, the expected benefit of this project is between 4 and 20 AF/yr. per acre which results in 6,000 AF to 36,000 AF/yr. of water that would remain in the river, or would not be required to be released from Nacimiento and/or San Antonio Reservoirs. During the implementation period, these numbers will be refined with evaporation studies that are more regionally specific and accurate; and that will demonstrate the variation between dry, wet, and normal years. Actual benefits will be further documented following completion of ongoing evapotranspiration studies being conducted by the Resource Conservation District of Monterey County, California State University Monterey Bay and University of California Santa Barbara.

Figure 9-2 shows the expected groundwater elevation benefit, in feet, in the 180-Foot Aquifer from this project. Figure 9-3 shows the expected groundwater elevation benefit, in feet, in the

400-Foot Aquifer from this project. The benefit is greatest at the south end of the 180/400-Foot Aquifer Subbasin, where there is no extensive aquitard separating the aquifers from the Salinas River. Model results suggest that this project reduces seawater intrusion by approximately 890 AF/yr. on average.

Invasive species removal has other benefits in addition to water savings. Thick stands of invasive species can, over time, lead to a narrower river channel, increasing flow velocities, eroding channel banks, and blocking bridge structures when large portions of vegetation break loose. Invasive species also crowd out native species and remove valuable riparian habitats which harbor bird species and provide shading, bank stability, and lower temperatures for instream habitat and associated species such as steelhead.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between invasive species eradication and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

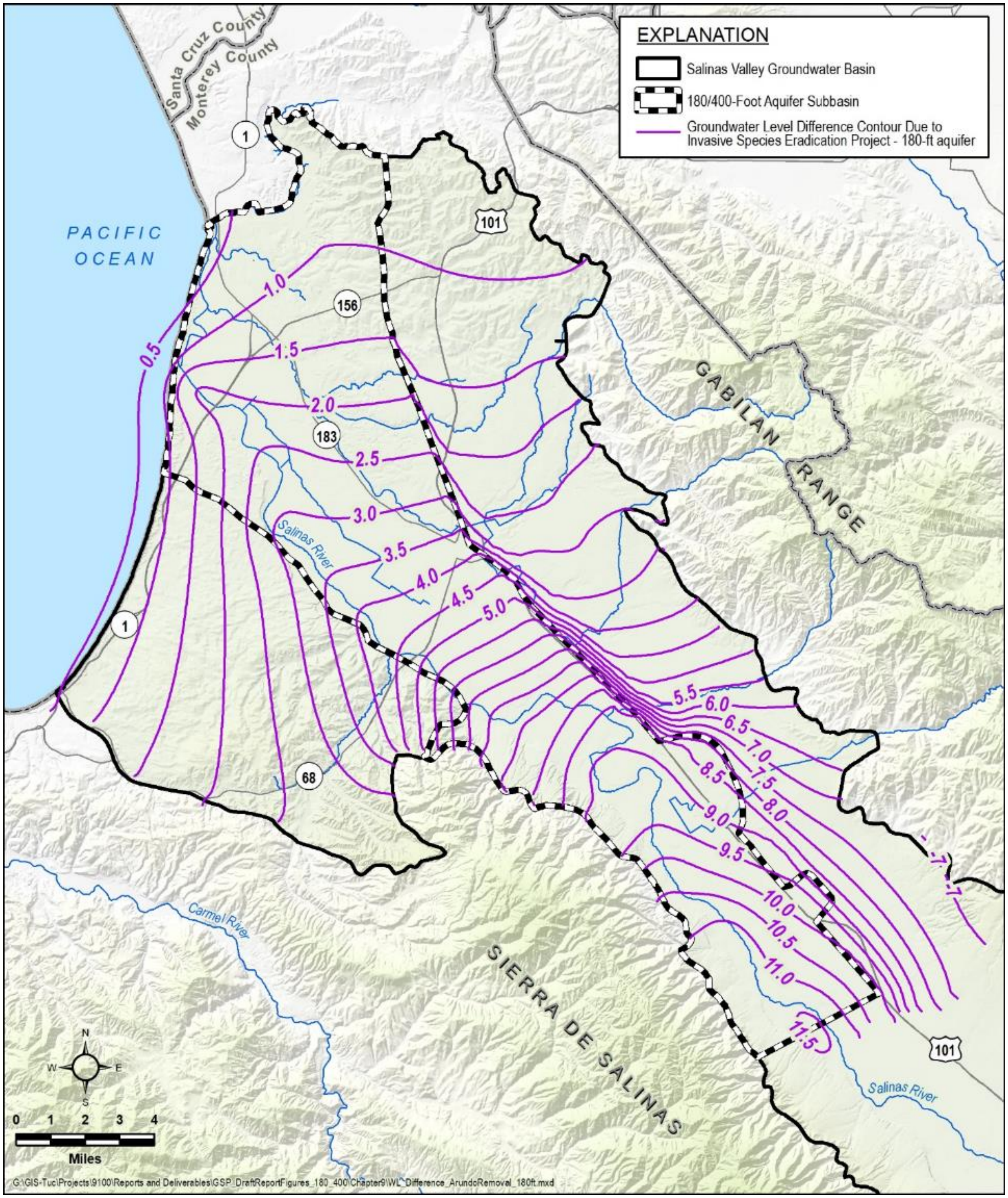


Figure 9-2. Estimated Groundwater Elevations Benefit in the 180-Foot Aquifer from Arundo Removal

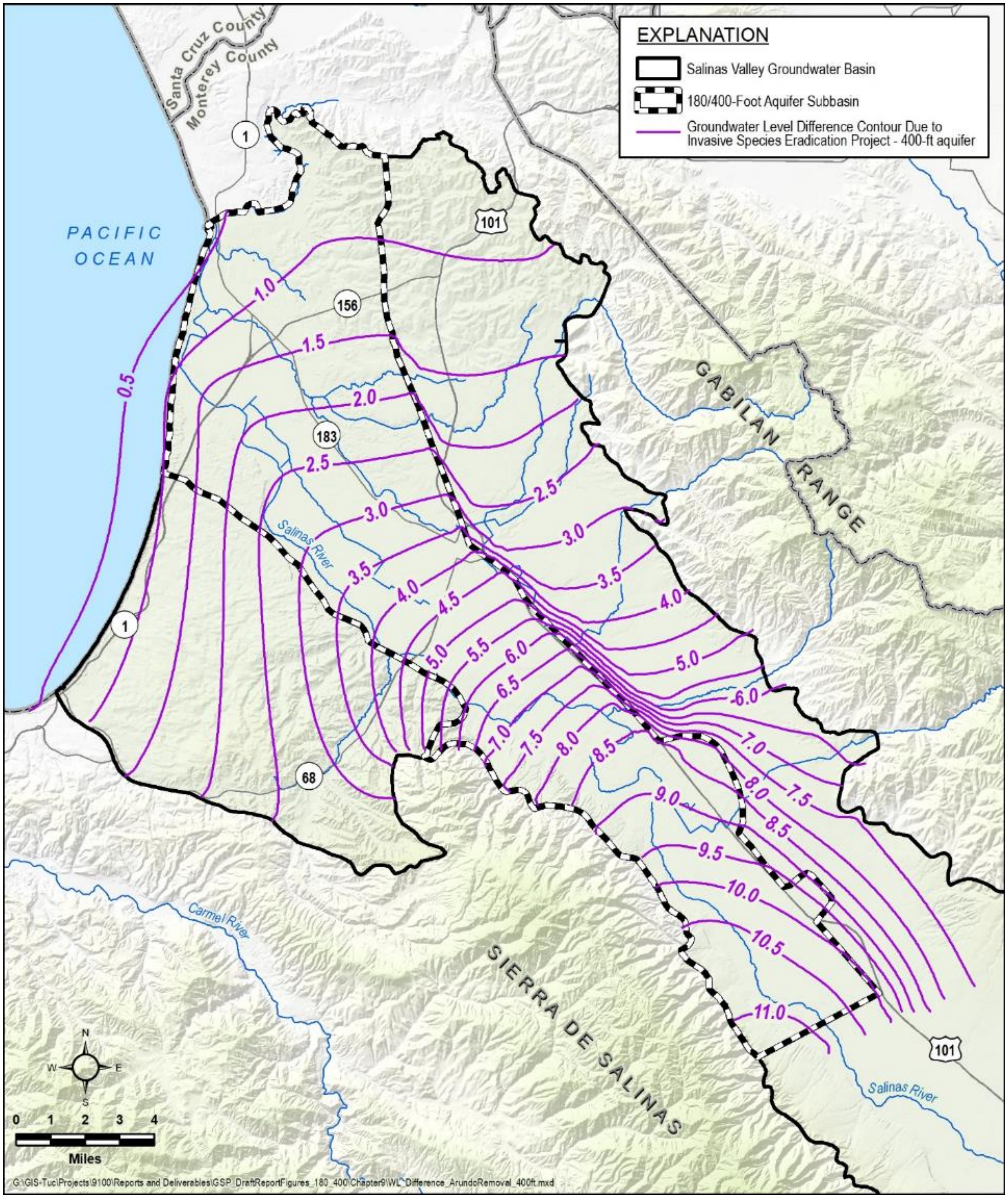


Figure 9-3. Estimated Groundwater Elevations Benefit in the 400-Foot Aquifer from Arundo Removal

9.4.3.2.3 Circumstances for Implementation

Invasive species eradication is a preferred project that is already ongoing in the Salinas Valley Groundwater Basin. Supporting these ongoing efforts will be initiated as soon as funds become available. No additional circumstances for implementation are necessary.

9.4.3.2.4 Public Noticing

The public noticing practices and requirements of the existing invasive species eradication programs will be continued as part of this project.

9.4.3.2.5 Permitting and Regulatory Process

The permitting process of the existing invasive species eradication programs will be continued as part of this project.

9.4.3.2.6 Implementation Schedule

The implementation schedule is presented on Figure 9-4. It is anticipated that Phase I will take two years. Phase II will overlap with Phase I and take an additional two to three years. Phase III, which is on-going maintenance will continue past Year three.

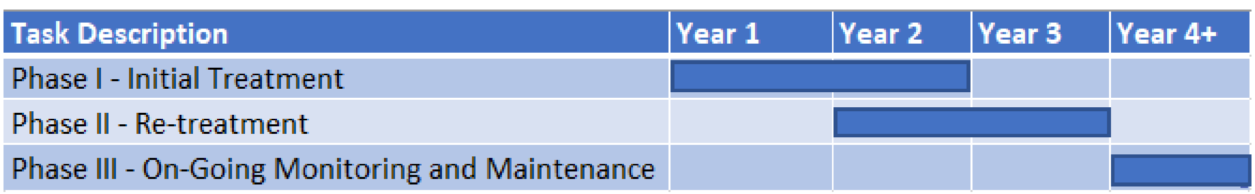


Figure 9-4. Implementation Schedule for Invasive Species Eradication

9.4.3.2.7 Legal Authority

The SVBGSA will use the legal authority for invasive species eradication contained in the existing eradication program.

9.4.3.2.8 Estimated Cost

Estimated capital cost for the invasive species eradication project is estimated at $35,230,000. Annual O&M costs are anticipated to be approximately $325,000. The indirect projected yield for the invasive species eradication project is estimated at 20,000 AF per year. The amortized cost of water for this project is estimated at $160/AF/yr.

CSIP PROJECTS

Preferred projects 2, 3, 4, and 5 all work together to improve and expand the performance of the CSIP system. The goal of these four projects, taken together, is to provide a reliable, year-round supply of water to all growers in the current CSIP system, and to expand the system as possible. The four projects are presented here as individual projects, even though they are all part of an integrated CSIP strategy.

9.4.3.3 Preferred Project 2: Optimize CSIP Operations

The CSIP system is operated and maintained by M1W under a contract with MCWRA. MCWRA and M1W have started evaluating opportunities to optimize the CSIP distribution system. This preferred project provides support for various elements of the MCWRA optimization project that is directly beneficial to the sustainability of the groundwater basin. The costs for a portion of this project will be funded directly through MCWRA. Additional funding will be provided by SVBGSA.

The CSIP distribution system has known flow and pressure constraints. The CSIP system will be optimized to better accommodate diurnal and seasonal fluctuation in irrigation demand, maximizing use of water supplied from the SVRP and the SRDF, thereby reducing the need for groundwater pumping. Furthermore, this project aligns CSIP irrigation with water availability, rather than on demand, to ensure the available supply water can be used to a greater extent.

The downsizing of flow meters and isolation valves at the time of construction of the CSIP system resulted in water delivery constraints. In addition, there is not enough water storage within the system to take advantage of all the available supplies. These bottlenecks in the system and lack of storage lead to the need for CSIP supplementary wells to meet total irrigation needs when either the treated or diverted water is not available, or the pressure is not sufficient.

The approach for CSIP system optimization includes the following general activities:

1. Hydraulic Modeling. This activity will develop and calibrate a hydraulic model of the CSIP water distribution system, will identify the hydraulic deficiencies in the system, and recommend upgrades to enhance the delivery system. This activity is currently being completed by MCWRA, therefore the costs for this component of the project are not included in the costs identified below.
2. Irrigation/Scheduling System Development. This activity will develop a program that will allow growers to order and schedule their water deliveries; reducing peak demands in the system. Part of the irrigation scheduling program will introduce incentives for farmers to modify irrigation practices (e.g., tiered charge pricing) which will promote use of water during off-peak times. In addition, real-time SCADA monitoring capabilities of the distribution system would be added.

3. Add Water Storage. This activity will add storage capacity for recycled water and SRDF water deliveries throughout the water distribution system. The hydraulic modeling will identify preferred locations for storage that would provide the most benefit to the system. Additional storage reservoirs will allow the CSIP system to store water produced by the SVRP or diverted by SRDF during low demand periods for later delivery when demand is high. Storage reservoirs would also assist in maintaining adequate pressure in the existing system and provide more flexibility in the timing of SVRP and SRDF deliveries. Additional storage may also reduce the need to drill additional CSIP supplementary wells.
4. Piping Upgrades. The hydraulic model will identify deficiencies in the water distribution system that will require piping upgrades. The exact piping upgrades are unknown. This component of the project is a placeholder for anticipated upgrades required to the system to assist in the regulation of flow and pressure.

9.4.3.3.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Seawater intrusion measurable objectives
- Land subsidence measurable objectives

9.4.3.3.2 Expected Benefits and Evaluation of Benefits

The primary benefit from CSIP optimization includes reduction or avoidance of groundwater pumping from wells in the CSIP area throughout the year. Two sets of wells pump groundwater in the CSIP area: CSIP standby wells and CSIP supplementary wells. CSIP standby wells are privately owned wells used to provide groundwater for irrigation either in lieu of, or in addition to, irrigation water provided by the CSIP system. CSIP supplementary wells are MCWRA owned wells that provide water to the CSIP system when the combination of SVRP and SRDF water is insufficient to meet demands. This project will benefit other subbasins, such as the Monterey and Eastside subbasins by reducing pumping that impacts the neighboring subbasins.

Figure 9-5 shows the expected groundwater elevation benefit in the 180-Foot Aquifer from projects 2, 3, and 5, combined. Figure 9-9 shows the expected groundwater elevation benefit in the 400-Foot Aquifer from projects 2, 3, and 5, combined. These projects were combined into a single simulation because of how closely they are intertied. Model results suggest that these projects reduce seawater intrusion by approximately 2,200 AF/yr. on average.

Figure 9-7 presents the CSIP standby well pumping data since 1993. Historical pumping data provided by MCWRA indicates that since 2010, the average pumping of CSIP standby wells located within the CSIP distribution area is around 2,000 AF/yr. The combination of projects 2, 3, and 5 are intended to eliminate this pumping by standby wells.

Figure 9-8 presents the historical pumping for CSIP supplementary wells. A sharp decline in pumping occurred in 2010 when the SRDF came online. Omitting years 2014 through 2016 when the SRDF was offline, the average CSIP supplementary well yield since 2010 is approximately 3,350 AF/yr. Combining the average CSIP standby well pumping and the CSIP supplementary well pumping yields an average benefit of approximately 5,500 AF/yr. of reported well pumping within the CSIP area that could be offset by projects 2, 3, and 5.

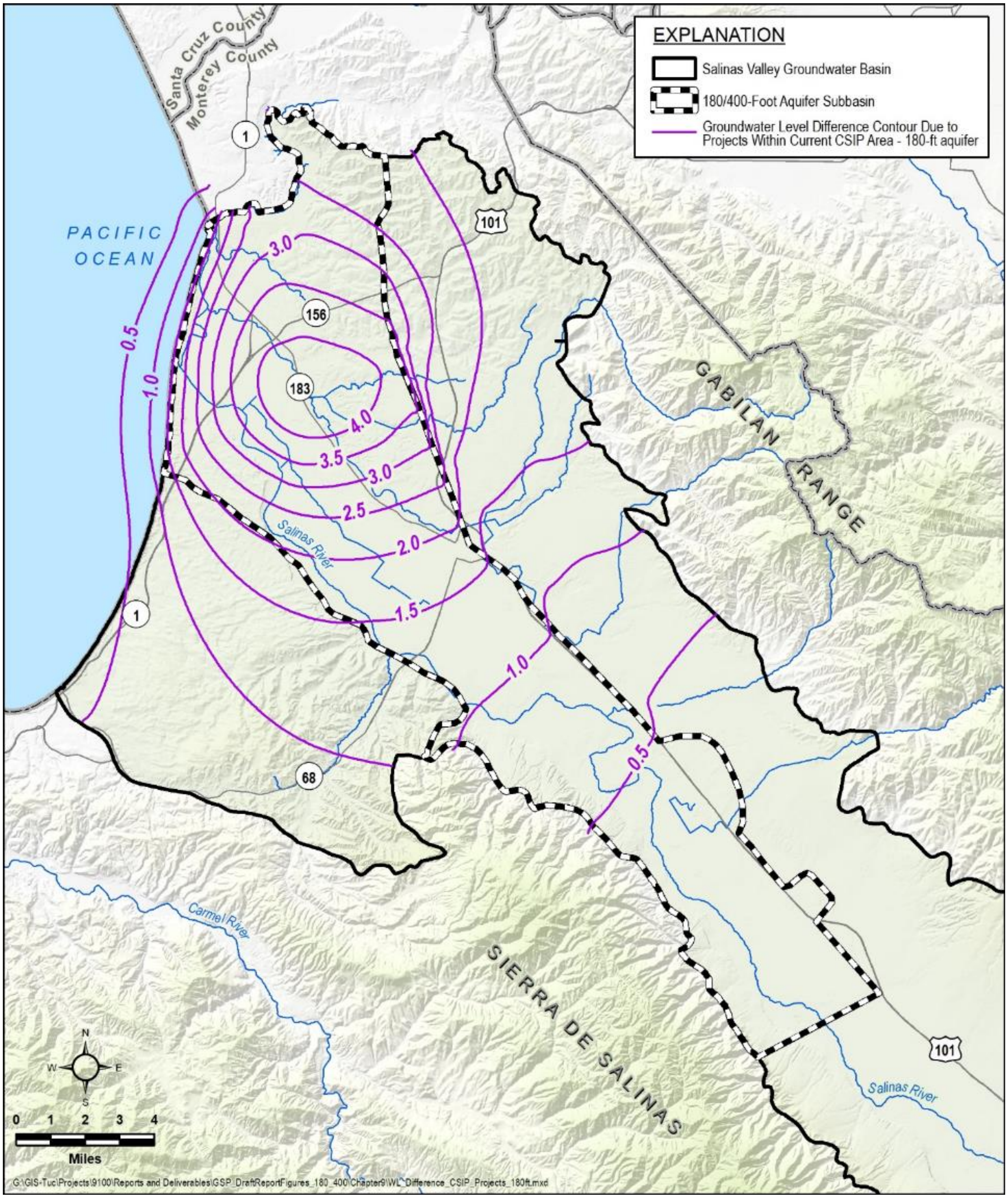


Figure 9-5. Estimated Groundwater Elevation Benefit in the 180-Foot Aquifer from All CSIP Projects

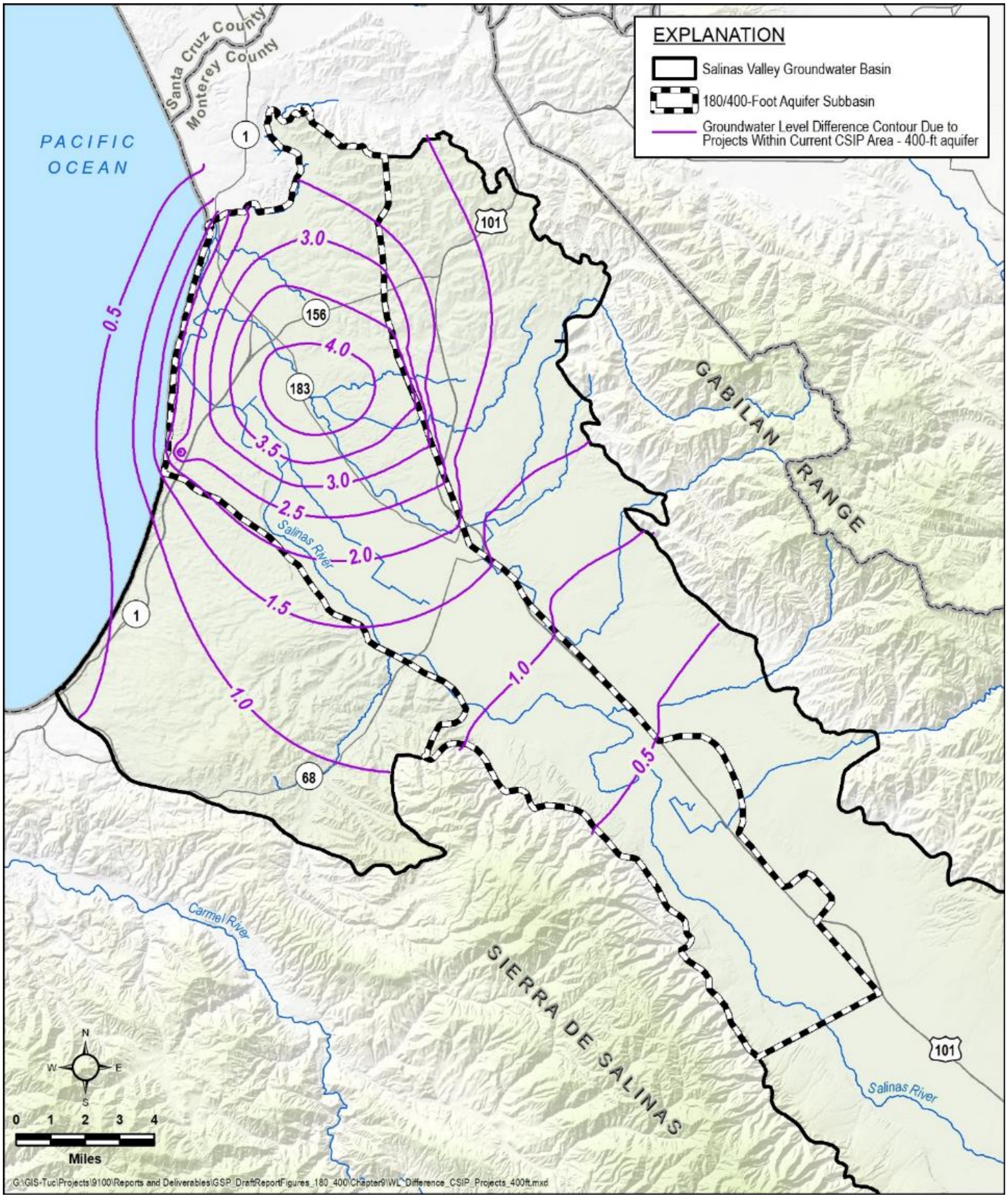


Figure 9-6. Estimated Groundwater Elevation Benefit in the 400-Foot Aquifer from All CSIP Projects

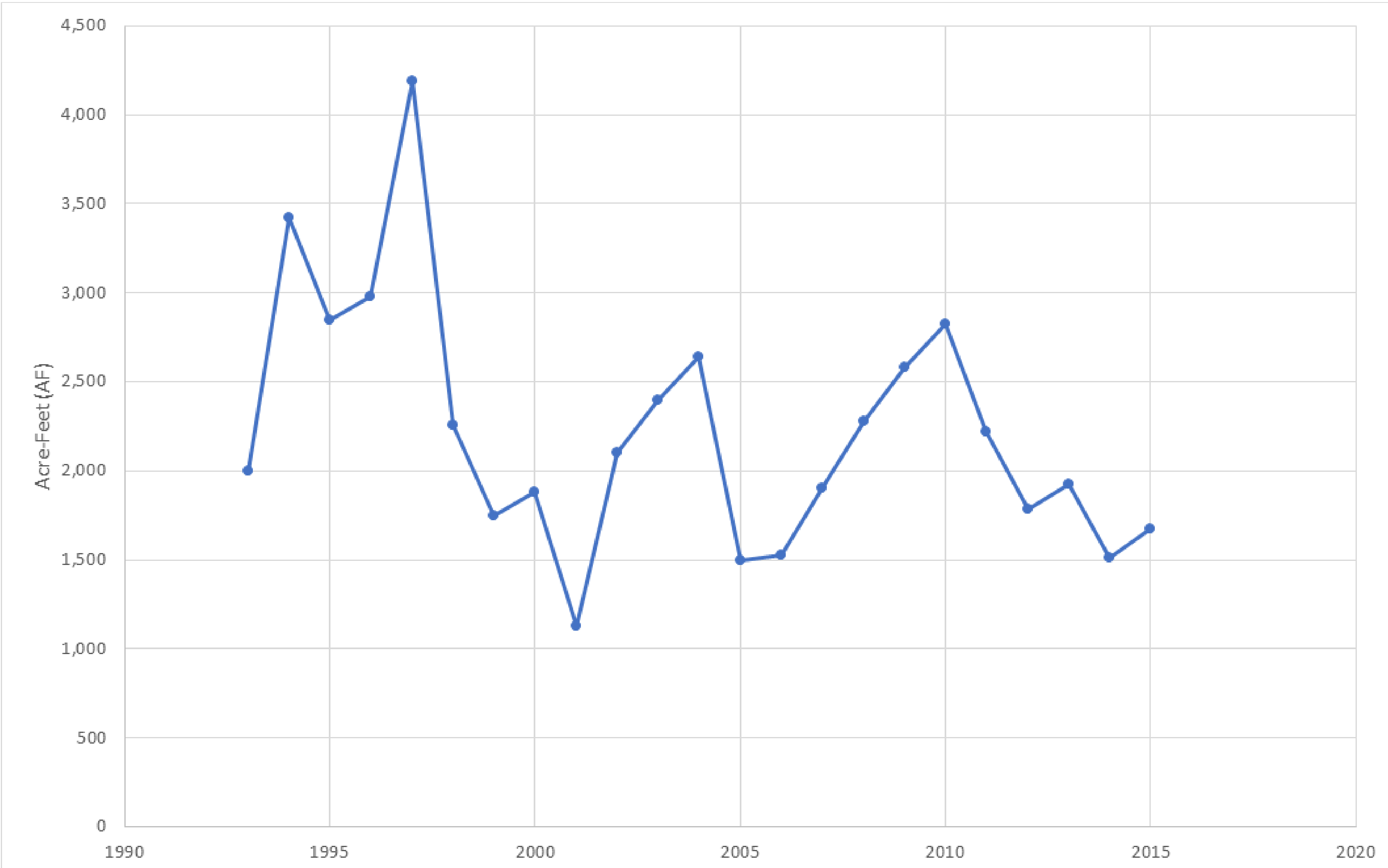


Figure 9-7. CSIP-Standby Wells within the CSIP Program Area - Standby Active (CSIP-SBA) Well Production 1993 to 2015

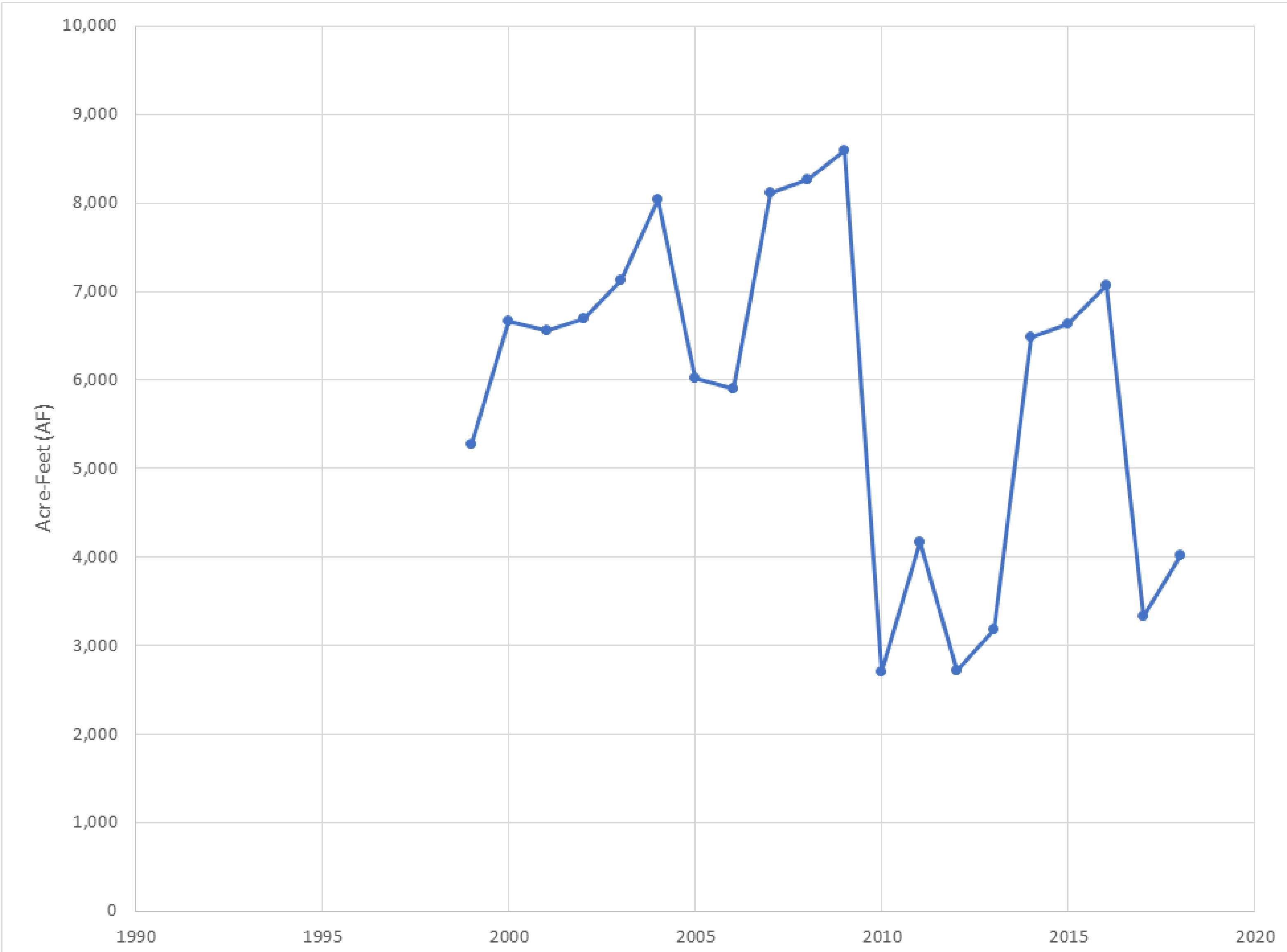


Figure 9-8. CSIP Supplementary Well Production 1999 to 2018

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between CSIP optimization and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.4.3.3.3 Circumstances for Implementation

The CSIP optimization project is a preferred project that builds on plans currently being initiated by MCWRA. Supporting and expanding these ongoing efforts will be initiated as soon as funds become available. No additional circumstances for implementation are necessary.

9.4.3.3.4 Legal Authority

MCWRA, who owns and operates the CSIP system, is a member of the SVBGSA. Therefore, optimizing the CSIP system is a benefit to one of the SVBGSA members. The SVBGSA will work in cooperation with MCWRA to modify and optimize the CSIP system.

9.4.3.3.5 Implementation Schedule

The implementation schedule is presented on Figure 9-9. It is anticipated to take three to six years to implement.

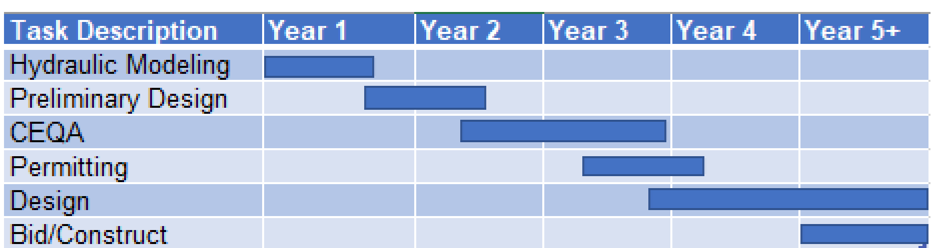


Figure 9-9. Implementation Schedule for CSIP Optimization

9.4.3.3.6 Estimated Cost

Estimated capital cost for the CSIP optimization project is estimated at $16,400,000. Annual O&M costs are anticipated to be approximately $200,000. The projected yield for the CSIP optimization project is estimated at 5,500 AF/yr. The amortized cost of water for this project is estimated at $270/AF/yr.

9.4.3.4 Preferred Project 3: Modify Monterey One Water Recycled Water Plant – Winter Modifications

Monterey One Water's Regional Wastewater Treatment Plant (RTP) has a maximum capacity of 29.6 mgd. Currently, the facility is only treating 16 to18 mgd of influent wastewater. During the wet weather months, 100% of all secondary treated wastewater is discharged to the ocean, forgoing the opportunity for beneficial reuse. During the wet weather months, there is some demand for recycled water in the CSIP system; however, M1W cannot produce tertiary treated water at a rate lower than 5 mgd, which is needed to supply the growers in the winter. As a result, growers turn to the groundwater basin for their irrigation needs during these months. Modifications are required at the M1W RTP in order to efficiently treat and deliver recycled water during the wet weather months.

Under the M1W Recycled Water Plant Modifications Project, the SVRP will be improved to allow delivery of tertiary treated wastewater to the CSIP system when recycled water demand is less than 5 mgd. Monterey One Water (M1W) is currently designing and permitting this project (Monterey One Water, 2018). SVBGSA will work closely with M1W to support and implement this project.

Table 9-2 provides the groundwater well pumping for the past 7 years during the winter months when the SVRP plant is not on-line. This results in an average wet weather pumping rate of 1,100 AF/yr.; with a minimum of 300 AF/yr. in wet years, and a maximum of 1,790 AF/yr. in dry years. The SVRP improvements would largely eliminate the need for this wintertime pumping. The demand for water during the winter from the SVRP will also increase with the Preferred Project 4; increasing the potential Project Yield from 1,100 AF/yr. to an estimated 1,300 AF/yr.

Table 9-2. Groundwater Winter Well Pumping FY 2011-2012 to FY 2017-2018

	Dec 2011-Jan 2012	Dec 2012-Jan 2013	Dec 2013 -Jan 2014	Nov 2014-Jan 2015	Nov 2015-Feb 2016	Nov 2016-Mar 2017	Nov 2017-Mar 2018
November				303	213	325	28
December	723	52	730	38	199	223	38
January	1,067	253	509	516	96	62	183
February					520	102	907
March						580	90
Total	**1,790**	**305**	**1,239**	**857**	**1,028**	**1,292**	**1,246**

9.4.3.4.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective

- Groundwater storage measurable objective
- Seawater intrusion measurable objectives
- Land subsidence measurable objectives

9.4.3.4.2 Expected Benefits and Evaluation of Benefits

The primary benefit from M1W SVRP Modifications is additional water supply to the CSIP system during low-demand wet weather months, reducing groundwater pumping. The M1W SVRP Modifications project has the potential to yield up to 1,100 AF/yr. through in-lieu recharge, providing an alternative to groundwater sources in the existing CSIP area and an additional 200 AF/yr. in the expanded CSIP area. This project will benefit other subbasins, such as the Eastside and Monterey Subbasins by reducing pumping that impacts the neighboring subbasins.

Figure 9-5 shows the expected groundwater elevation benefit in the 180-Foot Aquifer from projects 2, 3, and 5, combined. Figure 9-9 shows the expected groundwater elevation benefit in the 400-Foot Aquifer from projects 2, 3, and 5, combined. These projects were combined into a single simulation because of how closely they are intertied. Model results suggest that these projects reduce seawater intrusion by approximately 2,200 AF/yr. on average.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between M1W improvements and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.4.3.4.3 Circumstances for Implementation

The SVRP modifications project is currently being planned and implemented by M1W as part of the Pure Water Monterey Groundwater Replenishment Project. No other circumstances for implementation are necessary.

9.4.3.4.4 Legal Authority

The SVRP modification project is currently being planned and implemented by M1W. No legal authority is necessary.

9.4.3.4.5 Implementation Schedule

The implementation schedule is presented on Figure 9-10. It is anticipated to take approximately two years to implement.

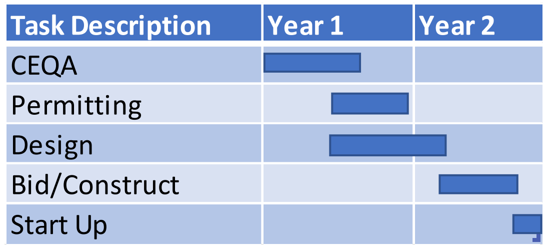


Figure 9-10. Implementation Schedule for M1W SVRP Modifications

9.4.3.4.6 Estimated Cost

The project cost will be covered through delivery charges to existing CSIP customers. Because a funding mechanism for this project has already been identified, these costs will not be incorporated into the Water Charges Framework.

The following estimates are provided by the MCWRA's *New Source Water Supply Study, Final Report*. Estimated capital cost for the M1W Winter Modification project was estimated at $1,493,000 (Raftelis Financial Consultants, 2018). The amortized cost of water for this project is estimated at $90/AF.

9.4.3.5 Preferred Project 4: Expand Area Served by CSIP

The CSIP expansion project involves enlarging the system's service area, thereby increasing the demand for recycled water in the spring and fall and lessening dependence on existing groundwater wells. The existing CSIP supplies may not be sufficient to meet the summertime demand of the expanded CSIP area without an increase in water supply from the SRDF or another source. If additional water supply sources are available in the summer, the expanded service area will be supplied summer irrigation water. The CSIP Optimization Project (Priority Project 2) will be required to be implemented before water has the potential to be supplied to the expanded CSIP area during the summer.

In previous studies, approximately, 8,500 acres have been identified on the north, east and south sides of the existing CSIP service area that could be included in the expanded service area. These areas were identified in the *Cal-Am Coastal Water Project Draft Environmental Impact Report* (ESA, 2009), and are shown on Figure 9-11. Other studies have suggested smaller expansions. In 2011, MCRWA considered approximately 3,500 acres for annexation into the CSIP service area as displayed on Figure 9-12. More recently, the May 2018 *Progress Report on Pure Water Monterey Expansion*, stated the current plan for expansion considers an additional 3,500 acres, a 29% increase in its service area (Monterey One Water, 2018).

Based on the report *Recommendations to Address the Expansion of Seawater Intrusion in the Salinas Valley Groundwater Basin*, a working group was established that recommended beginning an annexation plan for expanding the CSIP service area concurrently with optimizing the existing CSIP system (MCWRA, 2017b). The working group recommended expanding into areas nearest the advancing seawater intrusion front. The annexation plan would be implemented after 2020.

Assuming 3,500 acres of new farmland are annexed into the system, and with an assumed unit agricultural water demand of 2.8 AF/acre (MCWRA, 2017b), the expanded area may present an additional demand of 9,900 AF/yr. Initial estimates reported in the 2009 *Cal-Am Coastal Project Draft EIR* (ESA, 2009) suggested the 8,500 acre expansion proposal might require an additional 14,000 AF/yr. of water. Assuming the lesser of these two estimates, the 9,900 AF/yr. of deliveries would offset an equal amount of pumping from the Subbasin. The final size and location of CSIP expansion will be determined through additional hydraulic modeling and engineering that identifies the most cost-effective areas for expansion.

The CSIP expansion would include construction of a new distribution network. The distribution network will be developed only after the final location of CSIP expansion is agreed upon. Extrapolating from the existing CSIP system, the expanded area may include on the order of 13 miles of new pipeline. Because the existing distribution system is at its hydraulic capacity, the new network would likely be a pressurized system separate from the existing distribution system pipelines. A new 48" transmission main would extend from the existing SVRP storage pond to the expanded service area; with the exception of a smaller diameter pipeline serving an area southwest of the M1W SVRP. A crossing of the Salinas River would be required. Pipeline diameters would decrease further downstream in the distribution network. Turnouts would be installed for each new agricultural use customer.

Locations to be served in the expanded area would prioritize areas where risk of seawater intrusion is highest. Additional considerations include the cost of tank storage and booster pumps needed to supply areas east of Castroville along Highway 156.

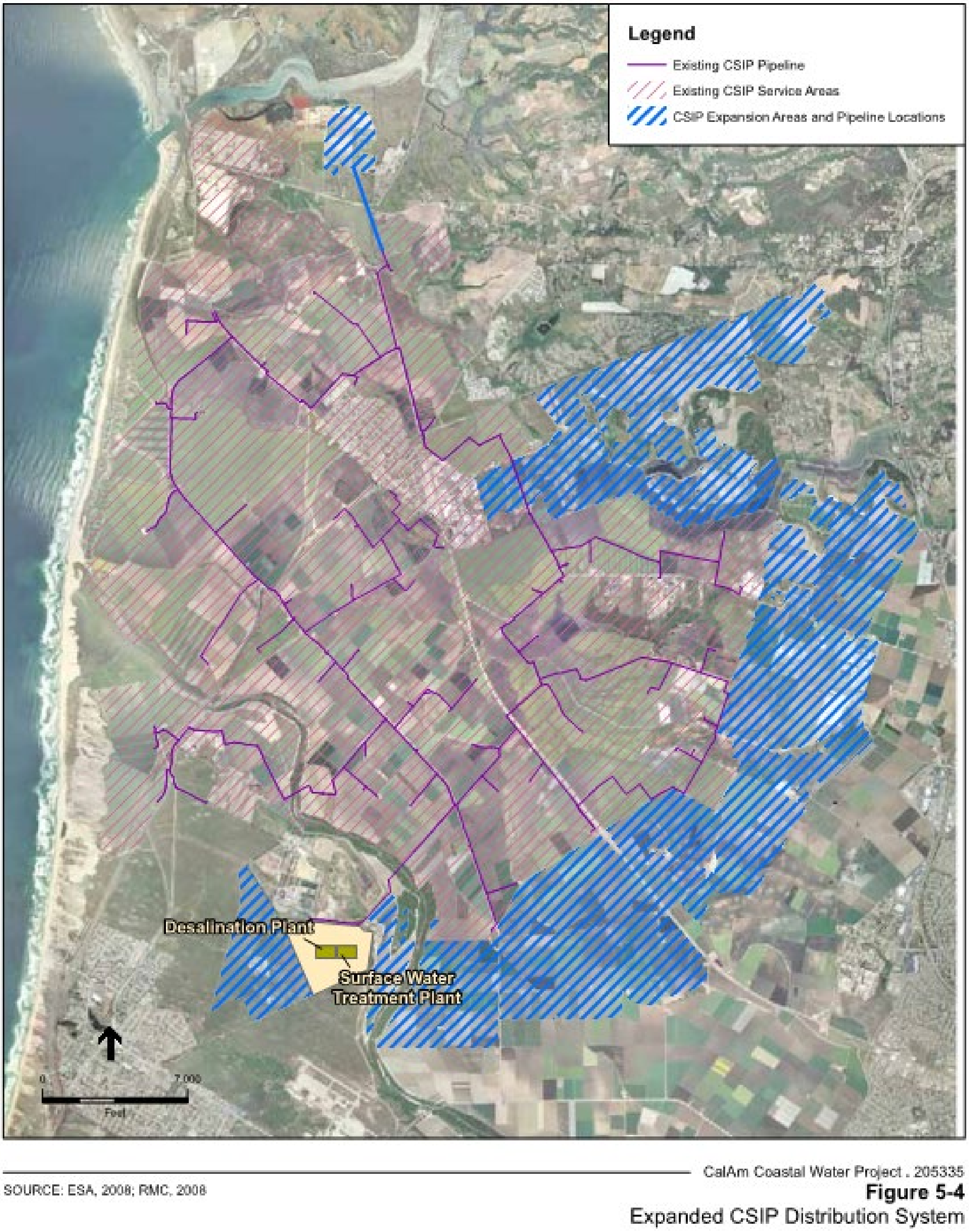


Figure 9-11. Potential CSIP Distribution System Expansion Areas
(Image from Cal-Am Coastal Water Project Draft EIR, 2005)

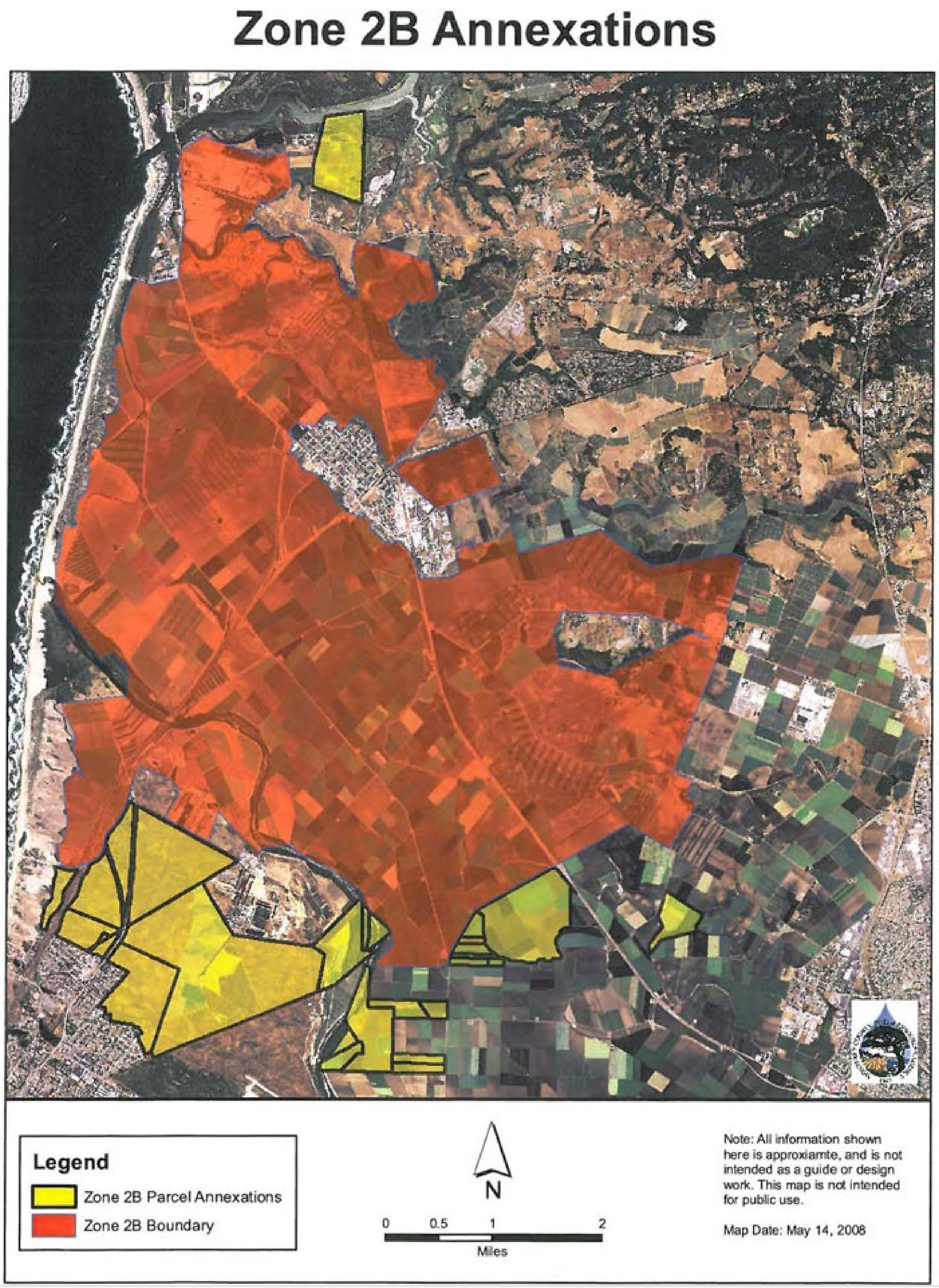


Figure 9-12. Zone 2B Requests for Annexation from 2011
(Courtesy of MCWRA)

9.4.3.5.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Seawater intrusion measurable objectives
- Land subsidence measurable objectives

9.4.3.5.2 Expected Benefits and Evaluation of Benefits

The primary benefits from CSIP expansion include the increase in demand for recycled water and river diversion water supplies, thus reducing groundwater pumping in the Subbasin. This increased demand could be supplied to the new service area during the winter, spring and fall when excess supply is available to the CSIP system. If additional water supplies are available in the summer, the new service area could also be supplied in the summer. The expanded service area would lessen groundwater pumping by an amount equal to the quantity delivered: approximately 9,900 AF/yr. This project will benefit other subbasins, such as the Monterey and Eastside subbasins by reducing pumping that impacts the neighboring subbasins.

Figure 9-13 shows the expected groundwater elevation benefit in the 180-Foot Aquifer from the CSIP expansion project. Figure 9-14 shows the expected groundwater elevation benefit in the 400-Foot Aquifer from the CSIP expansion project. Model results suggest that this project reduces seawater intrusion by approximately 2,800 AF/yr. on average.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between CSIP expansion and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

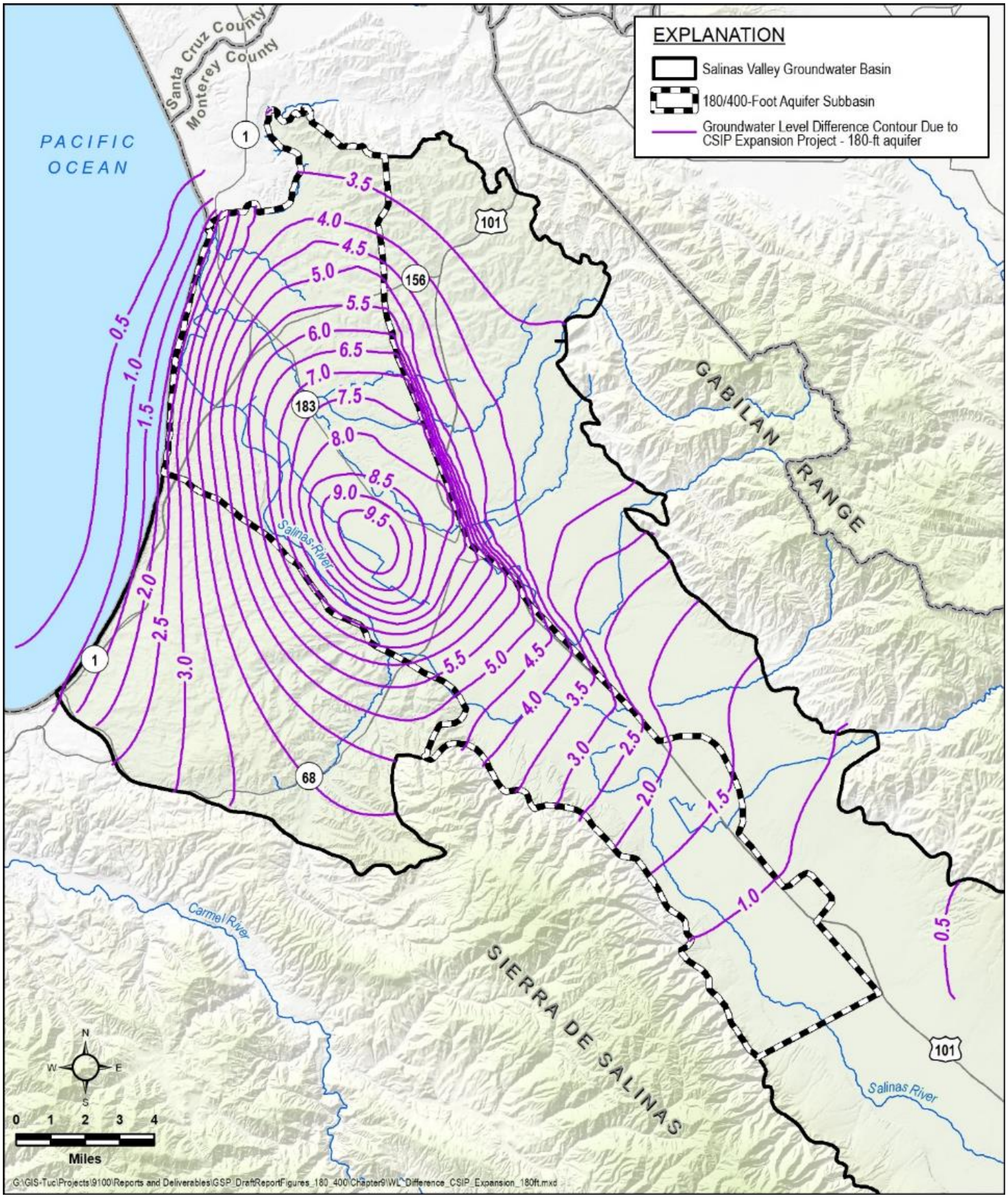


Figure 9-13: Estimated Groundwater Elevation Benefit in the 180-Foot Aquifer from the CSIP Expansion Project

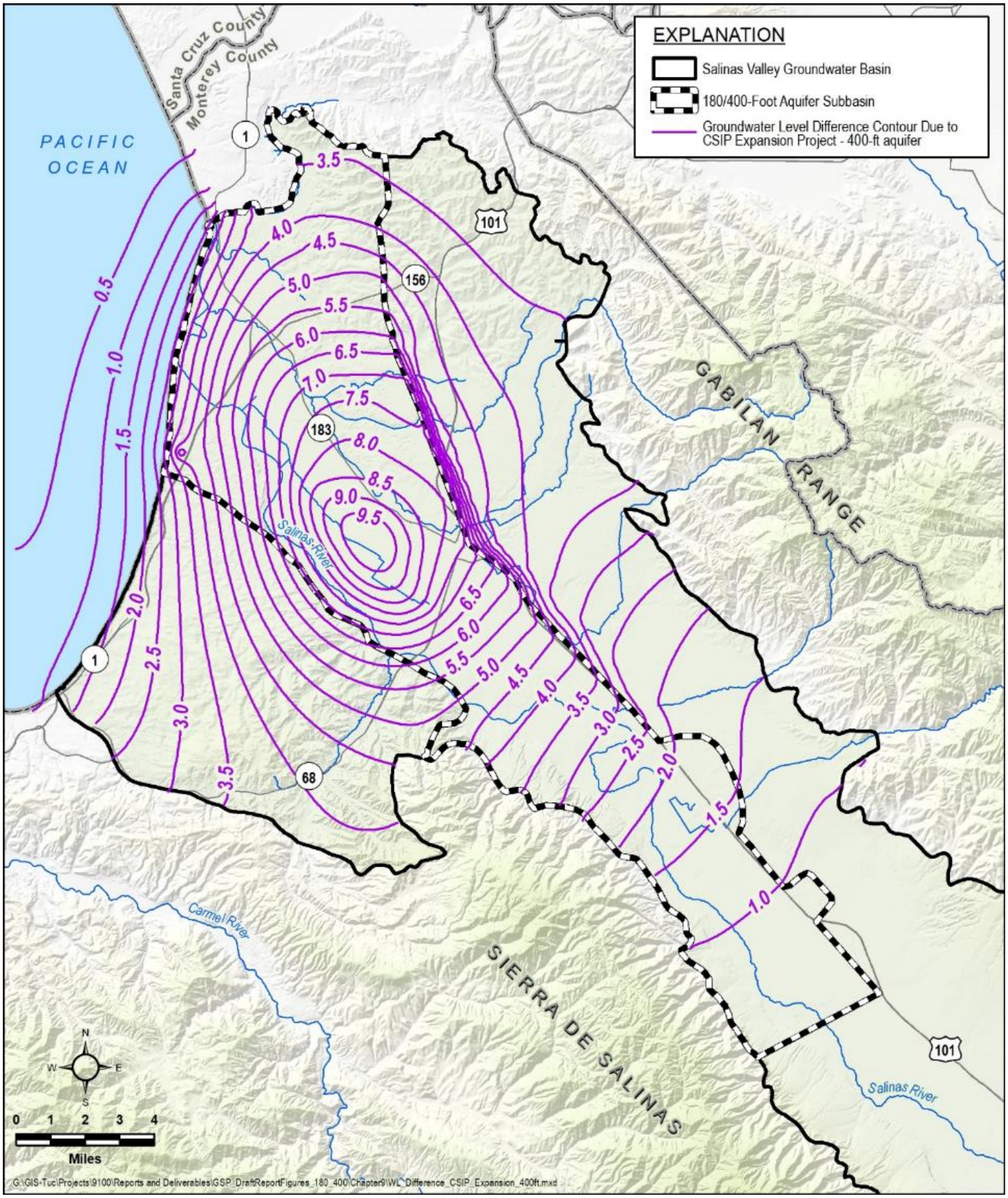


Figure 9-14. Estimated Groundwater Elevation Benefit in the 400-Foot Aquifer from the CSIP Expansion Project

9.4.3.5.3 Circumstances for Implementation

The CSIP expansion project will be implemented after completion of the CSIP optimization project.

9.4.3.5.4 Legal Authority

MCWRA, who owns and operates the CSIP system, is a member of the SVBGSA. Therefore, expanding the CSIP system is a benefit to one of the SVBGSA members. The SVBGSA will work in cooperation with MCWRA to design and construct the CSIP expansion.

9.4.3.5.5 Implementation Schedule

The implementation schedule is presented on Figure 9-15. It is anticipated to take five years to implement. Year one for this project would not start until the CSIP Optimization Project has been implemented.

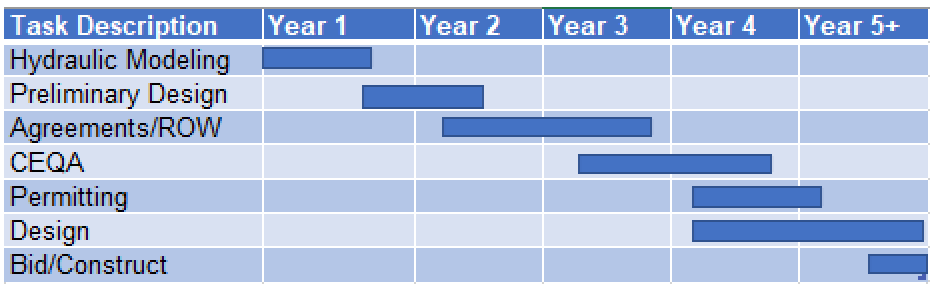


Figure 9-15. Implementation Schedule for CSIP Distribution System Expansion

9.4.3.5.6 Estimated Cost

Capital cost for the CSIP expansion project is estimated at $73,366,000. Annual O&M costs are approximately $480,000. The estimated projected yield for the project is 9,900 AF/yr. The amortized cost of water for this project is estimated at $630/AF.

9.4.3.6 Preferred Project 5: Maximize Existing SRDF Diversion

MCWRA owns and operates the SRDF. The SRDF operates normally at 36 cfs and has a maximum capacity of 48 cfs if necessary. The facility operates between April 1st and October 31st and can deliver annually up to approximately 15,000 AF/yr. to the CSIP system. The original Engineer's Report for the SRDF proposed a facility that could instantaneously deliver 85 cfs with a total annual diversion between 9,700 and 12,800 AF/yr. The instantaneous delivery was scaled back during design to reduce costs for the project.

The existing SRDF can theoretically divert up to 15,000 AF/yr. to the CSIP system, although since its startup in 2010 it has provided an average of 3,400 AF/yr. between the months of April and October, with a maximum delivery in WY 18-19 of 6,500 AF/yr. This deficit between the facility's capacity and its actual deliveries is largely attributable to a misalignment between the timing of supply and demand for the water. Currently, the CSIP's agricultural demand is primarily during the day. Recycled water is used as the first priority in supplying the CSIP, so the need for SRDF water during the day is limited. This results in the farmers and MCWRA turning on their wells to supplement the water supplies on average of 5,500 AF/yr. (see Priority Project 2).

Between 2002 and 2018, the average April through October demand in the CSIP system was 17,538 AF/yr. The SVRP supplied approximately 11,482 AF/yr. of that annual average demand. Under these operational parameters, in order to eliminate pumping from CSIP supplementary wells, the SRDF would need to provide an average annual diversion of approximately 6,506 AF/yr. Since operation of the SRDF began in 2010 there has been a minimum of 8,500 AF/yr. available for diversions to CSIP, with an average annual diversion capacity of up to 11,600 AF/yr.

Therefore, after the CSIP system is optimized, the SVBGSA could increase the production from the SRDF with no added capital expenditures. In addition, there would be additional capacity available to offset a portion of the demand from the expanded CSIP area (Priority Project 4), up to an additional 4,300AF/yr. CSIP Optimization (Priority Project 2) must be completed to be able to maximize the SRDF deliveries.

9.4.3.6.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Seawater intrusion measurable objectives
- Land subsidence measurable objectives

9.4.3.6.2 Expected benefits and Evaluation of Benefits

The primary benefits from maximizing the existing SRDF facilities includes additional water supply to the CSIP system, allowing for its expansion into new service areas as well as providing a potential source of water for aquifer recharge through injection wells (See Priority Project 10 Winter Flow Injection). Maximizing the existing SRDF has the potential to yield up to 11,600 AF/yr. when operated April through October.

Figure 9-5 shows the expected groundwater elevation benefit in the 180-Foot Aquifer from projects 2, 3, and 5, combined. Figure 9-9 shows the expected groundwater elevation benefit in the 400-Foot Aquifer from projects 2, 3, and 5, combined. These projects were combined into a single simulation because of how closely they are intertied. Model results suggest that these projects reduce seawater intrusion by approximately 2,200 AF/yr. on average.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between SRDF improvements and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.4.3.6.3 Circumstances for Implementation

Maximizing the existing SRDF improvement project will be implemented following the completion of Priority Project 2, CSIP Optimization and Priority Project 3, Expand Area Served by CSIP Area.

9.4.3.6.4 Legal Authority

No additional legal authority is needed to maximize the use of the existing SRDF.

9.4.3.6.5 Implementation Schedule

This project is to be implemented following the completion of Priority Project 2 and 3.

9.4.3.6.6 Estimated Cost

There is no capital cost required for this project because the facilities are already sized to deliver 15,000 AF/yr. The project requires additional $2,500,000 annual O&M including higher energy and treatment costs to supply the water. The estimated projected yield for the project is 11,600 AF/yr. The yield for this project will facilitate achieving the yield that is identified in Priority Project 2 and a portion of the yield identified in Priority Project 4. The amortized cost of water for this project is estimated at $220/AF.

9.4.3.7 Preferred Project 6: Seawater Intrusion Pumping Barrier

Seawater intrusion will be halted using a pumping barrier along the coast. The barrier will be approximately 8.5 miles in length between Castroville and Marina. The intrusion barrier comprises 18 extraction wells; although this number may change as the project is refined. Nine wells will be located in the 180-Foot Aquifer and 9 wells will be located in the 400-Foot Aquifer. Supplemental water to replace the extracted water would come from one or a number of other sources. For costing purposes, the initial barrier alignment is assumed to largely parallel

Highway 1, diverging to the northeast on the northern side of Castroville. This alignment will be refined as land access agreements are developed and cost estimates are refined. Wells will be installed spaced approximately every 2,000 feet. The deepest wells would be installed to the depth of the base of the 400-Foot Aquifer, approximately 750 feet below ground surface.

The 9 wells in the 180-Foot Aquifer are assumed to produce 700 gpm each, for a total extraction rate of 6,300 gpm or 14 cfs. The 9 wells in the 400-Foot Aquifer are assumed to produce 1,400 gpm each, for a total extraction of 12,600 gpm or 28 cfs. The 18 wells would withdraw up to 30,000 AF/yr. Of this 30,00 AF/yr., 22,000 AF/yr. would be extracted from the 180/400-Foot Subbasin, the remainder would be extracted from neighboring subbasins. Half of this 22,000 AF/yr. comes from the inland side of the barrier. This number is conservatively high and will be refined as the project design is refined. Extracted groundwater would be conveyed in a new pipeline for ultimate discharge back into the Pacific Ocean. Alternatively, the extracted water or a portion thereof could be conveyed to a new or existing desalination facility where it can be treated for potable and/or agricultural use. The water extracted from these wells will be brackish due to historical seawater intrusion, therefore, the extraction will serve to remove the brackish water and allow replacement for fresh water from other sources, most likely a combination of desalinated water, excess surface water from the Salinas River, and/or purified recycled water.

An optional barrier using injection instead of extraction was also considered. This option would use the same 9 wells in the 180-Foot Aquifer and 9 wells in the 400-Foot Aquifer but would use these wells to develop an injection mound rather than a drawdown barrier. The mound developed by injection would need to be high enough to compensate for the density of seawater at the coast. Assuming the 180-Foot Aquifer has an average depth of 270 feet and using the Ghyben-Herzberg relationship for saltwater intrusion, the injection mound in the 180-Foot Aquifer at the coastline would need to be 6.75 feet above sea level to fully stop seawater intrusion. Assuming the 400-Foot Aquifer has an average depth of 550 feet, and using the same relationships, the injection mound in the 400-Foot Aquifer at the coastline would need to be 13.75 feet above sea level to fully stop seawater intrusion.

Mounding calculations presented in Appendix 9D suggest that approximately 46,000 AF/yr. of water would need to be injected to create the required mounding. Of this 46,000 AF/yr., 34,500 AF/yr. would be injected into the 180/400-Foot Aquifer Subbasin. Water that could be injected in accordance with existing regulations and ordinances includes treated Salinas River water, desalinated ocean water, and advanced purified recycled water. Treated Salinas River water and desalinated ocean water would be preferentially delivered to growers and municipalities rather than injected. The only likely source of water for injection is therefore advanced purified recycled water. Because it is unlikely that a reliable year-round supply of advanced purified recycled water will be available for a reasonable cost, the injection option was temporarily tabled.

9.4.3.7.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Seawater intrusion measurable objectives

9.4.3.7.2 Expected Benefits and Evaluation of Benefits

The project will stop and reverse seawater intrusion, helping to remediate and restore the 180/400-Foot Aquifer Subbasin.

9.4.3.7.3 Circumstances for Implementation

The seawater intrusion barrier project is a preferred project and will be implemented as soon as financially and legally possible. A number of land and access agreements will be needed before the project can be implemented.

9.4.3.7.4 Legal Authority

Section 10726.2(a) of the California Water Code gives the SVBGSA the right to acquire the land necessary for the required infrastructure (CWC, 2014).

9.4.3.7.5 Implementation Schedule

The implementation schedule is presented on Figure 9-16. It is anticipated to take 5 years to implement.

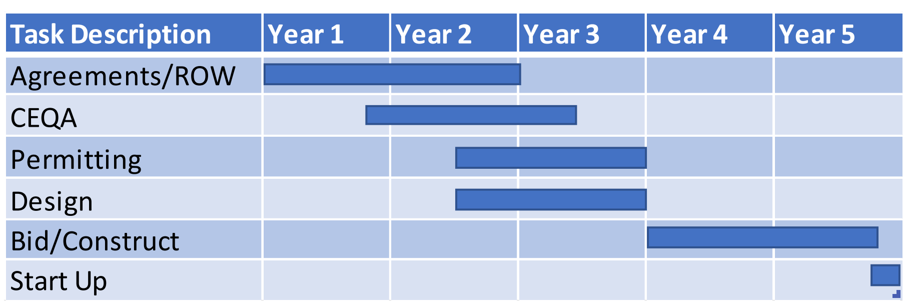


Figure 9-16. Implementation Schedule for Seawater Intrusion Extraction Barrier

9.4.3.7.6 Estimated Cost

Capital cost for the Seawater Intrusion Pumping Barrier project is estimated at $102,389,000. This includes 44,000 LF of 8-inch to 36-inch pipe and rehabilitation of the existing M1W outfall. Annual O&M costs are anticipated to be approximately $9,800,000. To make the project cost comparable to other projects, the total projected yield of 30,000 AF/yr. is used to estimate a cost per acre-foot. This project does not benefit the Subbasin in the same way as those that mitigate overdraft, and thus the yield is not directly comparable; the yield is only used to calculate the cost comparison. The amortized cost of water for this project is estimated at $590/AF. This project assumes the water will be discharged through the existing M1W outfall. If Alternative Project 1 is pursued, the upgrade to the outfall will not be required.

9.4.3.8 Preferred Project 7: 11043 Diversion Facilities Phase I: Chualar

MCWRA holds Permit 11043 (Permit), which is a wet weather diversion right on the Salinas River. The diversion can only occur in two identified locations: near Soledad and Chualar. The Permit has an annual maximum diversion limit of 135,000 AF. Permit Condition 13 only allows water to be diverted when there are natural flows in the river that exceed minimum specified flows. In addition, under Condition 13, the maximum allowed diversion is 400 cfs. Based on the conditions of the permit, a conservative estimate is that approximately 63,000 AF of water can be diverted during average years from either diversion point between the months of December through March. Diverting an average of 63,000 AF/yr., however, would require very large diversion structures. SVBGSA reviewed how much water could be reliably diverted using smaller diversions structures. Figure 9-17 illustrates the volume of water that can be diverted, based on historical flows and the size of the diversion structure.

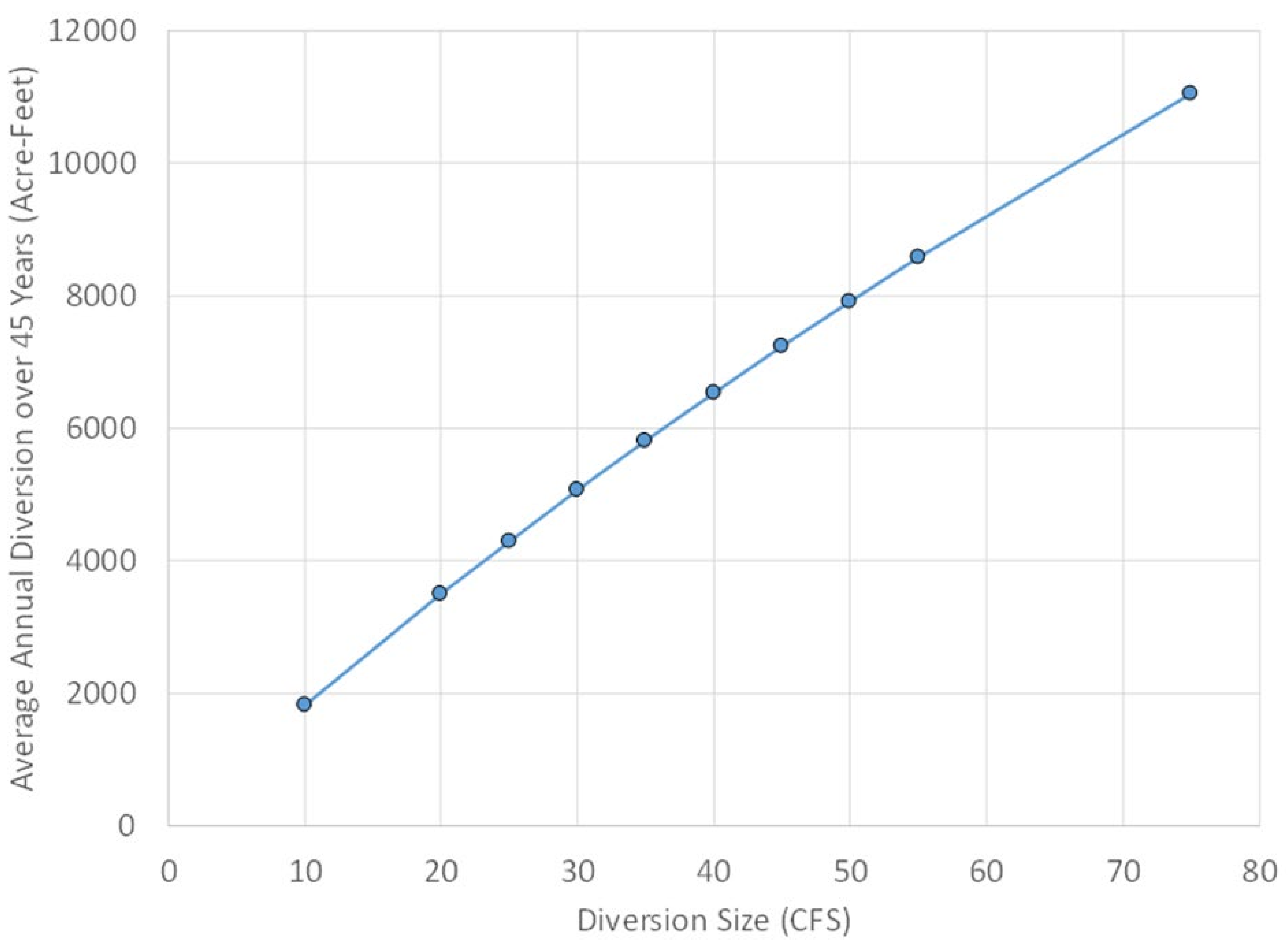


Figure 9-17: Water Right 11043 Average Annual Historical Diversions Volume for Various Sized Diversion Structures

Preferred Project 7 proposes to construct extraction facilities at the Chualar location and pump the water to the Eastside Subbasin where the water can then be infiltrated or injected into the groundwater basin at known pumping depressions. The first phase includes a diversion facility at the Chualar diversion site that would be sized to provide approximately 6,000 to 10,000 AF/yr. of water to the southeast edge of the City of Salinas. To obtain this volume of water, a diversion structure that can pump between 35 and 65 cfs is required. The diversion structure could be sized to extract more than 10,000 AF/yr.; however, it may not be economical to construct a larger facility. This issue can be further evaluated during the preliminary design stages of the project. The project would require the following facilities:

- A radial collector diversion facility with pump house capable of pumping between 35 and 65 cfs, equivalent to a rate of between 15,700 and 29,000 gpm.
- An infiltration basin that could be farmed in the summer and fallowed during the winter. It is estimated between 100 and 200 acres (estimating 0.25 in/hr. infiltration rate) would be required for the infiltration basin.
- An alternative to the infiltration basin is to construct a filtration and chlorination treatment facility and injection wells near the pumping depression. This alternative is more expensive but potentially more effective than the infiltration basins.

A radial collector well consists of a vertical, large diameter caisson which is sunk to a level below the water table; caisson diameters typically range between 8 to 20 feet. Extending from the central caisson is one or more lateral perforated screens which are typically 125 to 250 feet in length. The horizontal laterals collect water from the subsurface and convey it to the central caisson which also serves as a pump station. From the caisson, the water is pumped to its destination. Water collected in this manner offers the advantage of having undergone riverbank filtration, generally offering improved and more consistent water quality than that of water collected directly from a surface water. The radial collector wells also have a lower ground surface footprint than the equivalent number of vertical wells that would be needed to extract the same amount of water. Radial collector wells such as the Ranney Well™, have capacities ranging from 0.1 to 50 mgd. The radial collector for the 11043 Chualar Diversion would be sized for a capacity of 19 to 42 mgd.

For conceptual project evaluation purposes, the system is assumed to include:

- One 16’ diameter caisson to 100’ depth
- Six 12” diameter laterals, 150’ in length
- Elevated pump house and control room for four 350-HP, 7,500 gpm pumps.
- A 48” diameter, 23,750 linear foot transmission pipe to convey water from the diversion facility to the injection well sites.

An alternative to the Diversion Facility at Chualar would be to modify the 11043 permit to allow diversions closer to the City of Salinas. The City of Salinas owns infrastructure, land, and permanent pipeline easements that were previously part of the abandoned wastewater treatment plant. This plant discharged treated wastewater into the Salinas River. The City also owns and operates the Industrial Wastewater Treatment Facility, a 200-acre facility north of the Salinas River and west of Davis Road with pumping facilities, aeration basin, three large percolation/evaporation ponds, and smaller drying beds. The Industrial Wastewater Treatment Facility site contains a solar array which generates enough power to offset over half the current consumption at the facility. The modified project would still incorporate the radial collectors as described above but would use the City's existing infrastructure for treatment and distribution.

9.4.3.8.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Land subsidence measurable objectives

9.4.3.8.2 Expected Benefits and Evaluation of Benefits

There is no direct benefit from this project on the 180/400-Foot Aquifer Subbasin. This project is included here as part of the complete Valley-wide groundwater management program. The primary expected benefit of Preferred Project 7 is to provide an alternative water supply source to recharge the Eastside groundwater basin near the cone of depression, thereby either raising groundwater elevations or lowering the rate of groundwater elevation decline.

Figure 9-18 shows the expected groundwater elevation benefit in the 180-Foot Aquifer from this project. Figure 9-19 shows the expected groundwater elevation benefit in the 400-Foot Aquifer from this project. Model results suggest that this project reduces seawater intrusion by approximately 660 AF/yr. on average.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between the 11043 diversion and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

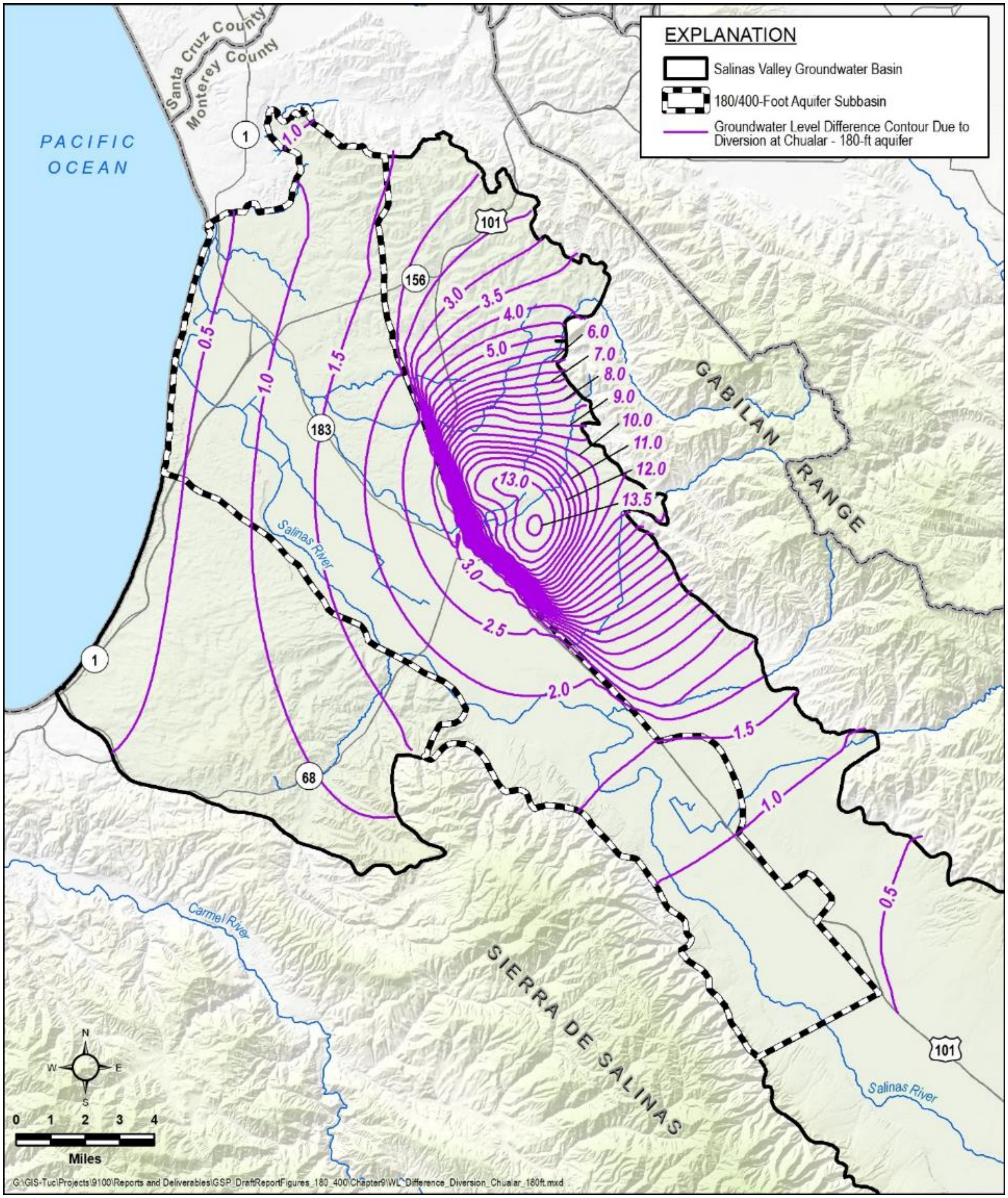


Figure 9-18: Estimated Groundwater Elevation Benefit in the 180-Foot Aquifer from the 11043 Diversion at Chualar

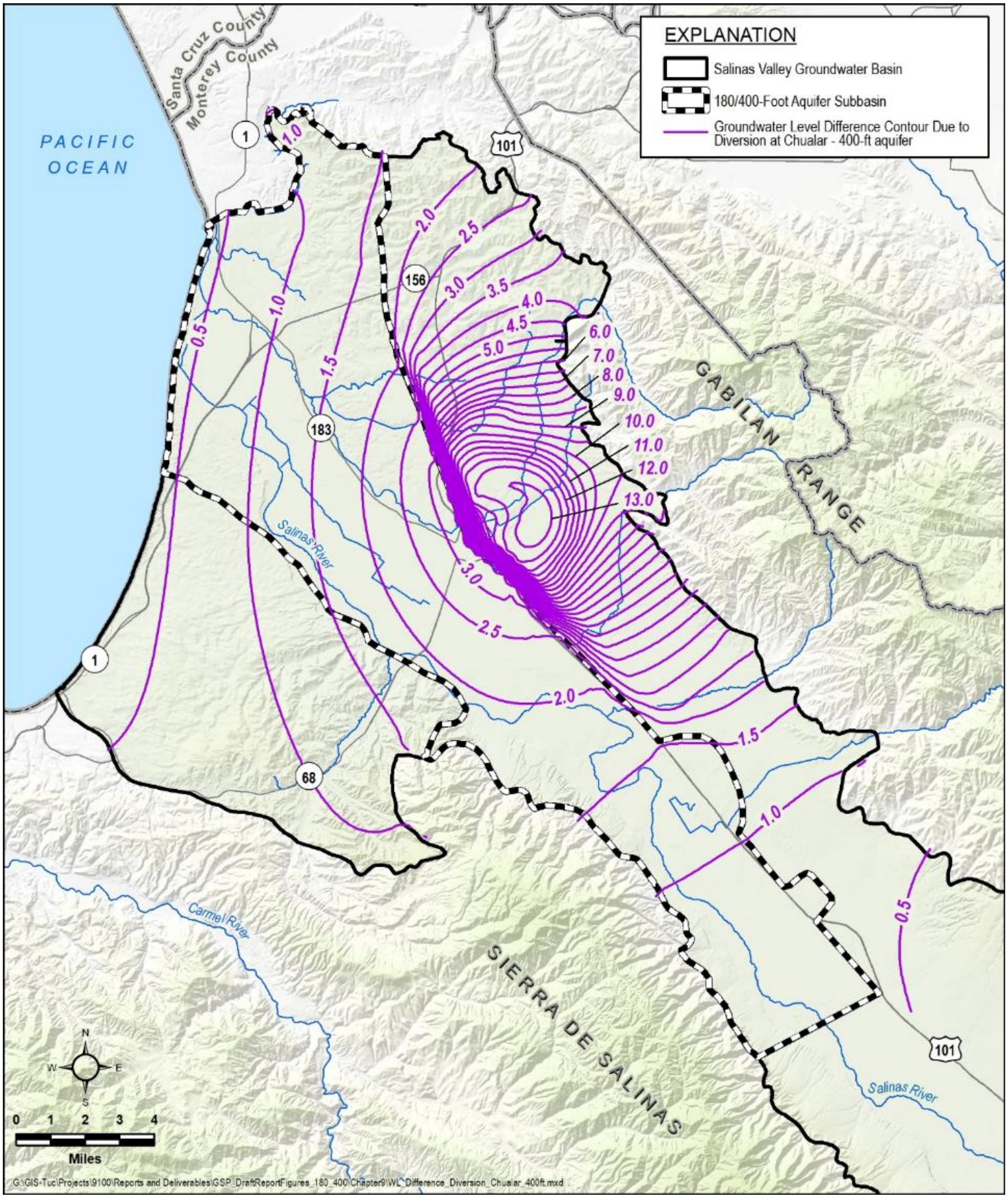


Figure 9-19: Estimated Groundwater Elevation Benefit in the 400-Foot Aquifer from the 11043 Diversion at Chualar

9.4.3.8.3 Circumstances for Implementation

The 11043 Diversion Project; Phase I Chualar is a preferred project and will be implemented as soon are financially and legally possible. A number of land and access agreements will be needed before the project can be implemented.

9.4.3.8.4 Legal Authority

MCWRA, who holds the 11043 permit, is a member of the SVBGSA. Either MCWRA will use the permit as a member of the SVBGSA, or MCWRA will transfer the permit to SVBGSA.

The SVBGSA has the right to divert and store water once it has access to the 11043 Permit. Section 10726.2 (b) of the California Water Code provides GSAs the authority to, "Appropriate and acquire surface water or groundwater and surface water or groundwater rights, import surface water or groundwater into the agency, and conserve and store within or outside the agency" (CWC, 2014).

9.4.3.8.5 Implementation Schedule

The implementation schedule is presented on Figure 9-20. It is anticipated to take 9 years to implement.

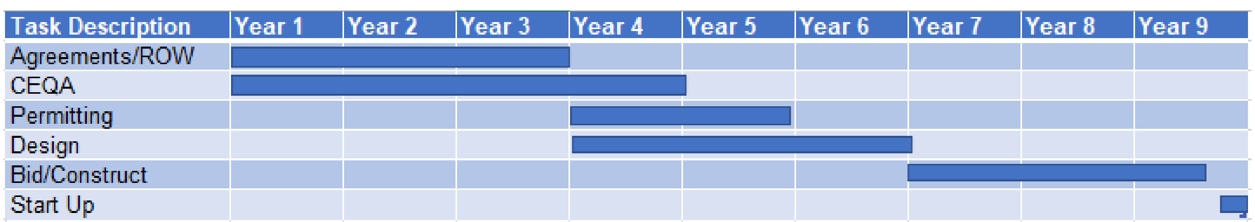


Figure 9-20. Implementation Schedule for 11043 Diversion at Chualar

9.4.3.8.6 Estimated Cost

The capital cost for the 11043 Diversion Facilities: Phase I, Chualar is estimated at $47,654,000. Annual O&M costs for the 8,000 AF project are anticipated to be approximately $2,296,000. The amortized cost of water for this project is estimated at $750/AF.

9.4.3.9 Preferred Project 8: 11043 Diversion Facilities Phase II: Soledad

As noted in Preferred Project 7, MCWRA holds Permit 11043 (Permit), which is a diversion right on the Salinas River. The diversion can only occur in two identified locations: Near Soledad and Chualar. The Permit has an annual maximum diversion limit of 135,000 AF. Permit Condition 13 only allows water to be diverted when there are natural flows in the river. In addition, under Condition 13, the maximum allowed diversion is 400 cfs. Based on the conditions of the permit, a conservative estimate is that approximately 63,000 AF of water can be diverted during average years from either diversion point between the months of December through March.

Preferred Project 8 proposes to construct extraction facilities similar to Preferred Project 7, at the Soledad location and pump the water to the Eastside Subbasin where the water can then be infiltrated into the groundwater basin at known pumping depressions or areas of poor water quality. The diversion facility would be sized to provide approximately 6,000 to 10,000 AF of water to the farmland between Soledad and Gonzales along the foothills of the Gabilan Range. The diversion structure may be sized to extract more than 10,000 AF/yr.; however, it may not be economical to construct a larger facility. This issue can be further evaluated during the preliminary design stages of the project. The SVBGSA will coordinate and consult with MCWRA on planning, construction, and operation of this project. The project would require the following facilities:

- A radial collector diversion facility with pump house capable of pumping between 35 and 65 cfs, equivalent to a rate of between 15,700 and 29,000 gpm.
- A 48” diameter, 23,750 linear foot (4.5 miles) transmission pipe to convey water to an infiltration basin or injection wells.
- An infiltration basin that could be farmed in the summer and fallowed during the winter. It is estimated between 100 and 200 acres (estimating 0.25 in/hr. infiltration rate) would be required for the infiltration basin.
- An alternative to the infiltration basin is to construct a filtration and chlorination treatment facility and injection wells near the pumping depression.

9.4.3.9.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Land subsidence measurable objectives

9.4.3.9.2 Expected Benefits and Evaluation of Benefits

There is no direct benefit from this project on the 180/400-Foot Aquifer Subbasin. This project is included here as part of the complete Valley-wide groundwater management program. The primary expected benefit of Preferred Project 8 is to provide an alternative water supply source to recharge the Eastside Subbasin, thereby either raising groundwater elevations or lowering the rate of groundwater elevation decline.

Figure 9-21 shows the expected groundwater elevation benefit in the 180-Foot Aquifer from this project. Figure 9-22 shows the expected groundwater elevation benefit in the 400-Foot Aquifer from this project. Model results suggest that this project will produce an indirect effect of reducing seawater intrusion by approximately 100 AF/yr. on average.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between the 11043 diversion and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

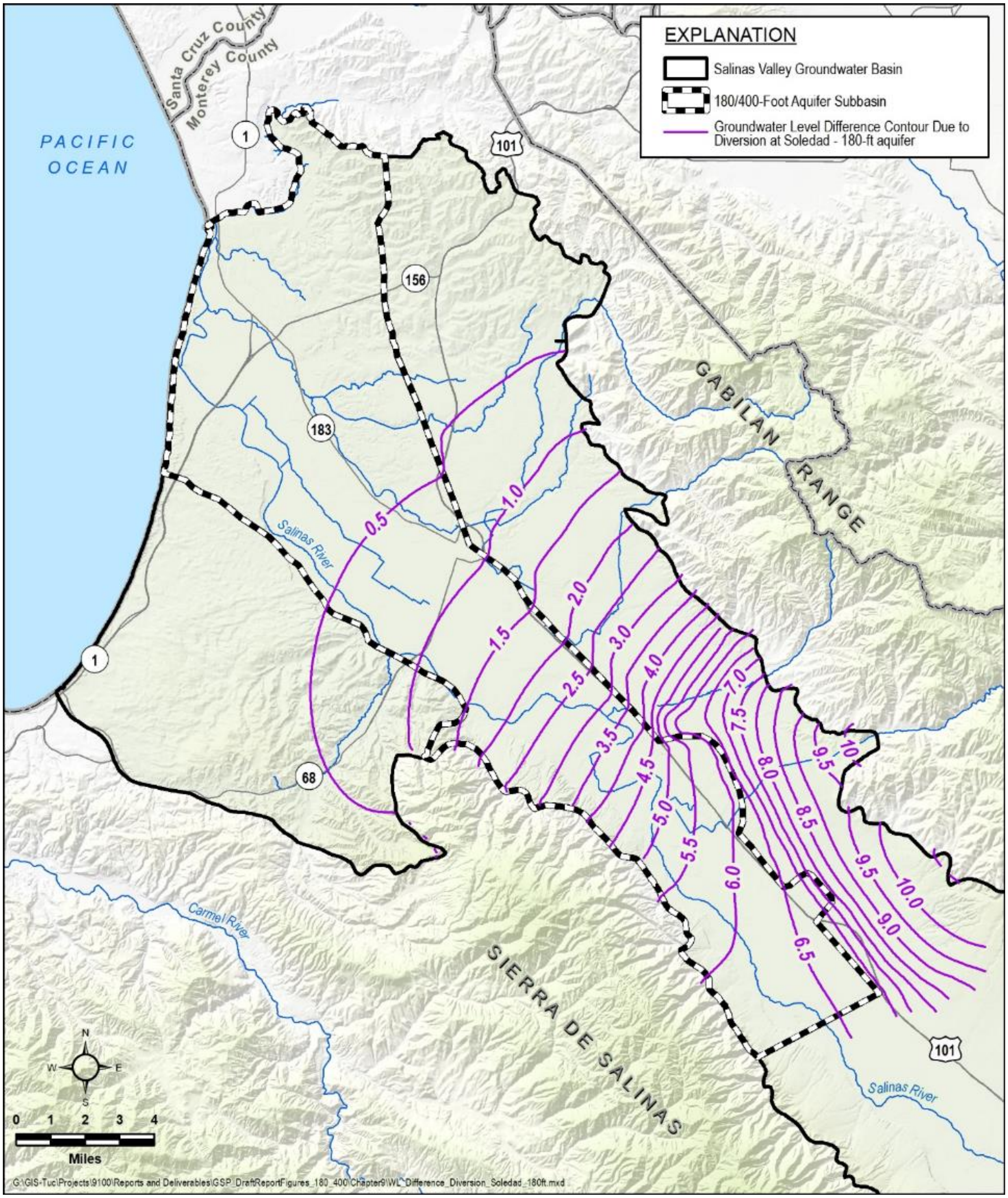


Figure 9-21: Estimated Groundwater Elevation Benefit in the 180-Foot Aquifer from the 11043 Diversion at Soledad

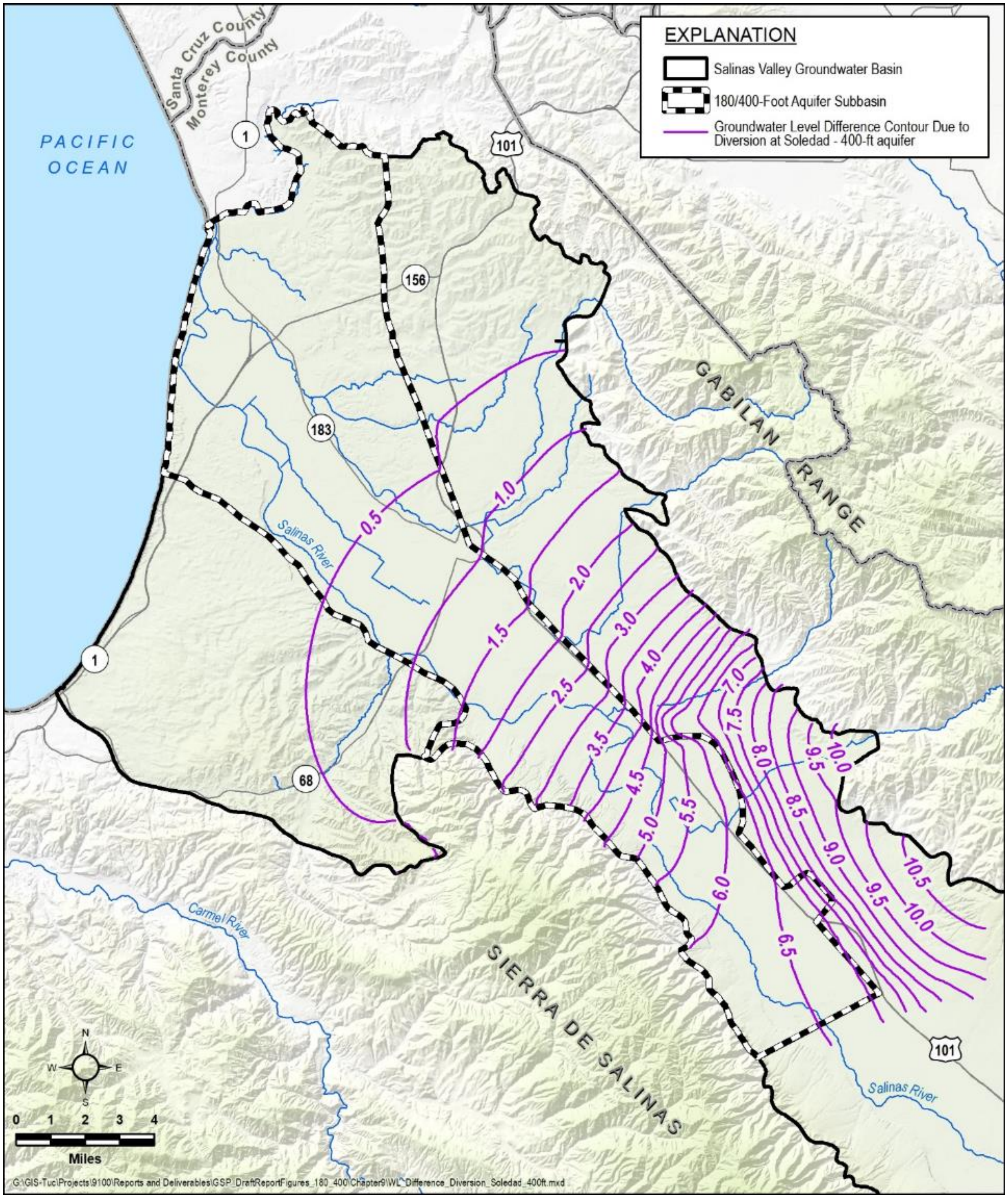


Figure 9-22: Estimated Groundwater Elevation Benefit in the 400-Foot Aquifer from the 11043 Diversion at Soledad

9.4.3.9.3 Circumstances for Implementation

The 11043 diversion project is a preferred project and will be implemented as soon are financially and legally possible. A number of land and access agreements will be needed before the project can be implemented.

9.4.3.9.4 Legal Authority

MCWRA, who holds the 11043 permit, is a member of the SVBGSA. Either MCWRA will use the permit as a member of the SVBGSA, or MCWRA will transfer the permit to SVBGSA.

The SVBGSA has the right to divert and store water once it has access to the 11043 Permit. Section 10726.2 (b) of the California Water Code provides GSAs the authority to, "Appropriate and acquire surface water or groundwater and surface water or groundwater rights, import surface water or groundwater into the agency, and conserve and store within or outside the agency" (CWC, 2014).

9.4.3.9.5 Implementation Schedule

The implementation schedule is presented on Figure 9-23. It is anticipated to take 9 years to implement.

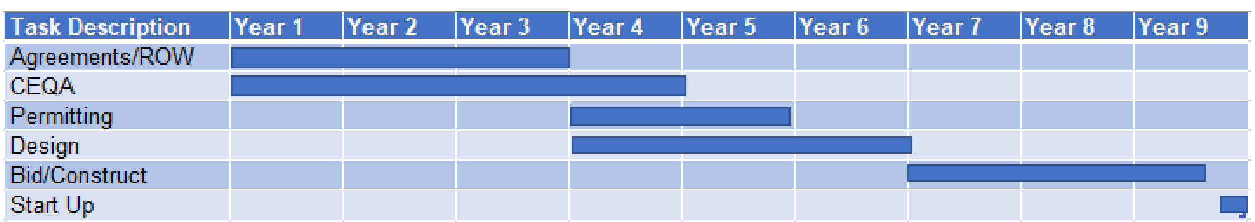


Figure 9-23. Implementation Schedule for 11043 Diversion at Soledad

9.4.3.9.6 Estimated Cost

The capital cost for the 11043 Diversion Facilities is estimated at $60,578,000. Annual O&M costs for the 8,000 AF project are anticipated to be approximately $5,050,000. The amortized cost of water for this project is estimated at $880/AF.

9.4.3.10 Preferred Project 9: SRDF Winter Flow Injection

Preferred Project 9 would divert winter flows from the Salinas River using the existing SRDF facilities and inject the water into the 180/400-Foot Aquifer Subbasin to maintain groundwater elevations, improve water quality, and prevent further seawater intrusion. An alternative to groundwater injection could be to treat the diverted water at the City of Salinas' Industrial Wastewater Treatment Facility. This treated water could be used for beneficial reuse that would reduce groundwater pumping. This project could benefit other subbasins, such as the Monterey and Eastside subbasins by providing potable water to these subbasins for direct recharge and/or municipal potable use.

One potential constraint on this project is clarifying water rights and establishing reservoir operation rules that can take advantage of the water rights. The operation of the SRDF is subject to the environmental flow prescriptions outlined in the Biological Opinion issued by NOAA's National Marine Fisheries Service (NMFS) in 2007 and incorporated into MCWRA's water diversion permit 21089 (NMFS, 2007);

For diversions to occur, there must be adequate flow in the Salinas River and flows for fish migration must be satisfied. At the SRDF fish ladder bypass, flows are maintained at 45 cfs for migration when the lagoon sandbar is open to the ocean, and 15 cfs for migration when the lagoon sandbar is closed, and flow is routed to the Old Salinas River channel. A minimum flow of 2 cfs is maintained to the lagoon when SRDF irrigation diversions are occurring or aquifer conservation releases from Nacimiento and/or San Antonio reservoirs are being made to the Salinas River.

Under this alternative project, water would be diverted from the Salinas River at a maximum flow rate of 36 cfs. Water would then be pumped to an expanded surface water treatment plant where it would be chlorinated, filtered, and conveyed to new injection wells in the 180/400-foot Aquifer Subbasin. Likely increased volumes of sediment in the river water during the winter will possibly require additional filtration or higher levels of maintenance on the existing filtration system. If river levels are low (less than 5 feet), the existing inflatable dam would be needed to operate the diversion. If river levels are higher than 5 feet, the inflatable dam would not be required.

Winter extractions are assumed to yield flows of 36 cfs, or 16,000 gpm. New injection wells will include wells completed in both the 180- and 400- Foot Aquifers, back-flush facilities including back wash pumps and percolation basin for water disposal into the vadose zone, electrical and power distribution and motor control facilities. The existing CSIP supplementary wells will be evaluated and considered as injection wells, which could result in a cost savings for this project.

Based on an injection rate of 1,000 gpm per injection well, 16 new injection wells would be installed. The wells would be located to the east toward the City of Salinas where they would inject water into the 180/400-Foot Aquifer Subbasin.

9.4.3.10.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation
- Groundwater storage

- Seawater intrusion
- Land subsidence

9.4.3.10.2 Expected Benefits and Evaluation of Benefits

The expected benefits were estimated assuming approximately 12,900 AF of water is available for winter recharge. Additional water could be available for recharge if water rights permit it. These estimates will be refined during preparation of the HCP.

Figure 9-24 shows the expected groundwater elevation benefit in the 180-Foot Aquifer from this project. Figure 9-25 shows the expected groundwater elevation benefit in the 400-Foot Aquifer from this project. Model results suggest that this project reduces seawater intrusion by approximately 1,600 AF/yr. on average.

Changes in groundwater elevation will be measured with the groundwater elevation monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between injecting winter streamflow in the Subbasin and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

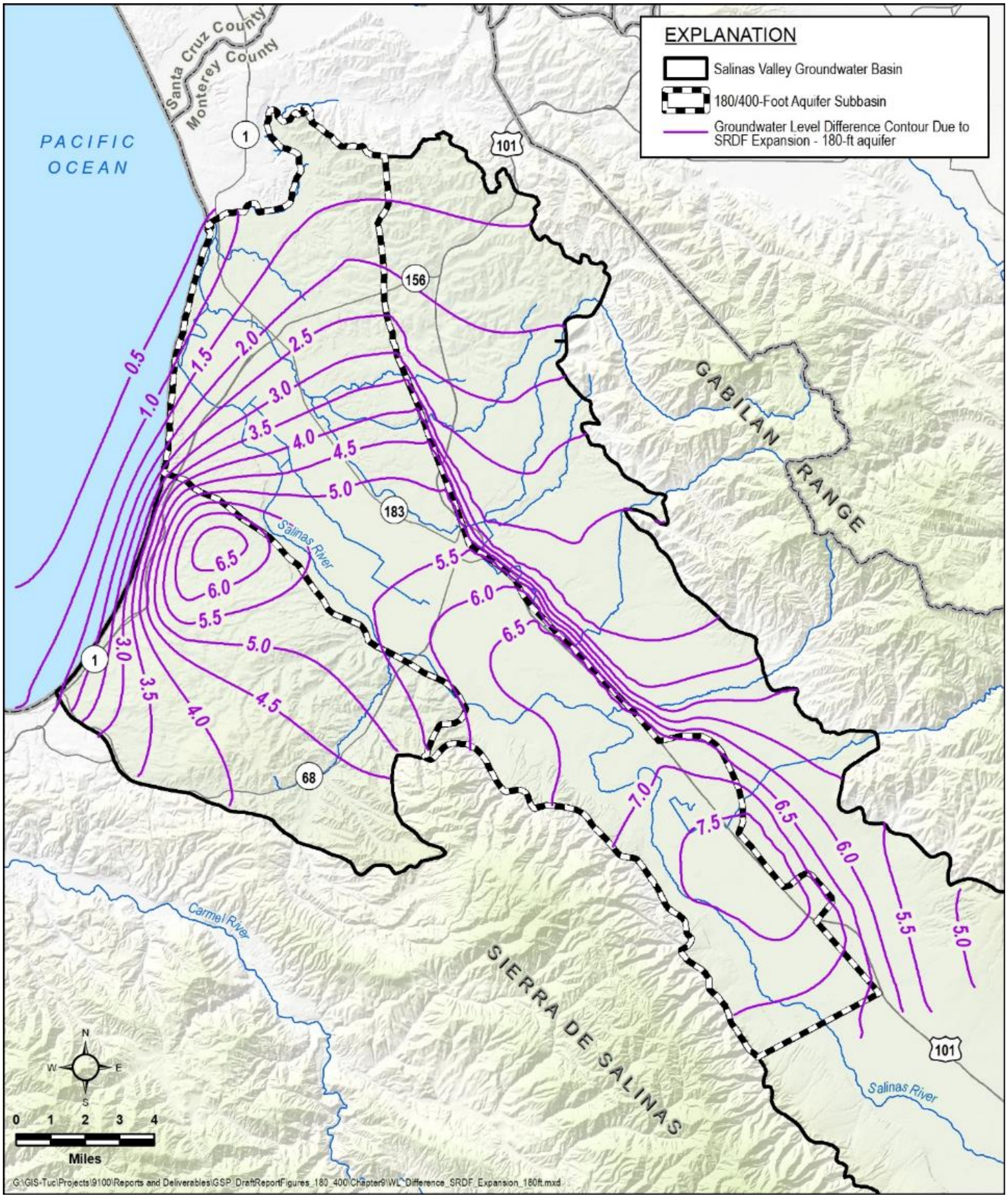


Figure 9-24: Estimated Groundwater Elevation Benefit in the 180-Foot Aquifer from the 11043 Diversion at Soledad

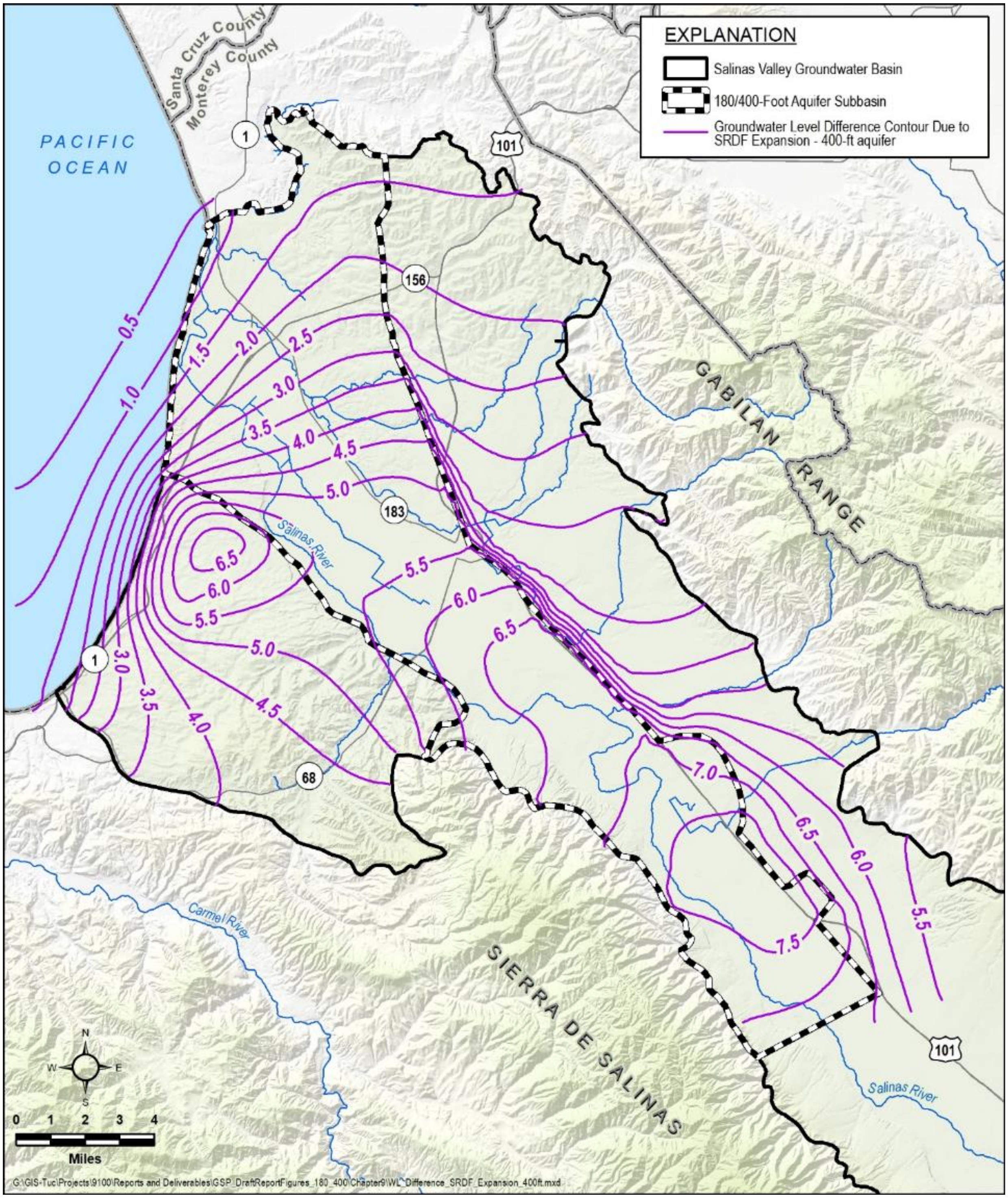


Figure 9-25: Estimated Groundwater Elevation Benefit in the 400-Foot Aquifer from the 11043 Diversion at Soledad

9.4.3.10.3 Circumstances for Implementation

Winter recharge will be implemented only if the existing water right permit is modified to allow for diversions between November and March. At this time, SVBGSA is not proposing to modify the volume of water being diverted.

This project will likely be subject to new flow restrictions and reservoir operations resulting from the planned HCP. This project will not proceed until the water rights and flow prescriptions from the HCP have been determined.

9.4.3.10.4 Legal Authority

The SVBGSA can acquire water for recharge under California Water Code section 10726.2 (b) which give the SVBGSA authority to "Appropriate and acquire surface water or groundwater …" as well as "the spreading, storing, retaining, or percolating into the soil of the waters for subsequent use" (CWC, 2014).

9.4.3.10.5 Implementation Schedule

The implementation schedule is presented on Figure 9-26. It is anticipated to take four years to implement which excludes any improvements performed under Preferred Project 5.

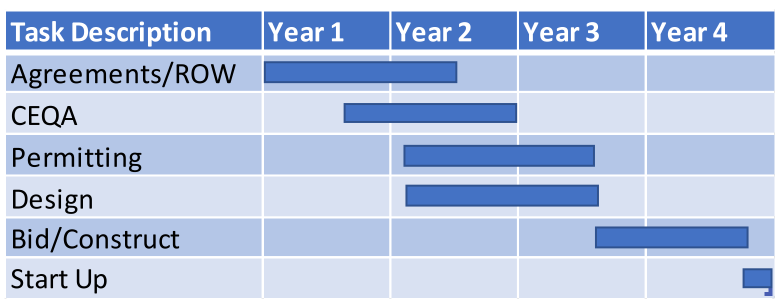


Figure 9-26. Implementation Schedule for Radial Collector Water Injection

9.4.3.10.6 Estimated Cost

Costs for the injection of winter flows from the expanded SRDF were estimated based upon using the existing SRDF facilities. The majority of the costs are for the construction of the injection wells. Capital costs are assumed to be $51,191,000 for construction of an injection well field consisting of 16 wells as well as construction of a 4-mile conveyance pipeline between the SRDF site and the injection well system. The cost of an expanded surface water treatment system for the SRDF expansion is not included in this estimate.

Annual O&M costs are estimated at $3,624,000 for the operation of the injection well field. Total annualized cost is $7,629,000. Based on a project yield of 12,900 AF/yr., the unit cost of water is $590/AF/yr.

9.4.4 Alternative Projects

The priority projects listed above, coupled with the management actions described in Section 9.3, might not lead to full sustainability in the 180/400-Foot Aquifer Subbasin. Four alternative projects are included in this GSP. These alternative projects supply additional water to the 180/400-Foot Aquifer Subbasin. Not all projects will necessarily be implemented by the SVBGSA. Projects will be implemented only if they are deemed cost effective or necessary to achieve sustainability.

One or more of these projects may be implemented based on future need and cost. The alternative projects are summarized in Table 9-3 and described below.

Table 9-3. Alternative Projects

Alternative Project #	Project Name	Water Supply	Project Type
1	Desalinate Water from the Seawater Barrier Extraction Wells	Brackish Groundwater	In Lieu Recharge
2	Recharge Local Runoff from Eastside Range	Stormwater	Direct Recharge
3	Winter Potable Reuse Water Injection	Recycled Water	Direct Recharge
4	Seasonal Water Storage in 180/400 Aquifer	Salinas River	In Lieu Recharge

9.4.4.1 Alternative Project 1: Desalinate Water from the Seawater Barrier Extraction Wells

This project would treat water extracted from the seawater intrusion barrier under Priority Project 6, and allow for local reuse. Local reuse could include providing municipal supply, providing agricultural supply, or reinjection in the 180-Foot Aquifer and 400-Foot Aquifer. The project relies upon the desalination of brackish water extracted from the 180/400-foot aquifer Subbasin to feed a treatment facility and discharge the treated water in injection wells east of the intrusion barrier.

The desalination treatment could be provided as a standalone plant or supply one of three proposed desalination plants in the region. The final decision on whether to implement this alternative project, and whether to desalinate the source water with a standalone plan or one of the three planned plants will depend on which of these alternatives is the most cost effective. The following plants are in various planning and design stages in the Monterey Bay Area:

- Monterey Peninsula Water Supply Project desalination plant, 6.4 mgd (7,100 AF/yr.)
- Deep Water Desalination Plant, 22 mgd (25,000 AF/yr.)
- People's Water Supply Project desalination plant, 12 mgd (13,400 AF/yr.)

Two of the desalination plants are being considered at Moss Landing: DeepWater Desal Project and the People's Desalination Project. These two plants are currently envisioned to be able to receive influent source water flows of 49 mgd (55,000 AF/yr.) in the case of DeepWater Desal and 30 mgd (33,600 AF/yr.) for the People's Desalination Project. Construction of the Cal-Am MPWSP desalination plant adjacent to M1W's RTP is anticipated to commence in 2020.

Depending on the desalination plant selected, the source water pipeline would consist of approximately 11 miles of source water pipeline to convey up to 22,000 gpm (32 mgd or 35,500 AF/yr.) of flow to the plant. The pipeline would range from 18" to 36" in diameter.

Assuming a 42% recovery efficiency, 12,700 gpm of brine would need to be sent to an ocean outfall. For costing purposes, SVBGSA assumed the 9,200 gpm of treated water would be sent for injection east of the seawater intrusion barrier. An additional 9 miles of 24" pipeline would be needed to convey this desalinated water to an injection well field or recharge basin.

9.4.4.1.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Seawater intrusion measurable objectives
- Land subsidence measurable objectives

9.4.4.1.2 Expected Benefits and Evaluation of Benefits

The desalination plants may provide up to approximately 15,000 AF of water for both in-lieu and direct recharge to the Subbasin. This project could benefit other subbasins, such as the Monterey and Eastside subbasins by providing potable water to these subbasins for both in-lieu and direct recharge.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between providing desalinated water to the Subbasin and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.4.4.1.3 Circumstances for Implementation

The desalination alternative project is one of four alternative projects that may provide additional water to the Subbasin. The project will only be implemented after all four alternative projects have been refined. The most cost-effective project of the four will be selected to supply additional water to the Subbasin.

Using an existing or planned plant for desalination requires the plant be permitted and fully designed. The desalination alternatives using existing plants will not proceed until one or more of the plants have been fully permitted for construction.

9.4.4.1.4 Legal Authority

Water used for desalination would be pumped from the seawater intrusion barrier wells and can be used by SVBGSA as long as the water is not exported out of the basin.

9.4.4.1.5 Implementation Schedule

The implementation schedule is presented on Figure 9-27. It is anticipated to take eight years to implement. The schedule is highly contingent upon whether a completely new desalination plant is conceived or if an existing plant already in the planning stages is elected.

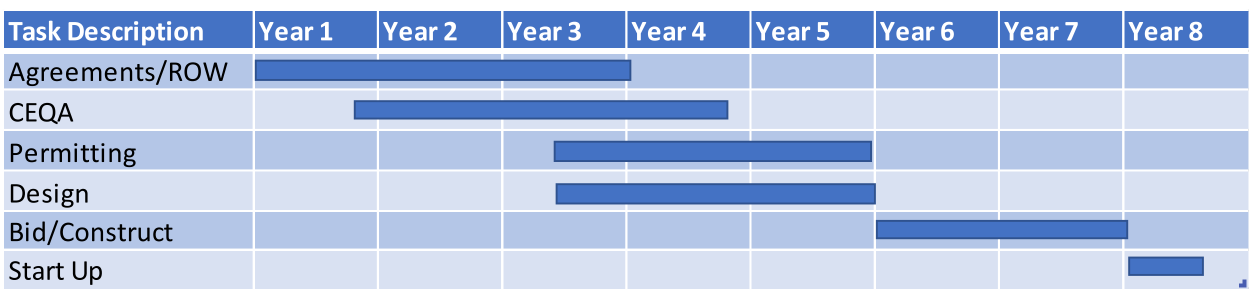


Figure 9-27. Implementation Schedule for Desalination of Extraction Barrier Seawater

9.4.4.1.6 Estimated Cost

Estimated costs for desalination depend on the facility used to desalinate the extracted water. For comparison purposes, a high-level estimate was developed for a 13 mgd facility. Capital costs are assumed to be $182,000,000 based on a construction unit cost of $14 million/mgd for desalination plants and associated intake/outfall facilities, a unit cost consistent with other desalination plant projects evaluated by WaterReuse (Kennedy-Jenks, 2014). As a point of comparison, the 6.4-mgd Cal-Am MPWSP project has an estimated capital construction cost of $226,900 equivalent to approximately $35 million/mgd. The total capital costs with the markups and the addition of the source water pipelines from the extraction barrier well field and desalinated water pump station and pipelines to a groundwater recharge site to the east, would be $341,472,000.

Annual O&M costs are estimated at $9,890,000 for the desalination plant and distribution of desalinated water. Based on a project yield of 15,000 AF/yr. of desalinated water, the unit cost of water is $2,440/AF/yr. This is a very rough estimate and will be refined in the first three years on GSP implementation.

9.4.4.2 Alternate Project 2: Recharge Local Runoff from Eastside Range

This project recharges local runoff from the Gabilan Range and diverts it to groundwater recharge basins before it reaches the Salinas River. This project will require additional legal and engineering analysis to evaluate water rights and actual available water supply from each of the watersheds. The project assumes that the stormwater is not being diverted upstream, however, many of the mountain ranges have diversion operations already occurring upstream in the watershed. Rain gauges and studies will be required to determine the true estimate of water available from each watershed.

This project can be implemented in two forms: on-farm recharge and stream diversion recharge. On farm recharge would be similar to the program initiated in Pajaro Valley that compensates landowners for retaining and recharging stormwater before it reaches any identified waterway. This program likely leads to less benefit but is also less expensive to develop.

The diversion recharge alternative diverts water from the major tributaries in the Eastside Subbasin to groundwater recharge basins. Figure 9-28 shows the watersheds in the Gabilan Range adjacent to the Eastside Subbasin. Figure 9-28 also provides an approximate volume of water, in AF, available during a 2-, 5-, 10-, and 25-year storm event for each of the watersheds. A series of recharge basins and piping network will be required. The system will operate by gravity. For costing purposes, it is estimated that approximately 10,000 feet of pipeline would be required in addition to what is constructed in Preferred Projects 7 and 8. In addition, 6 to 8 recharge basins at approximately 50 to 100 acres each will be required to infiltrate stormwater.

9.4.4.2.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Land subsidence measurable objectives
- Groundwater quality measurable objective

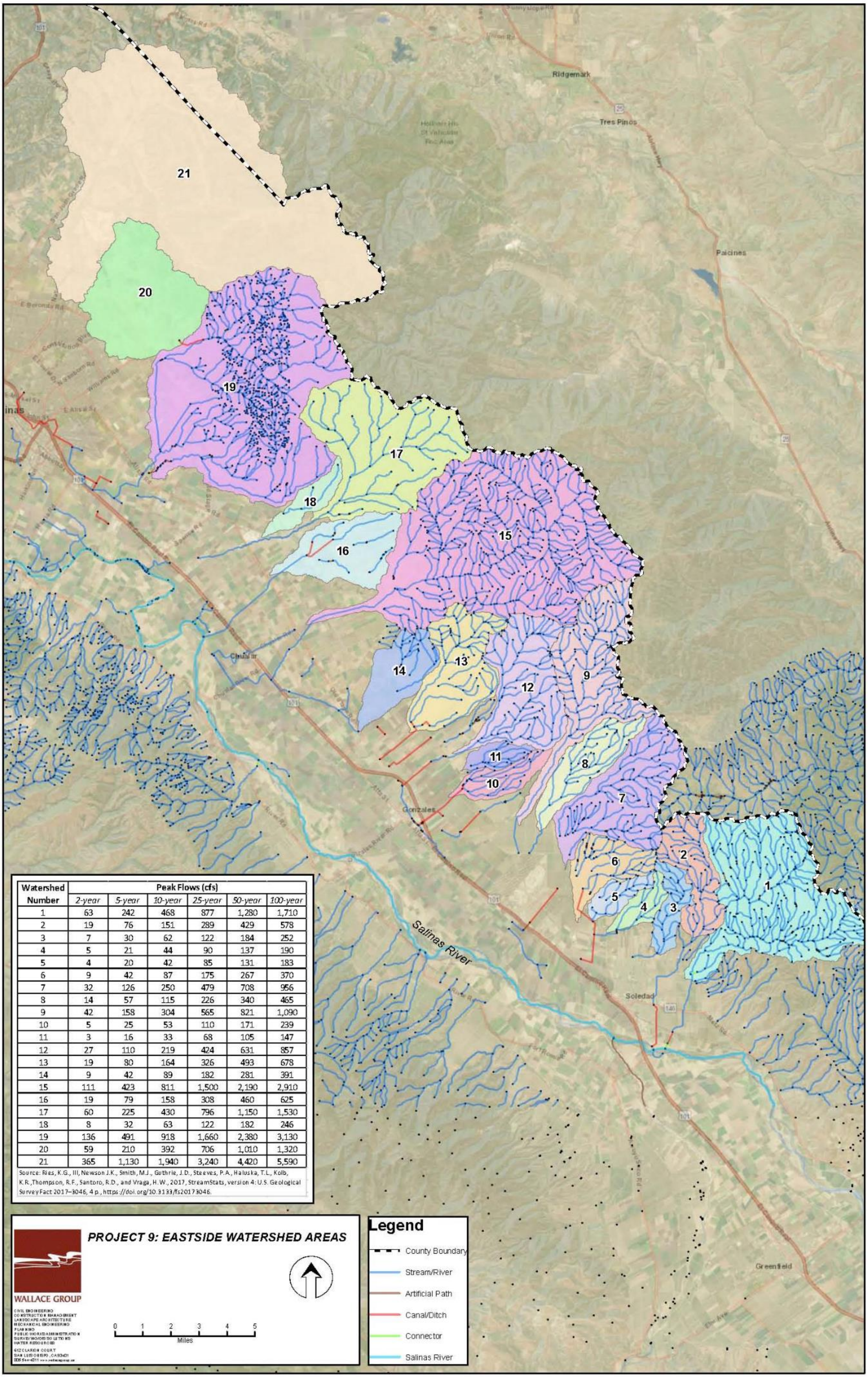
9.4.4.2.2 Expected Benefits and Evaluation of Benefits

There is no direct benefit from this project on the 180/400-Foot Aquifer Subbasin. This project is included here as part of the complete Valley-wide groundwater management program. The primary expected benefit of Alternative Project 2 is to provide an alternative water supply source to recharge the Eastside Subbasin and improve water quality in the Eastside Subbasin.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between the recharging local runoff and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.4.4.2.3 Circumstances for Implementation

The local recharge project is an alternative project and will be implemented only if additional water is required to reach sustainability. A number of agreements and rights must be secured before the project is implemented. Primarily, a more formal cost/benefit analysis must be completed to determine if the on-farm recharge or stream diversion recharge options are preferable. If on-farm recharge is preferable, an incentive program must be developed that works with the proposed water charges framework. If the stream diversion option is preferable, water diversion rights must be secured, which may take a significant number of years.



Watershed Number	Peak Flows (cfs)					
	2-year	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
1	63	242	468	877	1,280	1,710
2	19	76	151	289	429	578
3	7	30	62	122	184	252
4	5	21	44	90	137	190
5	4	20	42	85	131	183
6	9	42	87	175	267	370
7	32	126	250	479	708	956
8	14	57	115	226	340	465
9	42	158	304	565	821	1,090
10	5	25	53	110	171	239
11	3	16	33	68	105	147
12	27	110	219	424	631	857
13	19	80	164	326	493	678
14	9	42	89	182	281	391
15	111	423	811	1,500	2,190	2,910
16	19	79	158	308	460	625
17	60	225	430	796	1,150	1,530
18	8	32	63	122	182	246
19	136	491	918	1,660	2,380	3,130
20	59	210	392	706	1,010	1,320
21	365	1,130	1,940	3,240	4,420	5,590

Source: Ries, K.G., III, Newson J.K., Smith, M.J., Guthrie, J.D., Steeves, P.A., Haluska, T.L., Kolb, K.R.,Thompson, R.F., Santoro, R.D., and Vraga, H.W., 2017, StreamStats, version 4: U.S. Geological Survey Fact 2017–3046, 4 p., https://doi.org/10.3133/fs20173046.

Figure 9-28. Eastside Watersheds

Table 9-4. Estimated Eastside Watershed Runoff

Storm	Runoff (AF)	Storm	Runoff (AF)	Storm	Runoff (AF)
Watershed 1, 9600 Acres		**Watershed 8, 2368 Acres**		**Watershed 15, 17536 Acres**	
2-Year Storm	136	2-Year Storm	33.5	2-Year Storm	449.9
5-Year Storm	294.3	5-Year Storm	72.6	5-Year Storm	1,026.60
10-Year Storm	463.9	10-Year Storm	114.4	10-Year Storm	1,591.80
25-Year Storm	752.7	25-Year Storm	185.7	25-Year Storm	2,445.90
Watershed 2, 2816 Acres		**Watershed 9, 5376 Acres**		**Watershed 16, 3264 Acres**	
2-Year Storm	39.9	2-Year Storm	76.2	2-Year Storm	83.7
5-Year Storm	86.3	5-Year Storm	164.8	5-Year Storm	191.3
10-Year Storm	136.1	10-Year Storm	259.8	10-Year Storm	296.3
25-Year Storm	220.8	25-Year Storm	421.5	25-Year Storm	455.3
Watershed 3, 1152 Acres		**Watershed 10, 1280 Acres**		**Watershed 17, 8000 Acres**	
2-Year Storm	16.3	2-Year Storm	17.9	2-Year Storm	204.1
5-Year Storm	35.3	5-Year Storm	39.2	5-Year Storm	468.8
10-Year Storm	55.7	10-Year Storm	61.9	10-Year Storm	726.2
25-Year Storm	90.3	25-Year Storm	100.4	25-Year Storm	1,115.80
Watershed 4, 896 Acres		**Watershed 11, 704 Acres**		**Watershed 18, 1024 Acres**	
2-Year Storm	12.7	2-Year Storm	9.9	2-Year Storm	26.1
5-Year Storm	27.5	5-Year Storm	21.6	5-Year Storm	60
10-Year Storm	43.3	10-Year Storm	34	10-Year Storm	93
25-Year Storm	70.3	25-Year Storm	55.2	25-Year Storm	142.8
Watershed 5, 896 Acres		**Watershed 12, 4672 Acres**		**Watershed 19, 17344 Acres**	
2-Year Storm	12.7	2-Year Storm	66.2	2-Year Storm	443.2
5-Year Storm	27.5	5-Year Storm	143.2	5-Year Storm	1,016.40
10-Year Storm	43.3	10-Year Storm	225.8	10-Year Storm	1,574.40
25-Year Storm	70.3	25-Year Storm	366.3	25-Year Storm	2,419.10
Watershed 6, 1984 Acres		**Watershed 13, 3904 Acres**		**Watershed 20, 6016 Acres**	
2-Year Storm	12.7	2-Year Storm	55.1	2-Year Storm	199.1
5-Year Storm	60.8	5-Year Storm	119.7	5-Year Storm	386.3
10-Year Storm	95.9	10-Year Storm	188.7	10-Year Storm	565.2
25-Year Storm	155.6	25-Year Storm	306.1	25-Year Storm	828.5
Watershed 7, 5120 Acres		**Watershed 14, 2240 Acres**		**Watershed 21, 25664 Acres**	
2-Year Storm	72.5	2-Year Storm	31.3	2-Year Storm	854
5-Year Storm	156.9	5-Year Storm	68.7	5-Year Storm	1,647.80
10-Year Storm	247.4	10-Year Storm	108.2	10-Year Storm	2,411.00
25-Year Storm	401.4	25-Year Storm	175.6	25-Year Storm	3,534.20

9.4.4.2.4 Legal Authority

The SVBGSA has the right to divert and store water once it has access to the appropriate water rights. Water rights are not needed to infiltrate on-farm runoff. Section 10726.2 (b) of the California Water Code provides GSAs the authority to, “Appropriate and acquire surface water or groundwater and surface water or groundwater rights, import surface water or groundwater into the agency, and conserve and store within or outside the agency” (CWC, 2014).

9.4.4.2.5 Implementation Schedule

The implementation schedule for the stream diversion option is presented on Figure 9-29. It is anticipated to take 11 years to implement. The on-farm recharge project may take less time to implement.

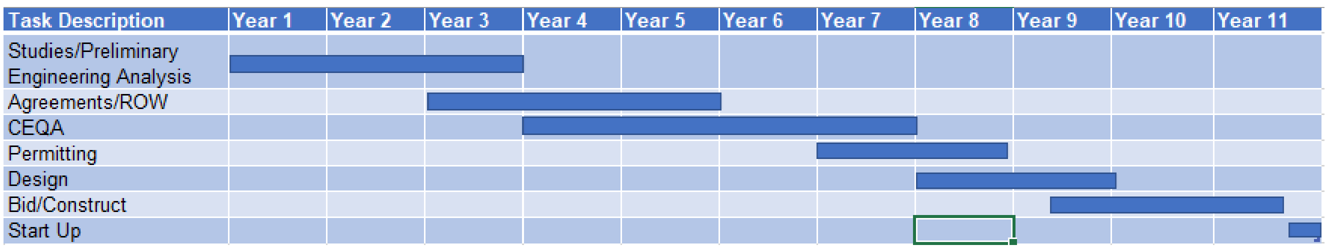


Figure 9-29. Implementation Schedule for Local Runoff with Stream Diversion Project

9.4.4.2.6 Estimated Cost

Estimated capital cost for the Stream Diversion option of the Recharge Local Runoff from Eastside project is estimated at $60,340,800. Annual O&M costs are anticipated to be approximately $1,261,000. The amortized cost of water for this project is estimated at $1,709/AF. The estimated cost for the on-farm recharge option is likely less but must still be developed.

9.4.4.3 Alternative Project 3: Winter Potable Reuse Water Injection

This project would treat additional secondary wastewater effluent through an expanded Advanced Water Purification Facility (AWPF) at M1W’s RTP and inject it into the 180/400-foot aquifer Subbasin for maintenance of groundwater elevations, improvement of water quality, and prevention of further seawater intrusion. This alternative project assumes the extra AWPF capacity planned under the Expanded Pure Water Monterey (PWM) project is built, but that Cal-Am does not require the additional purified recycled water. Instead, the water could be provided to MCWRA for groundwater recharge in the Salinas Valley Groundwater Basin.

Pure Water Monterey Groundwater Replenishment Project is under construction and a Supplemental EIR for an expanded PWM Project is being developed. This supplemental EIR covers an expansion which would raise the maximum production rate at the AWPF to 7.6 mgd.

Under this expansion, the project would provide up to 5,750 AF/yr. for groundwater recharge in the Seaside Basin, 200 AF/yr. for drought reserve, and 600 AF/yr. for MCWD irrigation, for a total production of 6,550 AF/yr.

The proposed Expanded PWM project also includes associated conveyance, injection and extraction facilities. Because the project depends on M1W's use of secondary wastewater effluent as a source of feed water to the AWPF, there will be a reduction in discharge of secondary effluent to Monterey Bay

If Cal-Am does not take the AWPF water, it could be available for injection into the 180/400-Foot Aquifer Subbasin, or other subbasins in the Salinas Valley Groundwater Basin. In particular, MCWD is currently conducting a feasibility study on injecting purified recycled water into the Monterey Subbasin. The project proposes using purified recycled water available to MCWD from the AWPF, some of which is available year-round per the district's agreement with M1W, for indirect potable reuse and prevention of further seawater intrusion. This project is consistent with, and can readily be implemented in conjunction with, the winter potable reuse project.

This project would involve the treatment of an additional 2.6 mgd at the AWPF. The project assumes that M1W installs the additional facilities needed at the AWPF, including additional treatment and pumping equipment, chemical storage, pipelines, and appurtenances within the existing 3.5-acre existing building area, that are needed to achieve a peak production rate of 7.6 mgd.

Assuming production of the purified recycled water during winter months only (November through March), the 2,250 AF/yr. would be delivered to the 180/400-Foot Aquifer Sub-Basin through a 16" diameter, 6-mile long pipeline. Water would be injected through four new injection wells west of the City of Salinas; two back-up injection wells would also be installed. Associated injection well facilities would include backwash well pumps, backwash percolation basins, electrical power supply, and motor controls.

9.4.4.3.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Seawater intrusion measurable objectives
- Land subsidence measurable objectives

9.4.4.3.2 Expected Benefits and Evaluation of Benefits

The AWPF may provide up to approximately 2,200 AF of water for direct recharge to the Subbasin. This project could benefit other subbasins, such as the Monterey and Eastside subbasins by potentially providing water to these subbasins for direct recharge.

Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between providing winter advanced treated water to the Subbasin and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.4.4.3.3 Circumstances for Implementation

The recharge of winter AWPF water project is one of four alternative projects that may provide additional water to the Subbasin. The project will only be implemented after all four alternative projects have been refined. If needed, the most cost-effective project of the four will be selected to supply additional water to the Subbasin.

This project can only be implemented after the AWPF is expanded, and only if Cal-Am is not injecting the water into the Seaside Basin. This project will not proceed until all of these circumstances have been met.

9.4.4.3.4 Legal Authority

The SVBGSA can acquire water for recharge under California Water Code section 10726.2 (b) which give the SVBGSA authority to "Appropriate and acquire surface water or groundwater …" as well as "the spreading, storing, retaining, or percolating into the soil of the waters for subsequent use" (CWC, 2014). All AWPF recharge will be done in accordance with the Division of Drinking Water's recycled water regulations.

9.4.4.3.5 Implementation Schedule

The implementation schedule is presented on Figure 9-30. It is anticipated to take between three and four years to implement.

Figure 9-30. Implementation Schedule for Winter Potable Reuse Water Injection

9.4.4.3.6 Estimated Cost

Costs for the injection of winter flows from the expanded AWPF were estimated based upon an anticipated 2,250 AF/yr. available for injection during the wet weather season (November through March). Capital costs are assumed to be $35,300,000 for construction of an injection well field consisting of six wells as well as construction of a 6-mile conveyance pipeline between the AWPF site and the injection well field.

Annual O&M costs are estimated at $500,000 for the operation of the injection well field. Based on a project yield of 2,250 AF/yr., the unit cost of water is $1,450/AF. The cost of water treatment will likely increase significantly if AWPF upgrades are included.

9.4.4.4 Alternative Project 4: Use the Southern Portion of the 180/400-Foot Aquifer Subbasin for Seasonal Storage

Under Alternative Project 4, conventional groundwater extraction well facilities would be constructed in the southern portion of the 180/400-Foot Aquifer Subbasin to extract seasonally stored groundwater during peak irrigation season for supply and environmental needs. Due to the laterally extensive presence of the Salinas Valley Aquitard within much of the 180/400-Foot Aquifer Subbasin, the ability of the Salinas River to effectively recharge the most productive aquifer zones for cyclic storage and extraction is limited. However, the Salinas Valley Aquitard is less prominent farther south, eventually pinching out near Chualar. This project relies on the ability to place extraction wells in an area of the southern 180/400-Foot Aquifer Subbasin where the Salinas Valley Aquitard is thin to missing, thereby allowing the Salinas River to recharge at least some of the more productive aquifer zones in the winter, and extracting that water for delivery in the summer.

This project could be most beneficial for supplementing flows to the existing Salinas River Diversion Facility (SRDF) at times when instream flows are insufficient to meet SRDF diversion and/or environmental flow requirements. This project could also be combined with various conveyance schemes to deliver the produced water to groundwater deficit areas in other parts of the 180/400-foot aquifer and/or Eastside subbasins to offset coastal pumping and seawater intrusion.

The project entails construction of traditional vertical production wells to extract water. The water would either be discharged to the Salinas River via a short pipeline, or to a centrally located sump, from which the water would be discharged to a coastal distribution network.

The extraction wells will only screen the 180-Foot Aquifer; accordingly, total well depths would likely not exceed 350 feet below ground surface (bgs). Three extraction wells would be installed, two as primary wells and one as a back-up well. Ideally, the wellfield would be located in close proximity to the Salinas River in order to minimize costs associated with water conveyance back to the river channel during peak irrigation periods.

For costing purposes, the extraction wells are capable of production rates up to 2,000 gpm. With two primary wells extracting water during a typical six-month irrigation season, approximately 3,000 AF would be available as supplemental water. This water, once extracted, would create a similar volume of available storage space within the aquifer system. Well spacing could be such that the seasonal drawdown would be spread over about one mile along the river.

On average, this aquifer storage volume would be recharged by percolating Salinas River flows during a typical winter high flow season. Assuming a five-month recharge period, this would equate to an average aquifer recharge rate of about 10 cfs over the 1-mile drawdown zone.

9.4.4.4.1 Relevant Measurable Objectives

Relevant measurable objectives benefiting from this project include:

- Groundwater elevation measurable objective
- Groundwater storage measurable objective
- Seawater intrusion measurable objectives
- Land subsidence measurable objectives

9.4.4.4.2 Expected Benefits and Evaluation of Benefits

The primary anticipated benefit is up to 3,000 AF of water available to the Subbasin for direct delivery and in-lieu recharge. This water could both offset coastal pumping and reduce seawater intrusion.

Reductions in groundwater pumping will be measured directly and recorded in the water charges framework database. Changes in groundwater elevation will be measured with the groundwater level monitoring program detailed in Chapter 7. Subsidence will be measured using the DWR provided subsidence maps detailed in Chapter 7. Seawater intrusion will be measured using MCWRA's existing seawater intrusion mapping approach. A direct correlation between seasonal storage of water in the upper reaches of the Subbasin and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible because this is only one among many management actions and projects that will be implemented in the Subbasin.

9.4.4.4.3 Circumstances for Implementation

Seasonal storage of Salinas River flows is one of four alternative projects that may provide additional water to the Subbasin. The project will only be implemented after all four alternative projects have been refined. If needed, the most cost-effective project of the four will be selected to supply additional water to the Subbasin.

Significant hydrogeologic studies are necessary to substantiate the Salinas River recharge rates in the area south of Chualar to make sure that any groundwater extracted during the summer will be recharged by winter flows. Additionally, agreements will be necessary with individual landowners to put extraction wells on their property and operate the extraction wells for the benefit of the Valley.

9.4.4.4.4 Legal Authority

The SVBGSA can acquire water for recharge under California Water Code section 10726.2 (b) which give the SVBGSA authority to “Appropriate and acquire surface water or groundwater …” as well as “the spreading, storing, retaining, or percolating into the soil of the waters for subsequent use” (CWC, 2014).

9.4.4.4.5 Implementation Schedule

The implementation schedule is presented on Figure 9-31. It is anticipated to take approximately 5 years to implement.

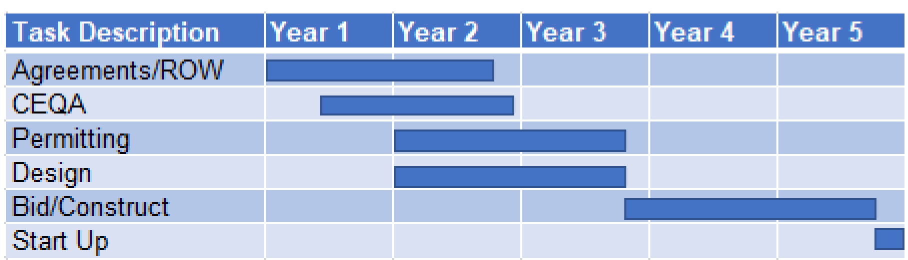


Figure 9-31. Implementation Schedule for Seasonal Storage in the Upper 180/400-Foot Aquifer Subbasin

9.4.4.4.6 Estimated Cost

Estimated capital costs include well construction, well pumps and motors, wellhead piping infrastructure, and land access. Estimated capital costs do not include conveyance infrastructure for direct discharge to the river channel or to a coastal distribution network, contingency or administrative costs. Estimated capital costs are $7,845,000. Estimated annual O&M costs are

$723,000. These costs do not include water treatment. Based on a project yield of 3,000 AF/yr. of extracted water, the amortized cost of water is $370/AF.

9.4.5 General Project Provisions

Many of the priority and alternative projects listed above are subject to similar requirements. The general provisions that are applicable to many or all projects include certain permitting and regulatory requirements, the methodology for public notice, and the legal authority to initiate and complete the projects.

9.4.5.1 Summary of permitting and regulatory processes

Projects of a magnitude capable of having a demonstrable impact on the environment will require a CEQA environmental review process. Projects will require either an Environmental Impact Report, Negative Declaration, or a Mitigated Negative Declaration. Additionally, any project that coordinates with federal facilities or agencies may require NEPA documentation.

There will be a number of local, county and state permits, right of ways, and easements required depending on pipeline alignments, stream crossings, and project type. Projects with wells will require a well construction permit.

9.4.5.2 Public Noticing

Before any project initiates construction, it will go through a public notice process to ensure that all groundwater users and other stakeholders have ample opportunity to comment on projects before they are built. The general steps in the public notice process will include the following:

- SVBGSA staff will bring an assessment of the need for the project to the SVBGSA Board in a publicly noticed meeting. This assessment will include:
    - A description of the undesirable result(s) that may occur if action is not taken
    - A description of the proposed project
    - An estimated cost and schedule for the proposed project
    - Any alternatives to the proposed project
- The SVBGSA Board will notice stakeholders in the area of the proposed project and allow at least 30 days for public response.
- After the 30-day public response period, the SVBGSA Board will vote whether or not to approve design and construction of the project.

In addition to the public noticing detailed above, all projects will follow the public noticing requirements required by CEQA.

9.5 Other Groundwater Management Activities

Although not specifically funded or managed by this GSP, a number of associated groundwater management activities will be promoted and encouraged by the SVBGSA as part of general good groundwater management practices.

9.5.1 Continue Urban and Rural Residential Conservation

Existing water conservation measures should be continued, and new water conservation measures promoted for residential users. Conservation measures may include the use of low flow toilet fixtures, or laundry-to-landscape greywater reuse systems. Conservation projects can reduce demand for groundwater pumping, thereby acting as in-lieu recharge.

9.5.2 Promote Stormwater Capture

Stormwater and dry weather runoff capture projects, including Low Impact Development (LID) standards for new or retrofitted construction, should be prioritized and implemented. The Monterey Stormwater Resource Plan (SWRP) outlines an implementation strategy to ensure valuable, high-priority projects with multiple benefits (Hunt, et al., 2019). While not easily quantified and therefore not included as projects in this document, stormwater capture projects may be worthwhile and benefit the basin.

9.5.3 Support Well Destruction Policies

Properly destroying unused wells in accordance with local and state regulations prevents the migration of poor-quality groundwater between aquifers. While well destruction does not directly address the sustainable management criteria included in this GSP, controlling the migration of poor-quality groundwater allows more efficient use of existing resources.

9.5.4 Watershed Protection and Management

Watershed restoration and management can improve stormwater recharge into the groundwater basin. While not easily quantified and therefore not included as projects in this document, watershed management activities may be worthwhile and benefit the basin.

9.6 Mitigation of Overdraft

The water charges framework is specifically designed to promote pumping reductions. Should adequate pumping reductions not be achieved to mitigate all overdraft, funds collected through the water charges framework will support recharge of imported water, either through direct recharge or in-lieu means. Therefore, the water charges framework in association with the projects and management actions listed in this chapter will mitigate overdraft through a combination of pumping reduction and enhanced recharge.

The historical Subbasin overdraft estimated in Chapter 6 is 10,900 AF/yr.; the projected 2030 overdraft is 8,100 AF/yr.; and the projected 2070 overdraft is 8,600 AF/yr. This GSP aims to mitigate 8,600 AF/yr. as the long-term future overdraft. Overdraft can be mitigated by either reducing pumping or recharging the basin, either through direct or in-lieu means, with additional water supplies. The priority projects include more than ample supplies to mitigate existing overdraft, as presented in Table 9-5.

Table 9-5. Total Potential Water Available for Mitigating Overdraft

Project	Potential Yield (AF/yr.)
Invasive Species Eradication	6,000
Optimize CSIP	5,500
Modify Monterey One Water Plant	1,100
Expand CSIP Area	9,900
Maximize Existing SRDF (facilitates achieving yields identified in other projects)	0
SRDF Winter Flow Injection	17,700
Total	**40,200**

As noted in Chapter 6, mitigation of overdraft is not sufficient to reach sustainability because balancing the water budget will not prevent future seawater intrusion. The amount of water needed to mitigate seawater intrusion depends on the approach taken.

10 GROUNDWATER SUSTAINABILITY PLAN IMPLEMENTATION

This chapter describes how the GSP for the 180/400-Foot Aquifer Subbasin will be implemented. The chapter serves as a roadmap for addressing all of the activities needed for GSP implementation between 2020 and 2040 but focuses on the activities between 2020 and 2025.

Implementing this GSP will require the following formative activities, each of which is detailed in a subsequent subsection:

- Monitoring and reporting groundwater data
- Refining and implementing the groundwater charges framework
- Addressing identified data gaps
- Expanding and improving the existing monitoring networks
- Updating the data management system
- Reviewing and implementing the SVIHM
- Refining and implementing projects and management actions

The implementation plan in this chapter is based on our current understanding of Subbasin conditions and our current assessment of the projects and management actions described in Chapter 9. Our understanding of the Subbasin's conditions and the details of the projects and actions will evolve over time based on future data collection, model development, and input from Subbasin stakeholders.

10.1 Implementation Activity 1: Monitoring, Reporting, and Outreach

Primary functions of this GSP's implementation during the first few years include the monitoring, evaluating, and reporting of sustainability conditions. The SVBGSA will hire consultants, negotiate agreements with agencies, and/or hire staff to implement the monitoring and reporting functions.

10.1.1 Monitoring

Monitoring of the six sustainability criteria will be initiated immediately upon adoption of the GSP. Most monitoring relies on existing monitoring programs, and therefore there is no need to immediately initiate new monitoring programs. The SVBGSA will direct the monitoring programs outlined in Chapter 7 to track Subbasin conditions related to the six 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 the Data Management System. Data from the monitoring program will be used by the SVBGSA to guide decisions on projects and management actions and to prepare annual reports to Subbasin stakeholders and DWR.

10.1.1.1 Groundwater Elevation Monitoring

Groundwater elevation monitoring data are being collected by MCWRA under the statewide CASGEM program. This program will be expanded, as detailed in Section 10.4.1. The CASGEM system will be replaced by the SGMA groundwater elevation monitoring program after GSP submission. Groundwater monitoring will continue to be conducted by MCWRA, and SVBGSA will conduct mid-year tracking of the data collection and annually download the data, prepare summary tables and figures, and compare the data to sustainability goals.

10.1.1.2 Groundwater Storage Monitoring

Groundwater pumping data are currently collected by MCWRA. This program will likely be expanded, as detailed in Section 10.4.2. SVBGSA will annually download MCWRA's groundwater pumping data, prepare summary tables and figures, and compare the data to sustainability goals.

10.1.1.3 Seawater Intrusion Monitoring

Seawater intrusion data are currently collected by MCWRA. This program will likely be expanded, as detailed in Section 10.4.3. SVBGSA will annually download MCWRA's seawater intrusion data and maps and compare the data and maps to sustainability goals.

10.1.1.4 Groundwater Quality Monitoring

Groundwater quality monitoring data collection will be tracked and reviewed mid-year, and will be compiled annually, analyzed, managed, and presented in the following ways:

- Download from public databases
- Check and verify data then upload data to the Data Management System
- Prepare data summary tables and figures
- Compare data to Sustainable Management Criteria at RMS
- Analyze impacts of projects and actions

Monitoring results will be included in the annual reports to DWR, as well as summarized for trends in the 5-year GSP Update report.

10.1.1.5 Land Subsidence Monitoring

SVBGSA will use InSAR data provided by DWR to assess land subsidence. InSAR data will be managed in the following way:

- InSAR data will be downloaded from the DWR website annually

- InSAR data will checked and verified for completeness and reasonableness
- Data will be used to develop annual subsidence maps, similar to maps shown in Chapter 5
- The annual subsidence maps will be compared to sustainable management criteria

10.1.1.6 Interconnected Surface Water Monitoring

Adequate monitoring sites for interconnected surface water monitoring is identified as a data gap in Chapter 7. The monitoring network for interconnected surface water monitoring will be enhanced, as described in Section 10.4.6. The enhanced monitoring network will be incorporated into MCWRA's existing monitoring system, which will replace the CASGEM system after GSP submission. After the enhanced monitoring network is established, SVBGSA will annually download the interconnected surface water data from the CASGEM system, prepare summary tables and figures, and compare the data to sustainability goals.

10.1.2 Reporting

SGMA regulations require that the reports comply with DWR submittal requirements that will be published by DWR, and that all transmittals are signed by an authorized party. Data will be organized and made available to the public to document Subbasin conditions relative to the SMC in Chapter 8. At a minimum, the following reports will be prepared.

- **Annual Reports.** In accordance with SGMA Regulation §356.2, annual reports will be submitted to DWR starting on April 1, 2020. The purpose of the report is to provide monitoring and total groundwater use data to DWR, compare monitoring data to the sustainable management criteria, and adaptively manage actions and projects implemented to achieve sustainability. Annual reports will be available to Subbasin stakeholders.
- **Five-Year GSP Assessment Reports.** Five-year GSP assessment reports will be provided to DWR starting in 2025. The SVBGSA shall evaluate the GSP at least every 5 years to assess whether it is achieving the sustainability goal in the Subbasin. 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.
- **GSP Periodic Evaluations and Amendment.** Although not required by SGMA regulations, the SVBGSA anticipates that an amendment to this GSP will be prepared within the first 5 years. Updates may include incorporating additional monitoring data, updating the SMC, documenting any projects or management actions that are being implemented, and identifying adaptive management activities. In addition, when the new

SVIHM is publicly available from the USGS, the water budgets will be updated in Chapter 6. Along with GSP amendments, the DMS will be routinely updated to include new information gathered from monitoring networks and included in annual and 5-year update reports.

10.1.3 Communication and Outreach

The SVBGSA will routinely provide information to the public about GSP implementation and progress towards sustainability and the need to use groundwater efficiently. The SVBGSA website will be maintained as a communication tool for posting data, reports, and meeting information. This website features a link to an interactive mapping function for viewing Salinas Valley Groundwater Basin-wide data that were used during GSP development.

10.2 Implementation Activity 2: Refine and Implement Water Charges Framework

The water charges framework outlined in Chapter 9 is one funding mechanism for long-term GSP implementation. Many details of the water charges framework will be developed during the first three years of implementation. Depending on the outcome of the negotiations, long-term GSP implementation may be funded by the water charges framework, another financing method as permitted by SGMA and other state law, or a combination thereof. The SVBGSA previously implemented a Groundwater Sustainability Fee as a regulatory fee pursuant to Water Code section 10730. In addition to the water charges framework, which implements an extraction charge pursuant to Water Code section 10730.2, the SVBGSA could use benefit assessments and special taxes, or any combination, subject to the requirements of state law.

The structure of the water charges framework, or other financing method, will be implemented in each of the six SVBGSA Subbasins, although the details will be unique to each subbasin. Details of the water charges framework for all six subbasins will be developed during the first three years of this GSP's implementation through a facilitated, Valley-wide process. This process will be similar to the successful facilitated process that resulted in the SVBGSA serving as the GSA for some or all parts of all six subbasins. The result of this facilitated process will be an agreement on the financing method approved by the SVBGSA. The facilitation will be complete by January 31, 2023, and the financing method will be implemented in all six subbasins immediately following.

To bridge the gap between GSP submission and initiation of the GSP implementation financing framework, an interim base fee may be charged as an extension to the current regulatory fee. This fee may be adjusted periodically to cover the cost of initial GSP implementation.

10.3 Implementation Activity 3: Address Identified Data Gaps

Chapter 4 identified a few key data gaps related to the hydrogeologic conceptual model characterization, including data gaps related to:

- **Aquifer properties**. The values and distribution of aquifer properties in the Subbasin have not been well characterized and documented. There are very few measured aquifer parameters in the overall Salinas Valley Groundwater Basin.

- **Hydrostratigraphy of the Deep Aquifers**. Vertical and horizontal extents, and potential recharge areas of the Deep Aquifers are poorly known. Hydrographs are not available for wells completed in the Deep Aquifers.

- **Areas of Salinas River recharge and discharge**. Specific river recharge and discharge areas have not been mapped.

These key data gaps will be addressed early during implementation through the following programs.

- **Aquifer properties assessment**. To develop better estimates of aquifer properties, the SVBGSA will identify up to three wells in the 180-Foot Aquifer and up to three wells in the 400-Foot aquifer for aquifer testing. Each well test will last a minimum of 8 hours and will be followed by a 4-hour monitored recovery period. Wells for testing will be identified using the following criteria.
    - Wells are owned by willing well owners
    - Wells have known well completion information
    - Wellheads are completed such that water elevations in wells can be monitored with data loggers
    - Wells are equipped with accurate flow meters
    - Wells have area for discharge of test water
    - Preferred wells will have nearby wells that can be monitored during the test
- **Deep Aquifers investigation**. To address the hydrostratigraphy of the Deep Aquifers, on April 24, 2018, the Monterey Board of Supervisors directed MCWRA to conduct a comprehensive investigation of the Deep Aquifers of the Salinas Valley Groundwater Basin. The SVBGSA will adopt the findings of this investigation into its updated hydrologic conceptual model.

- **Mapping areas of Salinas River recharge and discharge**. The SVIHM will be used, when it becomes available, to develop estimates of Salinas River recharge and discharge reaches.

Results of the aquifer properties assessment, Deep Aquifers investigation, and Salinas River recharge and discharge mapping will be incorporated into the required GSP 5-year update.

10.4 Implementation Activity 4: Expand Existing Monitoring Networks

As noted in Chapter 7, the monitoring networks leverage existing monitoring programs. This section identifies the plan for expanding and enhancing each monitoring network.

10.4.1 Groundwater Level Monitoring Network

Currently, the groundwater elevation monitoring network comprises the CASGEM wells monitored by MCWRA. Specific gaps in the groundwater level monitoring network were identified in Chapter 7, including insufficient coverage of wells along the boundaries of the Subbasin and near the Salinas River, and a lack of monitoring data from wells in the Deep Aquifers.

The general plan for adding monitoring to the monitoring network will be to first incorporate existing wells if possible. The SVBGSA will use MCWRA's existing well database to identify potential candidate wells in each data gap area. Well owners will be contacted to assess if they are willing to incorporate their wells into the groundwater elevation monitoring network. All candidate existing wells for incorporation into the monitoring network will be inspected to ensure they are adequate for monitoring and to determine depth, perforated intervals, and aquifer designation. Access agreements will be secured with well owners to ensure that data can be reported from the wells.

If an existing well cannot be identified, or permission to use data from an existing well cannot be secured to fill a data gap, then a new monitoring well will be drilled and added to the monitoring network. The SVBGSA will obtain required permits and access agreements before drilling new wells. The SVBGSA will retain the services of licensed geologists or engineers and qualified drilling companies for drilling new wells. The SVBGSA will evaluate the availability of grant funds and technical assistance support services through DWR or other entities for new wells. Once drilled, the new wells will be tested as necessary and equipped with dedicated data loggers for monitoring.

10.4.2 Groundwater Storage Monitoring Network

The SVBGSA will work with MCWRA to expand the existing well metering system to collect additional groundwater pumping information. The groundwater pumping information will be used to report on the groundwater storage SMC, as described in Chapter 8. General improvements to the existing MCWRA groundwater extraction reporting system may include some subset of the following:

- Develop a comprehensive database of extraction wells
- Expanding reporting requirements to all areas of the Salinas Valley Groundwater Basin
- Including all wells with a 2-inch discharge or greater
- Requiring automatically reporting flow meters
- Comparing flow meter data to remote sensing data to identify potential errors and irrigation inefficiencies

10.4.3 Seawater Intrusion Monitoring Network

MCWRA monitors seawater intrusion in coastal wells by measuring chloride concentrations and developing chloride isocontour maps that define the extent of seawater intrusion. MCWRA publishes estimates of the extent of seawater intrusion every 2 years. However, those maps are based in part on confidential information obtained from private wells. The seawater intrusion monitoring network will include only wells where the data can be made publicly available.

As discussed in Chapter 7, the network of wells with publicly available data for monitoring chloride concentrations includes an adequate number and distribution of wells in the 180-Foot and the 400-Foot Aquifers. However, the distribution of wells in the Deep Aquifers is inadequate and considered a data gap. As described in Section 7.4.2, some of the data gaps in the Deep Aquifers will likely be filled in response to Monterey County Urgency Ordinance 5302. This ordinance, adopted in 2018, requires that all new wells in the Deep Aquifers meter groundwater extractions, monitor groundwater elevations and quality, and submit all data to MCWRA and SVBGSA.

10.4.4 Water Quality Monitoring Network

Groundwater quality monitoring will be performed using existing monitoring networks and programs. As described in Chapters 7 and 8, three water quality networks are included for the GSP monitoring program:

- Municipal public water supply wells reported to DDW.
- Small public water systems wells reported to the County of Monterey.
- Agricultural and domestic supply wells monitored under the Irrigated Land Regulatory Program (ILRP).

There is currently adequate spatial coverage to assess impacts to beneficial uses and users.

As part of the GSP implementation, the SVBGSA will track and review the ILRP monitoring network for Ag Order 4.0 and also identify any new small public system water supply monitoring network wells to add to the current network. During implementation, the SVBGSA will obtain any missing well information, select wells to include in monitoring network, and finalize the water quality network.

10.4.5 Land Subsidence Monitoring Network

Land subsidence monitoring will be conducted by DWR using InSAR technology, and the data will be made available on the DWR SGMA Data Viewer, as described in Chapter 7. The SVBGSA will download the data from the SGMA Data Viewer and the data will be evaluated to verify they are adequate for determining whether subsidence is occurring and for inclusion in the monitoring network. No data gaps related to the land subsidence monitoring network were identified in Chapter 7.

10.4.6 Interconnected Surface Water Monitoring Network

As described in Chapter 5, the initial analysis identifying locations of interconnected surface water is based on best available data but contains significant uncertainty. Additional data are needed to reduce uncertainty and refine the map of interconnected surface waters. The main source of these data will be the SVIHM when it becomes available.

The level of interconnection between the Salinas River and the shallow sediments is unclear and therefore this is considered a data gap that needs to be resolved. The SVBGSA will either identify existing shallow wells adjacent to the Salinas River or install up to two new shallow wells along the Salinas River in the 180/400-Foot Aquifer Subbasin to establish the level of interconnection. If existing shallow wells are identified and deemed adequate based on an inspection, an agreement will be secured with the well owner to incorporate the well into the investigation and report data from the well. If existing wells cannot be identified or accessed, then SVBGSA may consider drilling new monitoring wells.

10.5 Implementation Activity 5: Update Data Management System

As described in Chapter 7, the SVBGSA has developed a DMS that is used to store, review, and upload data collected as part of the GSP development and implementation. A web application showing these data is available on the SVBGSA's website for stakeholders to view the data (https://svbgsa.org/gsp-web-map-and-data/). As new information is collected during monitoring and provided by local stakeholders, the DMS will be updated. The regular updates will also coincide with the review of new data and development of annual reports.

10.6 Implementation Activity 6: Implement the USGS Groundwater Model

As mentioned in various sections of this GSP, the USGS is currently working on revising and calibrating the SVIHM. The fully calibrated historical SVIHM was not available for use during this GSP development. A preliminary operational version of the model was available to use with climate change inputs to develop an initial projected water budget but was not available to assess project benefits.

The model is expected to be released within 1 year and will be fully available for developing the remaining five Salinas Valley Groundwater Subbasin GSPs. During implementation of the 180/400-Foot Aquifer Subbasin, the SVIHM will be used for the following tasks:

- Revisit the historical, current and projected water budgets.
- Update the estimated sustainable yield of the Subbasin, as needed.
- Develop numerical minimum thresholds for the depletions of interconnected surface water. As soon as the model is available, current flow depletions will be computed and set as the minimum threshold not to be exceeded during implementation of the GSP.
- Add interim milestones for groundwater elevations and seawater intrusion.
- More rigorously evaluate benefits of proposed management actions and priority projects.

Results of these modeling tasks will be included in an addendum to the GSP or the 5-year GSP update. In addition, alternative models that complement the SVIHM may be necessary to evaluate certain projects. In particular, models with enhanced capabilities for simulating seawater intrusion may be needed to assess the interim milestones for the proposed seawater intrusion barrier.

10.7 Implementation Activity 7: Refine and Implement Management Actions and Projects

The projects and management actions identified in Chapter 9 are sufficient for attaining sustainability in the 180/400-Foot Aquifer Subbasin as well as the other five subbasins in the Salinas Valley Groundwater Basin. As the SVBGSA refines the projects and management actions, it will retain sufficient projects and actions to account for the level of uncertainty in the HCM. The projects and actions will be implemented in a coordinated fashion across the entire Salinas Valley Groundwater Basin to ensure Basin-wide sustainability. Because five of the subbasins in the Basin will not complete GSPs until January 31, 2022, many of the projects and actions will be implemented only after this time. Therefore, the initial activities for project implementation will include refining the projects and actions identified in Chapter 9. Activities during the first three years of implementation that will be undertaken before January 31, 2023 include:

- Clarifying water rights for recharge opportunities
- Applying for change of diversion or change of timing on water rights as necessary
- Refining yields of proposed projects
- Refining costs of proposed projects based on the ability to modify water rights, as discussed above, and the expected yield of the projects.
- Producing preliminary design of projects if projects are adequately defined
- Initiating environmental permitting for projects as necessary

An additional benefit of refining the projects during the first three years of implementation is that this approach complements the approach for refining the water charges framework, as outlined in Section 10.2. Refinement of the projects and actions will occur simultaneously with refinement of the funding mechanism that supports the projects and actions. By refining all of these plans simultaneously, the funding mechanism and the projects will all be in place by June 30, 2023. Projects and management actions will then be immediately implemented in a coordinated fashion across the entire Salinas Valley Groundwater Basin.

10.8 Short-Term Implementation Start-Up Budget

Table 10-1 and Table 10-2 summarize the conceptual planning-level costs for the initial five years of GSP implementation. Because this GSP is being developed in coordination with other GSPs in the Salinas Valley Groundwater Basin, the initial implementation costs are divided into costs that directly benefit the 180/400-Foot Aquifer Subbasin and costs that benefit other subbasins in the Salinas Valley Groundwater Basin. These costs do not include costs of project development or implementation. These costs are independent of fees currently collected by MCWRA; no fees will be collected by SVBGSA that duplicate fees already being collected by MCWRA.

The Subbasin specific costs, shown in Table 10-1, include public outreach; supplemental hydrogeologic investigations to address data gaps; improvements to the monitoring networks, including installation of up to six new monitor wells; and annual monitoring and reporting of sustainability conditions. The Valley-wide costs, shown in Table 10-2, include routine administrative operations, negotiating funding mechanisms, implementing the SVIHM model, and early planning efforts. The Valley-wide costs include the already implemented $1,200,000 per year administrative costs agreed to by the SVBGSA. These costs include an estimated $2,000,000 for environmental permitting should it be necessary in the first five years of implementation.

The costs in Tables 10-1 and 10-2 are categorized either as a lump sum or as an annual cost. Annual costs are directly related to work that needs to be done consistently to meet the requirements of SGMA and mitigation plans adopted by the GSA. The annual costs are multiplied by 5 to get an overall 5-year lump sum, and then added to the other lump sum costs for a total cost at the bottom of each table. This lump-sum cost is then averaged over 5 years to show an average annual cost. It is important to note that not all lump sum costs will be required at the beginning of the 5-year implementation schedule but should be anticipated within the 5-year timeframe for budgeting purposes.

Table 10-1. 180/400-Foot Aquifer Subbasin Specific Estimated Planning-Level Costs for First 5 Years of Implementation

Activity	Estimated Cost	Cost Unit	Assumptions
Management Actions			
Seawater Intrusion Working Group	$ 250,000	Lump Sum	Two years of technical studies, meetings, and agreements
Monitoring and Reporting			
Monitoring GW Elevations	$ 12,000	Annual	Data download, data checking, costs may reduce in subsequent years after a defined process in place
Monitoring GW Extractions	$ 8,000	Annual	Data download, data checking, costs may reduce in subsequent years after a defined process in place
Monitoring GW Quality	$ 16,000	Annual	Data download, data checking, costs may reduce in subsequent years after a defined process in place
Monitoring Subsidence	$ 5,000	Annual	Data download, data checking, costs may reduce in subsequent years after a defined process in place
Monitoring Seawater Intrusion	$ 5,000	Annual	Data download, data checking, costs may reduce in subsequent years after a defined process in place
Monitoring Stream Depletion	$ 8,200	Annual	Data download, data checking, costs may reduce in subsequent years after a defined process in place
Annual Reporting	$ 22,000	Annual	$30,000 for first one, subsequent ones at $20,000 each
2-Year Update Report	$ 100,000	Lump Sum	This only applies to the 180/400-Foot Subbasin GSP to refine the current version of the Plan
5-Year Update Report	$ 150,000	Lump Sum	
Technical Communication and Outreach	$ 20,000	Annual	Tasks related to ongoing communication and outreach
Address Identified Data Gaps			
Aquifer tests	$ 160,500	Lump sum	Based on assumed general aquifer testing procedures
Expand Existing Monitoring Networks			
Identify new GW Elevation wells	$ 40,000	Lump Sum	Five-week effort
Install up to two new 180-Foot monitoring wells	$ 242,000	Lump Sum	No land purchase, 1 week permitting, 2 weeks design, bids average $100,000 per well
Install up to two new 400-Foot monitoring wells	$ 282,000	Lump Sum	No land purchase, 1 week permitting, 2 weeks design, bids average $120,000 per well
Install two shallow wells near Salinas River	$ 78,000	Lump Sum	No land purchase, 1 week permitting, 1-week design, bids of $25,000 per well
Total	**$ 1,783,500**		
Average Annual Cost for Five Years	**$ 356,700**		

Table 10-2. Valley-Wide Estimated Planning-Level Costs for First 5 Years of Implementation

Activity	Estimated Cost	Cost Unit	Assumptions
Operational costs including cost of General Manager, staff, etc. (based on 2019 fee study)	$ 1,200,000	Annual	2019 Fee Study
Monitoring and Reporting			
Refine Water Charges Framework	$ 630,000	Lump Sum	Facilitator = 3 years x $150,000 per year. Technical = 3 years x $60,000 per year
Update Valley-Wide Water Quality Well Completion Data	$20,000	Lump Sum	50 wells, 2 hours per well
Expand Existing Monitoring Networks			
Negotiate expansion of MCWRA GEMS	$ 36,000	Lump Sum	Assuming MCWRA continues to implement and oversee the GEMS pumping database; assist them with developing detailed requirements for local pumpers
Implement monitoring data from Ag Order 4.0	$ 33,000	Lump Sum	Review the new Ag Order 4.0 monitoring well network and evaluate which wells to include within the GSP monitoring network
Update DMS	$ 15,200	Annual	Add newly collected data to DMS
Implement SVIHM Model	$ 327,600	Lump Sum	6 wks. model review, 4 wks. water budget extraction, 8 wks. projects modeling, 6 wks. modeling in each of 4 subsequent yrs.
Refine Projects and Management Actions	$ 460,000	Annual	$2,000,000 for CEQA
Total	**$ 9,422,600**		
Average Annual Cost for 5 Years	**$ 1,884,520**		

10.9 Implementation Schedule

The SVBGSA oversees all or part of six subbasins in the Salinas Valley Groundwater Basin. Implementing the 180/400-Foot Aquifer Subbasin GSP must be integrated with the implementation of the five other GSPs in the Salinas Valley Groundwater Basin. None of the other five subbasins in the Salinas Valley Groundwater Basin are critically overdrafted and will only submit GSPs in January 2022. The implementation schedule reflects the significant integration and coordination needed to implement all six GSPs in a unified manner.

The general implementation schedule refines details of the water charges framework, the sustainability projects, and the management actions during the first three years of implementation. These refinements will be developed as the five other GSPs in the Salinas Valley Groundwater Basin are produced. The refined water charges framework, projects, and management actions will then be implemented Valley wide approximately one year after all six GSPs are complete. This will ensure the 180/400-Foot Aquifer Subbasin GSP is implemented in coordination with the other Valley subbasins, while at the same time not waiting for the other GSPs to be complete before negotiating many of the implementation details.

A general schedule showing the major tasks and estimated timeline during the first 5 years of GSP implementation is provided on Figure 10-1. In Chapter 9, every project has its own implementation timeline; however, the timeline for the accrual of benefits will be determined after the projects are refined.

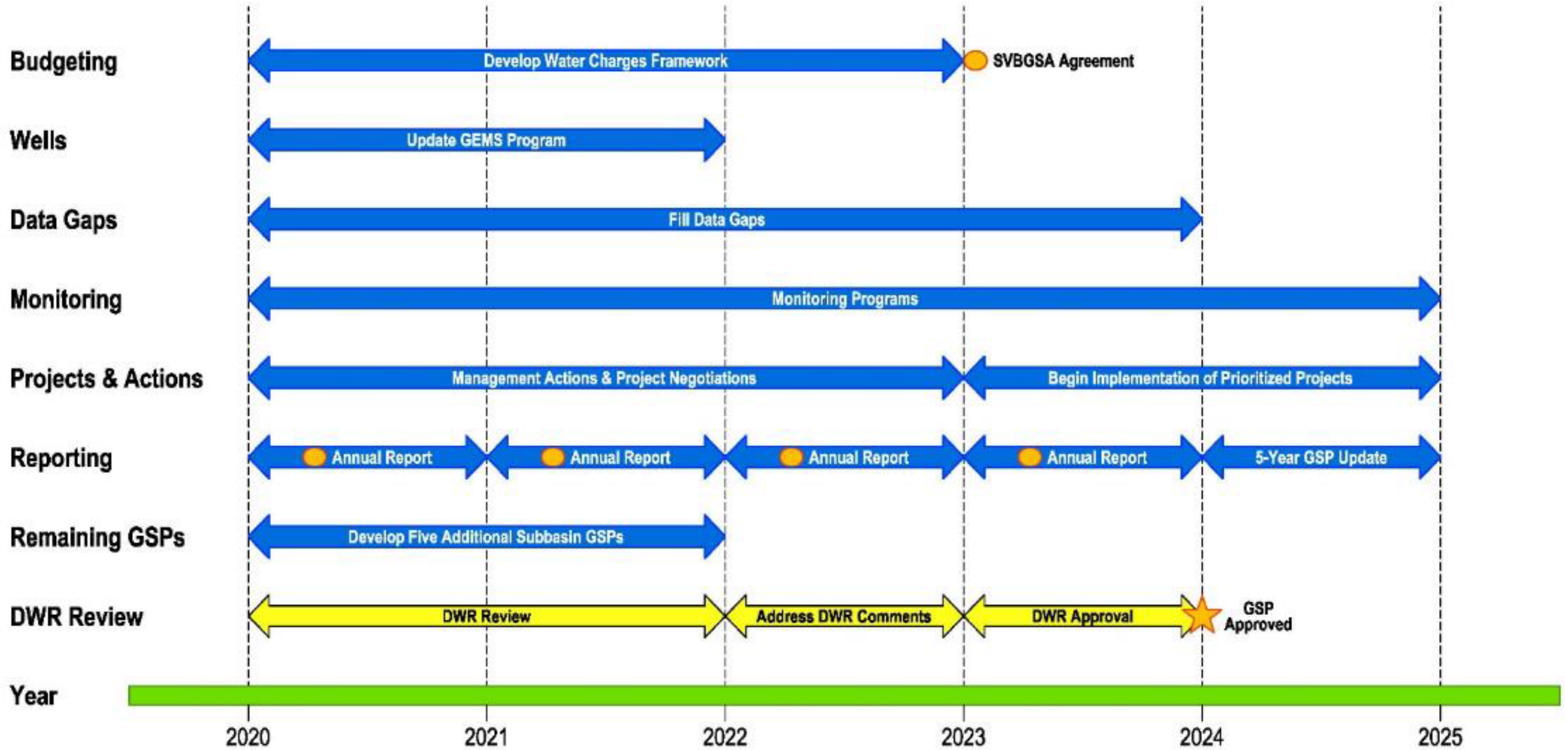


Figure 10-1: General Schedule of 5-Year Start-Up Plan

11 STAKEHOLDER ENGAGEMENT AND COMMUNICATION STRATEGY

11.1 Overview

The SVBGSA is governed by a local and diverse board of directors (Appendix 11A) and depends heavily on public involvement for decision-making. An Advisory Committee (Appendix 11B) and a Planning Committee have been formed to advise the GSA. A list of all governance meetings is included in Appendix 11C.

All phases of SGMA in the Salinas Valley Groundwater Basin have been, and will continue to be, characterized by an open collaborative process with legitimate stakeholder engagement that allows stakeholders and public participants opportunities to provide input and influence the planning and development process. Public participation is supported by the development of an interactive website that allows access to all planning and meeting materials, data sets and meeting notifications. The website can be accessed at https://svbgsa.org.

11.2 Implementation of SGMA - Phases of Work

Implementation of SGMA and associated outreach includes the following phases:

Phase 1: GSA Formation and Coordination – The formation of the SVBGSA began in 2015. Ongoing negotiations regarding coordination agreements with other GSAs is continuing. Most of this phase was concluded in 2017 for all the Salinas Valley Groundwater Basin subbasins.

Phase 2: GSP Preparation and Submission – This phase of work began in 2017 with the preparation of the 180/400-Foot Aquifer Subbasin GSP. This phase will continue through January 2022, when GSPs for all Subbasins are complete. During this phase, the SVBGSA will develop GSPs that ensure basin sustainability and comply with SGMA legislation as well as develop any necessary coordination agreements.

Phase 3: GSP Review and Evaluation – This phase will take place beginning 2020 for the 180/400-Foot Aquifer Subbasin GSP and will continue in 2022 once other subbasin GSPs are completed.

Phase 4: Implementation and Reporting – Following the submission of the GSP to the DWR, the SVBGSA will begin implementation of efforts described in the GSP to reach sustainability within the basin. This will be an ongoing phase, as the goal of SGMA is to reach sustainability in the 180/400-Foot Aquifer Subbbasin by 2040; and reach sustainability in the other five subbasins by 2042.

11.3 Phase 1. GSA Formation and Coordination

From 2015 through 2017, local agencies and stakeholders worked with the Consensus Building Institute (CBI) to facilitate the formation of the SVBGSA. CBI began by conducting a Salinas Valley Groundwater Stakeholder Issue Assessment (Appendix 11D), which included interviews and surveys, and resulted in recommendations for a transparent, inclusive process for the local implementation of SGMA and the formation of the GSA.

Findings from the interviews and surveys reflect a range of feedback on GSA formation, the process, challenges, and critical issues. In brief, stakeholders articulate:

- Groundwater supply is high stakes; everyone recognizes the importance of forming the GSA successfully.
- Interviewees cannot identify any one organization as a likely candidate to serve as the GSA. Many envision multiple organizations coming together under a Joint Power Authority to form a single GSA.
- The GSA must have the trust of all the interested parties and the technical expertise to develop the plan. The GSA should draw on existing data and studies wherever possible.
- Stakeholders strongly support inclusivity and diversity to build success in the process. Fairly representing all interests would support creating a shared framework of mutual benefit.
- Given that agriculture is the primary economic driver in the area, stakeholders recommend that agriculture have a significant voice in governance and decision-making on GSA formation, while balancing that voice with urban, cities, county, and other interests.
- Many recognize the need to act to avoid both undesirable results and state intervention.
- Interviewees readily talk about historic tensions and sources of distrust in the region that the process must manage.
- Critical issues are tied to land use and small communities losing water supply because of poor water quality.
- *"The Valley is innovative and progressive – it moves ahead to address problems."* While interviewees define and view groundwater supply quite differently, everyone concurs that a range of stakeholders must agree on the GSA.

Stakeholder Forums were also held throughout 2016 and served as another critical element for interested stakeholders and the public to learn about and provide input on GSA. The engagement process is shown graphically on Figure 11-1.

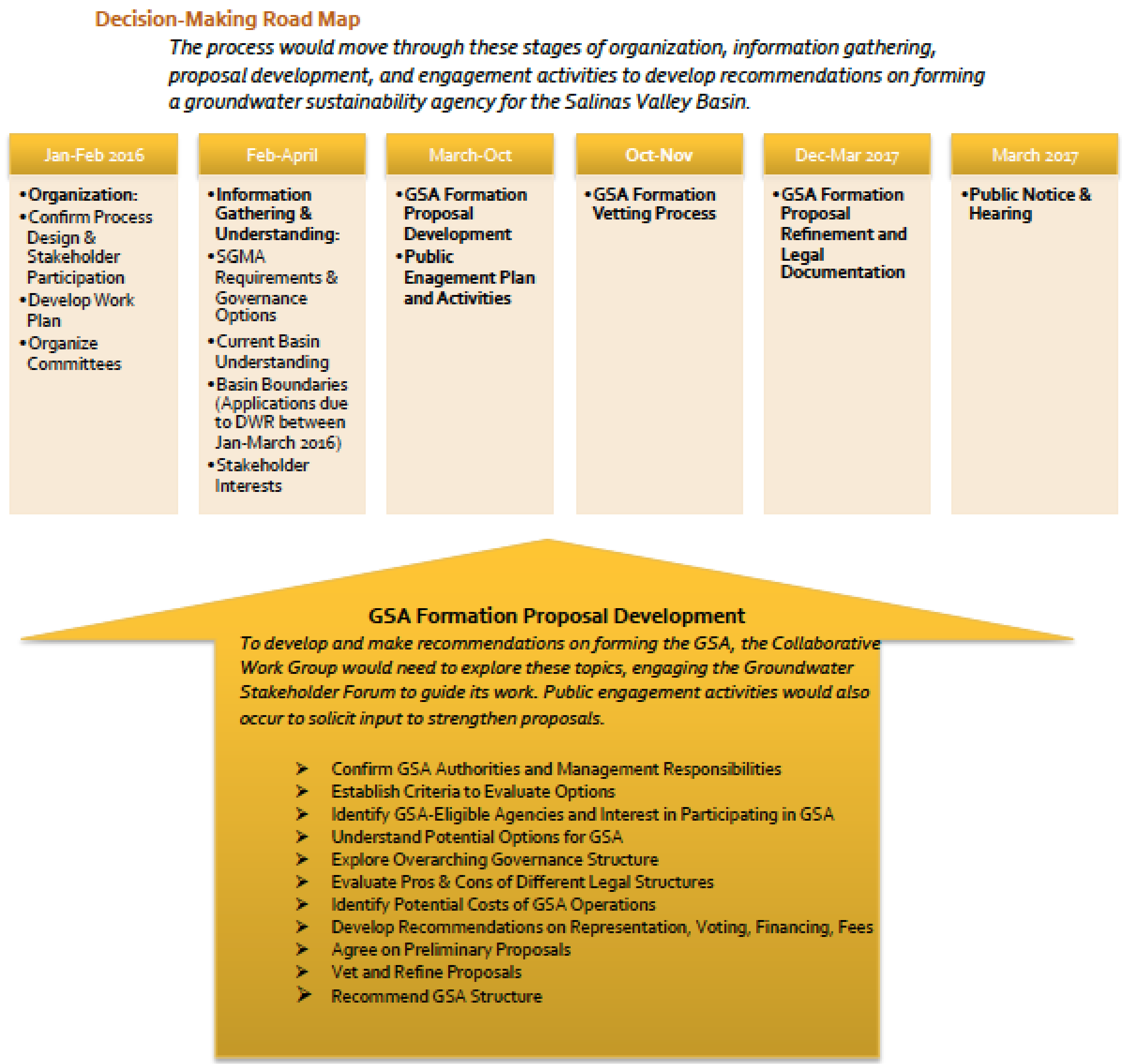


Figure 11-1: Engagement Process

Following the Issue Assessment and Stakeholder Forums, a Collaborative Work Group representing a broad range of interests used this information to develop recommendations on the governance structure, voting, and legal structure of the GSA. After two years of community engagement the Salinas Valley Basin Groundwater Sustainability Agency was formed as a Joint Powers Authority in April 2017 with a broad and diverse foundation of support (Appendix 2A). The Salinas Valley Groundwater Basin provides water for beneficial users across Monterey County. The SVBGSA stakeholders are highly diverse. Groundwater supports economic activities from small domestic scale to large industrial scale. Groundwater is an important supply for over 400,000 people living within the County. The population swells as seasonal workers come to harvest crops during certain periods of the year.

Many of the communities in the Salinas Valley are classified as Disadvantaged Communities (DACs) and Severely Disadvantaged Communities (SDACs), as well as Economically Distressed Areas (EDAs), shown on Figure 11-2. The SVBGSA program area has well documented DAC designation including seven Census Designated Places (CDPs), 60 Block Groups and 20 Tracts. Additionally, work conducted by the Greater Monterey County Integrated Regional Water Management Program (IRWMP) identified 25 small disadvantaged, severely disadvantaged, and suspected disadvantaged communities in unincorporated areas of the IRWMP region (IRWM, 2018). DACs are further described in Appendix 11E. While IRWMP objectives are consistent with SGMA, SGMA has limited authority with regards to water quality improvements related to drinking water beneficial uses. Despite these limitations SVBGSA seeks to engage more constructively with disadvantaged communities moving forward in the four subbasin planning processes.

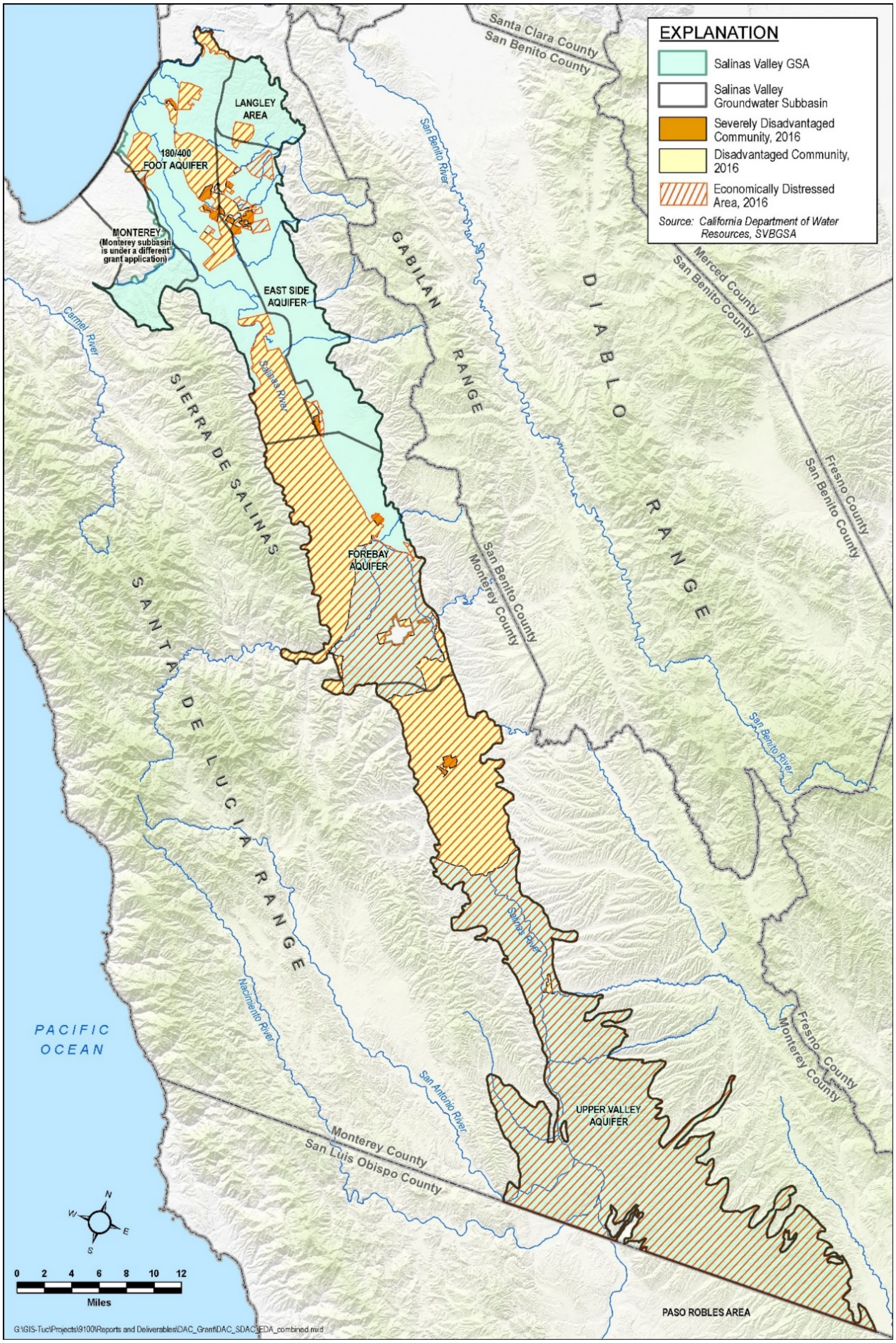


Figure 11-2. Map of DACs, SDACs, and EDAs in the Salinas Valley Groundwater Basin

The beneficial uses and users in the Salinas Valley Groundwater Basin are represented in the structure of the Board of Directors, Planning Committee and Advisory Committee. Along with DACs and SDACs, GSP beneficiaries include individuals, businesses, and government agencies, including the State of California. The Salinas Valley relies almost completely on groundwater. Major land uses in the Salinas Valley include agriculture, rangeland, forest, and urban development. Agriculture is a beneficial user of groundwater. Agriculture in this region produces a large percentage of the nation's produce: 61% of the leaf lettuce, 57% of celery, 56% of head lettuce, 48% of broccoli, and 38% of spinach. The Salinas Valley agricultural region supports a $4.25 billion dollar production value. Due in part to the agricultural productivity of the region, which is dependent on reliable water resources, sustainable management of the Basin has significance far beyond the Basin boundaries. Other beneficial users include municipal public water systems, small community and public water systems, and private domestic wells for drinking water. Environmental users include the habitats and associated species maintained by conditions related to surface water flows such as steelhead trout and groundwater dependent ecosystems including brackish and freshwater march and riparian habitats.

Stakeholders on the SVBGSA Board of Directors, Advisory Committee, and Planning Committee include representatives from agriculture, environmental organizations, disadvantaged communities, city and county government, land use nonprofits, residential well owners, and water agencies. The GSA Board of Directors includes seats for non-governmental entities including four seats for agriculture, a seat for environmental interests, disadvantaged communities, local government, and a public seat, among others. The composition of the Board of Directors is detailed in Table 11-1.

Table 11-1. Board of Directors Composition

Director	Representing	Specific Qualifications	Nominating Group Members[1]	Appointing Authority[2]
a) City of Salinas.	City of Salinas.	To be determined by the Appointing Authority.		Salinas City Council.
b) South County Cities.	Cities of Gonzales, Soledad, Greenfield, and King City.	To be determined by the Appointing Authority.		Appropriate City Council as recommended by the City Selection sub-Committee.
c) Other GSA Eligible Entity.	GSA Eligible Entities but not including the cities of Salinas, Gonzales, Soledad, Greenfield or King City.	Must be a representative of a GSA Eligible Entity but not including the cities of Salinas, Gonzales, Soledad, Greenfield or King City.	County of Monterey MCWRA Monterey Regional Water Pollution Control Agency	Monterey County Board of Supervisors.
d) Disadvantaged Community, or Public Water System, including Mutual Water Companies serving residential customers.	Unincorporated Disadvantaged Communities, or Public Water Systems, including Mutual Water Companies serving residential customers only.	Must be a resident of a Disadvantaged Community in the unincorporated area, or a representative Public Water System, including Mutual Water Companies serving residential customers only.	Castroville Community Services District Environmental Justice Coalition for Water San Jerardo Cooperative San Ardo Water District San Vicente Mutual Water Company	Castroville Community Services District.
e) CPUC Regulated Water Company.	CPUC Regulated Water Companies in the Basin.	Must be a representative of a CPUC Regulated Water Company	Alisal Water Corporation DBA Alco Water Service California Water Service Company	Salinas City Council.
f) Agriculture	Agricultural interests	Must be an individual that is 1) engaged in and derives the majority of his or her gross income or revenue from commercial agricultural production or operations, or 2) designated by an entity this is engaged in commercial agricultural production or operations, and the individual derives the majority of his or her gross income or revenue from agricultural production or operations, including as an owner, lessor, lessee, manager, officer, or substantial shareholder of a corporate entity		Monterey County Board of Supervisors

Director	Representing	Specific Qualifications	Nominating Group Members[1]	Appointing Authority[2]
g) Agriculture	Agricultural interests	Same as (f)		Monterey County Board of Supervisors
h) Agriculture	Agricultural interests	Same as (f)		Monterey County Board of Supervisors
i) Agriculture	Agricultural interests	Same as (f).		Monterey County Board of Supervisors
j) Environment	Environmental users and interests	Must be a representative of an established environmental Board of Supervisors or organization that has a presence or is otherwise active in the Basin	Sustainable Monterey County League of Women Voters of Monterey County Landwatch Monterey County Friends and Neighbors of Elkhorn Slough California Native Plant Society Monterey Chapter Trout Unlimited Surfriders The Nature Conservancy Carmel River Steelhead Association	Monterey County Board of Supervisors
k) Public Member	Interests not otherwise represented on the Board	A rural residential well owner; an industrial processor; a Local Small or State Small Water System; or other mutual water company		Monterey County Board of Supervisors

1 The Nominating Group Members make a recommendation to the corresponding Appointing Authority.

2 The Appointing Authority must be one of the signatories to the JPA.

Three other GSAs have been formed in the Salinas Valley Groundwater Basin, including the MCWD GSA, the County GSA, and the Greenfield/Arroyo Seco GSA. These filings do not overlap, and one GSP is developed for the Subbasin.

11.4 Phase 2. Preparation and Submission

The SVBGSA is required to develop a GSP for each separate subbasin. Given the critical overdraft identification of the 180/400-Foot Aquifer Subbasin, initial planning efforts have focused on the development of this GSP in order to meet the January 31, 2020 deadline for submittal.

The SVBGSA Board has also determined that another level of planning, not required by SGMA Legislation, would be completed. This plan, identified as the Integrated Sustainability Plan (ISP), identifies overarching issues that are common to all subbasins as well as identifying opportunities for all subbasin stakeholders to share resources. Several chapters of the ISP have been developed concurrently with chapters for the critically over drafted basin.

Throughout the development of the GSP, the Advisory Committee and Board reviewed each chapter. For each chapter, after the SVBGSA staff and technical consultant drafted it, the Planning Committee and the Advisory Committee reviewed it first, the SVBGSA staff and consultant incorporated revisions, and then the Board reviewed it and voted to make it public. A list of Advisory Committee and Board of Directors meetings are included in Appendix 11C.

Given the importance of the Salinas Valley Groundwater Basin and the development of the GSP to the communities, residents, landowners, farmers, ranchers, businesses, and others, it is essential that inclusive stakeholder input continue to be a primary component of the GSP process. This *SVBGSA Communication and Public Engagement Document* (Appendix 11F) has been developed to support the preparation and implementation of a well-informed GSP and ISP. The public engagement strategies are designed to be flexible and will generally align public engagement opportunities with the development of technical information throughout the GSP process.

In order to encourage ongoing stakeholder engagement, the following strategies have been developed:

- Conduct an inclusive outreach and education process that best supports the success of a well- prepared GSP that meets SGMA requirements.
- Keep the public informed by distributing accurate, objective, and timely information.
- Foster open dialogue and stakeholder engagement by hosting opportunities to participate in the planning process.

- Invite input and feedback from the public at every step in the decision-making process.
- Offer a comprehensive, transparent outreach and education process that builds understanding; and evaluate and update the engagement methods throughout the GSP process as needed.

Additionally, a rigorous review process for each Chapter in the GSP and for the final plan has been developed. This process ensures that stakeholders have multiple opportunities to review and comment on the development of the chapters. A map of the planning process is shown on Figure 11-2.

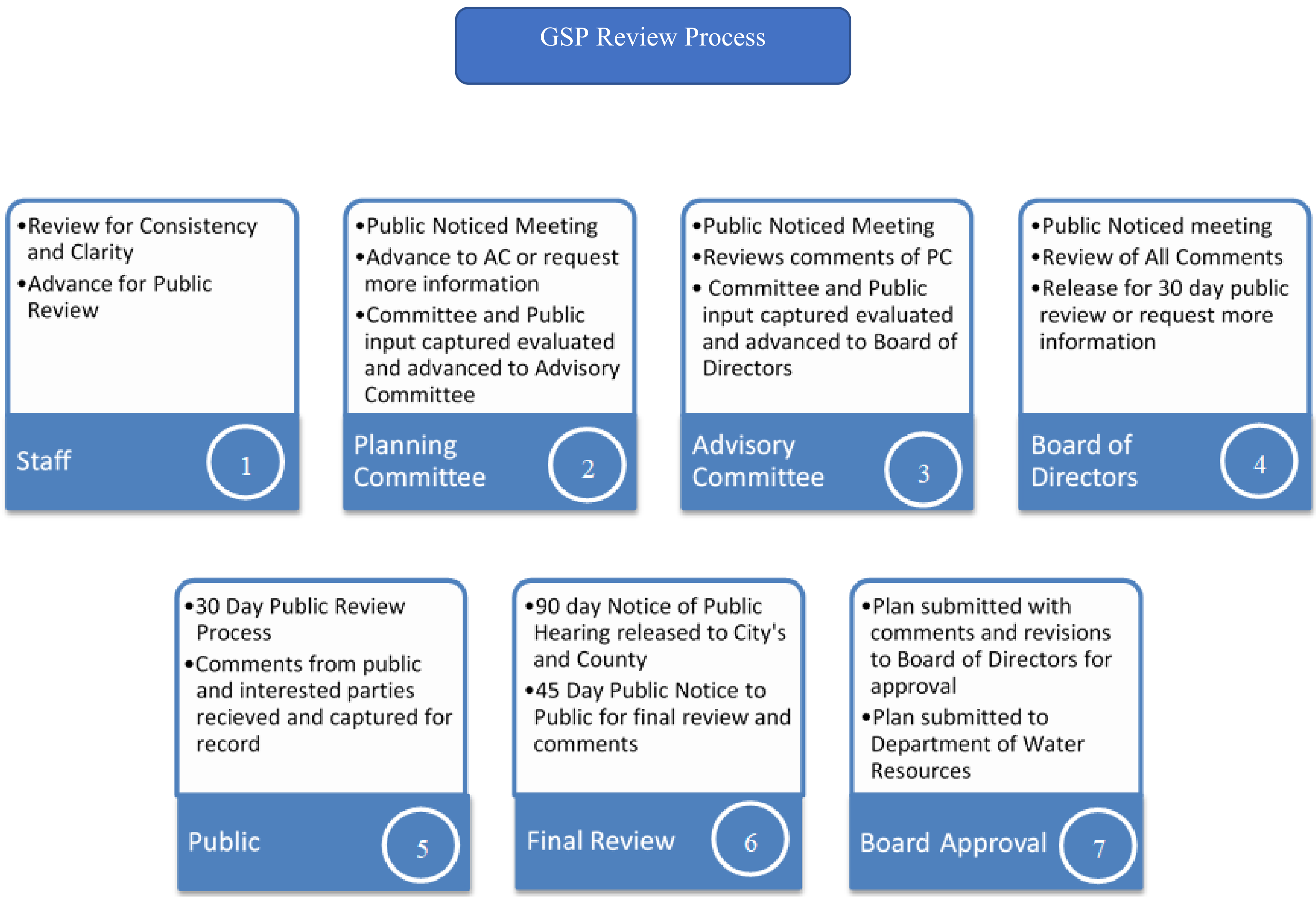


Figure 11-3: GSP Review Process

11.4.1 Data Coordination and Outreach

The GSP for the 180/400 Foot Aquifer is based on data, modeling, and evaluation of surface water and groundwater conditions, water uses, and water management options. Public outreach and engagement have been an important element of efforts to collect, review, validate, and refine the data and evaluations that will form the basis of the GSP and future management actions. Public access to data that can be shared is located at https://svbgsa.org/gsp-web-map-and-data/.

Significant outreach to other agencies and organizations that have data being used for developing this GSP has taken place. Agreements with the Monterey County Water Resources Agency, the County of Monterey, Monterey One Water and Marina Coast Water District have been developed to ensure a level of consistency in data shared between planes and staff.

11.4.2 Public Engagement, Education and Outreach

The SVBGSA continues to conduct outreach to the wider Salinas Valley municipalities, county departments, MCWRA, municipal and domestic water users, disadvantaged communities, environmental organizations, elected officials and state and federal government agencies. SVBGSA partners have also done outreach and provided additional input and data suggestions into the planning process. The SVBGSA Board of Directors meetings include public comment on every item and SVBGSA Advisory Committee meetings include public comment time and recording of all comments and these meetings are recorded and minutes taken. These efforts and records provide important feedback from the broader community and more importantly establish a comprehensive base of involved parties that SVBGSA will continue to dialog with through plan implementation and updates, in order to be as comprehensive and inclusive as possible for next phases of the plan.

Phase 2 began for this Subbasin in 2017 and will continue until the GSP is submitted to DWR by January 31, 2020. In 2018 and 2019, the development of the GSP has been undertaken by the SVBGSA Board of Directors, SVBGSA, Advisory Committee, Planning Committee, and stakeholders for feedback and input. During 2018 and 2019, the SVBGSA held a series of community workshops in the Salinas Valley Groundwater Basin to educate and inform stakeholders about SGMA and the GSP process, while also soliciting feedback and input.

Phase 2 of the GSP planning and development process has included outreach and education activities that involve stakeholders affected by water management in the Basin. The outreach and education process has informed and educated them about SGMA, groundwater management, and the GSP planning process. It has also solicited input and addressed issues and opportunities to improve groundwater management for the Salinas Valley Groundwater Basin Subbasins. The SVBGSA has undertaken following activities:

- Identified existing notification lists that could be used to reach the various social, cultural, and economic elements of the Salinas Valley Groundwater Basin population.
- Developed and provided information regarding SGMA, GSP planning, and groundwater management.
- Solicited stakeholder and public input on groundwater analysis and modeling, sustainability goals, management actions, and implementation plans.
- Provided and summarized stakeholder and public input for the Advisory Committee, the Planning Committee, and the SVBGSA Board of Directors throughout the GSP process.
- Identified and provided opportunities for public input at key project milestones.
- Developed a website that includes access to maps and data and allows stakeholders to register in order to receive meeting notifications and relevant documents.

Table 11-2 provides a list of public information meetings the SVBGSA held on the draft final 180/400-Foot Aquifer Subbasin GSP.

Table 11-2. Public Information Meetings on the Draft 180/400-Foot Aquifer Subbasin GSP

Date	Format	Location	Participation	Purpose
July 19, 2019	Advisory Committee	Schilling Place	22 Members – 9 Public	Review
July 26, 2019	Community Meeting	Castroville CSD Office	20 Public	Input
July 31, 2019	Community Meeting	Salinas City Hall	25 Public	Input
Aug 1, 2019	Community Meeting	King City Hall	10 Public	Input
Aug 2, 2019	Community Meeting	Gonzales City Hall	15 Public	Input
Aug 7, 2019	Ag Facilitated Process	Grower Shippers	14 Public	Input
Oct 16, 2019	Housing Working Group	Monterey	15	Input
Oct 21, 2019	CSUMB	Campus	20 (est)	Input
Oct 22, 2019	Salinas City Council	Salinas City Hall	35	Info
Oct 23, 2019	Community Meeting	Gonzales City Hall	1 Public	Input
Oct 28, 2019	Community Meeting	Salinas City Hall	23 Public	Input
Nov 6, 2019	Community Meeting	King City City Hall	8 Public	Input
Nov 13, 2019	Community Meeting	Castroville CSD Office	14 Public	Input

11.5 Phase 3: GSP Review and Evaluation

Phase 3 began in 2019. During this phase, the draft of the GSP has been completed along with a 45 day the public review and comment process. Four community workshops have been held to provide an overview of the GSP content, while giving stakeholders an opportunity to provide feedback and comments about the GSP. With the public review period completed, public comments will be taken into consideration as time allows and incorporated into a final version of the GSP before submitting to DWR by January 31, 2020.

Following submittal, stakeholders will be given a 60-day comment period through the DWR's SGMA portal at http://sgma.water.ca.gov/portal/. Comments will be posted to the DWR's website prior to the state agency's evaluation, assessment, and approval.

11.6 Phase 4: Implementation and Reporting

Phase 4 will continue through the duration of the 50-year planning window to ensure that sustainability is achieved and maintained.