REPORT

**Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA)**

# Brackish Groundwater Restoration Project (BGRP) and Alternative Water Supply Project (AWSP) Economic and Financial Analysis

**June 2026**

Prepared for:

Salinas Valley Basin
Groundwater Sustainability Agency

Prepared by:

ERA Economics
Environment • Resources • Agriculture

# Table of Contents

# List of Tables

# List of Figures

# List of Definitions

Alternatives – The No Action Alternative and two project alternatives, the Brackish Groundwater Restoration Project and the Alterative Water Supply Project.

Measurable Objective (MO) - a specific quantitative target established by a Groundwater Sustainability Agency for various sustainability indicators of a groundwater basin. It represents the ideal groundwater conditions for the basin and allows the GSA to achieve its sustainability goals.

Minimum Threshold (MT) - a specific quantitative limit established by a Groundwater Sustainability Agency for various sustainability indicators of a groundwater basin. It represents the groundwater conditions at a representative monitoring site that, when exceeded individually or in combination with minimum thresholds at other representative monitoring sites, may cause an undesirable result(s) in the basin.

Payment capacity – A financial measure of the ability of an individual or entity to pay for a good or service. Sometimes called ability to pay.

Project – Jointly refers to the project alternatives considered in the feasibility study, including the Brackish Groundwater Restoration Project and the Alterative Water Supply Project

Salinas Valley – the six groundwater subbasins managed by the Salinas Valley Basin Groundwater Sustainability Agency.

Subbasin – A subbasin as defined by the Department of Water Resources Bulletin 118 that is determined to be within the jurisdiction of the Salinas Valley Basin Groundwater Sustainability Agency. Subbasins include the 180/400Foot Aquifer (180/400), Eastside Aquifer (Eastside), Forebay Aquifer (Forebay), Upper Valley Aquifer (Upper Valley), Langley Area (Langley), and Monterey Subbasins.

Sustainable Management Criteria (SMC) – a critical factor that Groundwater Sustainability Agencies must address in their Groundwater Sustainability Plans. Sustainable Management Criteria include: Sustainability Goals, Undesirable Results (UR), Minimum Thresholds (MT), Measurable Objectives (MO).

Sustainable Yield (SY) - volume of water that can be extracted from the aquifer without causing Undesirable Results.

Undesirable Result (UR) - an adverse outcome that Sustainable Groundwater Management Act (SGMA) aims to prevent by monitoring and managing the six sustainability indicators.

Willingness to Pay – an economic measure of the benefit that is the value that an entity or individual places on a good or service; it is not a measure of payment capacity.

# List of Acronyms

AF – Acre-foot

AVA - American Viticultural Areas

AWSP – Alternative Water Supply Project

BEA – Bureau of Economic Analysis

BGRP – Brackish Groundwater Restoration Project

Cal Water – California Water Service Salinas District

CalAm – California American Water Monterey

CIMIS – California Irrigation Management Information System

CSIP – Castroville Seawater Intrusion Project

DWR – Department of Water Resources

GDP – Gross Domestic Product

GEMS – Groundwater Extraction Management System

GSA – Groundwater Sustainability Agency

GSP – Groundwater Sustainability Plan

M1W – Monterey One Water

MCWD – Marina Coast Water District

MCWRA – Monterey County Water Resources Agency

MPWMD – Monterey Peninsula Water Management District

NAA – No Action Alternative

NPV – Net Present Value

O&M – Operations and Maintenance

PV – Present Value

SGMA – Sustainable Groundwater Management Act

SVBGSA – Salinas Valley Basin Groundwater Sustainability Agency

USDA – United States Department of Agriculture

# 1 Executive Summary

The Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) is evaluating projects and management actions (PMAs) to address seawater intrusion in portions of the Salinas Valley to ensure compliance with the Sustainable Groundwater Management Act (SGMA). Seawater intrusion (SWI) is one of six sustainability indicators defined under SGMA and the Minimum Threshold (MT) for it is defined as the 500 mg/l iso-contour in 2017. Avoiding Undesirable Results (UR) under SGMA requires halting the inland migration of seawater to meet the MT. SVBGSA is evaluating the Brackish Groundwater Restoration Project (BGRP) and a functionally equivalent alternative, the Alternative Water Supply (AWSP). The selected project alternative would be targeted for funding under the Bureau of Reclamation Title XVI Large-Scale Water Recycling Program.

Under current pumping and hydrologic conditions, SWI is anticipated to continue moving inland, degrading groundwater quality and threatening agricultural production (crop quality and yield losses), domestic water supplies (damage to household appliances and equipment), and long-term sustainability. Figure 1 illustrates the projected extent of SWI in the 180-foot aquifer at 2040 if pumping continues at current rates (the baseline) and under the BGRP alternative. The figure illustrates that under the current pumping baseline scenario the SWI MT will not be met by 2040. Also shown is the effectiveness of the BGRP in preventing further inland migration of seawater and substantially reversing the 500 mg/l chloride iso-contour line by 2070 in the 180-foot aquifer.

**Figure 1. BGRP Alternative 180 Foot Aquifer 500 mg/l Chloride Line 2040**

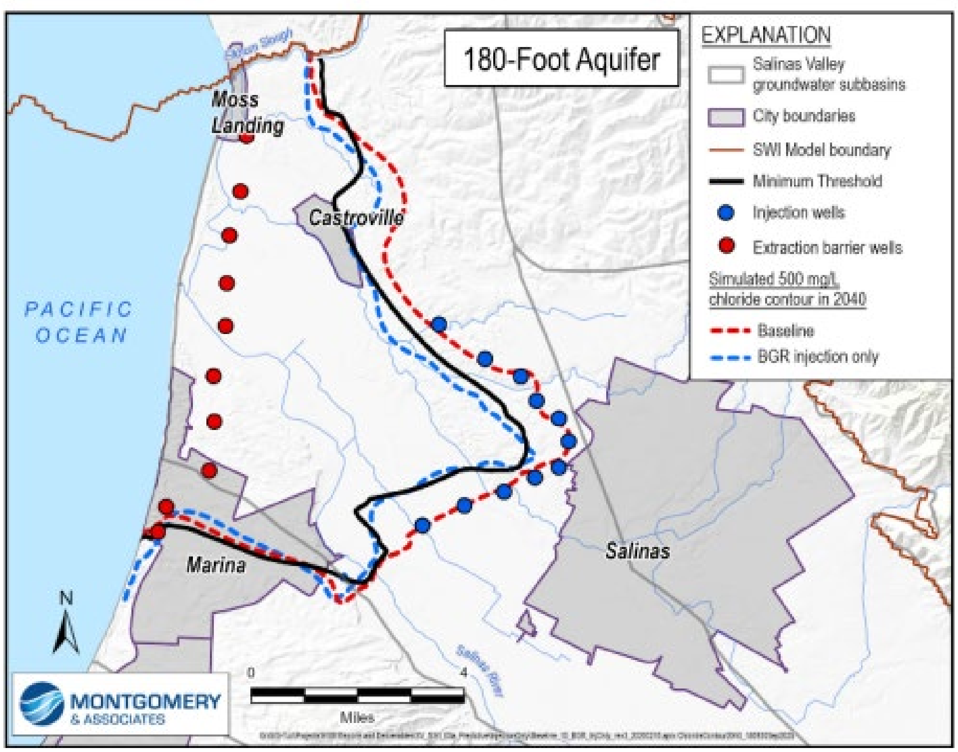
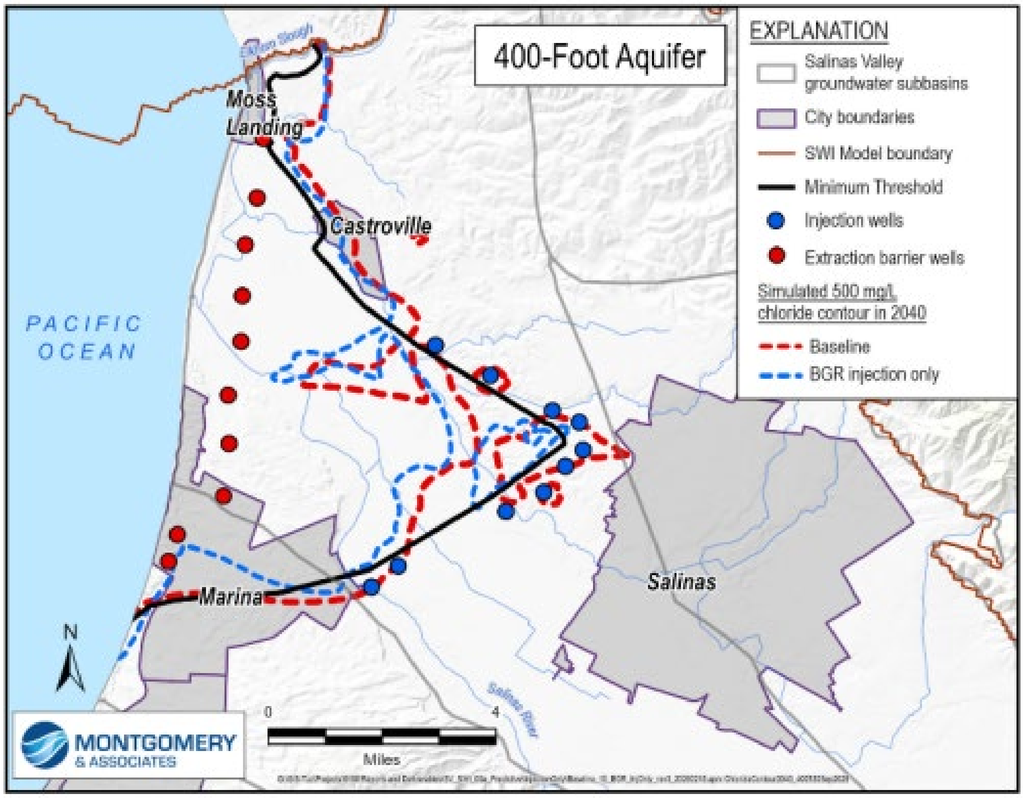


Figure 2 illustrates the 500 mg/l iso-contour line under baseline conditions (continued pumping) and the BGRP alternative for the 400-foot aquifer. The contour lines are shown at 2040 conditions for the 400-Ft aquifer. In the absence of a project the baseline conditions show continued inland migration of salinity. Both BGRP and AWSP halt the 500mg/l iso-contour line in 2040 and reverse the migration by 2070 in the 400-foot aquifer.

**Figure 2. BGRP Alternative 400 Foot Aquifer 500 mg/l Chloride Line 2040**




Pumping continuing at current rates is called the baseline condition. This would violate SGMA because the MT for SWI would be exceeded, which would be designated as an UR. Persistent URs would trigger State Water Resources Control Board (State Board) intervention, where the State Board intervenes to manage the subbasin, or subbasins, by charging fees and developing an interim plan that would achieve sustainability. State Board intervention is the most likely future condition in the absence of a project since MTs are expected to be exceeded. This likely future condition defines the basis for measuring the economic benefits of the project alternatives – the project avoids the cost of State Board intervention.

An economic feasibility analysis and financial analysis was developed for the BGRP and AWSP alternatives. Carollo Engineers and Montgomery & Associates (M&A) developed project costs, groundwater modeling, and operating assumptions. This data was provided to ERA Economics to prepare an economic feasibility analysis and financial analysis of the project alternatives. This includes the following components:

- Economic feasibility. The economic feasibility analysis evaluates the benefits of the project and compares them to the standardized costs of the project, using appropriate methods. The analysis is conducted from the perspective of the Salinas Valley and is used to determine whether the project represents a justifiable use of resources by creating benefits that exceed the costs.
- Financial feasibility. Financial feasibility is an analysis that demonstrates that sufficient resources are available to cover all construction and long-term operations and maintenance (O&M) costs of the project. It is evaluated separately from economic feasibility and ensures that the project can be paid for, from initial construction to operations. Financial feasibility is determined after a cost allocation step that apportions project costs among parties (e.g., in proportion to project benefits received). Project cost allocation has not been determined currently, and as such a preliminary financial analysis is presented.

The economic and financial analyses are based on the information available currently, including project operations, groundwater modeling, design, and implementation period. The economic analysis and preliminary financial analysis were developed to inform ongoing project evaluation and project planning.

## 1.1 Project Alternatives

Project alternatives were considered for addressing SWI. This includes BGRP and AWSP[1] as well as the No Action Alternative (NAA).

The NAA is required for the Bureau of Reclamation feasibility study. It is used to evaluate project economic benefits and it must represent future conditions that comply with existing legal requirements (e.g., SGMA and the GSP MT for SWI) but does not include a new project.

The NAA assumes that SVBGSA would take no actions to address the seawater intrusion problem. Two scenarios could result from this. One is that the State would also take no action and groundwater conditions would continue to deteriorate. This was deemed unlikely given that no attempt to address the MT is taken and SGMA empowers the State Board to enforce compliance. The second scenario is that the State Board would act, and in the absence of a new project the only alternative would be to set extraction limits (i.e., demand management) to address SWI. This was deemed the more likely future condition and is therefore the basis for the NAA used in the economic feasibility analysis. ERA Economics and the SVBGSA team are not recommending or predicting that the State Board would impose widespread and severe limits on groundwater extraction—this is simply the assumption used as the basis for estimating the potential economic costs of the NAA.

[1] BGRP and AWSP are referred to jointly as the "project" throughout the report when it is not necessary to differentiate between the project alternatives.

A groundwater analysis was developed by Montgomery & Associates to evaluate the NAA. The groundwater analysis established that no level of pumping reduction, regardless of how the reduction is distributed across subbasins, can meet the 2040 SWI MT. As a result, it is unclear what level of pumping limits the State Board would set. It could potentially impose very sever limits that apply across more than one subbasin. To address this uncertainty, ERA Economics applies a sensitivity analysis to calculate the level of demand management that would impose greater economic costs than the cost of the project (i.e., BGRP or AWSP). The proposed project would therefore avoid such costs, and the avoided costs are the economic benefits of the BGRP.

In summary, in contrast to baseline conditions (continued pumping at current levels that would violate MTs), the NAA includes assumed State Board intervention without new projects, which is the representative future condition and consistent with existing law (SGMA). The BGRP and AWSP are the capital (structural) project alternatives to address SWI and are both evaluated relative to the NAA as required for the Bureau of Reclamation feasibility study. ERA Economics and the SVBGSA team are not recommending or predicting that the State Board would impose widespread and severe limits on groundwater extraction.

### 1.1.1 No Action Alternative

The NAA follows standard practice and additional requirements under Reclamation guidelines for Title XVI funding. The Council on Environmental Quality Principles and Guidelines (P&G) defines the six key elements to address in the without-project condition, or NAA. The elements of the P&G that are applicable to the NAA for addressing SGMA compliance are as follows:

- The NAA is the most likely condition expected to exist in the future in the absence of a project. The NAA must be consistent with existing laws and institutions, including any known changes in law or public policy. If violations of existing law are expected to occur without the project, the NAA must include the reasonably likely consequences of the violation. SGMA requires that GSAs develop and implement plans that meet sustainable management criteria. If these requirements are not met, the State has ultimate enforcement authority.
- Other projects or programs, such as additional water supplies, can be included in the NAA if they are under construction or authorized and likely to be implemented during the period of analysis. No new projects are included in the NAA as these would be evaluated as either a different project (if it is to address a different purpose and need) or another project alternative (if it is to address SWI).
- Reasonably expected management actions can be included in the NAA, such as conservation measures, upstream watershed management, or modifying existing water development by management actions. This could involve changing system operations (e.g., reservoir operation), but this has not been evaluated.

In the absence of a project the SWI MT is projected to be exceeded. Therefore, the NAA considers State Board intervention without new structural solutions (i.e., projects), but management actions are included (e.g., pumping limits). Accordingly, the NAA is defined as:

- SWI continues and the MT is exceeded in the absence of a project.
- The State Board designates one or more subbasins as probationary and intervenes with management actions.
- State Board intervention includes administrative fees, pumping limits/cuts (location, timing, and magnitude not yet specified), and other management actions to address SWI.
- Because subbasins are hydrologically connected, pumping limits could extend beyond the 180/400-Foot Aquifer Subbasin.

Groundwater modeling was used to evaluate potential State Board pumping limits (reductions/cuts) to address SWI. The modeling shows that pumping reduction alone, even complete cessation of all agricultural pumping in the Salinas Valley, cannot meet the SWI MT by 2040. If the SWI MT is viewed as a legal mandate that cannot be altered or delayed, then a structural solution/alternative would be necessary, which violates the definition of a NAA. In addition, a NAA that assumes that all agricultural pumping is cut off in the 180/400-Foot Aquifer and other Subbasins in the Salinas Valley does not appear to be politically plausible and certainly violates any notion of an economically sustainable solution.

The NAA assumes that the State Board would implement certain pumping reductions to manage SWI recognizing that the MT may not be fully achieved by 2040. Domestic water users would be limited to the target of 42 gallons per capita per day (gpcd)[2]. Since the location and magnitude of agricultural pumping reductions are not known, a range of pumping cuts up to full cessation of pumping were considered in the economic analysis. The level of pumping reduction at which the economic cost of the cuts would exceed the cost of the project was determined. At this level of pumping reduction, any NAA that meets or exceeds that level of cuts is economically inferior to a structural alternative (e.g., BGRP or AWSP).

In summary, the NAA considers State Board intervention that would impose administrative fees, reduce domestic water use to minimum requirements, and limit agricultural pumping. A range of agricultural pumping limits were evaluated. A 30 and 50 percent cut is reported in this analysis as this would result in economic costs that exceed the cost of the BGRP and AWSP alternatives.

### 1.1.2 Brackish Groundwater Restoration Project

The Brackish Groundwater Restoration Project (BGRP) Injection-Only Scenario was included in the economic and financial analysis. It extracts brackish groundwater near the coast, treats the

[2] Water Code section 10609.4 indoor residential water use standard by 2030. The M&A modeling applies the indoor standard (42 gpcd) in its modeling.

water through reverse osmosis, and reinjects approximately 46,900 acre-feet per year (AFY) inland to create a freshwater barrier that achieves the SWI MT by 2040.

### 1.1.3 Alternative Water Supply Project

The Alternative Water Supply Project (AWSP) was included in the economic and financial analysis. It is functionally equivalent to the BGRP with inland injection wells that rely on alternative water sources—Salinas River flows, agricultural tile drainage, industrial wastewater, and excess diversion-facility flows—with a total volume of approximately 44,000 AFY. The AWSP also achieves the SWI MT by 2040.

## 1.2 Economic Analysis of Project Alternatives

Addressing SWI and protecting groundwater quality is important for all water users and the greater Monterey County economy. Over 400,000 residents depend on local water supplies. Agriculture is a major industry in Monterey County. The US Department of Commerce Bureau of Economic Analysis estimates the total gross domestic product (GDP) of Monterey County to be about $36.86 billion as of 2023. Agriculture generates nearly one-quarter of this value, about $8.04 billion annually. Transportation, warehousing, processing, and other wholesale trade industries that are directly tied to the local farming industry contribute an additional $3-$4 billion in annual GDP. Salinas Valley communities have substantial linkage to the agricultural industry.

The economic analysis evaluates project benefits and determines whether each project alternative represents an efficient use of resources for the Salinas Valley. This involves monetizing economic benefits and comparing them to project costs. The economic analysis evaluated economic benefits, in addition toother economic effects, and regional economic effects. These separate components (economic benefits, other economic effects, regional effects) are summarized in the following sections. In addition, the project may provide other intangible (i.e., currently non-monetized) economic benefits such as improved water supply reliability by developing a stable, drought-resistant supply for the region, benefits for broader water resources system conjunctive operations, and environmental benefits. These are qualitatively described.

Table 1 summarizes the economic analysis, economic benefits, other economic effects, regional effects, and other considerations attributable to the BGRP or AWSP.

**Table 1. Economic Benefits, Economic Effects, and Regional Effects Summary**

| Component | Component | Evaluation | Monetized |
|---|---|---|---|
| Economic Benefits | Domestic water shortage costs | Avoided costs benefit relative to NAA | Yes |
| | State Board administrative costs | Avoided costs benefit relative to NAA | Yes |
| | Agricultural land fallowing | Avoided costs benefit relative to NAA | Yes |
| Other Economic Effects | Agricultural water quality | Economic effect relative to baseline | Yes |

| | | | |
|---|---|---|---|
| | Domestic water quality | Economic effect relative to baseline | No |
| | Well deepening and replacement | Economic effect relative to baseline | No |
| | CSIP improvements | Economic effect relative to baseline | Qualitative overview |
| | Pumping lift / groundwater levels | Economic effect relative to baseline | Yes |
| Regional Economic Effects | Regional effects | Distributional effects | Yes |
| Other Qualitative Factors | Water supply reliability | Potential benefit | Qualitative overview |
| | Deep aquifers | Potential benefit | Qualitative overview |
| | System operations | Potential benefit | Qualitative overview |
| | Environment | Potential benefit | Qualitative overview |

## 1.3 Economic Benefits

The economic benefits of the AWSP or BGRP are the increase in economic value to society that occurs because the project is implemented. Benefits are measured relative to the NAA (the most likely conditions in the future). Economic benefits are defined as the avoided costs, avoided damages, or increased productivity that result from the project compared to what would otherwise occur under the NAA. The economic benefits of the project includes the avoided cost of:

- Domestic water shortage costs
- State Board administrative costs
- Agricultural land fallowing (State Board agricultural pumping reductions)

### 1.3.1 Methods

The analytical approach uses several economic models that represent current and future agricultural production, domestic water use, and the regional economy in the Salinas Valley and greater Monterey County. These models respond to physical and economic changes estimated to occur under the NAA and project alternatives (BGRP and AWSP), translating those changes into monetized benefits, evaluating other economic effects, and quantifying regional economic effects. For the analysis of economic benefits this includes:

- **Agricultural economic benefits**. The analysis applies market data and crop production budgets developed using published sources and validated through grower and other industry expert interviews and outreach. These data are applied to an agricultural production and economic optimization model of Salinas Valley agriculture, which is used to estimate the effects of groundwater conditions and management policies under the NAA and project alternatives. The agricultural economic model calibrates to observed cropping (by season, crop, and farm), water use, costs, and crop market conditions, and responds to changes in water quality, quantity, and other economic conditions. The agricultural economic model links directly to groundwater modeling outputs and incorporates Subbasin-specific crops, rotations, prices, costs, yields, and water requirements.

- **Domestic economic benefits**. An economic demand function for domestic water is calibrated for each district/purveyor. The economic demand function represents how households and businesses adjust water use as availability declines, and how those changes translate into economic benefits measured as changes in consumer surplus—the economic value customers receive from water above what they pay for it. Districts would also benefit from the project, and these benefits are typically measured as the change in producer surplus, measured as the change in revenue less variable costs to produce the water. The domestic economic benefits analysis measures the change in consumer surplus only.

The economic models were applied to evaluate agricultural and domestic economic benefits under 2040 and 2070 levels of development.

### 1.3.2 Results

The economic analysis was applied to evaluate economic benefits of the project alternatives at 2040 and 2070 conditions. Economic benefits are reported as an annual value and the present value of the stream of annual benefits.

Table 2 summarizes the results of the analysis of economic benefits (avoided costs) attributable to the project. The annual and present value of each economic benefit is shown under the 30 percent and 50 percent pumping reduction scenarios. The annual benefit of the project (BGRP or AWSP alternative) is between $220 million and $365 million. The present value (PV) of the project is between $4.88 billion and $8.11 billion. This does not include other economic effects attributable to the project (summarized in the subsequent section). The economic benefits are the same for the BGRP and AWSP alternatives because both alternatives would avoid the same costs under the NAA.

**Table 2. Summary of Scenario Benefits at 30% or 50% Pumping Reduction**

| Benefit (Avoided Cost) | 30% Cut | 50% Cut |
|---|---|---|
| PV Agricultural Water Supply ($ M) | $3,798 | $7,107 |
| PV Municipal Water Supply ($ M) | $787 | $787 |
| PV State Board Fees ($ M) | $295 | $215 |
| Total PV ($ M) | $4,880 | $8,108 |
| Annualized Benefits ($ M) | $220 | $365 |

### 1.3.3 Benefit Cost Analysis

The monetized benefits and costs were applied to calculate the benefit-cost ratio for the BGRP and AWSP alternatives. The benefit cost ratio divides the present value of project benefits by the present value of project costs. A benefit cost ratio of 1 indicates benefits exceed costs.

Table 3 summarizes the BGRP and AWSP benefit-cost analysis. The BGRP annualized cost equals $155.7 million, or $3,321 per AF of injected project water, and the present value (PV) of those costs equals $3.46 billion. The annualized BGRP economic benefits are between $4.88 billion and $8.11 billion under the 30 and 50 percent cut scenarios. The BGRP benefit-cost ratio is between 1.41 and 2.34 with net present value (NPV) benefits of $1.4 to $4.6 billion. The AWSP annual cost equals $257.9 million, or $5,836 per AF of injected project water, and the present value of those costs equals $5.7 billion. The annualized AWSP economic benefits are between $4.88 billion and $8.11 billion under the 30 and 50 percent cut scenarios. The AWSP benefit-cost ratio is between 0.85 and 1.42 with NPV benefits of ($0.85 billion) to $2.4 billion.

**Table 3. Summary of Project Alternatives Economic Evaluation**

| Item | BGRP | AWSP |
|---|---|---|
| **PV Cost** | **$3,459M** | **$5,730M** |
| **Annualized Cost per AF Injected** | **$3,321 ($/AF)** | **$5,836 ($/AF)** |
| **30% Agricultural Cut, 42 gpcd domestic, SWRCB Fees** | | |
| PV Benefit | $4,880M | $4,880M |
| B/C Ratio | 1.41 | 0.85 |
| Net Present Value | $1,420M | -$850M |
| **50% Agricultural Cut, 42 gpcd domestic, SWRCB Fees** | | |
| PV Benefit | $8,108M | $8,108M |
| B/C Ratio | 2.34 | 1.42 |
| Net Present Value | $4,650M | $2,378M |
| **B/C Ratio Range** | **1.41 - 2.34** | **0.85 – 1.42** |

The economic feasibility analysis finds that the BGRP has a benefit cost ratio greater than 1.41 and generates net benefits of $1.4 to $4.6 billion, which is greater than the AWSP alternative.

## 1.4 Other Economic Effects

There are other monetizable economic values generated by the project, but they are measured relative to baseline conditions of continued pumping at current levels and not the NAA. Therefore, these other economic effects are not economic benefits of the project. However, as the project is refined, and additional data is developed, these other economic effects may become important project economic benefits. These additional economic effects of the project include the avoided cost of:

- Water quality impacts (crop yield losses) to agriculture
- Water quality impacts to domestic water users

- Well deepening and replacement costs
- CSIP improvements
- Additional pumping lift and energy costs

### 1.4.1 Methods

The same analytic approach applied to evaluate project economic benefits was applied to evaluate other economic effects. The analysis approach includes:

- **Agricultural economic benefits**. The data and model structure of the Salinas Valley agricultural economic model was applied. Crop-salinity yield response functions were applied to the economic model data to evaluate salinity impacts to crop production in the seawater intruded area. In addition, energy pumping costs were applied to calculate the value of the change in pumping lift.
- **Domestic economic benefits**. Other economic effects for domestic water users were not evaluated. There is an economic effect for domestic users from improved water quality – improved taste and improved life of appliances and equipment. Insufficient data was available to quantify these effects at this time.

In contrast to economic benefits, the other economic effects are measured relative to a baseline (continued pumping at current levels) at 2040 and 2070.

### 1.4.2 Results

Other economic effects include agricultural and domestic water quality improvements, reduced groundwater pumping costs, avoided well replacement, avoided deep aquifer pumping, improved regional water supply reliability, operational value to broader conjunctive use of the regional water system, and other environmental effects.

Table 4 summarizes other economic effects, the annual value at 2040 conditions, and the PV of the effect over the project planning horizon. The monetized economic effects are shown for the AWSP and BGRP separately because the effects are measured for each project relative to baseline conditions. The PV of BGRP economic effects equals $220.54 million. The PV of AWSP economic effects equals $160.64 million.

**Table 4. Other Economic Effects Summary**

| | BGRP | | AWSP | |
|---|---|---|---|---|
| **Effect** | **Annualized ($ Millions)** | **Present Value ($ Millions)** | **Annualized ($ Millions)** | **Present Value ($ Millions)** |
| Agricultural water quality | $9.66 | $214.54 | $6.74 | $149.60 |
| Domestic water quality | Not evaluated | Not evaluated | Not evaluated | Not evaluated |
| Pumping lift / groundwater levels | $0.27 | $6.00 | $0.50 | $11.04 |

| | | | | |
|---|---|---|---|---|
| Avoided CSIP costs | Not evaluated | Not evaluated | Not evaluated | Not evaluated |
| **Total** | **$9.93** | **$220.54** | **$7.24** | **$160.64** |

Other economic effects were evaluated relative to the baseline conditions. These can be evaluated in future iterations of this analysis and compared to the NAA to establish project economic benefits.

## 1.5 Regional Economic Effects

Regional effects evaluate how changes in economic activity caused by the project ripple through the regional economy, affecting jobs, income, output, and business activity. These effects measure distributional changes in gross economic activity, not the net economic value of the project, and are not a measure of project benefits. Regional economic effects include changes in:

- Jobs
- Output value
- Value added
- Income

Regional economic effects are evaluated for the NAA. That is, the regional economic effects illustrate the regional implications of the BGRP or AWSP in terms of jobs, output value, and related metrics for local (county) economic activities by keeping more agricultural land in production. The regional economic effects do not consider the effect of expenditures for project construction and operations, as well as any offsetting costs of additional water charges to users to pay for the project. These may be evaluated in future iterations of the analysis.

### 1.5.1 Methods

Regional effects are estimated using the IMPLAN input-output modeling system, which estimates spending relationships among industries, households, and institutions within Monterey County. IMPLAN quantifies how changes in direct economic activity—such as agricultural production and farm income—propagate through the regional economy through supply-chain purchases and household spending (so called indirect and induced effects).

### 1.5.2 Results

The regional economic effects of the project translate changes in agricultural production into associated spending in the regional economy. Outputs of the analysis include the change in total output, labor income, value added, and employment. The regional effects are reported separately for the 30 percent and 50 percent pumping reduction (cut) NAA scenarios.

Additional regional effects would result from project construction and secondary effects of that construction and project operation. In addition, there would be secondary regional effects from the reduction in net income from operating costs and repayment of construction costs. There may also be modest regional effects from improvements in crop yield/productivity due to improved water quality. These regional effects are not evaluated and can be considered as the project construction and alternatives are refined.

Table 5 shows the regional effects of the project for the 30 percent cut scenario. The project is associated with an increase of (i.e., would protect) 9,495 full time equivalent (FTE) jobs (over 18,000 seasonal jobs as is typical in farming), $1,559 million in value added annually, and $1,845 million in gross output value annually for the 30 percent cut NAA scenario.

**Table 5. NAA 30 Percent Cut Scenario Regional Economic Effects**

| Effect | Employment (FTE) | Labor Income ($ Millions) | Value Added ($ Millions) | Output ($ Millions) |
|---|---|---|---|---|
| Direct | -5,238 | -$732 | -$1,133 | -$1,196 |
| Indirect | -1,794 | -$117 | -$164 | -$229 |
| Induced | -2,463 | -$144 | -$263 | -$421 |
| **Total** | **-9,495** | **-$993** | **-$1,559** | **-$1,845** |

Table 6 shows the regional effects of the project for the 50 percent cut scenario. The project is associated with an increase of (i.e., would protect) 14,224 FTE jobs (over 28,000 seasonal jobs as is typical in farming), $2,353 million in value added annually, and $2,781 million in gross output value annually for the 50 percent cut NAA scenario.

**Table 6. NAA 50 Percent Cut Scenario Regional Economic Effects**

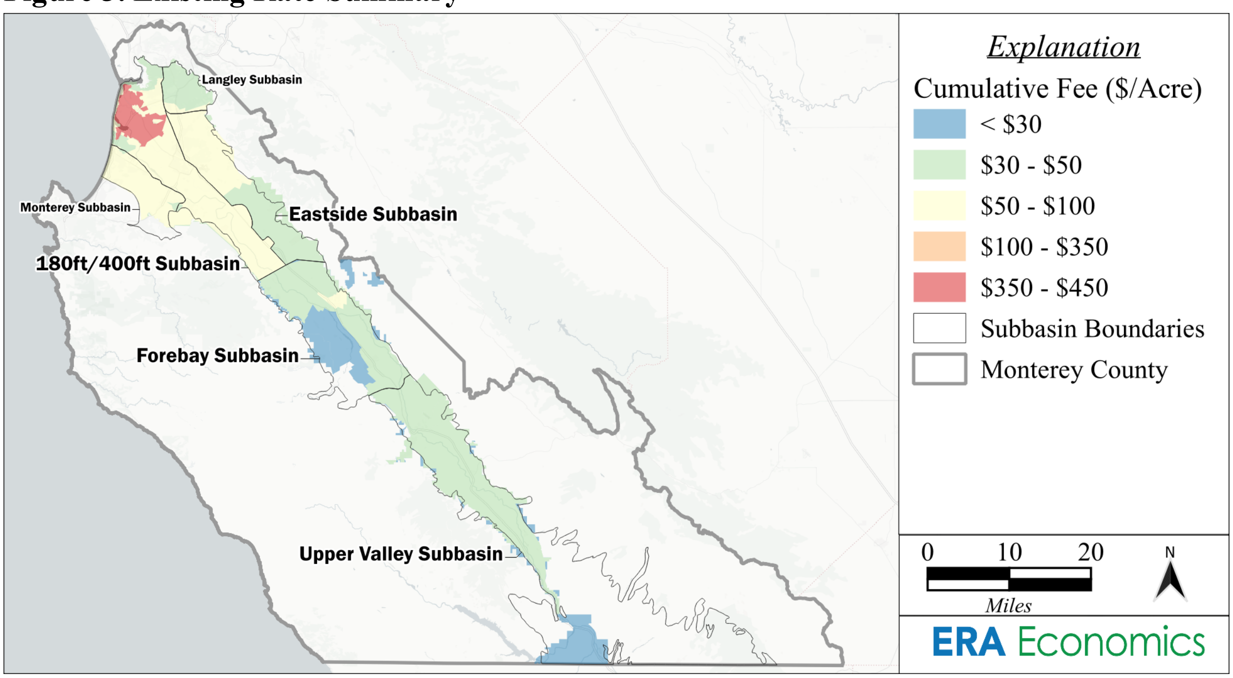
| Effect | Employment (FTE) | Labor Income ($ Millions) | Value Added ($ Millions) | Output ($ Millions) |
|---|---|---|---|---|
| Direct | -7,806 | -$1,107 | -$1,711 | -$1,802 |
| Indirect | -2,695 | -$176 | -$245 | -$343 |
| Induced | -3,723 | -$218 | -$397 | -$636 |
| Total | **-14,224** | **-$1,501** | **-$2,353** | **-$2,781** |

## 1.6 Financial Analysis

The financial analysis provides an initial screening-level review based on current capital and O&M cost estimates, financing scenarios, and potential cost allocation approaches. It was developed for the BGRP alternative. A more complete financial feasibility analysis will be developed in subsequent phases as project configuration, benefits, cost allocation, funding options, and financing structures are defined.

Water users in the Salinas Valley currently pay a range of water-related charges. This includes the SVBGSA Groundwater Sustainability Fee, which is applied per domestic connection and per cropped acre annually. It also includes the MCWRA Zone Fees and the CSIP Water Delivery Charge. There are additional water costs (e.g., pumping cost and domestic water rates) in addition to these charges. Figure 3 illustrates the approximate per acre fees across the Salinas Valley.

**Figure 3. Existing Rate Summary**




The financial analysis considers potential (illustrative) cost allocation approaches, and summarizes total capital costs, O&M costs, replacement costs, and financing costs under a illustrative cost allocation approach. Cost allocation can be based on various factors including supply volumes, groundwater extraction, irrigated acreage, number of domestic connections, or relative economic benefits of the project.

The cost allocation approach applies project financial costs to total pumping in the Salinas Valley, including all domestic and agricultural pumping. Financial costs assume a 30-year bond at 4% interest with 3% annual inflation on O&M costs. Financial cost is the combined debt service repayment and annual O&M cost, shown at start of operations in 2035 and future years. The financial analysis of the BGRP includes the capital cost, interest during construction, cost of issuance, annual O&M costs, and replacement costs. The amount borrowed for BGRP includes the interest during construction and capital costs, and a portion of the issuance cost for the approximate share that would not be funded through Reclamation. The Reclamation cost share is assumed to be 25 percent.

The financial cost of the BGRP alternative (the alternative with the greater benefit-cost ratio and net benefits) after 25 percent Reclamation cost share is $425 per acre-foot if spread over all Salinas Valley groundwater pumping (in 2035 dollars). This is an illustrative cost allocation approach (spreading costs over all groundwater pumping) and will be revised as part of future project evaluation and planning, which will change the financial cost of the project.

The financial analysis suggests there is sufficient overall payment capacity to support the project, although the affordability to individual payers will depend on the final cost allocation approach. In general, the Monterey County economic base and the scale of anticipated project benefits suggest that project costs can be supported if they are distributed in a manner that is equitable and aligned with beneficiaries. As the project is refined and a funding plan is developed, the allocation of costs among groundwater users, landowners, other beneficiaries, and other potential funding sources will be developed. Accordingly, preliminary findings indicate that payment capacity is expected to be adequate, subject to development of a feasible and appropriately structured cost allocation methodology.

## 1.7 Summary

The economic benefits and other economic effects of addressing SWI in the Salinas Valley exceed several billion dollars in present value terms. Both project alternatives avoid State Board intervention, with loss of local control over groundwater management, imposition of fees, and management that, for the NAA, was evaluated as pumping curtailments up to 50 percent. The regional economic effects of the NAA are also substantial and would result in profound implications for Salinas Valley and broader Monterey County communities. This includes the loss of tens of thousands of farm jobs, loss of labor wage income, and losses to farming businesses and communities across the county.

The analysis illustrates that there are economic benefits from managing SWI in the Salinas Valley, and importantly, that the SWI MT cannot be achieved by pumping reductions alone. The BGRP and AWSP alternatives both raise groundwater levels, improve water quality, and help push SWI back toward the coast. The economic analysis shows that the BGRP is lower cost than the AWSP alternative and results in a benefit cost ratio between 1.41 and 2.34, and PV of net benefits between $1.42 and $4.65 billion. The financial analysis provides a preliminary overview of financial costs with an example cost allocation approach and payment capacity.

The analysis is based on available and project information and data, next steps include:

- Refine the NAA to reflect the location, timing, and allocation of pumping reductions and associated State Board intervention outcomes. This includes applying economic analysis to evaluate additional project benefits and developing groundwater inputs and project operations.
- Expand monetization of benefits that are currently treated qualitatively or only partially quantified (e.g., economic effects), including domestic water quality, well replacement and deepening risk, reliability, and other avoided costs.
- Advance financial feasibility work by cost-allocation methodologies tied to beneficiaries and testing affordability across payer groups. Prepare a funding and implementation strategy, including grant positioning, partner participation, ownership and operating agreements, and a financial plan or rate study. Refine the Reclamation feasibility study.

# 2 Overview

The Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) was formed to plan for and carry out groundwater management to comply with the Sustainable Groundwater Management Act (SGMA) while continuing to support productive agriculture, the domestic sector, environment, and regional economy. Complying with SGMA requires preparing and implementing Groundwater Sustainability Plans (GSPs). The GSPs have been developed by the SVBGSA and approved by the Department of Water Resources (DWR) for the six subbasins of the Salinas Valley: 180/400-Foot Aquifer (180/400), Eastside Aquifer (Eastside), Forebay Aquifer (Forebay), Upper Valley Aquifer (Upper Valley), Monterey, and Langley Area (Langley). The six subbasins are referred to as the Salinas Valley or Valley. SVBGSA coordinates implementation of the GSPs with Marina Coast Water District Groundwater Sustainability Agency (GSA), Arroyo Seco GSA, and the County of Monterey GSA.

SMGA requires managing groundwater to avoid undesirable results associated with six sustainability indicators. A key sustainability indicator—seawater intrusion (SWI) —continues to worsen under current pumping and hydrologic conditions in the Salinas Valley. SWI leads to increasing chloride (more broadly, salinity which is the total dissolved solids in the groundwater inclusive of chloride), which damages crops, irrigation systems, appliances, and infrastructure. Groundwater modeling shows that without intervention, SWI will continue its inland progression, threatening agricultural productivity, domestic supplies, and long-term groundwater basin health.

To address SWI the SVBGSA is studying the Brackish Groundwater Restoration Project (BGRP) and a functionally equivalent Alternative Water Supply Project (AWSP). The BGRP and AWSP[3] are evaluated relative to a No Action Alternative (NAA) that reflects likely conditions in the absence of the project. This includes SWI that exceeds Minimum Thresholds (MT) defined in the subbasin GSPs. This would constitute an Undesirable Result (UR) under SGMA, potentially resulting in probationary designation of one or more subbasins, and ultimately State Water Resources Control Board (State Board) intervention in the absence of a locally implemented solution.

A technical analysis of the project alternatives was developed by Carollo Engineers (Carollo) and groundwater modeling of the project alternatives and NAA was developed by Montgomery & Associates (M&A). ERA Economics was engaged to evaluate the economic feasibility of the project and support preliminary evaluation of payment capacity to support a financial feasibility assessment. The economic feasibility and financial analyses include:

- **Economic feasibility**. The economic feasibility analysis evaluates the benefits of each project alternative and compares them to the standardized costs of the project. The

[3] The BGRP and AWSP are jointly referred to a the project throughout this document when it is not necessary to differentiate between these two project alternatives.

analysis is conducted from the perspective of the Salinas Valley and is used to determine whether a project alternative represents a justifiable use of resources by creating benefits that exceed the costs. Economic benefits of the project include avoided agricultural and domestic water use reductions, improved water quality, reduced pumping costs, and avoided regulatory compliance costs.

- **Financial feasibility**. The financial feasibility analysis determines whether there is sufficient payment capacity for the project. Since project alternatives are still being refined and a cost allocation method has not been determined, the analysis provides a preliminary assessment of payment capacity and illustrates potential cost allocation approaches. A full financial feasibility assessment will require future refinement as project configurations and funding sources are developed.

The economic feasibility and financial analyses follow standard professional practice. In addition, the economic feasibility analysis follows specific Bureau of Reclamation (Reclamation) guidelines for Title XVI Large-Scale Water Recycling Program (WRP) for projects with total costs greater than $500,000. The WRP provides a 25 percent federal cost share with no per-project maximum. The economic and financial analyses follow Title XVI WRP guidelines.

## 2.1 Project Evaluation Process

The AWSP and BGRP are one of several projects and management actions (PMAs) that are being evaluated as part of SVBGSA planning and GSP implementation efforts to avoid significant and unreasonable impacts to groundwater sustainability indicators (Sustainable Management Criteria, or SMC). PMAs target different sustainability indicators (e.g., levels, seawater intrusion, or water quality), would work in different areas, and may be developed in combination with other projects or actions. Importantly, PMAs have different costs and create different groundwater benefits for the Salinas Valley.

The SVBGSA is studying the following elements for each PMA:

- Effects on SMCs
- Technical feasibility for engineering, design, permitting, and environmental considerations that affect project operations and cost
- Economic feasibility to establish project benefits, to whom those benefits accrue, and whether the economic benefits are sufficient to justify the project costs
- Financial feasibility to establish how project costs would be allocated and that there is sufficient payment capacity to cover construction through operations and ongoing maintenance

The planning process produces relevant information to determine cost-effective PMAs. Each PMA is evaluated for its costs, anticipated benefits, and effects on SGMA sustainability indicators. Cost allocation approaches are also considered to ensure that projects are financially viable (e.g., that there is sufficient repayment capacity and costs are shared appropriately among the project beneficiaries). An initial screening can narrow the planning process to the most cost-effective portfolio of PMAs. The selected projects are then advanced into further development for technical, environmental, economic, and financial feasibility. A feasibility study follows established professional standards and may include additional requirements based on the specific funding source being pursued.

Two project alternatives were analyzed in the economic and financial analysis:

- Brackish Groundwater Restoration Project (BGRP) Injection-Only Scenario, which extracts brackish groundwater near the coast, treats approximately 46,900 acre-feet per year (AFY), and reinjects it inland to create a freshwater barrier that meets SWI MT within roughly ten years of operation.
- Alternative Water Supply Project (AWSP), which provides a functionally equivalent inland injection barrier and relies on 44,000 AFY of alternative water sources—Salinas River , agricultural tile drainage and industrial wastewater.

Both project alternatives are designed to address SWI, but their performance and lifecycle costs differ substantially, establishing the basis for the comparative economic and financial analysis that follows.

## 2.2 Economic Conditions in the Greater Project Area

Managing SWI and protecting groundwater quality is important for all water users and the greater Monterey County economy. Agriculture is a major industry in Monterey County. As of 2023 the US Department of Commerce Bureau of Economic Analysis (BEA) estimates the total gross domestic product (GDP) of Monterey County to be about $36.86 billion. Agriculture generates nearly one-quarter of this value, about $8.04 billion annually. Transportation, warehousing, processing, and other wholesale trade industries that are directly tied to the local farming industry contribute an additional $3-$4 billion in annual GDP. Communities in the Salinas Valley are closely linked to the local agricultural industry and related businesses.

Land use in the Salinas Valley of Monterey County is primarily agriculture, with large acreages in leafy greens (e.g., lettuce, spinach, salad mixes), strawberries, wine grapes, and other high-value specialty crops. Many of these crops are highly sensitive to salinity and require sufficient water quality. The Salinas Valley region accounts for about 92 percent of irrigated agricultural acreage in the county. Urban and residential development is concentrated in Salinas, Gonzales, Soledad, Greenfield, King City, and the smaller unincorporated communities. These cities are surrounded by farmland and industry is heavily dependent on the farming sector. Rangelands and foothills on the valley’s margins are primarily used for cattle grazing

Salinas Valley agriculture is a tightly managed high-input, high-value system. Growers manage crop rotations, inputs, and logistics to help meet (effectively) year-round demand for fresh produce, responding quickly to weather stressors and market conditions. Rotations, planting, and harvest windows shift acreage among lettuce, brassicas, berries, and other crops depending on market conditions (e.g., upstream supply gaps or disruptions in Mexico spring production). Growers manage inputs to maintain yield and quality. Qualified crew labor is important for everything from crop establishment and irrigation to harvest during short windows. Crops including strawberries, leaf lettuce, head lettuce, broccoli, and wine grapes comprise the greatest share of both land use and economic value. Fields can be planted with up to three crops per year, which is what supports the high agricultural land values in the region, highlighting the importance of groundwater reliability in addition to groundwater quality.

Monterey County has a total irrigated footprint of around 215,200 acres, with 198,370 acres (92 percent) located within the SVBGSA's jurisdictional area. The total harvested acreage (accounting for multiple crops) in Monterey County is 367,000, and in the SVBGSA's jurisdictional area is about 335,500 acres (about 94 percent of the county total).

Farming in the Salinas Valley varies significantly from north to south, driven by differences in climate, soil, water availability, and markets. The northern and western portions of the valley experience cooler, coastal-influenced weather that supports high-value cool-season vegetables like lettuce, spinach, broccoli, other leafy greens, along with strawberries and nursery crops. These crops benefit from market access enabled through longer growing seasons, and reduced heat stress. The northern portion of the valley has areas of seawater intrusion into the 180-foot and 400-foot aquifers that has degraded irrigation water quality, with some lands partially served by the Castroville Seawater Intrusion Project. Warmer conditions and winds in the inland areas and southern valley favor crops such as wine grapes, garlic, carrots, and other row crops, with relatively small acreage in forage and rotational grains. The Salinas Valley includes a well-established wine grape industry, with American Viticultural Areas (AVAs) including the Santa Lucia Highlands on the western slope stretching from Gonzales to Soledad.

Salinas Valley farming is part of an integrated supply chain that involves a network of suppliers, processors, and distributors. A farm can have multiple crop cycles per year with post-harvest operations that vary depending on the commodity. In general, for lettuce/leafy greens and vegetables, fields are harvested with multiple crews in shifts. Timing is synchronized with anticipated packing house arrival and cooling capacity. Produce is eventually washed, sanitized, trimmed, sorted for size and quality, boxed or clam shelled, and some is further processed (e.g. bagged salads) before moving to domestic and export consumer markets. Changes in farming due to SGMA have implications for individual farms, the Salinas Valley and the entire region through changes in market price and the integrated supply chain, and local communities.

Table 7 summarizes the harvested acreage by crop type in the Salinas Valley by subbasin as of 2023. Harvested acreage includes fields that are harvested multiple times per year.

**Table 7. SVBGSA Harvested Acreage by Major Crop Type and Subbasin, 2023**

| Crop Type | 180 / 400 | Eastside | Forebay | Upper Valley | Langley | Monterey | Harvested Acres |
|---|---|---|---|---|---|---|---|
| Artichokes | 1,400 | 600 | 1,300 | 400 | 0 | 0 | 3,700 |
| Broccoli | 23,800 | 10,700 | 18,800 | 11,400 | 0 | 200 | 64,900 |
| Other Leafy Greens | 15,700 | 9,400 | 12,800 | 12,000 | 0 | 100 | 50,000 |
| Cauliflower | 10,000 | 4,100 | 6,200 | 3,500 | 0 | 100 | 23,900 |
| Celery | 4,000 | 1,800 | 2,800 | 1,500 | 0 | 100 | 10,200 |
| Carrots | 300 | 300 | 1,300 | 800 | 0 | 0 | 2,700 |
| Greenhouse | 100 | 300 | 300 | 0 | 0 | 0 | 700 |
| Head Lettuce | 13,900 | 7,900 | 10,400 | 11,200 | 0 | 100 | 43,500 |
| Leaf Lettuce | 18,700 | 10,600 | 14,400 | 14,000 | 0 | 200 | 57,900 |
| Onions | 200 | 300 | 1,100 | 1,900 | 0 | 0 | 3,500 |
| Field Crops | 2,500 | 2,000 | 2,700 | 2,000 | 500 | 0 | 9,700 |
| Strawberries | 8,100 | 6,300 | 0 | 0 | 1,000 | 100 | 15,500 |
| Tree Fruit | 200 | 100 | 1,900 | 400 | 0 | 0 | 2,600 |
| Grapes | 1,600 | 3,100 | 19,900 | 21,800 | 200 | 0 | 46,600 |
| Harvested Acres | 100,600 | 57,500 | 93,900 | 80,900 | 1,700 | 900 | 335,500 |

The baseline conditions for the Salinas Valley and broader Monterey County agriculture highlight that the industry is integrated through the supply chain and with communities through farm labor and related industries. The Salinas Valley includes high proportions of lower income and farmworker households. Changes in local farming operations affect jobs, income, and communities across the county.

## 2.3 Project Purpose and Need

The purpose and need of the project shape the baseline conditions that define what happens in the absence of the project, as well as consideration of other potential projects and project alternatives (i.e., PMAs). The analysis of project technical performance, physical benefits, economic feasibility, and financial feasibility are then determined by evaluating the difference from without project conditions. This allows for consistent comparison across different project alternatives by evaluating what conditions would be without the project, and how those conditions change with the project.

Groundwater quality challenges, especially seawater intrusion, threaten both agricultural viability, which affects local communities, and domestic water supplies. Many crops grown in the Salinas Valley are salt-sensitive, and increasing salinity of groundwater used for irrigation reduces yields, forcing shifts to less profitable crops, crop quality impacts, and land fallowing. Domestic users face increased water treatment needs, corrosion, and system wear as salinity increases. Managing SWI and maintaining an economically viable agriculture and linked domestic industries in the Salinas Valley and greater Monterey County is critical for the region. This defines the project's purpose and need: *to address the SWI sustainability indicator by preventing SWI from exceeding the MT by 2040*.

The economic benefits of the project in the future are measured relative to reasonable future conditions in the absence of the project. This is called the No Action Alternative. Each alternative (BGRP and AWSP) is compared to the No Action Alternative, which provides a consistent basis for evaluation and selection of a preferred project alternative.

### 2.4 Report Structure

This report describes the data, analysis, and results of the economic and financial of the project alternatives based on the data, groundwater modeling, and project operations information currently available. The report is structured as follows.

- Section 3 summarizes the economic and financial feasibility analyses.
- Section 4 summarizes the No Action Alternative, which is the baseline against which the economic benefits of the project alternatives are measured. This section also describes the two project alternatives.
- Section 5 summarizes the economic analysis of the project alternatives, describes economic benefits, and estimates the value of economic benefits. It also summarizes project lifecycle costs for each alternatives and compares those costs to the monetized benefits to evaluate economic feasibility.
- Section 6 summarizes other economic effects that were considered, and in some cases monetized, but are separate from the economic benefits of the project alternatives.
- Section 7 describes the regional economic effects of the project alternatives in terms of jobs, income, and regional economic activity.
- Section 8 presents the financial analysis of the project alternatives.
- Section 9 summarizes the results of the analysis and describes next steps.

# 3 Economic and Financial Analysis

ERA Economics prepared an economic and financial analysis of the project alternatives. The economic analysis evaluates project benefits and makes a preliminary assessment of the economic feasibility of the project. The financial analysis provides a preliminary assessment of payment capacity but does not assess project financial feasibility because there is insufficient information currently to determine appropriate cost allocation methods.

The economic feasibility and financial analyses have been integrated into sections of the BGRP Feasibility Report. The economic and financial analyses summarized in this report include:

- Present an overview of economic conditions against which the economic benefits of the project alternatives are measured.
- Describe and apply an economic analysis to monetize economic benefits of the project alternatives defined by the SVBGSA team. Evaluate other economic effects and regional economic effects that are not project economic benefits but are important considerations for the project.
- Standardize economic and financial costs of the project alternatives defined by the SVBGSA team and compare them to monetized project benefits and to assess the economic and financial viability of the project.
- Document the next steps in the project evaluation process for additional evaluation of the project alternatives based on the findings in the economic and financial analysis.

The economic and financial analysis is based on the information for the project alternatives available to ERA Economics currently. Project alternatives and configurations continue to be developed. Some economic benefits of the project alternatives have consequently not been fully evaluated at this time, and these are reported as other economic effects. These are described in the report and may be evaluated to support future project planning.

## 3.1 Economic Feasibility

The economic feasibility analysis evaluates the benefits of each project alternative and compares them to the standardized costs of the project alternative, using appropriate methods. The analysis is conducted from the perspective of the Salinas Valley and is used to determine whether the project represents a justifiable use of resources by creating benefits that exceed the costs.

The economic analysis standardizes project costs developed by the engineering team including all capital expenditures, replacement, and operation and maintenance expenses. It also evaluates economic benefits. Economic benefits for a specific class of users are sometimes referred to as willingness to pay, which is a measure of economic benefit and is not a measure of financial payment capacity. The economic benefits of the project alternatives are all measured relative to a without-project condition called the No Action Alternative. Economic benefits of each project alternative are measured (monetized) through improvements from the No Action condition.

Economic feasibility is determined using different methods that depend on the specifics of the project. Common methods include benefit-cost analysis, net benefits, and cost-effectiveness, where the latter focuses on achieving a specific outcome (e.g., meeting a legal mandate) or level of benefits at the lowest possible cost. The benefit cost ratio and net benefits for each project alternative is calculated.

The economic feasibility analysis follows standard professional practice. In addition, the economic feasibility analysis follows Bureau of Reclamation (Reclamation) grant program guidelines. Reclamation manages the Title XVI Large-Scale Water Recycling Program (WRP) for projects with total costs greater than $500,000. The WRP provides a 25 percent federal cost share with no per-project maximum.

The project would be eligible for funding under the WRP[4] once USBR has informed Congress that the project meets Reclamation guidelines WTR TRMR-128[5], *Large-Scale Water Recycling Program Feasibility Study Review Process* and WTR 11-01[6], *Title XVI Water Reclamation and Reuse Program and Desalination Construction Program Feasibility Study Review Process*. Due to the large federal investment in projects, WTR TRMR-128 requires additional analysis above WTR 11-01. WTR TRMR-128 guidance requires consistency with the Department of the Interior's Agency Specific Procedures[7] (ASP). The ASP provides the policy for conducting water and related land resources implementation studies. The policy follows requirements described in the CEQ Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies[8] (PR&G), CEQ Interagency Guidelines[9], and the ASP Handbook. The PR&G is an update to the Principles and Guidelines (P&G); however, the specific analysis requirements are still defined in the P&G. Even if these specific federal requirements were not applied, the economic feasibility analysis would be similarly defined as a matter of standard economic practice.

## 3.2 Financial Feasibility

Financial feasibility is an analysis that demonstrates that sufficient resources are available to cover all construction and long-term operations and maintenance (O&M) costs of the project

[4] Bureau of Reclamation. (2024). WaterSMART: Large-Scale Water Recycling Projects

[5] Bureau of Reclamation. (2026). Change in Discount Rate for Water Resources Planning

[6] Bureau of Reclamation. (2019). Title XVI Water Reclamation and Reuse Program and Desalination Construction Program Feasibility Study Review Process

[7] Department of the Interior. (2015). Water and Land Related Resources Implementation Studies - Principles, Requirements, and Guidelines, for Water and Land Related Resource Implementation Studies

[8] Council on Environmental Quality. (2013b). Principles and Requirements for Federal Investments in Water Resources

[9] Council on Environmental Quality. (2013a). Interagency Guidelines: Principles and Requirements for Federal Investments in Water Resources

(typically done for the preferred project alternative). It is evaluated separately from economic feasibility and ensures that the project can be paid for, from initial construction to operations. Financial feasibility is determined after a cost allocation step that apportions project costs among parties (e.g., in proportion to project benefits received).

Under Title XVI, WTR TMRM-128 requires the project sponsor to evaluate financial feasibility by indicating that it will have the financial capability to fund the selected project. From WTR 11-02 Title XVI Financial Capability Determination Process[10], "*Funds may not be appropriated for the construction of any project…until after… the Secretary has determined that the non-Federal project sponsor is financially capable of funding the non-Federal share of Project's cost*." An early award does not require as much rigor as an award for construction, but financial capability should be demonstrated across the proposed implementation schedule[11].

This report does not include a full financial feasibility analysis because project alternatives are still being refined and no cost allocation has been established. The financial analysis presents an illustrative cost allocation approach and discusses payment capacity. The economic analysis provides the basis needed to advance the project through subsequent planning, funding, and implementation phases, which would include evaluating cost allocation approaches and financial feasibility.

[10] Bureau of Reclamation. (2012). Title XVI Financial Capability Determination Process

[11] This work relates to another ERA work stream for SVBGSA (funding strategy). ERA Economics may develop a funding plan covering pre-construction through long-term operations. Critical to this task is developing a realistic cost allocation across the beneficiaries.

# 4 No Action Alternative (NAA)

The No Action Alternative (NAA) represents the most likely conditions in the Salinas Valley if no structural project is implemented to address SWI. Under Title XVI, a well-defined NAA must be consistently applied across all project alternatives. USBR guidelines for Title XVI WRP call upon the requirements in the Council on Environmental Quality (CEQ) P&G[12]. The P&G defines six key elements to address in the without-project condition, or NAA, in Section 2.2.3 Planning Setting[10]. A summary of the key elements of the P&G that are applicable to the NAA (without-project condition) for addressing SGMA compliance and SWI in the Salinas Valley is as follows:

- The NAA is the most likely condition expected to exist in the future in the absence of the project. The NAA must be consistent with existing laws and institutions, including any known changes in law or public policy. If violations of existing law are expected to occur without the project, the NAA must include the reasonably likely consequences of the violation. SGMA requires that local GSAs develop and implement plans and PMAs that meet quantified sustainability goals and it gives ultimate enforcement authority to the State.
- Other projects or programs, such as additional water supplies, can be included in the NAA if they are under construction or authorized and likely to be implemented during the period of analysis. No new capital projects are included in the NAA as these would be evaluated as another project alternative.
- Reasonably expected management actions can be included in the NAA, such as conservation measures, upstream watershed management, or modifying existing water development by management actions. This could involve reoperation of the water system, but this option has not been evaluated at this stage of the analysis.

The NAA must reflect outcomes that are legally and institutionally realistic. This means complying with existing law. SGMA requires avoiding URs, including exceedance of the SWI Minimum Threshold (MT). The 180/400-Foot Aquifer GSP[13] defines the MT for SWI as the 2017 extent. An exceedance of the MT would be considered an UR. Persistent URs would not comply with SGMA and would eventually cause DWR to refer the subbasin to the State Board. The State Board may designate the subbasin as probationary and then has broad authority to implement an interim plan where it intervenes in local groundwater management. Specifically,

[12] Water Resources Council. (1983). Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies

[13] Salinas Valley Groundwater Basin 180/400-Foot Aquifer Subbasin 2022 GSP Amendment 1. Approved by Salinas Valley Basin Groundwater Sustainability Agency Board of Directors on September 8, 2022

SGMA provides the State Board with authority to limit pumping and/or mandate a structural solution that would be paid for by groundwater users if the GSA fails to avoid URs[14].

## 4.1 Requirements for the NAA

In the absence of a project the SWI MT is expected to be exceeded. The NAA considers State Board intervention in response to exceeding the SWI MT. New structural solutions are not included in the NAA unless they are already authorized and likely, but management actions are included (e.g., pumping reductions or changes in system operations). Accordingly, the NAA is defined as:

- SWI continues and the MT is exceeded in the absence of a project.
- The State Board designates the basin as probationary and intervenes with management actions.
- In the absence of new capital projects (structural measures), State Board intervention includes administrative fees, pumping limits (location, timing, and magnitude not yet specified), and other non-structural measures to address SWI.
- Because subbasins are hydrologically connected, limits could extend beyond the 180/400-Foot Aquifer Subbasin.

ERA Economics was provided with groundwater modeling prepared by M&A to evaluate the NAA[15]. The modeling evaluates the NAA and several additional analyses that reflect varying levels of demand management (pumping reductions) in the Salinas Valley. The NAA groundwater modeling includes:

- Domestic pumping constrained to an average of 42 gallons per capita per day (gpcd), which is the state target for indoor use.
- Eliminating all agricultural groundwater pumping within the Salinas Valley.
- Eliminating agricultural groundwater pumping in selected areas of the Salinas Valley.

Groundwater model outputs were used by M&A to assess basin response under these conditions, with particular emphasis on comparing the projected 2040 iso-contour lines for SWI to the MT. A baseline (i.e., continued pumping at current levels) scenario was also developed that shows SWI at future conditions with continued pumping. The groundwater modeling shows that it is not possible to meet the MT for SWI by 2040 even under the unrealistic scenario where all agricultural groundwater pumping is eliminated and domestic pumping is limited to the

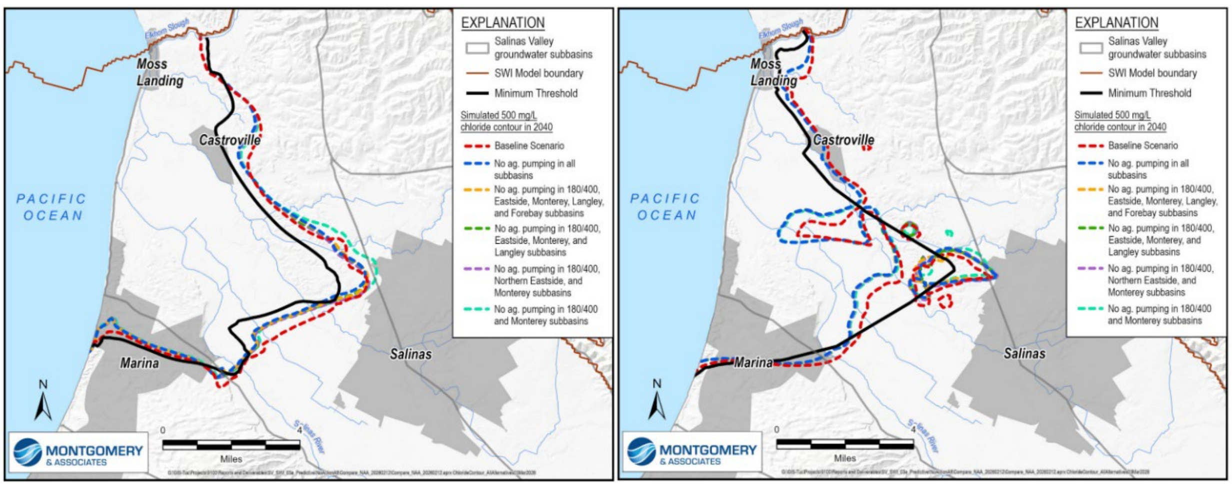
[14] See, for example, the State Board explanation of its authority and considerations for an interim plan: California State Water Resources Control Board (SWRCB). (2023a). Groundwater Sustainability: State Intervention FAQs

[15] M&A Technical Memorandum Groundwater Modeling.

minimum indoor 2030 state standard (42 gpcd), with no new population growth in the Salinas Valley.

Figure 4 illustrates SWI at 2040 showing that even with no agricultural pumping the MT is exceeded. The red dotted line additionally shows the baseline scenario where pumping continues at current rates and the 180 and 400-ft aquifers continue to degrade, with the chloride iso-contour line moving farther inland. The SWI exceeds the MT under the baseline, which would violate SGMA and trigger State Board intervention. The NAA (the dark blue dotted line) shows the seawater intrusion line if agricultural pumping is fully eliminated in the Salinas Valley and domestic pumping is limited to 42 gpcd. This still exceeds the MT.

**Figure 4. 180 and 400-Foot Aquifers Modeled SWI at 2040**




The groundwater modeling shows that pumping reduction alone, even complete cessation, cannot meet the SWI MT. If the SWI MT is viewed as a legally mandated condition that cannot be altered or delayed, then a structural solution would be necessary, which violates the definition of an NAA. Further, a NAA that assumes that all agricultural groundwater pumping is cut off in the 180/400-Foot Aquifer and other Subbasins in the Salinas Valley does not appear to be politically plausible and certainly violates any notion of an economically sustainable solution.

A NAA that assumes complete cessation of pumping would substantially overestimate the economic benefits of the BGRP and is not helpful for planning purposes, consistent with standard practice for feasibility studies, or consistent with Title XVI guidelines.

### 4.2 The Project NAA

A NAA that meets the MT by 2040 and yet implements only non-structural solutions to meet the SWI MT was developed. Two approaches to define the NAA were considered:

- Do not define and evaluate a specific level of pumping reductions in the NAA. The current groundwater modeling shows that it is not possible to achieve the currently specified MT by the statutory mandated time (2040) through pumping reductions only. If we assume that the current MT must be met by 2040, it appears that only structural alternatives can meet that legal requirement, so the economic feasibility analysis reduces to testing whether the BGRP or AWSP is the lowest cost feasible structural alternative that achieves the MT by 2040.

- Assume that the State Board would implement unspecified pumping reductions to achieve a reduction in the SWI area recognizing that that area may exceed the currently defined 2040 MT. Since the location and magnitude of pumping reductions are not known at this time with the available groundwater modeling, this approach would evaluate a range of pumping cuts, potentially up to full cessation of pumping, and calculate the economic costs of each level of cuts. Once the economic cost of the cuts exceeds the cost of the BGRP or AWSP (or other structural alternative), any NAA that meets or exceeds that level of cuts is economically inferior to the structural alternative.

Both approaches were considered. Approach 2 was selected because it monetizes the avoided costs of a NAA with management actions but no structural projects. These avoided costs are the economic benefits of implementing the project or other structural alternatives. In addition, the approach is more consistent with how the NAA for other PMAs should be defined to support a project planning process.

The following analysis steps were applied to evaluate the NAA, monetize economic benefits, and prepare a benefit-cost analysis for the AWSP and BGRP project alternatives:

- Calculate the lifecycle cost of the project alternatives
- Define NAA with incremental reductions in groundwater pumping for SVBGSA subbasins and monetize economic benefits including the avoided cost of:
    - Domestic water user costs to reduce use to 42 gpcd
    - State Board intervention administrative costs
    - State Board pumping restrictions that result in agricultural land fallowing

In summary, the economic analysis establishes the State Board pumping restrictions that would be needed to justify the economic cost of the project. This approach establishes the required economic benefits to deem the project economically feasible.

# 5 Economic Analysis

The economic analysis evaluates whether each project alternative represents an efficient use of resources for the Salinas Valley. This involves monetizing economic benefits and comparing them to project costs. The economic analysis evaluated economic benefits as well as other economic effects and regional economic effects. These are separate components summarized as follows:

- **Economic benefits**. This is the increase in economic value to society that occurs because the project is implemented, measured relative to the NAA. Economic benefits are defined as the avoided costs, avoided damages, or increased productivity that result from the project compared to what would otherwise occur under the NAA. The economic benefits include the avoided cost of:
    - Domestic water shortage costs
    - State Board administrative costs
    - Agricultural land fallowing (State Board pumping reductions)
- **Other economic effects**. These are other monetizable economic values generated by the project, but they are measured relative to baseline conditions of continued pumping at current levels. Therefore, these other economic effects are not economic benefits of the project. However, as the project is refined, and additional data is developed, these other economic effects may become important project economic benefits. These additional economic effects of the project include the avoided cost of:
    - Water quality impacts (crop yield losses) to agriculture
    - Water quality impacts to domestic water users
    - Well deepening and replacement costs
    - CSIP improvements
    - Additional pumping lift and energy costs
- **Regional economic effects**. These describe how changes in economic activity caused by the project ripple through the regional economy, affecting jobs, income, output, and business activity. These effects measure distributional changes in gross economic activity, not the net economic value of the project, and are not a measure of project benefits. Regional economic effects include changes in:
    - Jobs
    - Output value
    - Value added
    - Income

The project may provide other intangible (i.e., currently non-monetized) economic benefits. This includes improved water supply reliability by developing a stable, drought-resistant supply for the region, benefits for broader water resources system conjunctive operations, and environmental benefits.

Table 8 summarizes project economic benefits, other effects, and regional effects that were considered, whether each was included as a project benefit, and whether each was monetized. It is anticipated that the economic analysis of the project alternatives will be refined as additional information is developed and the alternatives and configuration are refined.

**Table 8. Project Economic Benefits, Economic Effects, and Regional Effects Summary**

| Component | Component | Evaluation | Monetized |
|---|---|---|---|
| Economic Benefits | Domestic water shortage costs | Avoided costs benefit relative to NAA | Yes |
| | State Board administrative costs | Avoided costs benefit relative to NAA | Yes |
| | Agricultural land fallowing | Avoided costs benefit relative to NAA | Yes |
| Other Economic Effects | Agricultural water quality | Economic effect relative to baseline | Yes |
| | Domestic water quality | Economic effect relative to baseline | No |
| | Well deepening and replacement | Economic effect relative to baseline | No |
| | CSIP improvements | Economic effect relative to baseline | Qualitative overview |
| | Pumping lift / groundwater levels | Economic effect relative to baseline | Yes |
| Regional Economic Effects | Regional effects | Distributional effects | Yes |
| Other Qualitative Factors | Water supply reliability | Potential benefit | Qualitative overview |
| | Deep aquifers | Potential benefit | Qualitative overview |
| | System operations | Potential benefit | Qualitative overview |
| | Environment | Potential benefit | Qualitative overview |

## 5.1 Methods

The analytical approach uses several economic models that represent current agricultural production, domestic water use, and the regional economy. These models respond to physical and economic changes estimated to occur under the NAA and alternatives, translating those changes into monetized benefits, evaluating other economic effects, and quantifying regional economic effects. The methodology follows a standard approach that links the modeling of economic benefits (and other economic effects) to changes in the regional economy.

The economic analysis includes agricultural domestic water supply benefits. The agricultural economic model is summarized below and described further in Appendix A. The urban economic model is summarized below and is also described further in Appendix A.

**Agricultural economic benefits**. The analysis applies market data and crop production budgets developed using published sources and validated through grower and other industry expert interviews and outreach. These data are applied to an agricultural production and economic optimization model of Salinas Valley agriculture, which is used to estimate the effects of groundwater conditions and management policies under the NAA and project alternatives. It shares similar structure, economic methods and assumptions, and calibration approach with other agricultural economic models that are widely applied for Reclamation feasibility studies in California[16]. The agricultural economic model applies ERA's calibration methodology and replicates observed cropping (by season, crop, and farm), water use, and costs given the crop market conditions, water quality, and other economic conditions. A calibrated economic model is a widely-used practice for this type of integrated analysis. Calibrated agricultural economic models are integrated with biophysical models representing land, water (e.g., SVIHM, SWIM, SVOM, crop-yield salinity response), and environmental constraints, allowing economic responses to be evaluated in response to changing physical conditions that represent the NAA and project alternatives. The calibrated economic model is grounded in local farm budgets (costs and returns) and therefore reflects the returns to farming for different crops, rotation systems, regions, and market conditions in the Salinas Valley. Appendix A provides additional information.

The economic analysis operates at a detailed spatial resolution with geospatial crop production data for calibration, regional groundwater supplies, and water quality (salinity). The economic analysis evaluates the direct response of agriculture (growers) to changes in groundwater availability, quality, and cost under the NAA and project alternatives. Responses can include a combination of adjustments in crop mix, changes in water use, and land fallowing. The agricultural economic model links directly to SVOM and SVIHM modeling outputs and incorporates Subbasin-specific crop groups, prices, costs, yields, and water requirements.

The economic benefit of a project alternative is measured as the change in appropriately defined net farm income between the NAA and the alternative. As explained under the No Action Alternative section, the model is applied to evaluate incremental increases in pumping restrictions to establish the range of economic benefits of the project. Aggregate changes in net farm income, gross farm revenue, groundwater pumping, and acreage are summarized in this

[16] See, for example, Sites Reservoir Feasibility Study (North of the Delta Offstream Storage) and various projects under the state Water Storage Investment Program.

report. The model reports acreage, production, and price by season as well as pumping by aquifer.

The economic analysis takes inputs from the SVIHM and SWIM—such as changes in SWI extent, salinity levels, groundwater elevations, and pumping lifts. These are grounded in the same calibration and data in the agricultural economic model to evaluate impacts on yield, input costs, acreage and production by season, and measures of gross and net economic value. For example, higher salinity reduces crop productivity through crop-specific yield response functions, while declining groundwater levels increase pumping energy costs. In turn, planted and harvested acreage changes and crop prices adjust, with impacts that vary by season. The agricultural analysis evaluates both short-term adjustments (such as changes in crop mix) and longer-term responses (including land fallowing), allowing the analysis to quantify the economic consequences of reduced groundwater pumping and declining groundwater quality under the NAA. Appendix A provides additional technical details and discussion regarding how this approach is equivalent (or superior) to farm budget accounting, land values, lease rates, and water market prices.

**Domestic economic benefits**. A separate economic model is calibrated to domestic water use data for the Salinas Valley. An economic demand function for domestic water is calibrated for each GSA/district. The economic demand function represents how households and businesses adjust water use as availability declines due to pumping restrictions. It estimates how those changes translate into economic losses measured as changes in consumer surplus—the economic value customers receive from water above what they pay for it. The domestic water supply benefits of a project alternative are the avoided consumer losses. Domestic water purveyors may also suffer losses due to restricted pumping, measured as the change in water sales revenue less variable costs to produce the water. Such potential losses depend on the purveyor's cost structure and pricing policies and are not estimated in this analysis, but could be evaluated in the future.

**Regional economic analysis**. Regional economic effects measure how changes in agricultural production and water availability affect the broader regional economy. These effects are evaluated using an input–output modeling framework to estimate changes in economic activity associated with the project relative to the NAA. The analysis quantifies regional effects of the NAA – no regional effects (either positive or negative) are included that may result from the spending to implement a project alternative or from water user payments needed to repay project costs.

Regional effects are estimated using the IMPLAN input-output modeling system, which estimates spending relationships among industries, households, and institutions within Monterey County. IMPLAN quantifies how changes in direct economic activity—such as agricultural production and farm income—propagate through the regional economy through supply-chain purchases and household spending (so called indirect and induced effects). The model is described further in Appendix B.

The economic models and data were applied to evaluate the NAA and project alternatives using the following sequence of steps:

- Economic benefits
    - Domestic economic benefits were calculated as the shortage cost to reduce use from current levels to 42 gpcd.
    - Agricultural economic benefits for avoided land fallowing were evaluated by incrementally increasing State Board pumping reductions until the avoided cost of fallowing was greater than the cost of the project. As pumping reductions become more stringent, the marginal economic cost increases through a combination of higher production value affected, increased operational constraints, and land transitioning out of irrigated use. The analysis started at a 10 percent reduction in pumping and ran up to 50 a percent reduction. Pumping reductions were applied across the entire Salinas Valley. The economic benefits are sufficient to justify project alternative costs at about the 30 percent pumping reduction. As pumping reductions increase, benefits exceed project alternative costs by wider margins. A range of 30 percent to 50 percent pumping reductions are shown in the numerical results below.
        - Economic benefits are calculated as the avoided cost of agricultural land fallowing. This is measured as the net return to farming.
    - Avoided State Board intervention costs were calculated by applying the State Board administrative fees to the level of pumping that would result under the 30 or 50 percent pumping reductions.
- Other economic effects were evaluated as follows.
    - Salinity impacts. Effects on agricultural production were evaluated using crop salinity yield response functions applied to the economic data and modeling framework. The average groundwater salinity, measured as chloride concentration, was obtained from the SVOM results, translated to total dissolved solids and electrical conductivity, and mapped to individual fields. The economic loss in yield was calculated based on the difference between the baseline yield (pumping of saline water continues at current levels) and with-project conditions for each alternative (groundwater salinity is improved).
    - Groundwater level impacts. Changes in groundwater levels for each project alternative were calculated relative to baseline conditions (pumping continues at current levels). The changes in pumping lifts from the groundwater modeling were used to calculate the changes in energy pumping cost and applied to all pumping within the area where levels are affected by the project alternatives.

- Other economic effects were qualitatively described including avoided system replacement costs, avoided well deepening costs, and other unquantified effects.

These results inform the economic feasibility determination by identifying the level of pumping reductions for which the present value of avoided economic losses is sufficient to justify the lifecycle costs of the project. The range of pumping reductions evaluated for the NAA went as high as 50 percent, though groundwater modeling indicates that no amount or distribution of pumping reduction, even exceeding 50 percent, cannot achieve the equivalent salinity improvement as the project alternatives.

## 5.2 Project Economic Benefits

Economic benefits evaluated in this analysis include avoided agricultural production losses resulting from pumping restrictions, avoided domestic water shortage costs, and avoided regulatory and administrative costs associated with State Board intervention. The following subsections describe the results of the analysis for each category, beginning with the agricultural water supply impacts.

### 5.2.1 Avoided Cost of Pumping Reductions

The specific actions that the State Board might take if one or more subbasins are placed on probation are not known at this time. This includes the timing, location, and magnitude of potential pumping restrictions. Pumping reductions were applied uniformly over the entire Salinas Valley, increasing to a 50 percent cut. Scenarios for 30 and 50 percent pumping cuts are summarized.

Table 9 summarizes current agricultural water supply by subbasin and aquifer under current conditions, as well as the two NAA scenarios showing 30 and 50 percent pumping cuts. Current applied water demand is around 465 TAF per year, which includes groundwater pumping and surface/recycled water supplies. Values are based on historical 2020-2024 average water use data. Use varies over time.

**Table 9. Current Agricultural Water Supply and Supply under 30 and 50 Percent Cut Scenarios**

| Subbasin | Current Supply | NAA Water Supply with 30% Pumping Cut | NAA Water Supply with 50% Pumping Cut |
|---|---|---|---|
| 180/400-Foot | 112,879 | 82,471 | 64,611 |
| Eastside | 81,401 | 55,759 | 40,700 |
| Forebay | 140,314 | 99,224 | 75,092 |
| Langley | 3,399 | 2,328 | 1,699 |
| Monterey | 370 | 253 | 185 |
| Upper Valley | 126,994 | 86,991 | 63,497 |
| **Total (AF/Year)** | **465,356** | **327,027** | **245,785** |

Note: Data sources include both DWR applied water data[17] and MCWRA GEMS annual extraction reports to approximate current applied water that includes groundwater pumping, surface water, and recycle water supplies. Totals may not add up due to rounding. Some areas have additional supplies that partially offset the 30 or 50 percent groundwater pumping cut (e.g., CSIP).

The economic analysis evaluates how production responds to the 30 and 50 percent State Board pumping cuts. For small reductions in groundwater pumping, growers can respond with limited adjustments and technology on farm to reduce applied water. However, cuts of 30 percent or more result in substantial land fallowing.

Table 10 summarizes the current irrigated acreage by crop and irrigated acreage under the 30 and 50 percent cut in agricultural pumping. Total fallowing equals 102,200 acres under the 30 percent scenario and 154,200 acres under the 50 percent agricultural groundwater pumping cut scenario. Acreage shows total harvest acreage, including multiple crops per year. If State Board cuts were targeted to specific subbasins, or aquifers, the scale and location of fallow acreage would change.

**Table 10. Current, 30 Percent Cut, and 50 Percent Cut Irrigated Acreage**

| Crop Group | Current Acreage | 30% Agricultural Cut Change in Acreage | 50% Agricultural Cut Change in Acreage |
|---|---|---|---|
| **Broccoli** | 63,800 | -15,900 | -24,900 |
| **Cauliflower** | 24,100 | -4,700 | -6,200 |
| **Other Vegetables** | 25,100 | -8,800 | -10,400 |
| **Strawberries** | 15,700 | -2,100 | -2,700 |
| **Head Lettuce** | 57,200 | -20,200 | -30,400 |
| **Leaf Lettuce** | 88,600 | -24,200 | -36,300 |
| **Field Crops** | 9,600 | -9400 | -9400 |
| **Orchards** | 2,600 | -500 | -600 |
| **Vineyards** | 46,900 | -16,400 | -33,300 |
| **Total (Acres)** | **333,600** | **-102,200** | **-154,200** |

[17] https://water.ca.gov/Programs/Water-Use-And-Efficiency/Land-And-Water-Use/Agricultural-Land-And-Water-Use-Estimates

Underlying the fallow acreages are changes in the timing and location of crops produced as well as market effects (crop prices changes) in response to extensive land fallowing. Table 11 summarizes the estimated net income loss for the 30 and 50 percent pumping cuts by subbasin including the change in crop prices in response to changing supply. Pumping cuts are evaluated as the short-run response by growers and net income reflects the return to management, risk, overhead, and capital. As pumping reductions increase, growers respond by shifting toward less water-intensive crops, reducing planted acreage, or fallowing land where irrigation becomes uneconomic. These adjustments reduce overall agricultural output and net farm income across the Salinas Valley. Annual losses are $171 and $320 million for 30 and 50 percent pumping cuts.

**Table 11. Annual Net Revenue Loss Under 30 Percent and 50 Percent Cuts ($ Millions)**

| Subbasin | Current Net Revenue | 30% Cut Change in Net Revenue | 50% Cut Change in Net Revenue |
|---|---|---|---|
| **180/400-Foot** | $288 | -$31 | -$68 |
| **Eastside** | $189 | -$26 | -$54 |
| **Forebay** | $301 | -$60 | -$103 |
| **Langley** | $6.7 | $0.2 | -$1.2 |
| **Monterey** | $1.0 | -$0.2 | -$0.4 |
| **Upper Valley** | $243 | -$54 | -$94 |
| **Total** | **$1,028** | **-$171** | **-$320** |
| **Present Value (Millions)** | | **$3,798** | **$7,017** |

A reduction of approximately 30 to 50 percent in agricultural pumping decreases annual agricultural water use from roughly 465 thousand acre-feet (TAF) to approximately 327 TAF under a 30 percent cut and 245 TAF under a 50 percent cut. This results in 102,200 to 154,200 acres fallow and $171 million to $320 million annual loss in net farm revenue. The project alternatives avoid these NAA economic losses. These avoided costs are the economic benefits of the project alternatives.

Evaluated over the economic life of the project the present value of the avoided cost under the 30 percent cut is $3.8 billion and the present value under the 50 percent cut is approximately $7 billion.

### 5.2.2 Domestic Water Demand

The economic analysis evaluates the cost of reducing water use to 42 gallons per capita per day (gpcd), the state target for indoor use, consistent with the NAA groundwater modeling developed by M&A. This is measured as the change in consumer surplus, which is the economic value households receive from water consumption above what they pay for it. These are avoided costs (benefits) attributable to the project alternatives.

The analysis applied current domestic water use for each major community/purveyor in the Salinas Valley. Current per-capita water use and water price information were applied. Projected future population levels were applied at current gpcd to estimate baseline water demand. Domestic water use was then reduced to 42 gpcd.

Table 12 summarizes the results of this analysis by region. Total consumer surplus (CS) losses equal $35.42 million annually. The table reports baseline municipal water use, water use at 42 gpcd as modeled by M&A, the resulting supply shortfall, and the estimated annual consumer surplus loss associated with the shortage. The results show that significant economic costs would occur across multiple communities if municipal pumping were restricted to this level (42 gpcd). The analysis did not evaluate large industrial water users (e.g., vegetable wash/processing) cuts.

**Table 12. Annual Domestic Shortage Costs**

| City | Domestic Water Use (AF/yr) | 42 gpcd Estimate (AF/yr) | State Board Cut (AF/yr) | Consumer Surplus Loss ($ Millions) |
|---|---|---|---|---|
| Salinas | 19,497 | 7,674 | 11,822 | $27.64 |
| Soledad | 3,313 | 1,231 | 2,082 | $1.32 |
| Marina | 2,964 | 1,556 | 1,408 | $2.67 |
| Greenfield | 2,197 | 1,014 | 1,183 | $0.91 |
| Prunedale | 571 | 253 | 319 | $0.79 |
| King City | 1,601 | 708 | 893 | $1.01 |
| Gonzales | 1,217 | 544 | 673 | $0.63 |
| Castroville | 717 | 317 | 400 | $0.19 |
| All other | 320 | 146 | 174 | $0.26 |
| **Total** | **32,397** | **13,443** | **18,954** | **$35.42** |
| **Present Value (Millions)** | | | | **$787** |

The present value of the annual avoided domestic consumer losses attributable to the project alternatives equals $787 million.

### 5.2.3 State Board Administrative Costs

State Board intervention would impose administrative costs on water users in the Salinas Valley. The administrative requirements include mandatory extraction reporting, well metering, data management, and oversight fees intended to cover the administrative costs associated with managing the basin under an interim plan. In addition to increased regulatory oversight, local agencies and groundwater users would incur ongoing costs associated with compliance, reporting, and coordination with the State Board.

The economic analysis considers the annual administrative expenses for State Board intervention. Additional costs for reporting and compliance (e.g., owner/operator time and paperwork as well as technology for reporting) are not evaluated in this analysis. State Board intervention follows a structured process:

- Triggering Conditions
  - No GSA established or GSP prepared by statutory deadlines.
  - GSP found inadequate or not implemented effectively.
  - Basin in critical overdraft or significant surface water depletion.
- Probationary Designation
  - State Board issues notice and conducts a public hearing.
  - If deficiencies remain, the basin is designated “probationary.”
  - Groundwater extractors must install meters, report pumping, and pay fees (currently $300 per well plus $40 per acre-foot).
- Requirements During Probation
  - Mandatory extraction reporting and metering.
  - Fees assessed to cover state oversight and data collection.
  - De minimis users (≤2 AF/year for domestic use) may be exempt.
- Interim Plan
  - If deficiencies persist, the State Board adopts an interim plan with enforceable measures: pumping limits, monitoring, and compliance actions to reduce overdraft.

Probation effectively shifts management from local agencies to the State, limiting local flexibility and increasing regulatory and financial burdens. Average annual pumping volumes and the number of active wells within each subbasin were summarized. Table 13 summarizes the estimated annual administrative costs by subbasin at current pumping volumes and estimated number of wells. This equals approximately $18.8 million per year across the Salinas Valley.

**Table 13. Annual State Board Administrative Costs**

| Subbasin | Approximate Avg. Annual Pumping Acre-feet (AF) | Approximate Number of Wells | State Board Intervention Administrative Cost ($M /year) |
|---|---|---|---|
| Upper Valley | 127,600 | 385 | $5.22 |
| Forebay | 124,200 | 511 | $5.12 |
| Eastside | 88,400 | 396 | $3.65 |
| 180/400-Foot | 109,100 | 563 | $4.53 |
| Monterey | 4,500 | 19 | $0.18 |
| Langley | 1,500 | 14 | $0.064 |
| **Total** | 455,300 | 1,888 | **$18.79** |

Note: Pumping volumes are average of 2020-2024 quantities rounded to nearest 100 AF and include agricultural and industrial urban extraction from MCWRA (2025), MCWDGSA and SVBGSA (2025), and M&A (2025). Number of wells from MCWRA

(2025) and SVBGSA (2025) Web Viewer for Monterey and Langley Subbasins and only those in MCWRA's current Groundwater Monitoring Program.

The avoided cost of State Board intervention does not include the full administrative cost. Under future conditions (the NAA), pumping would be curtailed to partially address SWI. Section 5.1 shows pumping limits at 30 percent and 50 percent levels. Table 14 summarizes the economic benefits of avoiding State Board administrative costs when pumping is reduced by 30 percent or 50 percent. This equals $13.31 million (30 percent cut) to $9.67 million (50 percent cut) annually. The costs are greater under the 30 percent cut because fees are assessed per acre foot pumped (and per well) and are thus higher if more water is pumped.

**Table 14. State Board Avoided Administrative Costs Economic Benefit**

| Subbasin | State Board Intervention Administrative Cost ($M/year) 30% Agricultural Pumping Cut | State Board Intervention Administrative Cost ($M/year) 50% Agricultural Pumping Cut |
|---|---|---|
| Upper Valley | $3.69 | $2.67 |
| Forebay | $3.63 | $2.64 |
| Eastside | $2.59 | $1.89 |
| 180/400-Foot | $3.22 | $2.35 |
| Monterey | $0.13 | $0.095 |
| Langley | $0.046 | $0.034 |
| **Total** | **$13.31** | **$9.67** |
| **Present Value** | **$295** | **$215** |

The PV of the annual avoided cost equals $295 million for the 30% cut and $215 million for the 50% cut. The 30% cut results in a higher PV cost due to the remaining agricultural pumping being greater than the remaining agricultural pumping in the 50% agricultural pumping cut.

### 5.2.4 Project Economic Benefits Summary

Table 15 summarizes the results of the analysis of economic benefits (avoided costs) attributable to the project alternatives. The annual and present value of each benefit is shown under the 30 percent and 50 percent pumping reduction. The total annualized benefit is between $220 million and $365 million. The present value is between $4.88 billion and $8.11 billion. This does not include other economic effects attributable to the project alternative (summarized in the subsequent section). The benefits are the same for both project alternatives (BGRP and AWSP) because both alternatives provide the same outcome for managing seawater intrusion and preventing State Board intervention.

**Table 15. Summary of Present Value Scenario Benefits at 30% or 50% Pumping Reduction**

| PV Benefit (Avoided Cost) | 30% Cut | 50% Cut |
|---|---|---|
| Agricultural Water Supply ($ Millions) | $3,798 | $7,017 |
| Municipal Water Supply ($ Millions) | $787 | $787 |
| State Board Fees ($ Millions) | $295 | $215 |
| Total Present Value (PV) ($ Millions) | $4,880 | $8,108 |
| Total Annualized Benefits ($ Millions) | $220 | $365 |

### 5.3 Project Economic Costs

Lifecycle economic costs were calculated for each project alternative. This includes all construction, operating and maintenance, and replacement costs over the economic life of the project. The present value analysis for the project alternatives applies federal feasibility guidelines and the following parameters:

- All economic costs are in 2025 dollars
- 2026 federal discount rate of 3.25 percent for water resources planning[18]
- Construction occurs from 2027 through 2035 and the project is operational in 2035
- A 40-year operational horizon extending to 2075
- All capital costs incorporate a 30 percent construction contingency, Monterey County's 7.75 percent sales tax applied to 50 percent of taxable components, and interest during construction.
- Planning, construction management, and construction costs are escalated to midpoint of construction[19].

The present value of annual project costs includes the sum of the construction costs, interest during construction, and the discounted annual operations, maintenance, and replacement costs occurring from 2035–2075. The following sections present the standardized costs for the BGRP and AWSP alternatives.

#### 5.3.1 Brackish Groundwater Restoration Project (BGRP) Injection Only Project Alternative

SVBGSA evaluated multiple configurations (scenarios) of the BGRP that each combine a coastal extraction barrier, brackish groundwater desalination, and inland injection to halt and reverse seawater intrusion while creating a drought-resilient regional supply. The BGRP Feasibility

[18] https://www.federalregister.gov/documents/2026/01/27/2026-01591/change-in-discount-rate-for-water-resources-planning

[19] The project cost estimates provided by Carollo and M&A to ERA Economics included an "inflation during construction" of 0.25% per month. This was approximately equal to estimated interest during construction using the 2026 federal discount rate of 3.25% and as such were applied to the analysis.

Study Phase 1 Report developed and compared multiple configurations—Small, Medium, Large, and several other configurations—to understand performance, infrastructure needs, and order-of-magnitude costs. Each configuration pairs coastal extraction wells and reverse osmosis treatment with varying mixes of direct deliveries and/or inland injection; all scenarios slowed or reversed intrusion. SVBGSA identified the Injection-Only Scenario (all treated water is reinjected inland) as the scenario to carry forward as a project alternative in the economic and financial analysis. Groundwater modeling shows that the BGRP meets SWI MT within roughly ten years of operation.

Table 16 summarizes the economic cost analysis. The present value of project costs is estimated at $3.46 billion, with an annualized cost of $155.7 million. BGRP replacement costs equal $13.2 million after 20 years of operation, with a total useful life of 40 years. The annualized economic cost per AF is $3,321 per AF of injected water[20].

**Table 16. BGRP Alternative Construction and Annual Cost Summary**

| Cost Category ($ Millions, in 2025 Dollars) | BGRP |
|---|---|
| Construction Cost | $812 |
| Pre-Construction Soft Costs | $138 |
| **Total Construction Cost** | $951 |
| Replacement Costs at 20 years | $13 |
| Annual O&M | $112 |
| **Present Value Total Cost** | $3,459 |
| Annualized Cost | $155 |
| Annual Yield (Acre-feet) | 46,900 |
| **$/Acre-Foot Cost** | **$3,321** |

### 5.3.2 Alternative Water Supply (AWS) Project

The Alternative Water Supply (AWS) project is designed as functionally equivalent to the BGRP. It would meet the SWI MT by 2040. Instead of relying on a coastal extraction barrier, the AWSP approach builds an inland injection barrier, supplied by four alternative water sources: Permit 11043 Salinas River water, treated agricultural tile drain flows, treated industrial wastewater from Salinas, and excess flows passing the Salinas River Diversion Facility. Together, these sources provide an estimated 44,000 AFY for injection, comparable to the BGRP water supply capacity.

To supplement injection, the AWSP includes optional demand-management strategies, including permanent land fallowing and municipal well pumping redistribution. Land fallowing was modeled as a 40% reduction in evapotranspiration (ET) within a defined area, reducing pumping

[20] It should be noted that the cost per AF of injected water does not directly correspond to useable irrigation (or domestic) water from the project. The project protects and improves the usability of a much larger volume of groundwater. For example, under the NAA it avoids the reduction of at least 138,000 AF of pumping under the NAA, implying a cost of $1,125 per AF of avoided cut.

by roughly 31,500 AFY. However, modeling shows that this reduction in ET provides only minor additional benefit by 2040 because groundwater level recovery in seawater-intruded areas occurs slowly. Similarly, the redistribution of municipal pumping—shifting roughly 5,000 AFY away from wells located near the intrusion front—had an insignificant effect on mitigating seawater intrusion by 2040[21].

Table 17 summarizes the AWSP alternative costs with total supply of about 44,000 AF per year. AWSP replacement costs equal $49 million after 20 years of operation with a total useful life of 40 years applied for this analysis. The economic cost analysis does not include the costs of fallowing (reduced ET) or municipal redistribution. The present value of project costs is $5.7 billion, with an annualized cost of $258 million. The annualized per AF economic cost is $5,836 per AF of injected water.

**Table 17. AWSP Alternative Construction and Annual Cost Summary**

| Cost Category ($ Millions, in 2025 Dollars) | AWS |
|---|---|
| Construction Cost | $3,288 |
| Pre-Construction Soft Costs | $559 |
| **Total Construction Cost** | $3,847 |
| Replacement Costs at 20 years | $49 |
| Annual O&M | $83 |
| **Present Value Total Cost** | $5,730 |
| Annualized Cost | $258 |
| Annual Yield (Acre-feet) | 44,208 |
| **$/Acre-Foot Cost** | **$5,836** |

### 5.4 Benefit–Cost Analysis

The monetized project benefits and costs were applied to calculate the benefit-cost ratio for the BGRP and AWSP alternatives. The benefit cost ratio divides the present value of project benefits by the present value of project costs. A benefit cost ratio of 1 indicates benefits exceed costs. The net present value (NPV) of project benefits is also reported.

Table 18 summarizes the BGRP and AWSP benefit-cost analysis. The BGRP annualized cost equals $155.7 million and the present value of those costs equals $3.46 billion. The annualized BGRP economic benefits are between $4.88 billion and $8.11 billion under the 30 and 50 percent cut scenarios. The BGRP benefit-cost ratio is between 1.41 and 2.34 with NPV benefits of $1.4 to $4.6 billion. The AWSP annual cost equals $258 million and the present value of those costs equals $5.7 billion. The annualized AWSP economic benefits are between $4.88 billion and $8.11 billion under the 30 and 50 percent cut scenarios. The AWSP benefit-cost ratio is between 0.85 and 1.42 with NPV benefits of ($0.85 billion) to $2.4 billion.

[21] Montgomery & Associates. (2026). Alternative Water Supply Project Concept. Prepared for Salinas Valley Basin Groundwater Sustainability Agency.

**Table 18. Summary of Project Evaluation**

| Item | BGRP | AWS |
|---|---|---|
| PV Cost | $3,459M | $5,730M |
| **30% Agricultural Cut, 42 gpcd domestic, SWRCB Fees** | | |
| PV Benefit | $4,880M | $4,880M |
| B/C Ratio | 1.41 | 0.85 |
| Net Present Value | $1,420M | -$850M |
| **50% Agricultural Cut, 42 gpcd domestic, SWRCB Fees** | | |
| PV Benefit | $8,108M | $8,108M |
| B/C Ratio | 2.34 | 1.42 |
| Net Present Value | $4,650M | $2,378M |
| **B/C Ratio Range** | **1.41 - 2.34** | **0.85 – 1.42** |

In comparison to the BGRP alternative, the AWSP alternative also provides a long-term solution to SWI but at a higher cost. Annual operating costs of the AWSP alternative are slightly less than the BGRP, but the present value of AWSP costs are greater than the BGRP due to higher capital and replacement costs. The BGRP includes extraction wells, treatment, and groundwater injection infrastructure designed to reduce SWI, increase groundwater levels, and provide a reliable supplemental regional water supply. The per acre-foot cost is around $3,321 for the BGRP, which is considerably less than the $5,836 per acre-foot cost of the AWS. The benefit-cost ratio of the BGRP is greater than the AWS.

The benefit-cost ratio reflects the NAA assumptions described in the report, which includes State Board intervention through management actions (pumping restrictions). The State Board could restrict pumping even more than the 50 percent level shown in this analysis, in which case the avoided costs would rise significantly above the values reported. This would increase benefits and the benefit-cost ratio of the project alternatives.

# 6 Other Economic Effects

The project would result in additional economic effects. These other economic effects are not included as project benefits because groundwater modeling and supporting data for these effects under the NAA condition were not available at this time. The other economic effects were instead evaluated relative to the baseline condition that assumed continued pumping by agriculture and domestic water users even though this continued pumping would violate the MT for SWI.

Other economic effects are evaluated by comparing the project alternatives to the baseline at 2040 and 2070 conditions. Economic effects considered include:

- Improvements in water quality
- Increased groundwater levels leading to reduced pumping costs
- Avoided CSIP improvements and well replacement costs
- Other economic effects

The following sections summarize the other effects and economic analysis.

## 6.1 Water Quality Improvements Relative to Baseline Continued Pumping

Both BGRP and AWSP alternatives provide substantial long-term improvements to groundwater quality in the Salinas Valley. Under future baseline conditions (continued pumping), seawater intrusion continues progressing inland, elevating chloride concentrations in the 180- and 400-foot aquifers and intensifying salinity-related impacts to both agriculture and domestic users. Both BGRP and AWSP halt the 500mg/l iso-contour line in 2040 and reverse the migration by 2070 in the 180-foot aquifer.

Figure 5 shows that the BGRP adequately maintains the 500 mg/l iso-contour line at the minimum threshold for the 180-foot aquifer at 2040 – 2070 conditions.

**Figure 5. Project Alternatives 180 Foot Aquifer 500 mg/l Chloride Line 2040 – 2070**

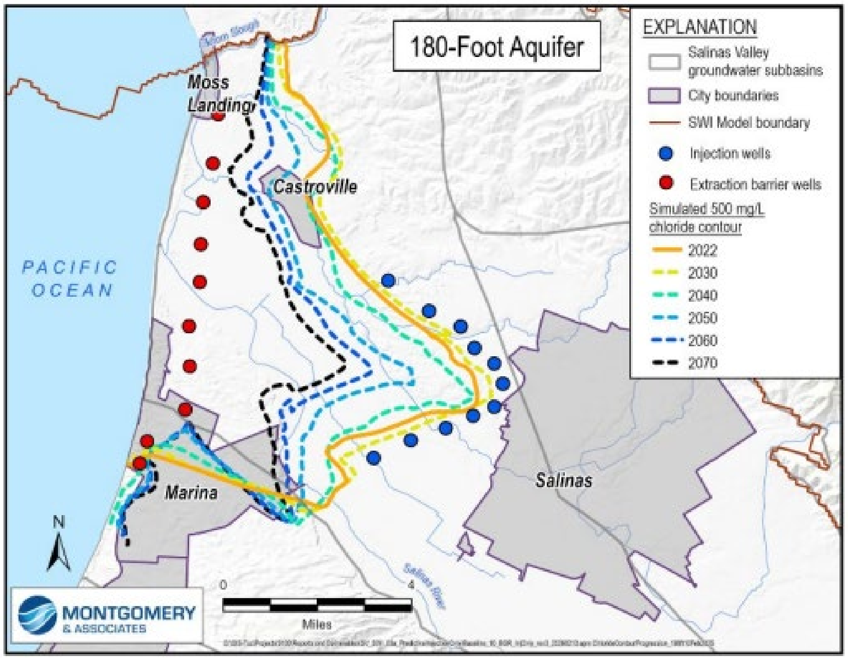
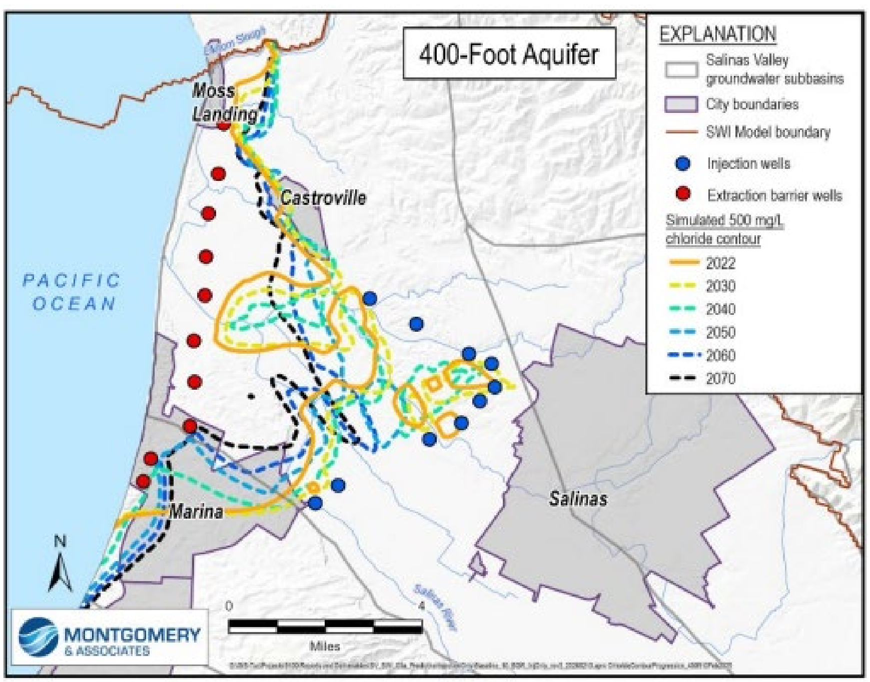



Figure 6 illustrates the 500 mg/l iso-contour line for the BGRP alternative for the 400-foot aquifer. The contour lines are shown at 2040 - 2070 conditions for the 400-Ft aquifer. In the absence of a project the baseline conditions show continued inland migration of salinity. Both BGRP and AWSP halt the 500mg/l iso-contour line in 2040 and reverse the migration by 2070 in the 400-foot aquifer.

**Figure 6. Project Alternatives 400 Foot Aquifer 500 mg/l Chloride Line 2040 - 2070**



BGRP provides substantial seaward movement of the 500 mg/L chloride line by 2070 in both the 180- and 400-foot aquifers. BGRP is more effective than the AWSP alternative in reducing chloride concentrations and improving long-term water quality conditions. The AWSP relies solely on injection of treated water with no extraction wells, limiting the project's ability to reduce chloride concentrations relative to the BGRP. For both alternatives these improvements translate into crop productivity effects for salt-sensitive crops (e.g., lettuce and strawberries).

Salinity impacts to agricultural production would be within the Castroville Seawater Intrusion Project (CSIP) as well as areas that overlay the 180-foot and 400-foot aquifers with inland migration of seawater. Table 19 shows the approximate 2019-2024 annual average pumping volumes for around 200 wells within the CSIP and greater seawater intruded area. Historical pumping in the seawater intruded area was gathered to capture the fluctuations in water use from hydrology and climate. The area includes productive farmland as well as the cities of Marina and Castroville.

**Table 19. Agricultural Water Use in the CSIP and SWI Area, 2020 - 2024**

| | 180-Ft Aquifer | 400-Ft Aquifer | Deep Aquifer | Surface/Recycled | Total |
|---|---|---|---|---|---|
| **CSIP Private Wells** | | 600 | 100 | | 700 |
| **CSIP** | | 5,100 | | 16,200 | 21,300 |
| **Outside CSIP** | 1,600 | 9,700 | 7,600 | | 18,900 |
| **Total** | **1,600** | **15,400** | **7,700** | **16,200** | **40,900** |

Note: Data approximates 2020-2024 GEMS data, SVBGSA 180/400 Annual Reports (2019-2024). Urban groundwater pumping volumes are included in this table.

CSIP provides approximately 21 TAF per year to agricultural lands, which includes a combination of recycled water, surface water, and supplemental groundwater pumping. The volume of supplemental groundwater pumping is dependent on hydrology and between 2019 and 2025 fluctuated between approximately 2.8 TAF per year and 11 TAF per year. Pumping from the deep aquifer, which currently has sufficient water quality, occurs in both the CSIP and greater area. Deep aquifer pumping has increased from approximately 3 TAF/year in 2009 to over 13 TAF/year in 2024. Deep aquifer pumping is being evaluated by SVBGSA for changes in levels and risks of seawater intrusion through vertical leakage of high-salinity water in the 180/400-foot aquifer.

A substantial share of the seawater intruded area is within the CSIP service area. Deep aquifer pumping and recycled/surface water deliveries from CSIP limit reliance on 180/400-foot aquifer pumping. Localized areas of the 180/400-foot aquifers continue to have sufficient water quality that is suitable for crop irrigation. In the longer term these areas are at risk of well failure from SWI. Under baseline of no action conditions (without projects) SWI expands to areas outside of CSIP and would result in impacts in those areas.

In the area outside of CSIP that currently experiences (or are predicted to) experience water quality impacts in baseline conditions, the deep aquifer is an alternative supply source that currently has sufficient water quality. The long-term impacts to the deep aquifer are not known currently. The cost of developing and operating a new deep aquifer well is substantial with capital costs that can exceed $2 million per well.

The economic response of Salinas Valley growers to increasing salinity levels was evaluated using the data and framework of the calibrated economic model. The yield/productivity-salinity relationship is modeled applying crop yield response functions[22]. These functions define the typical salinity threshold and the rate of yield decline for salinity levels above the threshold level. Crop productivity losses were evaluated for the gross and net revenue loss to growers by comparing the SWI area with the BGRP and AWSP alternatives to the baseline conditions (continued pumping) at 2040 and 2070 conditions.

Chloride is the salinity constituent modeled in the SWI model. Total Dissolved Solids (TDS) includes chloride and other salts, is the standard method to estimate crop yield loss. Chloride was converted to TDS (mg/l) using a factor of 1.8 (Webb, 2020)[23] and TDS is converted to electrical conductivity (EC) (d/Sm) of groundwater by dividing TDS by 640 (Grattan, 2002)[24]. The economic effect of each project alternative is avoiding productivity loss—and crop switching and changes in on-farm salinity practices (e.g., leaching and blending)—that protects high-value irrigated farmland.

The economic analysis evaluates the effect of the project alternatives on groundwater salinity levels. The analysis differentiates between pumping from the SWI areas in the 180- and 400-Foot aquifers as well as CSIP deliveries and pumping from the deep aquifer. No salinity impacts are applied to surface water and recycled water deliveries from CSIP or pumping from the deep aquifer.

Table 20 illustrates the acreage by crop type inside and outside of the CSIP area. Acreage includes only lands that are within the greater seawater intruded area and show water quality impacts under M&A modeling scenario conditions. There are approximately 34,207 currently irrigated acres potentially affected by salinity by 2070 that are overlying the SWI area. As described earlier, some of these lands are irrigated with CSIP deliveries or pumping from the deep aquifer and as such would not be (directly) affected by SWI. Acreage is harvested acres that account for parcels that have multiple crops/rotations per year.

---

[22] Maas, E.V. and Hoffman, G.J. (1977). Crop Salt Tolerance – Current Assessment

[23] Webb, Paul. (2020). Introduction to Oceanography

[24] Grattan, Stephen R. (2002). Irrigation Water Salinity and Crop Production

**Table 20. Current Crop Acreage Inside and Outside of Zone 2B (CSIP) in Greater SWI**

| Crop Group | Within CSIP (Acres) | Outside CSIP (Acres) | Total (Acres) |
|---|---|---|---|
| **Artichokes** | 223 | 91 | 314 |
| **Broccoli** | 6,180 | 3,163 | 9,343 |
| **Cabbage** | 2,423 | 2,113 | 4,535 |
| **Cauliflower** | 2,341 | 1,105 | 3,446 |
| **Celery** | 978 | 608 | 1,585 |
| **Greenhouse** | 16 | 46 | 62 |
| **Head Lettuce** | 2,337 | 1,746 | 4,083 |
| **Leaf Lettuce** | 3,117 | 2,115 | 5,231 |
| **Onion** | 15 | 10 | 25 |
| **Other Field** | 728 | 590 | 1,319 |
| **Strawberries** | 1,970 | 2,294 | 4,264 |
| **Total** | **20,328** | **13,878** | **34,207** |

As salinity increases at some point it is no longer profitable to farm any of the existing commodities. Land would be fallowed. Table 21 illustrates the impact of each project alternative relative to the baseline acreage. Crop rotations are factored into the acreage calculations (values reflect harvested acres). The AWSP keeps between 779 and 4,821 acres in production that would have otherwise been fallow at 2040 and 2070 with continued pumping at current levels. The BGRP keeps between 1,087 and 6,949 acres in production that would have otherwise been fallow at 2040 and 2070 with continued pumping at current levels.

**Table 21. Crop Acreage Increase from Water Quality Improvements Relative to the Baseline by Alternative and Year**

| Project and Year | Acreage within CSIP | Acreage outside of CSIP | Total |
|---|---|---|---|
| **BGRP 2040** | 340 | 747 | 1,087 |
| **BGRP 2070** | 2,744 | 4,205 | 6,949 |
| **AWSP 2040** | 162 | 617 | 779 |
| **AWSP 2070** | 1,577 | 3,244 | 4,821 |

Table 22 illustrates the effect of the AWSP and BGRP alternatives on net farm revenue relative to the baseline. Results show areas within CSIP and for the AWSP and BGRP at 2040 and 2070. The annual net revenue effect of the BGRP alternative begins at the start of operations in 2036 and increases annually to $3.48 million in 2040 and $19.82 million in 2070. The annual net revenue effect of the AWSP alternative begins at the start of operations in 2036 and increases annually to $2.38 million in 2040 and $13.88 million in 2070. This is the economic effect of the project alternatives on irrigation water quality.

**Table 22. Crop Net Revenue Increase from Water Quality Improvements Relative to the Baseline by Alternative and Year**

| Project and Year | Within CSIP ($ Millions) | Outside CSIP ($ Millions) | Total ($ Millions) |
|---|---|---|---|
| **BGRP 2040** | $1.18 | $2.30 | $3.48 |
| **BGRP 2070** | $6.84 | $12.98 | $19.82 |
| **AWSP 2040** | $0.73 | $1.65 | $2.38 |
| **AWSP 2070** | $3.81 | $10.07 | $13.88 |

The present value of crop net revenues from BGRP and AWSP water quality improvements are presented in Table 23. The BGRP present value of water quality effects for agricultural crop irrigation are $214.5 million with an annualized value of $9.7 million over the 40-year project planning horizon. The AWSP present value is $149.6 million with an annualized value of $6.7 million over the 40-year planning horizon.

**Table 23. Present Value and Annualized Crop Net Revenue Increase from Water Quality Improvements**

| | BGRP ($M) | AWSP ($M) |
|---|---|---|
| **PV** | $214.5 | $149.6 |
| **Annualized** | $9.7 | $6.7 |

Several data limitations constrain the interpretation of modeled agricultural impacts in the SWI area:

- Groundwater extraction continues within the CSIP area through both private agricultural wells and CSIP supplemental wells. Modeling results indicate that portions of this area exceed threshold crop salinity levels under current and future baseline conditions. Current crops suggests that groundwater quality in some locations remains sufficient for irrigation. As a result, modeled chloride concentrations may not fully reflect the range of conditions experienced by individual agricultural wells.
- Chloride concentrations at individual agricultural wells are not available. As described above, the economic analysis applies aggregate pumping volumes from each aquifer (or CSIP). Individual wells were not assigned to specific agricultural parcels or pumping locations in the analysis.
- Agricultural pumping data are aggregated, limiting the ability to represent localized pumping patterns and associated water quality conditions. Localized agricultural use of groundwater within the CSIP area may indicate better irrigation suitability than suggested by the modeled chloride contours.

Domestic water users in the SWI area may experience a range of water quality impacts associated with increasing salinity in groundwater supplies. Elevated TDS and hardness—common indicators of salinity intrusion—can affect both the taste and quality of drinking water and the performance and lifespan of household appliances and plumbing fixtures. Higher TDS concentrations can accelerate scaling and corrosion in household systems, reduce the useful life of water heaters, dishwashers, washing machines, faucets, and other water-using equipment, and increase maintenance and replacement costs for domestic users. Salinity can also affect consumer behavior and preferences, as higher mineral content in drinking water can result in taste issues and reduced consumer acceptance.

Domestic economic effects were not evaluated as part of this initial feasibility assessment. These effects can represent an important result of the project through avoided domestic damages where groundwater salinity is increasing. Examples of the additional costs associated with salinity-related water quality for domestic users include but are not limited to:

- Reduced lifespan and increased replacement frequency of household appliances and plumbing fixtures (e.g., water heaters, dishwashers, clothes washers, faucets)
- Increased scaling, corrosion, and maintenance needs in plumbing and water-using equipment
- Increased use of water treatment devices such as water softeners or home filtration systems
- Increased purchase of bottled or delivered water to avoid taste or aesthetic issues
- Higher use of soaps and detergents due to hardness effects on cleaning efficiency

These general categories of economic effects are well known. The impact (monetary value) varies depending on TDS concentrations and household appliance characteristics. This data is not currently compiled for this analysis for the SWI area or the broader Salinas Valley. Future analyses may evaluate how salinity translates into direct economic costs for domestic users.

## 6.2 Water Level Improvements Relative to Baseline Continued Pumping

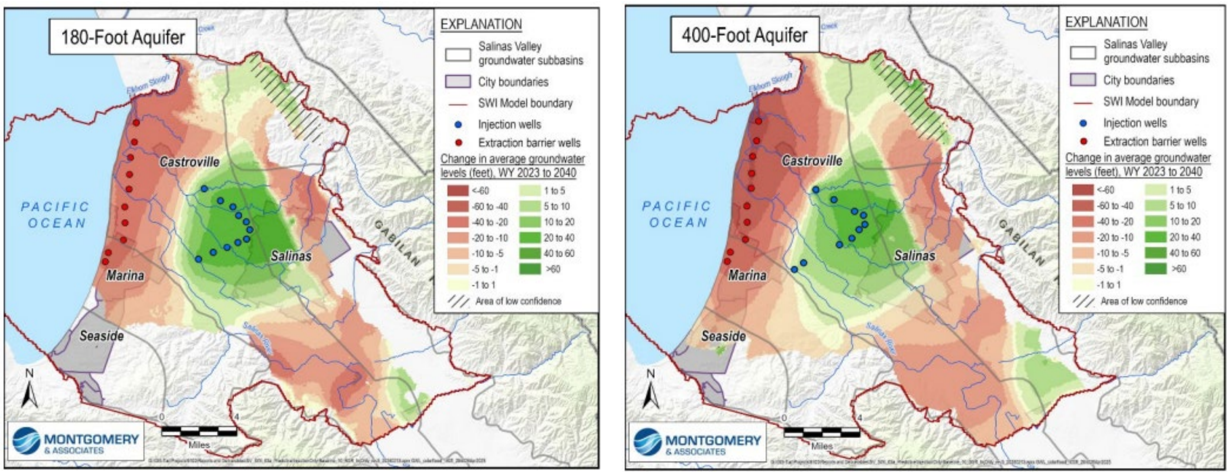
The project alternatives would increase groundwater levels relative pumping continuing at current rates through 2040 and 2070. The BGRP Scenarios Modeling Results memorandum[25] describes anticipated groundwater level changes under the project alternatives. Groundwater levels decline near the coast close to the barrier extraction wells. There is limited pumping from agricultural or domestic wells in this area. Groundwater levels increase near the injection wells in the 180-foot and 400-foot aquifers, which includes a region with agricultural wells, the City of Salinas, and pumping in the Eastside Subbasin. In general, the project alternatives would increase groundwater levels near the injection wells and in a broader area.

Figure 7 illustrates the change in groundwater levels between the simulated period 2020 – 2070 for the injection only BGRP alternative in the 180-foot and 400-foot aquifers. Groundwater levels fall near the coast. Groundwater levels increase between 20 and 60 feet near the injection

[25] https://svbgsa.org/wp-content/uploads/2025/10/BGR-Project-Scenarios_Modeling-TM_20251002-1.pdf

wells, creating a mound of freshwater near the City of Salinas and underlying agricultural areas with private wells. Change in groundwater level maps for the AWSP alternative were not available at the time of publication, but the analysis was able to rely on GIS data for the analysis.

**Figure 7. BGRP Change in Groundwater Levels, 2020 - 2070**




As pumping lifts decrease this reduces energy use and operating costs for both agricultural and domestic pumping. Higher water levels reduce total dynamic head (TDH), decreasing horsepower requirements and kilowatt-hour usage per acre-foot pumped. Table 24 summarizes approximate groundwater pumping by aquifer within a portion of the SWI area as well as the average change in groundwater level. Pumping volumes and change in lift were analyzed for wells in the 180-foot aquifer, 400-foot aquifer, and the 180/400-foot aquifer- which are wells that may extract from both the 180- and 400-foot aquifers.

**Table 24. Pumping by Aquifer and Change in Groundwater Level**

| Aquifer | Average Annual Pumping (AF) | BGRP Average Change in Lift (FT) Over Project Life | AWSP Average Change in Lift (FT) Over Project Life |
|---|---|---|---|
| **180-Foot** | 1,600 | 20.82 | 36.90 |
| **180/400-Foot** | 1,175 | 20.00 | 30.29 |
| **400-Foot** | 35,620 | 18.08 | 33.73 |

The pumping cost savings was estimated, including variable pumping costs[26] and capital and replacement costs. A electricity rate of $0.33/kWh for medium use operations (AG-4B) and $0.23/kWh for high-use operations (AG-C) was applied. A cost of $0.28/kWh was applied, which reflects the average of the AG-4B and AG-4C rate[27].

[26] See for example, Energy and Cost Required to Lift or Pressurize Water, University of California Cooperative Extension (UCCE)

[27] https://www.pge.com/assets/rates/tariffs/LgAgCurrent.xlsx

Equation (1) summarizes the pumping cost savings ($ thousands). The term $\Delta DTW_i$ represents the change in groundwater levels (groundwater lift) in feet. Subscript $i$ denotes region, and $Q$ is the quantity of groundwater pumping, measured in thousand acre-feet (TAF). The scalar is the collapsed unit cost based on assumed well size and efficiency.

$$(1)\ C_i = (0.408) * (\Delta DTW_i) * Q_i$$

Table 25 and Table 26 summarize the cost savings, and total economic effects of the project. The impact of pumping cost savings includes 19.5 TAF of pumping in the City of Salinas. Annual pumping cost savings from the BGRP alternative begin at the start of operations in 2036 and increase annually to $208 thousand in 2040 and $354 thousand in 2070. Annual pumping cost savings from the AWSP alternative begin at the start of operations in 2036 and increase annually to $371 thousand in 2040 and $662 thousand in 2070.

**Table 25. Annual Pumping Cost Savings by Aquifer, 2040 and 2070 ($ in Thousands)**

| | 180-Foot | | 180-400 Foot | | 400-Foot | | Total | |
|---|---|---|---|---|---|---|---|---|
| | BGRP | AWS | BGRP | AWS | BGRP | AWS | BGRP | AWS |
| 2040 | $11 | $18 | $6 | $9 | $191 | $345 | $208 | $371 |
| 2070 | $16 | $29 | $12 | $20 | $325 | $613 | $354 | $662 |

Table 26 summarizes the present value annual groundwater pumping cost savings from BGRP and AWSP alternatives. The BGRP present value of groundwater pumping cost savings for agricultural and urban uses equal $6 million with an annualized value of $270 thousand over the 40-year planning horizon. The AWSP present value for agricultural and urban uses equals $11 million with an annualized value of $497 thousand over the 40-year planning horizon.

**Table 26. Present Value and Annualized Pumping Cost Savings ($ in Thousands)**

| | BGRP | AWSP |
|---|---|---|
| **PV** | $6,000 | $11,040 |
| **Annualized** | $270 | $497 |

Increases in groundwater levels reduce well replacement and energy pumping costs. These effects would be realized in the 180-foot and 400-foot aquifers and around the City of Salinas, with the groundwater levels rising by 2040, through 2070, by up to 60 feet in some areas (relative to baseline conditions).

### 6.3 Avoided CSIP Costs

CSIP provides an alternative water supply to a portion of the current seawater intruded area. Multiple CSIP supplemental wells have already been taken out of service due to degraded water quality. The project alternatives would increase water quality in the CSIP area in the 180-foot and 400-foot aquifers, potentially allowing pumping in areas where groundwater is currently too saline. Replacement of some of the CSIP groundwater is a potential economic effect, or benefit, of the project.

A portion of future CSIP maintenance and modernization cost can reasonably be treated as an avoided or deferred cost if the BGRP or AWSP alternatives reduce dependence on the degraded 180/400-foot aquifers and/or improves water quality in those aquifers. MCWRA's FY 2025-26 budget includes over $1.2 million in planned CSIP capital improvements, specifically identifying planning, groundwater well replacement, and electrical upgrades to booster pumps. MCWRA increased the FY26 Zone 2B water delivery charge from $45.24/AF to $85.24/AF in part to fund deferred well maintenance, cathodic protection maintenance, and overdue facility condition assessments. Under current conditions the deferred-maintenance program is being funded, and these costs would increase as water quality continues to degrade under baseline conditions in the seawater intruded area.

However, for economic benefits attributable to the BGRP or AWSP alternative, only a portion of these costs would be counted as avoidable. Some CSIP replacement and repair costs would still be incurred with or without the project because the existing system has aging assets, fixed operating obligations, and ongoing debt service. MCWRA's FY26 budget includes $1.65 million in CSIP USBR loan payments and $1.76 million in SVWP bond debt service, and those fiscal costs are not fully eliminated if a new project improves aquifer conditions. The AWSP or BGRP project alternative may defer or reduce some well replacement, corrosion control, and other maintenance/ upgrade costs, but would not fully eliminate the costs of the existing regional system.

Even with the BGRP or AWSP, CSIP would still operate and deliver water to customers in the SWI area. If CSIP deliveries are reduced, or stop entirely as water quality improves, some of that water supply would need to be replaced through refurbishment of existing private wells or drilling of new private wells. In short, any potential avoided-cost benefit of the AWSP or BGRP would be framed as a partial deferral of CSIP modernization and maintenance, rather than full elimination of future CSIP or replacement-water costs. As the project alternatives are refined these CSIP avoided costs can be evaluated.

### 6.4 Other Economic Effects

The project may also generate other economic effects that are real but not yet monetized. These broadly include improved regional water supply resilience, operational benefits to the broader water resources system, and avoided long-term risks associated with continued groundwater degradation. Effects that may be considered include but are not limited to:

- Improved water supply reliability. The project would create a more stable, drought-resistant regional supply. This would reduce vulnerability to dry-year shortages and improve planning certainty for agricultural, domestic, and other water users. The value of regional water supply reliability increases under variable climate conditions and increasing water demands in the Salinas Valley in the future.

- Conjunctive system operation effects. The project would improve flexibility across the broader water resources system through use of groundwater, recycled water, and other supplemental supplies.
- Environmental and other effects. Reducing SWI and improving groundwater conditions can provide broader environmental benefits, including protection of groundwater quality and reduced long-term stress on groundwater resources.
- Avoided deep-aquifer well development. In addition to shallow-well replacement and pumping costs, future well replacement could require additional development of deep aquifers wells. The implications of increased deep aquifer pumping are not yet fully understood. These wells are expensive to install, operate, and maintain.

These potential effects are important considerations as the project operations are refined and many be considered as part of future economic analysis for the project. Additional data and operation details would be needed to monetize these effects.

### 6.5 Summary of Other Economic Effects

The project alternatives would generate economic benefits as described in Section 5. In addition, the project alternatives may generate other economic effects—some of which may be additional project economic benefits—that were summarized in this section. These include agricultural and domestic water quality improvements, reduced groundwater pumping costs, avoided well replacement, avoided deep aquifer pumping, improved regional water supply reliability, operational value to broader conjunctive use of the regional water system, and other environmental effects.

Table 27 summarizes selected other economic effects including the present value and the annualized value over the 40-year project planning horizon. The total annualized economic effects are $10 million and $7.2 million over the 40-year planning horizon, and $160.64 and $220.54 million in present value for the AWSP and BGRP scenarios.

**Table 27. Other Economic Effects Summary**

| | BGRP | | AWSP | |
|---|---|---|---|---|
| **Effect** | **Annualized ($ Millions)** | **Present Value ($ Millions)** | **Annualized ($ Millions)** | **Present Value ($ Millions)** |
| Agricultural water quality | $9.66 | $214.54 | $6.74 | $149.60 |
| Domestic water quality | Not evaluated | Not evaluated | Not evaluated | Not evaluated |
| Pumping lift / groundwater levels | $0.27 | $6.00 | $0.50 | $11.04 |
| Avoided CSIP costs | Not evaluated | Not evaluated | Not evaluated | Not evaluated |
| **Total** | **$9.93** | **$220.54** | **$7.24** | **$160.64** |

Other economic effects were evaluated relative to the baseline conditions. These can be evaluated in future iterations of this analysis and compared to the NAA to establish project economic benefits.

# 7 Regional Economic Effects

Regional economic effects are the changes in the distribution of production, effects on communities, jobs, and income that result from the project. In the context of the BGRP or AWSP alternatives the regional effects are from agricultural land that is kept in production by the project. This is compared relative to the NAA (see Section 5). This section summarizes the regional economic impacts of the loss of agricultural land shown in Section 5. This is economic activity in the county that would continue to occur under the BGRP or AWSP alternatives.

Additional regional effects would result from project construction and secondary effects of that construction project operation. There would also be secondary regional effects from the reduction in net income from operating costs and repayment of construction costs. There may be modest regional effects from improvements in crop yield/productivity due to improved water quality. These regional effects are not evaluated and can be considered as the project construction and alternatives are refined.

Regional effects are important to consider in the Salinas Valley where changes in farm production will affect supplier industries, transportation, processors, services, and local households, but these are not net economic benefits of the project. Regional economic effects describe how changes in direct economic activity associated with the project propagate through the local economy in terms of metrics such as employment (jobs), output, labor income, and value added. These effects are distributional and reflect gross economic activity and not net economic value. As such, they are not additive to project economic benefits and are not used in any benefit–cost calculations.

Regional economic effects include direct, indirect, and induced components (the sum of these components is the total effect):

- Direct Effects: The immediate economic activity generated by the affected industry (irrigated agriculture in Monterey County), including the gross value of the crops produced, farm employment, and grower spending on inputs such as labor, water, seed, fertilizer, and services.
- Indirect Effects: The secondary economic activity created when agricultural producers purchase goods and services from local suppliers, such as equipment dealers, input retailers, processors, and service providers. These operations are indirectly affected by farm-level spending. These effects capture the supply-chain linkages that support additional business activity across the region. Indirect effects can include both downstream and upstream industries. The default IMPLAN model applied for this evaluation does not capture downstream supply chain linkages.
- Induced Effects: The household spending impacts that occur when workers employed in both direct and indirect industries spend their earnings on goods and services in the Monterey County economy. Examples include housing, healthcare, food, and retail.

These effects capture how income generated by the directly and indirectly affected industries circulates through communities in the county.

Regional effects are modeled using a default IMPLAN model (see also Appendix B). The change in gross farm revenue estimated for the 30 percent and 50 percent pumping cuts described under Section 5 (NAA) was applied. The gross revenue output was aggregated into the IMPLAN crop sectors and evaluated as a change in sector output value.

Table 28 summarizes gross revenue by IMPLAN crop sector under the NAA. The project would increase the gross value of Salinas Valley farming by $1,196 million annually under the NAA 30 percent cut and by $1,802 million under the NAA 50 percent cut. This is driven largely by declines in high value irrigated agriculture sectors including productive vegetable crop ground. Most of the economic effects are in IMPLAN's Vegetable and melon farming and Fruit farming sectors.

**Table 28. NAA Gross Crop Revenue Impacts**

| Crop Category | NAA 30% Cut ($ Millions) | NAA 50% Cut ($ Millions) |
|---|---|---|
| Vegetable and melon farming | -$898 | -$1,333 |
| Fruit farming | -$290 | -$461 |
| All other crop farming | -$8 | -$8 |
| **Total** | **-$1,196** | **-$1,802** |

Table 29 shows the regional effects of the project for the 30 percent cut. The project is associated with an increase of 9,495 jobs, $1,559 million in value added annually, and $1,845 million in output annually for the 30 percent cut NAA.

**Table 29. NAA 30 Percent Cut Regional Economic Effects**

| Effect | Employment (FTE) | Labor Income ($ Millions) | Value Added ($ Millions) | Output ($ Millions) |
|---|---|---|---|---|
| Direct | -5,238 | -$732 | -$1,133 | -$1,196 |
| Indirect | -1,794 | -$117 | -$164 | -$229 |
| Induced | -2,463 | -$144 | -$263 | -$421 |
| **Total** | **-9,495** | **-$993** | **-$1,559** | **-$1,845** |

Table 30 summarizes the top 10 sectors affected by the project under the 30 percent cut. The regional effects impact the farming industries, support industries for agriculture (including wholesale trade businesses), and local services including real estate and other government and related services.

**Table 30. Thirty (30) Percent Cut Regional Economic Effects by Top 10 Sectors**

| Sector | Employment (FTE) | Labor Income ($ Millions) | Value Added ($ Millions) | Output ($ Millions) |
|---|---|---|---|---|
| Vegetable and melon farming | -2,911 | -$533 | -$858 | -$906 |
| Fruit farming | -2,357 | -$203 | -$283 | -$291 |
| Support activities for agriculture and forestry | -1,372 | -$82 | -$102 | -$126 |
| Real estate | -221 | -$9 | -$31 | -$50 |
| Full-service restaurants | -146 | -$5 | -$6 | -$10 |
| Limited-service restaurants | -145 | -$4 | -$10 | -$17 |
| Wholesale trade | -132 | -$19 | -$34 | -$41 |
| Individual and family services | -107 | -$2 | -$2 | -$3 |
| Retail - Food and beverage stores | -81 | -$4 | -$6 | -$7 |
| Offices of physicians | -81 | -$11 | -$10 | -$16 |

Source: IMPLAN 2014 R3 database. All values are inflation-adjusted in 2025 dollars.

Table 31 shows the regional effects of the project for the 50 percent cut. The project is associated with an increase of 14,224 jobs, $2,353 million in value added annually, and $2,781 million in output annually for the 50 percent cut NAA.

**Table 31. NAA 50 Percent Cut Regional Economic Effects**

| Effect | Employment (FTE) | Labor Income ($ Millions) | Value Added ($ Millions) | Output ($ Millions) |
|---|---|---|---|---|
| Direct | -7,806 | -$1,107 | -$1,711 | -$1,802 |
| Indirect | -2,695 | -$176 | -$245 | -$343 |
| Induced | -3,723 | -$218 | -$397 | -$636 |
| Total | **-14,224** | **-$1,501** | **-$2,353** | **-$2,781** |

Table 32 summarizes the top 10 sectors affected by the project under the 50 percent. The regional effects impact the farming industries, support industries for agriculture (including wholesale trade businesses), and local services including real estate and other government and related services.

**Table 32. 50 Percent Cut Regional Economic Effects by Top 10 Sectors**

| Sector | Employment (FTE) | Labor Income ($ Millions) | Value Added ($ Millions) | Output ($ Millions) |
|---|---|---|---|---|
| Vegetable and melon farming | -3,650 | -$792 | -$1,273 | -$1,345 |
| Fruit farming | -3,649 | -$323 | -$450 | -$463 |
| Support activities for agriculture and forestry | -2,065 | -$123 | -$153 | -$189 |
| Real estate | -331 | -$14 | -$47 | -$74 |
| Full-service restaurants | -221 | -$8 | -$9 | -$15 |
| Limited-service restaurants | -219 | -$6 | -$15 | -$26 |
| Wholesale trade | -199 | -$29 | -$52 | -$62 |
| Individual and family services | -162 | -$3 | -$3 | -$5 |
| Retail - Food and beverage stores | -123 | -$6 | -$9 | -$11 |
| Offices of physicians | -123 | -$16 | -$16 | -$25 |

Source: IMPLAN 2014 R3 database. All values are inflation-adjusted in 2025 dollars.

The project would keep additional land in production in the Salinas Valley by avoiding more costly demand management (fallowing) needed to achieve sustainable groundwater pumping amounts under State Board intervention to avoid SWI. Under the NAA 30 percent cut, the regional effects of the project are $1,845 million in output, $1,559 million in value added, 9,495 FTE jobs, and $993 million in labor income. Under the NAA 50 percent cut, the regional effects of the project are $2,781 million in output, $2,353 million in value added, 14,224 FTE jobs, and $1,501 million in labor income. This is a conservative (low) estimate in that it does not consider forward-linked (so-called downstream) industries.

# 8 Financial Analysis

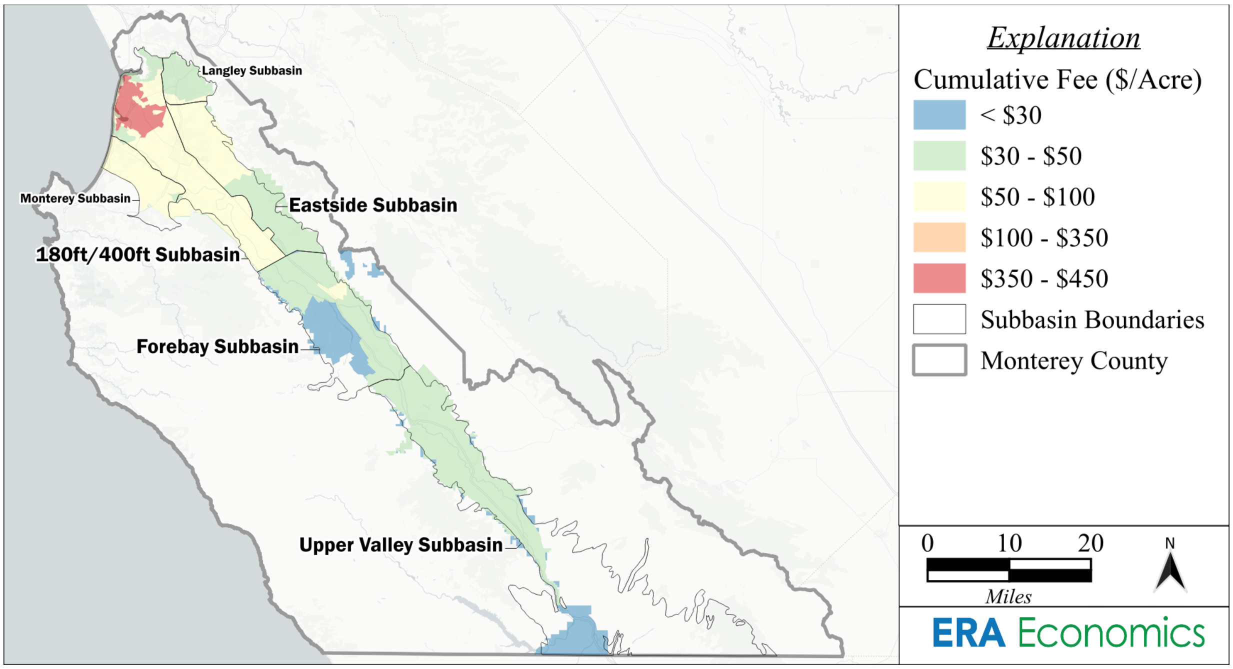
This section summarizes a preliminary financial overview for the project. The financial analysis applies to the BGRP alternative, which is the project alternative with the greater benefit-cost ratio.

The financial analysis introduces the conceptual financial framework for evaluating the project, outlines potential cost allocation options, summarizes estimated project costs, and discusses payment capacity. This is not a final financial feasibility analysis. Rather, it provides an initial screening-level review based on current planning-level capital and O&M cost estimates, financing, and an illustrative cost allocation approach. A more complete financial feasibility analysis will be developed in subsequent phases as project configuration, benefits, cost allocation, funding options, and financing structures are defined.

Water users in the Salinas Valley currently pay various water related charges. This includes the SVBGSA Groundwater Sustainability Fee, which is split by Tier 1 and 2 areas and charged per domestic connection and per cropped acre annually. It also includes the MCWRA Zone Fees and the CSIP Water Delivery Charge. There are additional water costs (e.g., pumping cost and domestic water rates) in addition to these charges.

Figure 8 illustrates the approximate per acre fees across the Salinas Valley. Charges range from less than $30 per acre to around $450 per acre in the CSIP delivery area. The existing charges establish a baseline for evaluating additional payment capacity for the BGRP.

**Figure 8. Existing Rate Summary**




BGRP payment capacity depends on existing charges, ability of water users to pay for additional charges, and how BGRP costs are allocated. BGRP cost allocation has not been established at this time. The financial analysis applies a cost allocation approach where project costs are spread evenly over all domestic and agricultural groundwater pumping in the Salinas Valley.

Cost allocation may include various approaches such as in proportion to supply volumes, groundwater extracted, irrigated acreage, domestic connections, and in proportion to project economic benefits.

The financial analysis of the BGRP includes the capital cost, interest during construction, cost of issuance, annual O&M costs, and replacement costs. The amount borrowed for BGRP includes the interest during construction and capital costs, and a portion of the issuance cost for the approximate share that would not be funded through Reclamation. The Reclamation cost share is assumed to be 25 percent. The project financial analysis applies the following to establish project financial costs:

- 25 percent federal cost share
- 30 year loan with 4% interest rate (borrowing cost)
- 3% Annual O&M Inflation

- Cost Recovery based on SVBGSA connections and parcel counts
- Values in the tables are the combined debt service repayment and annual O&M cost at start of operations in 2035 and a display of annual amounts in 2045, 2055, 2065, and 2075. The increase in annual cost over time is driven by the inflation applied to O&M cost. All values are in future year dollars.

The project configuration and funding plan are still being refined, this stage focuses on framing viable pathways rather than making final determinations. Moving from preliminary screening to a full financial feasibility finding will require updated cost estimates, a finalized project configuration, grant opportunities (including a potential Title XVI federal cost share), board policy direction on cost allocation, and continued stakeholder engagement.

Table 33 summarizes per acre-foot changes in 2035 through 2075. Costs are effectively distributed across the entire Salinas Valley with per AF cost showing the cost over all agricultural and domestic groundwater pumping. In practice, a cost allocation approach will be developed and applied. Financial costs include the 25 percent Reclamation cost share. Other water users and county industries that may directly or indirectly benefit from the project are not changed in this scenario. The per acre-foot cost equals $425 at the start of operations in 2035. These financial costs are all in future dollars.

**Table 33. BGRP Cost Summary and Cost Recovery Example (After 25% Reclamation Cost Share)**

| | 2035 | 2045 | 2055 | 2065 | 2075 |
|---|---|---|---|---|---|
| Annual Construction Repayment (millions) | $42 | $42 | $42 | $42 | |
| Annual O&M Costs (millions) | $151 | $203 | $273 | $367 | $493 |
| Replacement Cost (millions) | | | $32 | | |
| Total Annual Cost (millions) | **$193** | **$245** | **$347** | **$409** | **$493** |
| **$/AF Groundwater Pumped** (Spread Over All Salinas Valley Pumping) | $425 | $539 | $792 | $900 | $1,085 |

Note: Includes 25% federal cost share.

The financial analysis suggests there is sufficient overall payment capacity to support the project, although the affordability to individual payers will depend on the final cost allocation approach. In general, the Monterey County economic base and the scale of anticipated project benefits suggest that project costs can be supported if they are distributed in a manner that is equitable and aligned with beneficiaries. As the project is refined and a funding plan is developed, the allocation of costs among groundwater users, landowners, other beneficiaries, and other potential funding sources will be developed. Preliminary findings indicate that payment capacity is expected to be adequate, subject to development of a feasible and appropriately structured cost allocation methodology.

# 9 Summary

The economic benefits and other economic effects of managing SWI in the Salinas Valley exceed several billion dollars in present value terms. The project avoids State Board intervention, with loss of local control over groundwater management, imposition of fees, and management that, for the NAA, was evaluated as pumping curtailments up to 50 percent. The regional economic effects of the NAA are also substantial and would result in profound implications for Salinas Valley and broader Monterey County communities. This includes the loss of tens of thousands of farm jobs, loss of labor wage income, and losses to farming businesses and communities across the county.

The analysis illustrates that there are economic benefits from managing SWI in the Salinas Valley, and importantly, that the SWI MT cannot be achieved by pumping reductions alone. The BGRP and AWSP alternatives both raise groundwater levels, improve water quality, and help push SWI back toward the coast. The economic analysis shows that the BGRP is lower cost than the AWSP alternative and results in a benefit cost ratio between 1.41 and 2.34, and net benefits between $1.4 and $4.6 billion. The financial analysis provides a preliminary overview of cost allocation approaches and payment capacity.

The economic and financial analysis is based on the data available and project alternatives are continuing to be refined. Next steps for the analysis include:

- Refine the NAA to reflect the location, timing, and allocation of pumping reductions and associated State Board intervention outcomes. This includes applying economic analysis to evaluate additional benefits and developing groundwater inputs and project operations.
- Expand monetization of benefits that are currently treated qualitatively or only partially quantified (e.g., economic effects), including domestic water quality, well replacement and deepening risk, reliability, and other avoided costs.
- Advance financial feasibility work by cost-allocation methodologies tied to beneficiaries and testing affordability across payer groups. Prepare a funding and implementation strategy, including grant positioning, partner participation, ownership and operating agreements, and a financial plan or rate study. Refine the Reclamation feasibility study.

# 10 References

Bureau of Reclamation. (2012). Title XVI Financial Capability Determination Process (WTR 11-02). U.S. Department of the Interior Bureau of Reclamation Publication. Retrieved from https://www.usbr.gov/recman/wtr/wtr11-02.pdf

Bureau of Reclamation. (2019). Title XVI Water Reclamation and Reuse Program and Desalination Construction Program Feasibility Study Review Process (WTR 11-01). U.S. Department of the Interior Bureau of Reclamation Publication. Retrieved from https://www.usbr.gov/recman/wtr/wtr11-01.pdf

Bureau of Reclamation. (2024). WaterSMART: Large-Scale Water Recycling Projects. U.S. Department of the Interior Bureau of Reclamation Publication. Retrieved from https://usbr.gov/watersmart/title/largescale.html

Bureau of Reclamation. (2025). Large-Scale Water Recycling Program Feasibility Study Review Process (WTR TRMR-128). U.S. Department of the Interior Bureau of Reclamation Publication. Retrieved from https://www.usbr.gov/recman/temporary_releases/wtrtrmr-128.pdf

Bureau of Reclamation. (2026). Change in Discount Rate for Water Resources Planning (Document Number: 2026-01591). U.S. Department of the Interior Bureau of Reclamation Publication. Retrieved from https://www.federalregister.gov/documents/2026/01/27/2026-01591/change-in-discount-rate-for-water-resources-planning

Burrows, Rhoda and Stott, Lance. (2020). Salt/Salinity Tolerance of Common Horticulture Crops in South Dakota. South Dakota State University Agronomy, Horticulture & Plant Science Department.

California State Water Resources Control Board (SWRCB). (2023a). Groundwater Sustainability: State Intervention FAQs. Retrieved from https://www.waterboards.ca.gov/water_issues/programs/sgma/docs/groundwater-sgma-state-intervention-faqs.pdf

California State Water Resources Control Board (SWRCB). (2023b). SGMA GSA FAQs. Retrieved from https://www.waterboards.ca.gov/water_issues/programs/sgma/docs/20230621-sgma-gsa-faqs.pdf

Council on Environmental Quality. (2013a). Interagency Guidelines: Principles and Requirements for Federal Investments in Water Resources. U.S. Department of the Interior Publication. Retrieved from https://www.doi.gov/sites/doi.gov/files/uploads/chap_iii_interagency_guidance_march_2013.pdf

Council on Environmental Quality. (2013b). Principles and Requirements for Federal Investments in Water Resources. U.S. Department of the Interior Publication. Retrieved from https://www.doi.gov/sites/doi.gov/files/uploads/principles_and_requirements_march_2013.pdf

Department of the Interior. (2015). Water and Land Related Resources Implementation Studies - Principles, Requirements, and Guidelines, for Water and Land Related Resource Implementation Studies (707 DM 1). Departmental Manual. Retrieved from https://www.doi.gov/sites/doi.gov/files/elips/documents/707-dm-1.pdf

Grattan, Stephen R. (2002). Irrigation Water Salinity and Crop Production. University of California Agricultural and Natural Resources Publication Number: 8066.

Maas, E.V. and Hoffman, G.J. (1977). Crop Salt Tolerance – Current Assessment. Journal of Irrigation and Drainage (American Society of Civil Engineers). Volume 103, Issue 2, Pages 115-134.

Marina Coast Water District Groundwater Sustainability Agency and Salinas Valley Groundwater Sustainability Agency (MCWDGSA and SVBGSA). (2025). WY 2024 Annual Report Monterey Subbasin. Retrieved from https://www.mcwd.org/docs/gsa/3-004.10_WY_2024.pdf

Monterey County Public Works, Facilities and Parks. (2024). Groundwater Extraction Summary Report. Monterey County Water Resource Agency Publication. Retrieved from https://www.countyofmonterey.gov/home/showpublisheddocument/142365/638926748365700000

Montgomery & Associates (M&A). (2025). Salinas Valley Groundwater Basin Langley Area Subbasin Water Year 2024 Annual Report. Prepared for Salinas Valley Groundwater Sustainability Agency. Retrieved from https://svbgsa.org/wp-content/uploads/2025/04/Langley_AnnualReport2024_Final-Cond.pdf

Salinas Valley Basin Groundwater Sustainability Agency. (2022). Salinas Valley Groundwater Basin 180/400-Foot Aquifer Subbasin 2022 GSP Amendment 1. Salinas Valley Basin Groundwater Sustainability Agency Publication. Retrieved from https://svbgsa.org/wp-content/uploads/2025/01/180-400-GSP-Amendment-1-Document_compressed.pdf

Salinas Valley Groundwater Sustainability Agency (SVBGSA). (2025). Salinas Valley GSP Web Map. https://svbgsa.org/gsp-web-map-and-data/ (Accessed February 24, 2025).

U.S. Department of Agriculture, Agricultural Research Service (USDA). (1995). Salinity Effects on Bud Yield and Vegetative Growth of Artichoke. American Society for Horticultural Science. Alexandria, Virginia. 30(1):69-71.

Water Resources Council. (1983). Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. U.S. Water Resources Council Publication. Retrieved from https://planning.erdc.dren.mil/toolbox/library/Guidance/Principles_Guidelines.pdf

Webb, Paul. (2020). Introduction to Oceanography. Roger Williams University Open Publishing. Retrieved from https://pressbooks.pub/webboceanography1/. Accessed January 23, 2026.

# Appendix A. Salinas Valley Agricultural Production Model (SVAP) and Urban Water Shortage Model

This appendix summarizes the agricultural data and economic model of the Salinas Valley (SVAP) and the urban water supply model. The data and economic model were developed through standard sources, applying peer-reviewed economic methods, and with grower and other industry expert outreach and interviews conducted over 2025 and early 2026.

### Salinas Valley Agricultural Production Model

The economic analysis data and framework is referred to as the Salinas Valley Agricultural Production (SVAP) model. It is a regional agricultural production and economic optimization model that simulates the markets for Salinas Valley crops. It applies the same calibration methodology and economic approach as economic models applied for various Reclamation and other project feasibility studies[28]. The economic data includes farm production budgets for major commodities, which reflect gross and net returns to farming and the capitalized value of the net returns is a measure of the agricultural land value.

The fundamental economic logic underlying the economic model is as follows. Crops are produced in competitive input and output markets. That is, no individual grower/operation can affect or control the price of any commodity. The model simulates inputs, costs, returns, water supplies, and other farm inputs, subject to water availability (e.g. NAA) and water costs.

Agriculture in the Salinas Valley relies primarily on groundwater, supplemented in other regions by surface and recycled water supplies. As conditions change within the Salinas Valley (e.g., a reduction in the amount of groundwater that can be pumped), the model optimizes production by adjusting the crop mix, water quantities used, and other inputs. It fallows land when that is the most cost-effective response to resource conditions.

The SVAP model is applied to evaluate conditions with reduced groundwater supplies. It is a flexible framework that can be extended to evaluate the response of agriculture, and quantify economic costs and benefits, to other conditions affecting surface or groundwater conditions, markets, GSP implementation, or other economic values or restrictions in the Salinas Valley.

### Calibration

The model is calibrated using the method of Positive Mathematical Programming (PMP)[29]. This allows the incorporation of information on the local market conditions (factors that affect supply and demand), allowing the model to exactly replicate the base year of observed input use and outputs. Current farming conditions in the Salinas Valley are the result of a mix of management skill, land suitability, markets, proximity to processing facilities, risk management, differences in

[28] Howitt et al., "Calibrating Disaggregate Models of Irrigated Production and Water Use, 2012

[29] Howitt, R.E, Positive Mathematical-Programming, 1995

soil and other physical capital/inputs, among other factors. Model calibration translates these factors, in addition to observed average conditions, into an economic representation of production (supply) and market demand conditions.

This economic model include endogenous crop prices (crop demand functions) and CES production technology. Model calibration is at the Water Balance Area (WBA) level (matching regional ground and surface water supply) derived from the Salinas Valley Integrated Hydrologic Model[30].

**Regions**

The SVAP model includes nineteen areas/regions (WBAs) in the Salinas Valley. Within each region geospatial field-= and parcel-level seasonal crop data are included. These regions reflect differences in availability of surface and recycled water, differences in groundwater pumping depth, and subbasin boundaries. Table 34 summarizes economic model regions.

**Table 34. Economic Model Coverage**

| Subbasin | WBA | Description |
|---|---|---|
| 180/400-Foot Aquifer | 2 | CSIP Area |
| | 5 | Highlands South |
| | 8 | Blanco Drain Area |
| | 10 | Pressure-NE |
| | 11 | Pressure-SW |
| Eastside | 9 | East Side |
| Forebay | 12 | Forebay-NE |
| | 13 | Forebay-SW |
| | 14 | Arroyo Seco |
| | 15 | Clark Colony |
| | 21 | Westside Region |
| Langley | 6 | Langley |
| Monterey | 7 | Corral De Tierra |
| Upper Valley | 16 | Upper Valley-NE |
| | 17 | Upper Valley-NW |
| | 18 | Upper Valley-SE |
| | 19 | Upper Valley-SW |
| | 20 | Below Dam |
| | 22 | Hames Valley |

[30] Salinas Valley Integrated Hydrologic and Reservoir Operations Model, Monterey and San Luis Obispo Counties, California

Land use data is from the DWR Land Use Mapping dataset with crop categories further disaggregated using ERA Economics' geospatial crop data for the Salinas Valley reflecting seasonal production. The land use data defines production information for each field in the Salinas Valley and season. This includes the number of crops harvested, estimated planting date, and the type of crop planted in each season.

### Crop Groups

SVAP aggregates the DWR land use data into representative crop groups. Representative crop groups are defined by representative market conditions and water use. Table 35 summarizes the SVAP crop groups.

**Table 35. Economic Model Crop Groups**

| Crop Group | Example Crops |
|---|---|
| Head Lettuce | Head Lettuce |
| Leaf Lettuce | Leaf Lettuce |
| Other Leafy Greens | Spinach, Cabbage, Spring Mix, Kale |
| Strawberries | Strawberries |
| Broccoli | Broccoli, Brussels Sprouts |
| Cauliflower | Cauliflower |
| Celery | Celery |
| Artichokes | Artichokes |
| Carrots | Carrots |
| Onions | Onions, Garlic |
| Field Crops | Misc. Grains, Dry Beans, Alfalfa |
| Vineyards | Wine Grapes |
| Other Deciduous Crops | Lemons, Avocados |
| Greenhouses | Greenhouses, Nurseries, Cut Flowers |

#### Crop Budgets and Economic Parameters

The economic model calibrates to current conditions (market, prices, costs, etc.) and is then used to evaluate future conditions with BGRP and AWSP project alternatives and without any project (the NAA). SVAP model input data generally include the following that were reviewed and refined through a series of interviews with local growers and industry experts:

- Prices: Crop price data are compiled from Monterey County agricultural commissioner, as well as statewide (CDFA) and national (USDA) price reporting. Reviewed based on grower interviews.
- Production budgets: Yield, production practices, and costs are from University of California Cooperative Extension (UCCE) crop budgets [31] for the representative crop

[31] University of California Cooperative Extension (UCCE). Various years. Cost of Production Studies

groups. The corresponding costs of production are based on cost studies that reflect best management practices.

- Pumping costs: Energy costs depend on the price of electricity. Base electricity costs are derived using UCCE data and current PG&E rates for agricultural users. Overall well efficiency is assumed to be 70 percent. As groundwater elevations change within the Salinas Valley, variable pumping costs adjust accordingly.
- Applied water: Applied water is the amount of water applied by the irrigation system to an acre of a given crop for production in a typical year. Variation in rainfall and other climate effects will alter this requirement. Additionally, farmers may deficit irrigate crops or substitute other inputs in order to reduce applied water. Applied water per acre (base) requirements for crops in the SVAP model are derived from the DWR agricultural land and water use estimates data[32]. Water supply is calibrated to Salinas Valley groundwater model data.
- Other economic parameters: The economic model requires a number of economic response parameters, called elasticities, to estimate rates of change in variables. An elasticity is the percent change in a variable, per unit of percent change in another variable or parameter. Long run acreage response elasticities are used for this analysis. Other elasticities including income, demand price, and population (among others) are representative of statewide market conditions in California, or in the export market as appropriate.

**Water Supply**

Salinas Valley water supplies include ground, surface, and recycled water. Inputs to the SVAP model include ground, surface, and recycled water by WBA (model region). Water inputs are from the groundwater model data provided by the Monterey County Water Resources Agency's Groundwater Extraction Management System (GEMS), the Salinas Valley Basin Groundwater Sustainability Agency's Groundwater Sustainability Plans, agricultural water demand estimates informed by DWR's agricultural land and water use estimates, and agricultural land use data from DWR's Land Use Mapping.

### SVAP Model Application

The SVAP model is applied to evaluate the 30 percent and 50 percent NAA scenarios. The difference between current conditions and the NAA scenario provides a measure of the avoided cost (economic benefit) of the BGRP and AWSP for defined economic metrics. All values are adjusted for inflation using the GDP-IPD and reflect current (2025) dollars.

---

[32] https://water.ca.gov/Programs/Water-Use-And-Efficiency/Land-And-Water-Use/Agricultural-Land-And-Water-Use-Estimates

**Discussion**

An important application of a calibrated model linked to results from physical groundwater models is that effects far outside the range of historical or recent conditions can be evaluated. This feature is essential to evaluate the NAA's potentially severe restrictions on pumping and other factors such as the interaction of groundwater quality with crop yield and returns and complicated market conditions for Salinas Valley commodities.

The calibrated economic model is preferred to other farm budget or similar approaches, and includes as special cases some of these approaches. The results of the analysis can equivalently translate into farm budgets and land values. The following summarizes the calibrated model application and comparison to other related analysis approaches:

- **Calibrated economic model**. A calibrated economic model was applied to this analysis. It reflects local returns and market conditions for farming and links directly to groundwater and water quality inputs. It simulates the responsiveness of crop price and production to changes in the NAA and project alternatives and produces representative estimates of project economic benefits to agriculture.
- **Farm budgets**. The calibrated economic model is equivalent to a farm budget approach – it includes farm budgets as its fundamental input data. Farm budgets differentiate between variable and fixed costs and reflect local conditions in the Salinas Valley. The net return to farming in the calibrated economic model is equal to the farm budget inputs. In contrast to farm budgets, the calibrated economic model evaluates how price, acreage, production, and costs respond to changes in groundwater supply and quality.
- **Land values**. The value of land is the capitalized value of the net income stream that can be generated from the land, plus other property-specific factors such as urban proximity and other improvements. Salinas Valley agricultural land is valued between $35,000 and $75,000. The highest-value land is located around the City of Salinas, reflecting both its prime agricultural potential and the premium associated with parcels near urban boundaries due to development pressure. Land sales in the Castroville area have occurred at a significant discount, influenced by higher fees including MCWRA's Zone 2B assessment[33], CSIP water costs, and the risk of SWI. Trends for vineyards follow a similar pattern, with the highest recent sales on lands east of Gonzales. The net returns in the farm budgets in the calibrated economic model results in a capitalized value of $30,000 to $80,000 per acre, which is consistent with observed agricultural land values.
- **Lease rates**. A lease rate is an outcome of a negotiation between the landowner and grower. It effectively splits net returns to the land. Specific terms vary by parcel and lease agreement (e.g., party responsible for paying taxes, providing water, etc.). Land rental

[33] MCWRA's Zone 2B covers 195 parcels near the City of Castroville. The charge for 2024-2025 was $355.44 per acre.

rates reported in recent UC cost studies are around $3,200 per acre. Rental rate ranges reported by the American Society of Farm Managers and Rural Appraisers (ASFMRA) were between $500 and $4,000 in the valley, which is consistent with informal feedback from interviews with local experts. Capitalized lease rates are approximately half of the land value, reflecting an approximately even split between grower and landowner (on average – individual leases will vary).

- **Water markets**. There is currently no water market in the Salinas Valley. This is not an appropriate method for valuing water supply in the Salinas Valley.

In short, the calibrated economic model is an appropriate method for valuing benefits of the project and economic impacts of land fallowing. Farm budgets and other data are important for including in the model calibration and analysis, and may be applied to specific economic assessments. The evaluation of the NAA and project alternatives warrants a calibrated economic modeling framework able to evaluate the response to substantial changes in resource availability.

**Urban Water Supply Economic Model**

The economic benefit of project water supplies for urban areas applies the shortage-cost economic demand function method[34]. This quantifies how consumers adjust water use as available supply declines and prices—or implicit scarcity costs—increase. It measures the change in consumer surplus (benefits) and can be extended to measure the change in producer surplus.

An own-price elasticity of demand of -0.6 was applied based on estimates from other studies[35]. This may be refined in future analyses. As supply constraints reduce available water below baseline demand in the NAA, the model evaluates the associated loss in consumer surplus—the area between the demand curve and the constrained quantity—which represents the economic cost of shortage to households and businesses.

This analysis does not measure producer surplus changes, but the analysis can be extended in the future to consider these changes. The demand function is parameterized using price elasticity, and urban demand baselines. The model computes the incremental scarcity value of water under constrained conditions and the total economic loss to consumers from foregone water use. Changes in water sales revenue are not tracked but can be added in future iterations of this analysis and would quantify financial impacts on water suppliers (e.g., reduced volumetric revenue and offsetting rate adjustments).

[34] Water Storage Investment Program. Technical Reference Document. 2016.

[35] Bruno, E. M., & Jessoe, K. Using Price Elasticities of Water Demand to Inform Policy, 2021

# Appendix B. Impacts for Planning and Analysis Model (IMPLAN)

This appendix provides an overview of the IMPLAN input-output model applied to evaluate Salinas Valley water-dependent industries (primarily, agriculture).

### IMPLAN Model Overview

The IMPLAN model is developed by MIG, Inc. IMPLAN is a widely used regional input–output platform that models how changes in spending in one part of the economy ripple through related industries and households. It has a series of accounting matrices that estimate the purchasing relationships between defined sectors that represent components of the economy (e.g., real estate, wholesale trade, nut farming, etc.). There are 440 sectors in the default IMPLAN model.

IMPLAN estimates the direct, indirect, and induced economic effects from a change in industry spending (in this case, changes in agriculture resulting from the project). Outputs include employment, income, and spending patterns, as well as estimates of the change in tax base

### IMPLAN Model Application

This analysis applies the IMPLAN Version 3.1 software package and the 2014 IMPLAN economic data file. The 2014 datafile was compared to more recent IMPLAN versions and determined to be representative of industry spending linkages. All values are adjusted for inflation and reported in current (2025) dollars. Key model application components include:

- **Region**: Model data for Monterey County is included. This defines the economic region.
- **Model**: Version 3.1 software; 2014 data file. Default IMPLAN sectors are applied. Industry data was reviewed, but no adjustments were made for this initial analysis.
- **Industries**: Economic contribution analysis includes the farming industries and agricultural support industries (sectors 1 – 19). The regional effects analysis includes the IMPLAN commodity sectors.
- **Inflation adjustment**. All values are adjusted for inflation using the GDP-IPD to the current year (2025).

Table 36 summarizes the IMPLAN sectors and corresponding example crop types.

**Table 36. IMPLAN Sector and Example Crops**

| IMPLAN Sector | Selected Example Crops |
|---|---|
| Grain farming | Wheat and other grains |
| Vegetable and melon farming | Lettuce, vegetables, crucifers, etc. |
| Fruit farming | Berries, vineyards |
| Tree nut farming | N/A |
| All other crop farming | Hays, other field crops |

The IMPLAN model was applied for the regional effects analysis. The analysis is a preliminary economic assessment that may be refined under future work streams if customized IMPLAN sectors are developed.