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# **Sustainability Strategy Report: SVBGSA Round 2 Sustainable Groundwater Management Grant**

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## ACRONYMS & ABBREVIATIONS

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180/400 Subbasin.....	180/400-Foot Aquifer Subbasin
AACE.....	Association for the Advancement of Cost Engineering
AFY.....	acre-feet per year
ASR.....	Aquifer Storage and Recovery
AWSP .....	Alternative Water Supply Project
BEA.....	Commerce Bureau of Economic Analysis
BGRP .....	Brackish Groundwater Restoration Project
BODR .....	Basis of Design Report
CEQA.....	California Environmental Quality Act
cfs.....	cubic feet per second
CIPs.....	capital improvement projects
CSIP .....	Castroville Seawater Intrusion Project
DWR .....	Department of Water Resources
Eastside Subbasin....	Eastside Aquifer Subbasin
GDP.....	gross domestic product
gpm .....	gallons per minute
GSP .....	Groundwater Sustainability Plan
IIS.....	Integrated Implementation Strategy
M1W .....	Monterey One Water
MCWDGSA.....	Marina Coast Water District Groundwater Sustainability Agency
MCWRA .....	Monterey County Water Resources Agency
MGD .....	million gallons per day
mg/L.....	milligrams per liter
MO .....	Measurable Objective
MT.....	Minimum Threshold
NAA.....	No Action Alternative
NAVD.....	North American Vertical Datum
NEPA .....	National Environmental Policy Act
NPV.....	Net Present Value
NSIP.....	New Seawater Intrusion Project
O&M.....	operations and maintenance
PMA.....	project and management action
PV .....	present value
RMUs.....	Remote Monitoring Units
RO .....	reverse osmosis
SGM R1 Grant .....	Sustainable Groundwater Management Round 1 Implementation Grant
SGM R2 Grants.....	Sustainable Groundwater Management Round 2 Implementation Grants
SGMA .....	Sustainable Groundwater Management Act

SMC	Sustainable Management Criteria
SRDF	Salinas River Diversion Facility
SVBGSA	Salinas Valley Basin Groundwater Sustainability Agency
SVIHM	Salinas Valley Integrated Hydrologic Model
SVOM	Salinas Valley Operational Model
SVRP	Salinas Valley Reclamation Project
SWI	seawater intrusion
SWIM	Salinas Valley Seawater Intrusion Model
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geological Survey

# 1 INTRODUCTION

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Following the passage of California’s Sustainable Groundwater Management Act (SGMA), local agencies formed the Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) in 2017. SVBGSA has full or partial jurisdiction over 6 of the 9 subbasins in the Salinas Valley Groundwater Basin:

- 180/400-Foot Aquifer (180/400) Subbasin (3-004.01)
- Eastside Aquifer (Eastside) Subbasin (3-004.02)
- Forebay Aquifer (Forebay) Subbasin (3-004.04)
- Upper Valley Aquifer (Upper Valley) Subbasin (3-004.05)
- Langley Area (Langley) Subbasin (3-004.09)
- Monterey Subbasin (3-004.10)

SVBGSA shares jurisdiction over portions of the Monterey, 180/400, and Forebay Subbasins with the Marina Coast Water District Groundwater Sustainability Agency (MCWDGSA), the County of Monterey Groundwater Sustainability Agency (MGSA), and the Arroyo Seco Groundwater Sustainability Agency (ASGSA), respectively.

Groundwater levels in the 180/400 Subbasin, Monterey Subbasin, and Eastside Subbasin are well below sea level, contributing to extensive inland intrusion of seawater into previous freshwater aquifers over the last 80 years. Over 95% of water used within the Salinas Valley is sourced from managed groundwater resources, providing for domestic, agricultural, and environmental uses. Seawater intrusion has significantly degraded groundwater resources in portions of the 180/400 Subbasin and Monterey Subbasin and is a key reason the California Department of Water Resources (DWR) classifies the 180/400 Subbasin as high priority and critically overdrafted. The Eastside and Langley Subbasins are classified as high priority and the Monterey, Forebay and Upper Valley Subbasins are classified as medium priority.

SVBGSA submitted the 180/400 Subbasin Groundwater Sustainability Plan (GSP) in 2020, and DWR approved it in June 2021. SVBGSA and partner GSAs submitted the GSPs for the Eastside, Forebay, Langley, Monterey, and Upper Valley Subbasins in 2022, and DWR approved them in April 2023. The GSPs establish Sustainable Management Criteria (SMC) for the 6 sustainability indicators required by SGMA. While seawater intrusion and chronic groundwater level declines are of concern particularly in the 180/400 and Monterey Subbasins, groundwater levels are the main sustainability criteria of interest in the Eastside, Forebay, Langley, and Upper Valley Subbasins. The GSPs outline projects and management actions (PMAs) designed to

achieve and maintain sustainability within 20 years of the initial GSP. SVBGSA prepared Amendment 1 to the 180/400 Subbasin GSP in 2022 and submitted it in 2025 (SVBGSA, 2025a). DWR is currently reviewing Amendment 1 concurrently with the GSP 5-year evaluation. SVBGSA is preparing GSP 5-year evaluations for all 6 subbasins for submittal in January 2027.

On January 1, 2024, DWR awarded SVBGSA a \$10,393,900 Sustainable Groundwater Management Implementation Round 2 Grant for the Salinas Valley (SGM R2 Grant). This critical funding has supported numerous activities over 2 years to improve groundwater conditions, fill data gaps, and conduct feasibility studies for potential PMAs, building on work SVBGSA completed with its SGM Round 1 Grant (SGM R1 Grant) and complementing work completed under the SGM R2 Grant for the Monterey Subbasin. The feasibility studies prepared with the grant funding develop critical information to support understanding of the effectiveness of the main types of PMAs through which groundwater can be managed sustainably: increasing recharge, reducing extraction, providing alternative water supplies, and a seawater intrusion extraction barrier.

This Sustainability Strategy Report (Report) summarizes outcomes of the PMA investigations funded by the SGM R2 Grant for the Salinas Valley with a focus on groundwater sustainability in the Eastside, Langlely, Forebay, and Upper Valley Subbasins. Seawater intrusion in the 180/400 Subbasin could impact groundwater supplies in the Eastside and Langlely subbasins if not addressed. As SVBGSA is working toward groundwater sustainability across all subbasins, information gained from these grant-funded activities is used to further our understanding in all applicable subbasins. This valley-wide approach means these grant-funded activities may have ancillary benefits to the 180/400 and Monterey Subbasins. The report builds on the Project Update Report for the 180/400 Subbasin<sup>1</sup> (SVBGSA, 2025b). SVBGSA and MCWDGSA are also preparing the Monterey Subbasin Project Update Report concurrently, with some overlap in the projects discussed in this report as well as additional projects proposed by MCWDGSA and other considerations for that subbasin.

This Report summarizes technical analyses, groundwater modeling results, preliminary cost information, economic analysis, and financial analysis for the several PMAs evaluated through the grant term. It is intended to inform ongoing work and future decision making for the next phase of GSP implementation. Project concepts will continue to be refined and looked at in conjunction with other PMAs. SVBGSA is working toward an integrated implementation approach on SGMA compliance activities across all subbasins within its jurisdiction.

SVBGSA's work on potential PMAs is being considered in parallel with the efforts of other water management agencies throughout the Salinas Valley and other necessary water projects being studied (e.g., dam repairs, regional wastewater treatment upgrades, and other water supply

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<sup>1</sup> Available at: <https://svbgsa.org/wp-content/uploads/2025/12/180-400-SGM-R1-Project-Update-Report.pdf>.

projects). The PMA findings discussed in this Report provide an account of progress within a broader, multi-phase planning process; nothing in this report constitutes or indicates a final project selection or investment decision.

## 2 CONTEXT

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The Salinas Valley covers an area of approximately 1,000 square miles with a footprint of over 250,000 acres (around 335,000 harvested acres) of irrigated crops—including lettuce, strawberries, broccoli, artichokes, and wine grapes—generating over \$3.9 billion in gross annual value at the farm level. Managed groundwater resources provide drinking water for more than 400,000 people in urban and rural communities in the Salinas Valley. The sources of groundwater recharge include precipitation, return flows from applied irrigation water, and streambed percolation from the Salinas River. Agriculture heavily relies on managed groundwater resources, accounting for about 90% of the extractions in the Salinas Valley. Agriculture also directly provides more than 1 in 5 jobs in Monterey County, with growers producing a substantial share of seasonal leafy green production for domestic markets (Monterey County Farm Bureau, 2024).

MCWRA owns and operates Nacimiento and San Antonio Reservoirs, which release water into the Salinas River for beneficial uses. In addition, since 1998, MCWRA and Monterey One Water (M1W) have cooperated to implement the Monterey County Water Recycling Projects. This includes the Salinas Valley Reclamation Project (SVRP), which provides tertiary treatment of municipal wastewater and delivers it to Castroville Seawater Intrusion Project (CSIP) to augment groundwater supplies for agricultural irrigation on about 12,000 acres in the seawater-intruded area near Castroville. In 2010, MCWRA began to operate the Salinas River Diversion Facility (SRDF) to add treated surface water to the CSIP water supply. This was done as part of the Salinas Valley Water Project, which resulted in reoperation of the reservoirs to release additional stored water during the summer when it is needed for irrigation. MCWRA operates the reservoirs for multiple purposes including recharge of the Salinas Valley groundwater basin, re-diversion of surface water at the SRDF, recreational use at the reservoirs, and incidental power generation. Reservoir operations also consider flood control and environmental considerations such as fish and wildlife habitat and migration. MCWRA is currently developing the Salinas River Operations Habitat Conservation Plan to obtain federal Endangered Species Act (ESA) permits for its water management activities associated with these projects.

Figure 1 shows the Salinas Valley Subbasins and how releases from Lake Nacimiento and Lake San Antonio recharge the Salinas River, which flows to the coast through the Upper Valley, Forebay, and 180/400 Subbasins.



The southern Salinas Valley subbasins—the Upper Valley and Forebay Subbasins—share a single Basin Fill Aquifer. Over the long term, groundwater levels in these subbasins have generally been stable, though groundwater levels show a slight overall decline. During droughts and years with low river flows, groundwater levels can drop rapidly. However, they typically rebound after wet winters. Historically, these short-term declines have led to some wells going dry during drought periods. The complex interaction between surface water and groundwater in this area further complicates groundwater management. Most wells in the Upper Valley Subbasin are screened at relatively shallow depths within river alluvium. In contrast, the groundwater basin in the Forebay Subbasin deepens and widens, with more heterogeneous hydrogeologic conditions—a complex mix of Arroyo Seco and Gabilan Range alluvial fans as well as interspersed clays that transition northward into aquitards—increasing the overall complexity of the basin.

The Langley Subbasin, located in the northeastern corner of the Salinas Valley, contains a single, thin Basin Fill Aquifer composed of geologic units distinct from those in the southern subbasins. In this area, granitic bedrock rises closer to the surface, and wells are screened within fractured and decomposed granite. This fractured bedrock system results in highly variable groundwater levels that do not show consistent trends in response to precipitation, pumping, or between nearby wells, making groundwater management particularly challenging. Water use in Langley Subbasin is predominantly rural domestic, and groundwater is the sole source of supply.

The Eastside Subbasin's sole principal aquifer is made up of 2 generalized water-bearing zones that have been recognized within the alluvial fan aquifer system: the Eastside Shallow Zone and the Eastside Deep Zone. Together these are commonly considered the Eastside Aquifer and are part of the unconfined Basin Fill Aquifer that extends into the adjacent Langley and Forebay Subbasins. These designations of shallow and deep are not identified as distinct aquifers, as there is no contiguous aquitard separating them. They are only generalized zones of water-bearing sediments with time-correlated depositions that are hydraulically connected to the 180-Foot, 400-Foot, and Deep Aquifers in the 180/400 Subbasin.

Along the coast, the 180/400 and Monterey Subbasins have a layered system of productive aquifers separated by clay-rich aquitards that restrict vertical groundwater movement. A near-surface aquitard covers much of the 180/400 Subbasin, limiting direct recharge from surface water. The upper 2 aquifers—the 180-Foot and 400-Foot Aquifers—are hydraulically connected to the Pacific Ocean, creating pathways for seawater intrusion. As groundwater pumping lowered water levels below sea level, seawater migrated inland through these connections. Pumping has increased in the underlying Deep Aquifers as seawater intrusion has spread in the 400-Foot Aquifer.

The Salinas Valley faces several groundwater challenges caused by pumping more water from the ground than is naturally replenished. These challenges include seawater intrusion near the coast, declining groundwater levels, and loss of groundwater storage. Seawater intrusion is the

primary management concern in the 180/400 and Monterey Subbasins, and the Langley and Eastside Subbasins are vulnerable to it.

Northeast of the City of Salinas, there is a long-standing issue with a large area of low groundwater levels referred to as the Eastside trough. In this area, groundwater levels remain up to 100 feet below sea level. When inland groundwater levels are this low and there are pathways for water to move underground, seawater flows inland and can contaminate freshwater supplies. Ongoing overdraft, along with underground flows between adjacent subbasins, all influence groundwater levels and seawater intrusion. Because these subbasins are connected below ground, seawater intrusion is a regional issue rather than a problem confined to a single subbasin.

### 3 PURPOSE OF THE SUSTAINABILITY STRATEGY REPORT

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The GSPs identified potential PMAs to achieve and maintain groundwater sustainability. Some build on existing projects and facilities that mitigate seawater intrusion, specifically the Monterey County Water Recycling Projects, which the SVRP, CSIP, and the Salinas Valley Water Project/SRDF. Other GSP projects and management action descriptions introduce new concepts, such as additional surface water diversions, a seawater intrusion extraction barrier combined with brackish water treatment and injection injection or direct delivery for a regional supply project, and demand management. Project ideas studied under the SGM R2 Grant include a range of conceptual approaches to achieving the SMC identified in the GSPs. Several preliminary feasibility (planning) studies were prepared to evaluate PMA scenarios, considering whether they are effective at improving groundwater conditions, assessing project costs, and starting to evaluate economic benefits.

The purpose of this Sustainability Strategy Report is to summarize the results of PMA studies funded by the SGM R2 Grant for the Salinas Valley. It discusses what has been learned, as well as challenges and next steps to determine which PMAs should be advanced into the next phase of GSP implementation. Collectively, the SGM R2 Grant work provides critical steps that help the Salinas Valley advance from SGMA planning to implementation. This report highlights several milestones and outlines next steps for PMAs selected to move forward. It should be viewed as a progress update and is intended to both satisfy grant reporting obligations and inform interested parties about groundwater management progress.

This Report summarizes the findings from the following feasibility studies:

- Castroville and Eastside Canals and Alternatives – a river diversion project to source water for recharge or direct delivery
- New Seawater Intrusion Project (NSIP) – direct delivery of alternative supplies of irrigation water for the area intruded or at risk of seawater intrusion not served by CSIP
- Brackish Groundwater Restoration Project (BGRP) – a seawater intrusion extraction barrier project with brackish water treatment and injection of treated water to raise groundwater levels inland of the intrusion front
- This study includes 2 alternatives to the BGRP: a comparable project using other source waters to achieve the seawater intrusion minimum threshold, referred to as the Alternative Water Supply Project (AWSP), and a No Action Alternative (NAA), a scenario used for an economic analysis that aims to address seawater intrusion without an infrastructure project.
- Demand Management – management actions that reduce extraction
- Enhanced River Recharge – investigation of river recharge in the Somavia Road area and options for enhancing recharge along the Salinas River through Multi-Benefit Stream Channel Improvements and the Stream Maintenance Program

## 4 PROJECTS AND MANAGEMENT ACTION FEASIBILITY STUDIES

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SVBGSA has been undertaking various feasibility studies and analyses to help assess options for GSP implementation and inform a project selection process. The discussion below focuses on recent feasibility efforts to achieve SGMA compliance and sustainability, focusing mainly on the efforts funded by the SGM R2 Implementation Grant for the Salinas Valley. The grant-funded feasibility studies for new PMAs include those providing alternative supplies, increasing groundwater recharge, and reducing demand. The studies focused on the extent to which these types of projects could help meet the SMC for groundwater levels and seawater intrusion established within SVBGSA's GSPs. These feasibility studies are complementary to work completed under the SGM R2 Grant for the Monterey Subbasin and build on the work completed under the SGM R1 Grant on CSIP optimization, Aquifer Storage and Recovery (ASR), BGRP, and demand management.

Section 4.1 begins with describing the PMA planning process. Section 4.2 shows the Baseline Scenario groundwater conditions to which PMAs are compared. This is a status quo groundwater modeling scenario showing the anticipated groundwater conditions if no additional PMAs are implemented. Section 4.1 describes the methods used for an economic analysis. Each PMA subsection describes the project concepts or scenarios evaluated, the effect on groundwater conditions, costs and economic analysis, and key findings.

### 4.1 PMA Planning Process

Evaluation of supplemental projects and demand management is an iterative process designed to screen, refine, and ultimately select the most appropriate and cost-effective investment options that achieve SGMA compliance. This planning process is brought together in 1 or more project feasibility studies. Feasibility studies provide a structured framework to compare project alternatives on a consistent basis, identify tradeoffs, and inform decision making before significant capital commitments are made. A feasibility study includes multiple considerations to help ensure that selected investments are not only technically viable, but also can meet environmental, economic, and financial requirements. The SVBGSA is following a deliberative planning process for transparency and ultimately the recommendation of sound investment decisions.

Project feasibility is evaluated across 4 primary components:

- **Technical Feasibility.** This encompasses evaluation of the legal, engineering, scientific, and planning elements for the project. Project technical components and configuration are developed and refined in coordination with other project feasibility elements. SVBGSA has completed substantial work on technical elements for project feasibility investigations, including:
  - Groundwater modeling to evaluate project alternatives and scenarios.

- Legal considerations including existing laws, water rights frameworks, and other regulations.
- Project engineering –evaluating whether projects can be practically designed, constructed, operated, and maintained using available engineering methods and within site-specific constraints. The engineering assessment includes conceptual design alternatives, construction, compatibility with existing infrastructure, operations, preliminary cost estimates, and project schedule.
- Other technical evaluations, which include but are not limited to evaluating project performance, risk, and interaction with other planned projects.
- **Environmental.** Evaluates potential environmental impacts and consistency with environmental compliance obligations. This would include a preliminary evaluation of impacts to environmental resources such as water quality, groundwater and surface water interactions, biological resources, wetlands, air quality, noise, cultural and tribal resources, land use, and environmental justice communities. Potential project impacts are identified at this stage, including an assessment of how impacts can be avoided, minimized, or mitigated to less-than-significant levels. This aspect of feasibility includes evaluation of all environmental and permitting requirements that must be addressed including compliance with California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), and other applicable review and permitting processes.
- **Economic.** Examines whether the project generates sufficient economic benefits to the region to justify its total economic costs over the life of the project. The economic evaluation monetizes project benefits—and qualitatively evaluates non-monetizable project benefits—and compares those benefits to appropriately standardized project costs. An economic feasibility determination is an assessment of whether the project is a good investment for the region. A project may be economically feasible—creating net value for the region—even as additional work is needed to determine how costs are allocated, financed, or recovered from specific users. Economic feasibility may be assessed through different approaches as appropriate for each project including cost-effectiveness, benefit-cost ratio, or net present value (NPV).
- **Financial.** Establishes that there is sufficient payment capacity by assessing whether available funding sources, rates, assessments, grants, and financing can support capital, operations, maintenance, and debt service over time. This financial assessment starts with a cost allocation method. Cost allocation applies standard methods to split project costs into separable cost categories and then apportions costs to project beneficiaries using the results of the economic feasibility assessment (i.e., monetized project benefits). Financing options—such as grants, bonds, and ratepayer contributions—will be explored to evaluate what may be applicable to each project. A project is financially feasible if all capital, debt service, operating, and reserve costs—after appropriately allocating costs—can be paid through all available funding sources and financing options.

Not all components have been thoroughly assessed and evaluated through the work performed under the grant. SVBGSA will continue to address some of the above feasibility considerations as it moves into the next phase of GSP implementation.

Other considerations are important elements of the PMA selection and evaluation process. Stakeholders and community acceptance will be key determinants of project success. Outreach to local communities, landowners, and water users will be conducted to gauge support and address concerns. Agency partnerships will also play a critical role, as collaborative implementation across GSAs, municipalities, and other entities strengthens project viability. PMAs with broad social and political support are more likely to avoid opposition and delays.

The PMA planning process begins with a clear “purpose and need” statement, which shapes the definition of the project alternatives and frames the evaluation of potential PMAs. For SVBGSA, the purpose and need centers on achieving groundwater sustainability, as defined by SGMA and GSPs, while minimizing economic impacts to the region’s agricultural economy and communities.

PMA planning includes identifying both individual PMAs and combinations of the PMAs that could be implemented together. Options will be assessed for technical performance, costs, anticipated benefits, economic feasibility, and effects on sustainability indicators. Future stages of PMA planning will also consider cost allocation approaches, potential external funding, and how local funding may be appropriately attributed to various groundwater users, agencies, and other beneficiaries.

The technical, economic, and financial performance of individual PMAs are compared to a consistent baseline that represents future conditions based on historical hydrology. This is essential for illustrating the effects of each PMA on groundwater conditions and allowing for comparison across multiple potential PMAs. As described further under Section 4.2, the Baseline Scenario developed for this comparison represents conditions if WY 2022 land use and crops remain constant, municipal pumping adjusts according to projected population changes, and no additional PMAs are implemented.

However, this inaction is not a plausible future condition because inaction ultimately would violate the requirements of SGMA. In addition to the Baseline Scenario, a No Action Alternative (NAA) that represents plausible future conditions in the absence of a project to address seawater intrusion was developed as part of the BGRP feasibility study. This study was prepared following U.S. Bureau of Reclamation guidelines for its Title XVI funding program, which requires the No Action Alternative (NAA) for the economic analysis. SGMA outlines the consequence of inaction—probationary designation of 1 or more subbasins and intervention in local groundwater management by the State Water Resources Control Board (SWRCB)—for failing to implement PMA to avoid undesirable results, such as seawater intrusion. The NAA frames future conditions with SWRCB intervention in 1 or more subbasins. The technical, economic, and financial performance of PMAs can then be consistently evaluated as the avoided

cost of SWRCB intervention, with resulting pumping limits, fees, and loss of local control. Such a scenario has not been developed for groundwater levels.

The feasibility work summarized in this report provides an initial screening to identify the most promising PMAs, or combinations of PMAs. These selected options will then move forward for more detailed evaluation, including technical, environmental, economic, and financial considerations. SVBGSA plans to incorporate this work into the Integrated Implementation Strategy (IIS) that supports implementation of the selected PMA portfolio and achievement of groundwater sustainability in all subbasins within SVBGSA's jurisdiction. The IIS will serve as a roadmap for coordinating how the individual GSPs are implemented in a holistic, unified program. It will describe how PMAs are aligned and how SVBGSA will work with the partner agencies to carry out implementation.

Economic and financial analysis of some of the potential PMAs have been completed. Economic and financial analysis serve complementary but distinct purposes. Economic analysis informs whether the project is a good investment by comparing project benefit to project costs. A financial analysis establishes whether and how the project costs will be paid for. The Round 2 grant funding supported components of economic and financial analyses for the PMAs. This includes:

- **Standardizing Project Costs.** Lifecycle cost analysis is applied to standardize PMA costs across different capital, operations and maintenance (O&M), replacement, and other project cost categories. Project cost estimates are still being refined. Lifecycle (annualized) economic costs are presented for each project and project alternatives (sometimes referred to as scenarios) in this Sustainability Strategy Report.
- **Economic Analysis of Project Benefits.** An overview of the economic modeling is applied to quantify avoided losses (costs avoided) and other economic benefits (e.g., productivity improvements) associated with improved groundwater conditions under the various project alternatives.
- **Economic and Financial Feasibility.** As described above, economic feasibility is an assessment of whether benefits are sufficient to justify project costs and can include various metrics for that assessment (e.g., cost effectiveness, benefit-cost ratio, or NPV). Financial feasibility determines project affordability, after establishing a cost allocation, and the ability of beneficiaries to pay (payment capacity). Both are important considerations for developing the portfolio of PMAs.

Further feasibility analyses will continue as needed, alongside refinements to groundwater modeling results, project configurations, and cost estimates. Some projects—such as the BGRP—have an initial feasibility-level evaluation that includes an economic analysis and preliminary financial implications. Other projects are at earlier stages of development and currently include more limited economic analyses focused primarily on estimating, and

standardizing, project economic costs. As project concepts continue to evolve through improved understanding of project operations and groundwater modeling, additional work will be conducted to refine both economic benefits and financial planning.

In summary, SVBGSA's planning process to date has included technical evaluations, preliminary engineering design, and groundwater modeling to establish whether projects can achieve sustainability objectives. Preliminary economic and financial evaluations assess whether those projects are cost effective, affordable, and implementable. The work summarized in this Report provides a structured foundation for comparing alternatives, screening potential PMAs (or portfolios of PMAs), and informing subsequent phases of feasibility analysis, cost allocation, and funding strategy development to be done through the IIS process.

## **4.2 Baseline Scenarios for Analysis of New PMAs**

The potential for PMAs to improve groundwater levels and reduce seawater intrusion is evaluated primarily through groundwater modeling using 2 models: the Valley-wide Salinas Valley Operational Model (SVOM) and the Seawater Intrusion Model (SWIM, or SWI Model). The 2 groundwater models serve complementary purposes and are often used together. The SVOM is the predictive version of the Salinas Valley Integrated Hydrologic Model (SVIHM) and is a coupled surface water–groundwater flow model covering most of the Salinas Valley. For the coastal area affected by seawater intrusion, SVBGSA developed the SWIM, a variable-density groundwater flow model that simulates chloride movement and concentrations in the seawater intruded aquifers. The models have been aligned with consistent layering and similar hydraulic properties, resulting in comparable—though not identical—outputs. Depending on the focus of the analysis and the parameters being evaluated, feasibility studies may rely on 1 model or both.

Modeled PMA groundwater impacts are compared against SVOM and SWIM Baseline Scenarios, which represent projected groundwater conditions with no additional projects or management actions. These Baseline Scenarios reflect a status quo condition with respect to land use and agricultural pumping, with current infrastructure and water project operations remaining unchanged. Municipal pumping changes based on population projections. As a result, the Baseline Scenarios may identify continued impacts to sustainability indicators, including the potential exceedance of defined minimum thresholds.

The projected hydrology used in the SVOM and SWIM Baseline Scenarios is a representative 25-year climate sequence based on historical hydrology, repeated twice over the projection period to support water budget analysis across a range of hydrologic conditions. The sequence corresponds to the hydrology of water years 1993, 2019, 1975, followed by 1999-2020 to best match observed recent conditions and provide a representative mix of wet and dry years. Actual future climate is unknown; however, this provides a representative estimate through which the effects of potential projects can be assessed. The Baseline Scenarios include estimates of sea

level rise, but do not include potential effects from climate change on precipitation or potential evapotranspiration.

The Baseline Scenarios provide a consistent reference for evaluating the physical effects of new PMAs on pumping, groundwater levels, and seawater intrusion. They allow for comparison of near-term groundwater conditions, assuming minimal changes in agricultural, urban, or other water uses beyond actions already implemented. Their purpose is to support a consistent assessment of physical and technical outcomes across PMAs evaluated in this section.

The Baseline Scenarios are distinct from the NAA, which is developed to represent a future “without-project” condition to address seawater intrusion. The NAA considers how basin management and pumping would realistically change in the future in the absence of capital projects. The NAA is different than the Baseline Scenarios. The Baseline Scenario reflects pumping continuing at approximately current levels and is a technical reference for physical impact analysis. The NAA reflects plausible future conditions in the absence of a project to address seawater intrusion for the purpose of project economic analyses.

#### **4.2.1 SVOM Projected Baseline Scenario**

Project scenarios are derived from a common future SVOM Baseline Scenario (Montgomery & Associates [M&A], 2026a) and results are compared to the Baseline Scenario to isolate the effect of the project. SVOM Version 1 (v1) is based on the Salinas Valley Integrated Hydrologic Model (SVIHM) Version 1, an updated version of the original USGS SVIHM. SVIHM simulates coupled surface water and groundwater processes across the Salinas Valley and the dynamic interactions between water supply, water demand, and groundwater flow. Agricultural demands are estimated by the model based on land use and climate inputs and are met through a combination of precipitation, recycled water, surface water diversions and deliveries, and groundwater pumping.

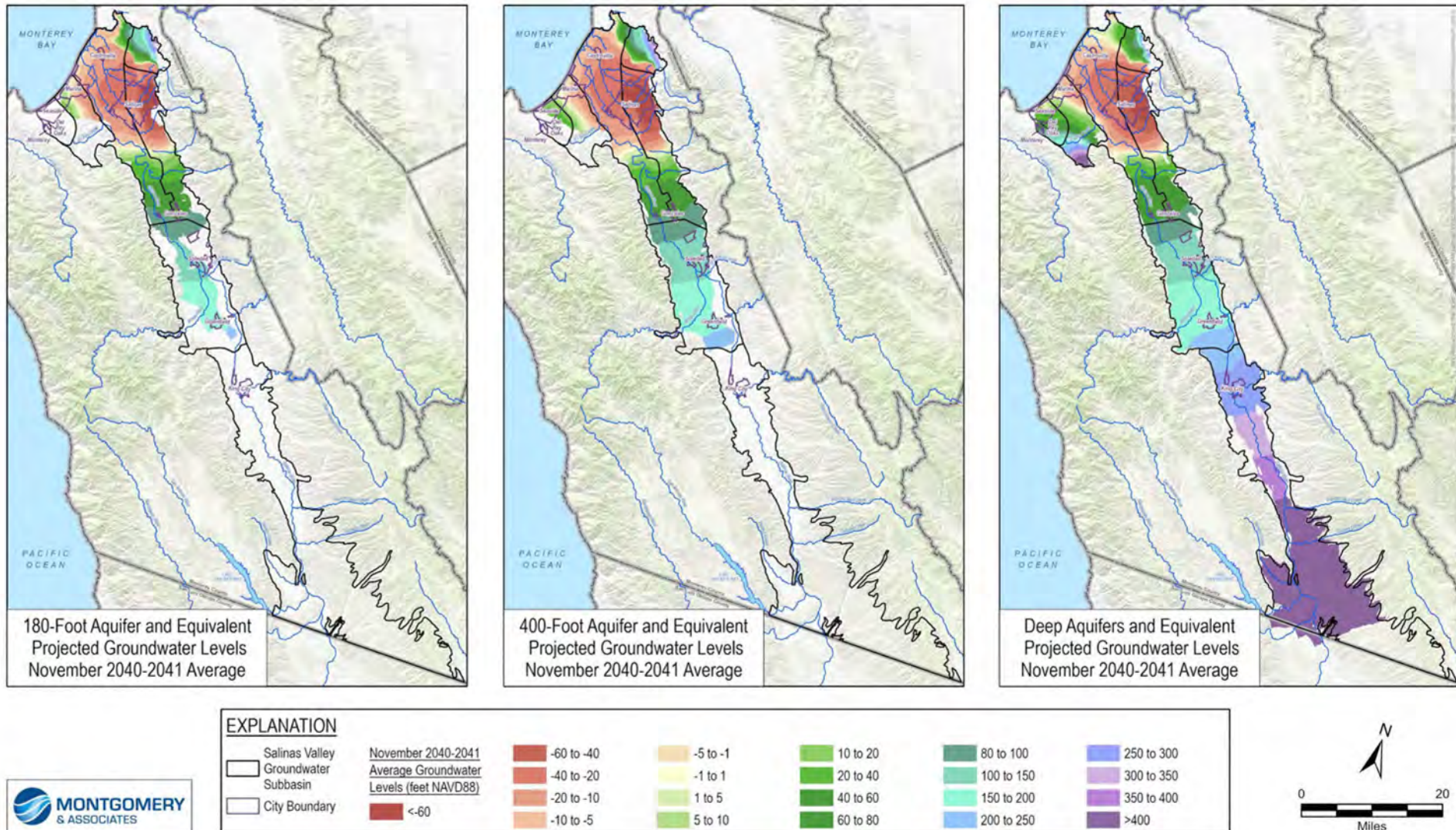
The SVOM Baseline Scenario uses the Surface Water Operations (SWO) module to dynamically simulate operations of Nacimiento and San Antonio Reservoirs. Reservoir releases are calculated in response to climatic inputs, reservoir operating rules, CSIP demands, and simulated Salinas River flows. Salinas river flows are in turn influenced by reservoir releases, tributary inflows, and surface water–groundwater exchange. For project scenarios aiming to isolate the effect of a particular project or management action, the SWO module was omitted, and reservoir releases and SRDF diversions from the future Baseline Scenario were applied as fixed inputs. This approach isolates the groundwater system response to proposed project actions while maintaining consistency in upstream reservoir operations across scenarios.

Figure 2 shows simulated November groundwater elevations averaged over water years 2040 and 2041. This period is used for SGMA evaluation because it represents average conditions and closely aligns with the 2040 and 2042 SGMA compliance milestones. Groundwater elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

Figure 2 includes 3 maps: the first shows groundwater levels in the 180-Foot Aquifer and equivalent water-bearing zones; the second shows levels in the 400-Foot Aquifer and equivalent water-bearing zones; and the third shows levels in the Deep Aquifers in the northern valley and the single aquifers in the southern valley. On these maps, red areas indicate groundwater levels below an elevation of zero, green areas indicate elevations between 0 and 80 feet, and blue and purple areas indicate groundwater elevations above 80 feet.

Although the Deep Aquifers occur only below the 400/Deep Aquitard, the geologic formations that make up the Deep Aquifers extend beyond the mapped extent of the Deep Aquifers identified in the Salinas Valley Deep Aquifers Study (M&A, 2024). As a result, the model layers representing these formations also extend beyond the delineated Deep Aquifer boundaries and are shown together on the same map to represent groundwater levels in those areas. For example, model layer 9 represents the Paso Robles Formation, which extends across the Upper Valley Subbasin. Although most wells in the Upper Valley Subbasin are screened in river alluvium, simulated groundwater levels in the alluvium closely reflect those in the Paso Robles Formation.

Figure 3 shows long-term projected groundwater elevation change between November 2040 and November 2065, representing a full 25-year cycle of average historical climate conditions. Positive values, shown in green, indicate rising groundwater levels, while negative values, shown in red, indicate declining groundwater levels. Across much of the 180-Foot Aquifer, the SVOM projects continued declines of up to 5 feet. Similar declines are projected in the 400-Foot Aquifer and in the Deep Aquifers outside of Monterey and Seaside Subbasins. The SVOM projects groundwater level rises in northern Langley Subbasin; however, projections in this area are more uncertain because the aquifer system consists of fractured bedrock.



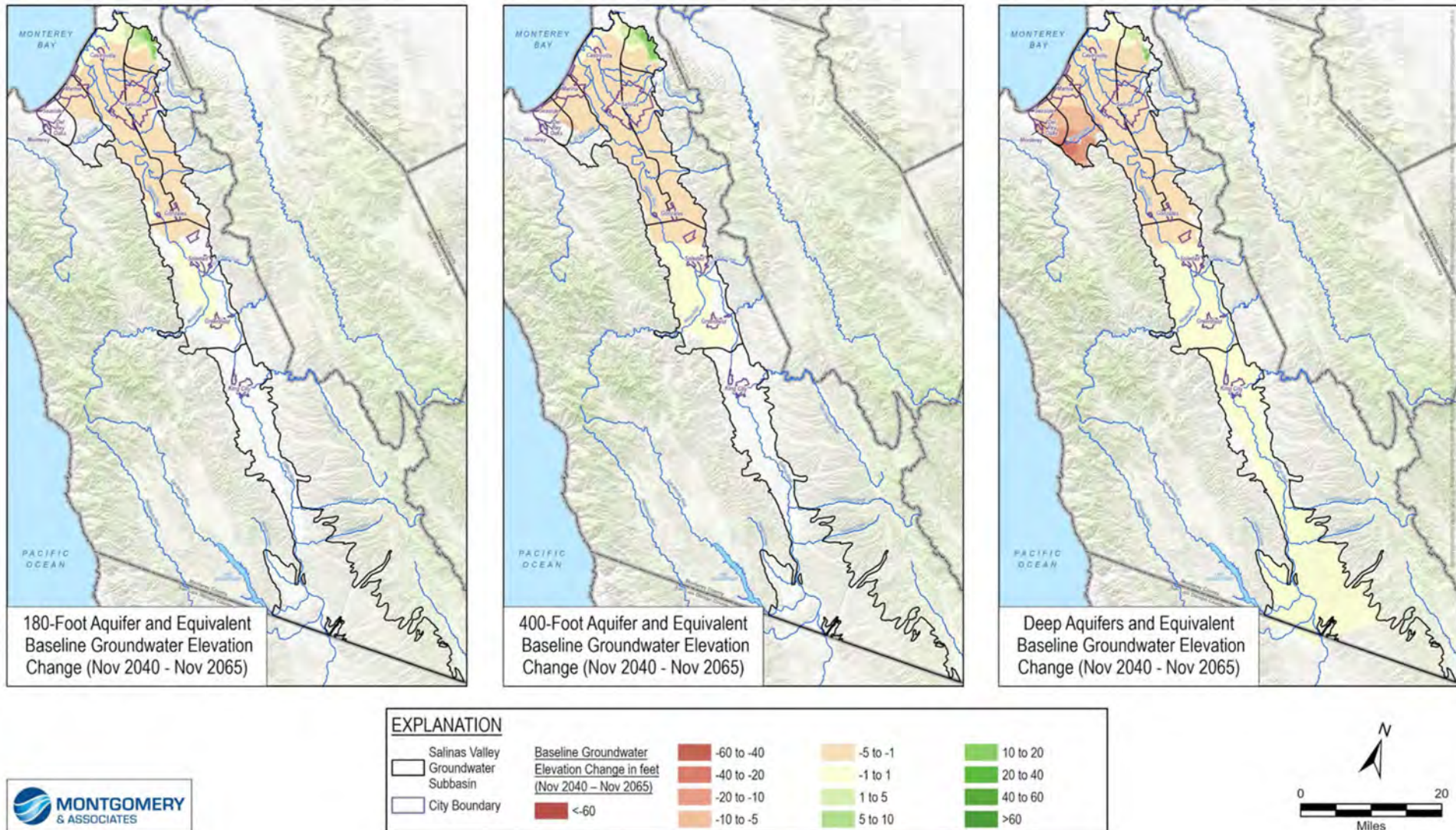


Figure 3. SVOM Baseline Scenario Projected Groundwater Elevation Change

For a preliminary assessment of sustainability with respect to the Groundwater Level SMC, model results are assessed in a similar way to the observed SMC measurement. Simulated groundwater levels within Representative Monitoring Site (RMS) wells are compared to SMC at the 2040-2041 SGMA evaluation period. Since the future climate is unknown, the average of November 2040 and 2041 was selected as the sustainability assessment period since this average is more representative of long-term trends in the model than using 2040 alone. A subbasin or aquifer is considered sustainable if no more than 15% of the wells are below the minimum threshold in any single aquifer. Figure 4 shows the location of RMS wells used for this analysis and whether the well is above the measurable objective (MO), between the measurable objective and minimum threshold (MT), or below the minimum threshold. The model projects that most of the northern portion of the basin will have RMS wells below the minimum threshold. Forebay and Upper Valley show a larger percentage of wells above the minimum threshold and are more likely to maintain and achieve sustainability in the future if conditions are kept similar to today. The Monterey Subbasin is excluded from this analysis since it will be assessed using the SWIM.

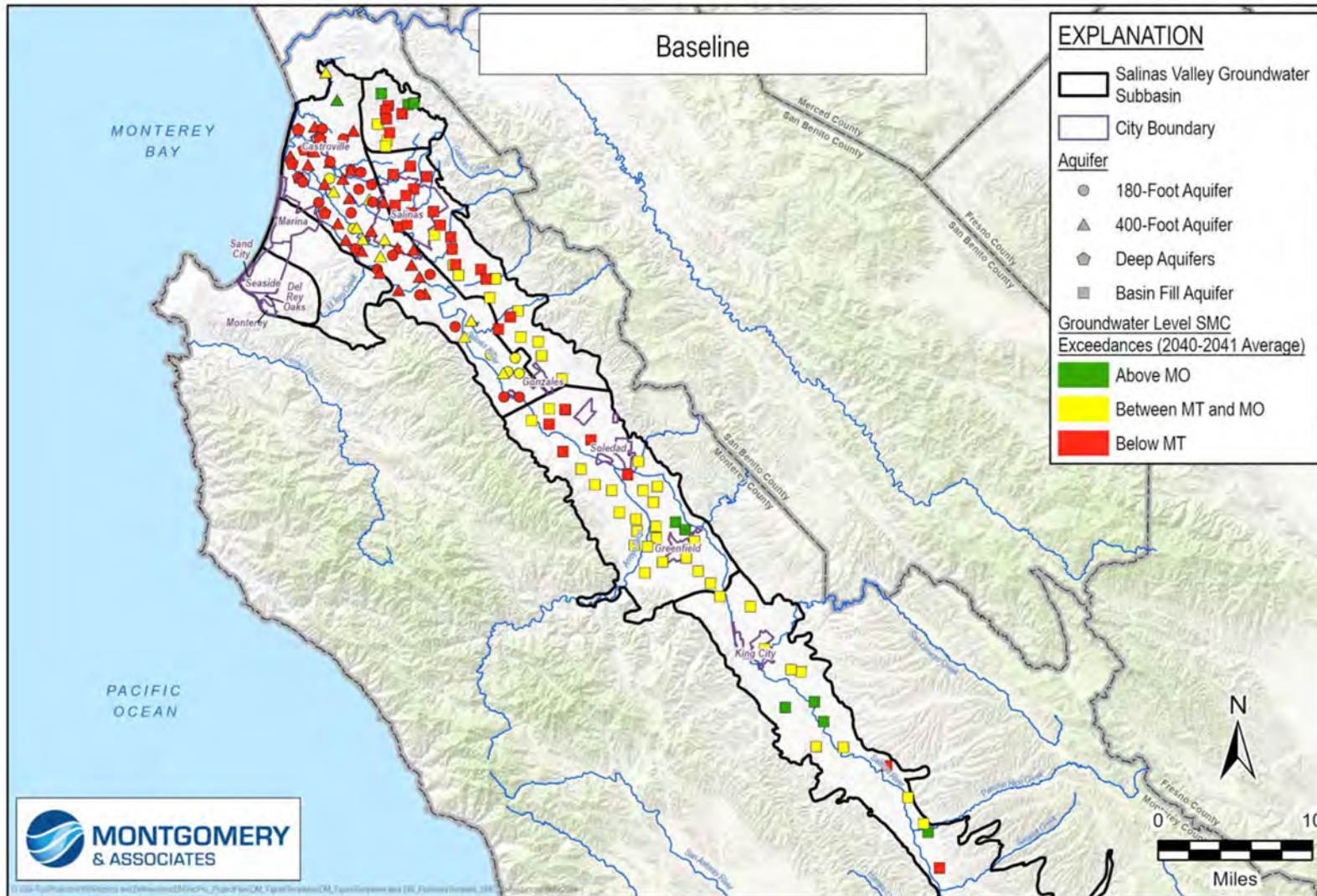


Figure 4. Groundwater Level SMC Exceedances for RMS Wells for 2040-2041 Evaluation Period

## 4.2.2 SWIM Projected Baseline Scenario

The projected SWIM Baseline Scenario (M&A, 2026b) is developed with version 3 (v3) of the SWIM, and it includes similar assumptions to the SVOM Baseline Scenario. It includes the same climate sequence as the SVOM Baseline Scenario. Municipal pumping, agricultural pumping, recharge, and Chualar boundary inputs from the SVOM are included in the SWIM Baseline Scenario.

In the SWIM Baseline Scenario, seawater intrusion in the 180-Foot and 400-Foot Aquifers continues advancing inland from 2020 through 2070, as shown on Figure 5. In both the 180-Foot and 400-Foot Aquifers, seawater intrusion advances inland toward the City of Salinas because groundwater elevations remain below sea level.

Figure 6 shows the projected chloride concentrations for the 180-Foot and 400-Foot Aquifers at 2040. Seawater has a concentration of approximately 19,000 mg/L and the threshold for sustainability is set at 500 mg/L. The color gradation shows the chloride concentration, with the red indicating chloride levels closer to seawater, transitioning to lower chloride concentration in blue. The 500 mg/L chloride isocontour is marked by the black dashed line. The blue colors extend into the Eastside Subbasin, projecting that by 2040, chloride concentrations will begin to increase in the Eastside Aquifer at equivalent depths to the 180-Foot and 400-Foot Aquifers.

Finally, Figure 6 marks the seawater intrusion minimum threshold with a black solid line, showing that at 2040 seawater intrusion is inland of the minimum threshold. While the GSP minimum threshold is established based on the mapped 2017 extent of the 500 mg/L chloride isocontour, the SWIM-simulated 2017 500 mg/L chloride isocontour is shown as the minimum threshold for the purposes of comparing modeling results to other modeling results.

Figure 7 shows the 2040 to 2065 groundwater level change in the SWIM Baseline Scenario. It matches the declining trend of the SVOM Baseline Scenario across most of the northern part of the Valley. Toward the northeastern part of the Eastside Subbasin, the SWIM Baseline Scenario shows slightly larger declines than the SVOM Baseline Scenario, mostly in the 5- to 10-foot range, but also reaching up to 20 feet in the very northeastern corner. Observed groundwater level trends in Eastside Subbasin fall between the more rapid decline simulated by the SWIM and gradual decline simulated by the SVIHM, which suggests projected groundwater levels would decline at rates between the SWIM and SVOM Baseline Scenarios. Overall, both models show a continuation of the declining groundwater level trends.

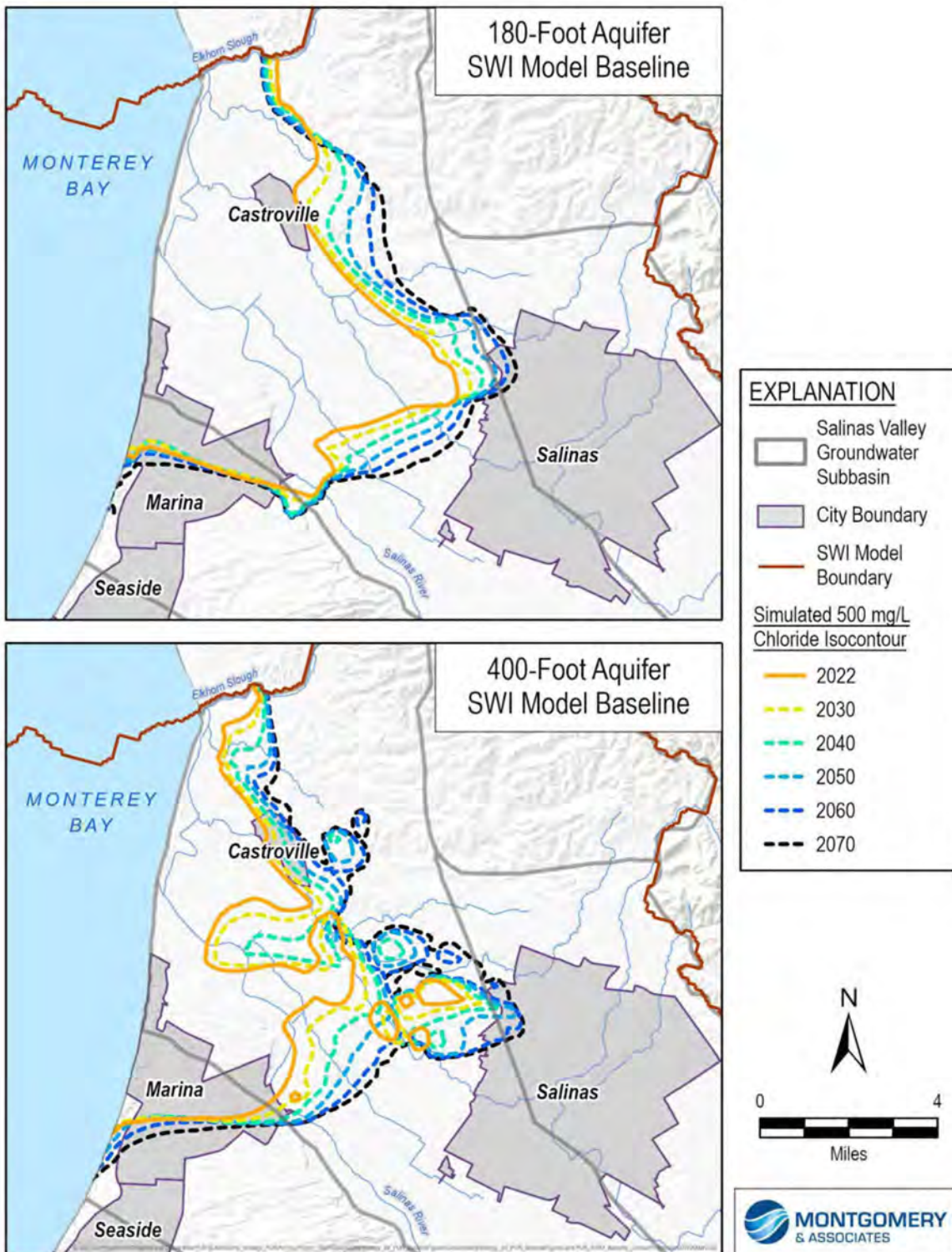


Figure 5. SWIM Baseline Scenario Projected Chloride Isocontour Progression in the 180-Footer and 400-Footer Aquifers

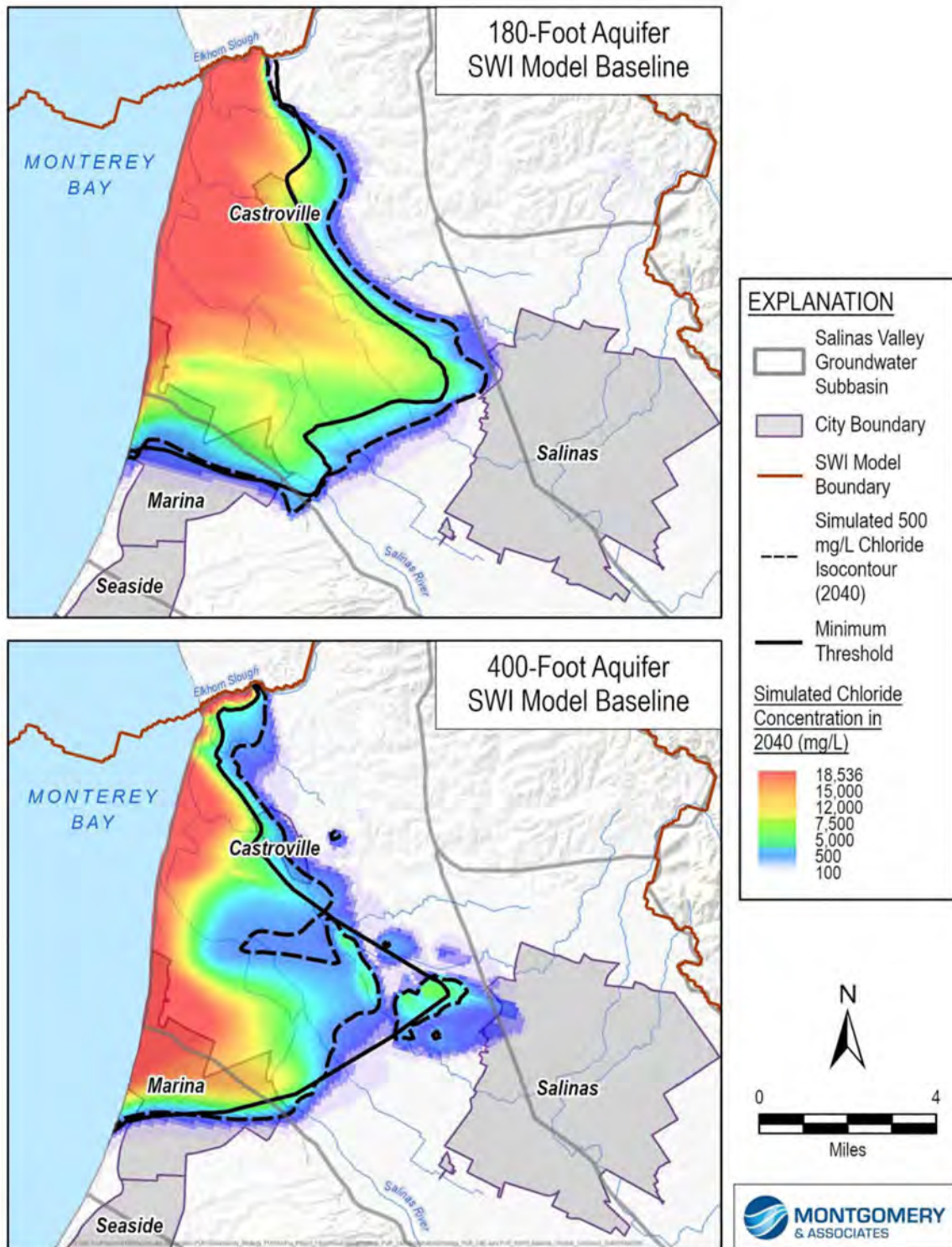


Figure 6. SWIM Baseline Scenario Chloride Concentration in the 180-Footer and 400-Footer Aquifers

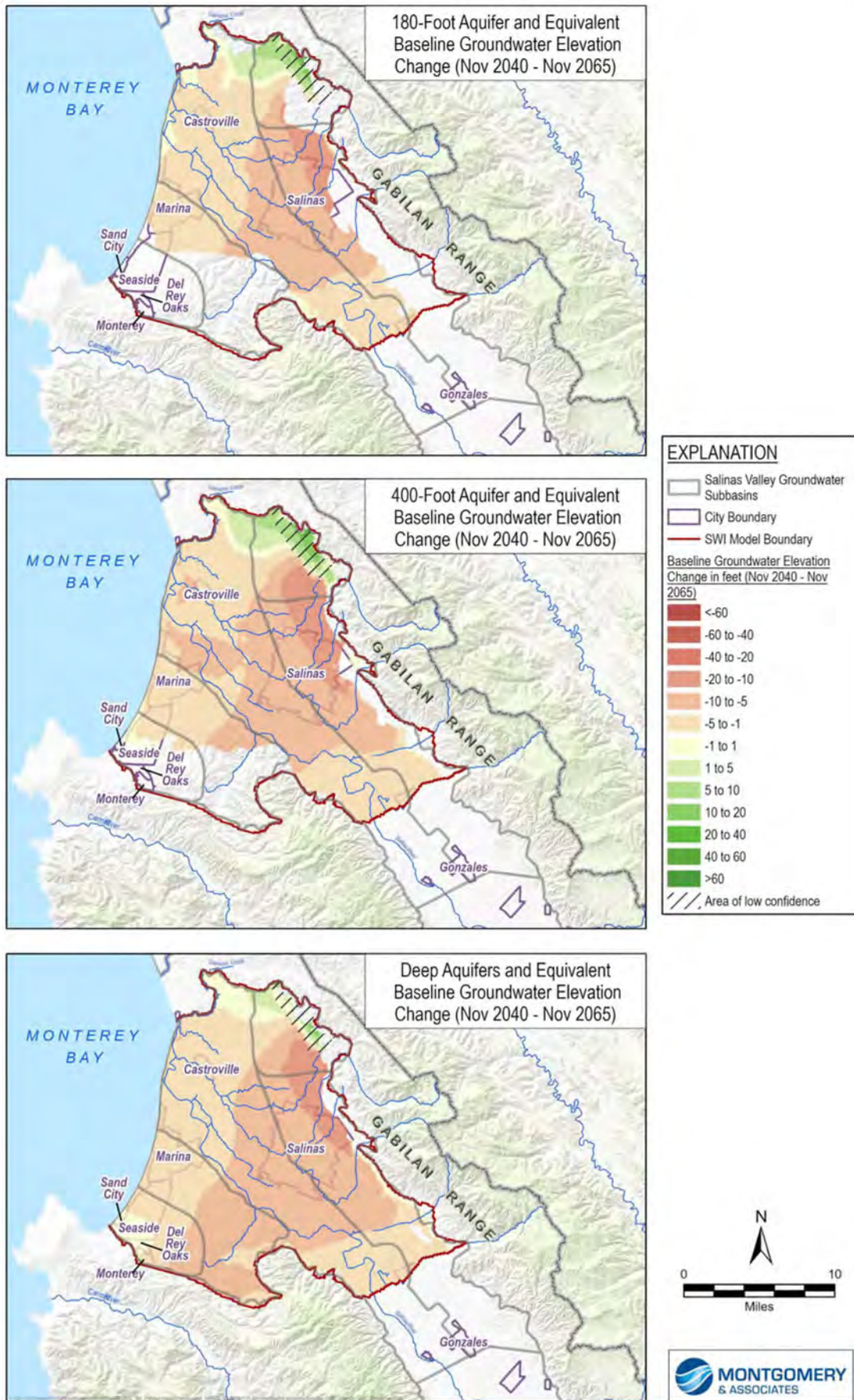


Figure 7. SWIM Baseline Scenario Projected Groundwater Elevation Change

### 4.3 Castroville and Eastside Canals and Alternatives

SVBGSA contracted a team to assess the potential feasibility of a river diversion project and develop project scenarios to help meet SGMA goals. Diversion of available Salinas River water could capture surface water that would otherwise flow to the ocean and provide additional water supplies to areas with low groundwater levels or seawater intrusion. MCWRA holds Water Right Permit 11043 (Permit 11043, or Permit), which provides a conditional right to divert excess Salinas River flows for irrigation and municipal use.

Numerous studies prepared over time have proposed river diversions through this Permit or other means. A historical review of river diversion projects considered in the Salinas Valley found that most project concepts focused on diverting river water for use in the areas of overdraft. Documents outlined the benefit of seasonal storage and identified the simultaneous need for demand management. Earlier concepts did not account for subsequently built infrastructure, nor current regulatory and environmental requirements. The C&E Study provides the necessary framework to modernize and adapt these earlier ideas into feasible, actionable projects.

The Castroville and Eastside Canals and Alternatives Preliminary Feasibility Study<sup>2</sup> (C&E Study, M&A *et al.*, 2026) advanced scoping of a potential river diversion project by conducting a thorough review of the water rights options, historical documents, and infrastructure options, and using the results to develop 4 project concepts: 1 for each of the 4 groundwater goals identified for the C&E Study. Groundwater goals included raising groundwater levels in the central/southern Eastside and 180/400 subbasins, northern Eastside Subbasin and in the Deep Aquifers where there is seawater intrusion. Another groundwater goal identified for the C&E Study is to stop seawater intrusion. If any of these river diversion projects are constructed, diverted flows could partially contribute to the solution for 1 or more of the groundwater goals. Within this project alternative, this report summarizes the 4 project concepts through which the Permit could be used, outlines 8 project scenarios, conducts preliminary feasibility of the most viable concepts, and highlights tradeoffs and considerations of each.

SVBGSA retained a team of consultants for the C&E Study – M&A, Wallace Group Engineering, MBK Engineers, and Denise Duffy & Associates. Each member of the team has specialized expertise relevant to the study and has provided water resources consulting services to the Agencies in the past and contributed to the content of this report. The study was completed jointly with SVBGSA and MCWRA staff to ensure consistency with both agency priorities.

Permit 11043 was issued in 1957, but to date no water has been diverted or used pursuant to the Permit. The main purposes of this C&E Study are to support MCWRA in its use of Permit 11043

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<sup>2</sup> Available at: <https://svbgsa.org/castroville-and-eastside-canals-and-alternatives/>.

for beneficial use, and to understand river diversion project options for achieving groundwater sustainability in the Salinas Valley. SGMA brought a renewed interest in the Permit given the new regulatory requirement to address groundwater conditions, and the C&E Study developed river diversion project concepts that would help meet SGMA goals, including through use of Permit 11043. Amendments to previously filed petitions are likely necessary; more may be needed if a project concept requires storage or other parameters not currently defined in the Permit. Ultimately, these proactive project concepts for how the Permit could be used provide the foundation required to transform this long-standing water right into a functional asset for the Salinas Valley.

To develop the 4 project concepts, the project team conducted interrelated, and often iterative, workstreams on the following:

- **Water Right Options:** Reviewing the Permit to 1) understand its history, status, conditions, and limitations, 2) outline the process to use and modify the Permit, and 3) identify other water rights options.
- **Potential Diversion Rates:** Analyzing historical Salinas River flow data, reservoir release data, and Permit conditions to estimate the approximate timing and amount of surface water that likely could be diverted. This includes calculating the maximum quantity of water that could have been diverted from the River under the Permit historically and estimating future potential flow using a surface water-groundwater model.
- **Project Scenarios:** Identifying conceptual project components, component methods, and potential end-uses and users. Evaluation of these components, infrastructure constraints, and groundwater conditions led to the development of project scenarios for each of the 4 groundwater goals.
- **Effect on Groundwater Conditions:** Using groundwater models to assess general project locations, sizes, and effect on groundwater conditions.
- **Cost Estimates:** Estimating the project cost of each scenario.
- **Permitting and Other Considerations:** Outlining the permitting requirements and other aspects of feasibility that may be informative to the agencies in determining whether to advance the scoping of any of the project scenarios after completion of the study.

#### 4.3.1 Project Concepts and Scenarios

This Study targets 4 groundwater sustainability goals and develops a project concept to address each, some with multiple scenarios building in variation in size or storage locations. The 4 project concepts evaluated represent fundamentally different approaches to using Salinas River

diversions to support groundwater sustainability, each shaped by the physical constraints of the groundwater basin, anticipated diversion volumes, and the regulatory and operational requirements associated with treatment, storage, and delivery. While all scenarios provide some level of benefit, they differ substantially in the extent to which they improve groundwater conditions, the complexity of infrastructure needed, the feasibility of long-term implementation, and the cost per unit of water delivered or recharged.

The 4 project concepts include:

1. **Eastside Recharge Basins** – To address groundwater levels in the central Eastside Subbasin, surface water would be diverted through a pumped direct diversion under a modified 11043 Permit from the Castroville Canal Intake permitted location south of Salinas. Diverted river water would be conveyed via pipeline to sedimentation basins and then surficial recharge basins located in the Eastside Subbasin. To assess a range of project sizes, 4 flow scenarios are included with diversion flow rates at 400, 200, 100, and 50 cfs.
2. **Northern Eastside Injection** – To address groundwater levels in the northern Eastside and southern Langley Subbasins, surface water would be diverted through a pumped direct diversion under a modified 11043 Permit from the Castroville Canal Intake location. Diverted water would be conveyed to a surface storage reservoir to allow for regulation of flows to a treatment plant and more consistent injection. A network of injection wells located in the northern Eastside Subbasin enable recharge below shallow clays that would inhibit infiltration from recharge basins in this area. Two scenarios are included: a 50 cfs diversion sized around capacity of a new surface reservoir at Merritt Lake, and a 100 cfs diversion sized around capacity of a new surface reservoir in the Gabilan Range near Alisal Creek.
3. **Coastal Injection** – To address seawater intrusion, Permit 11043 water would be diverted just upstream of the existing SRDF location using a pumped direct diversion with a capacity of 50 cfs. Diverted river water would be conveyed to a surface storage reservoir at Merritt Lake. Stored water would be treated, delivered to a network of injection wells located just inland of the seawater intrusion front and CSIP system, and injected into the 400-Foot Aquifer. For this scenario, the purpose of use may need to be changed to be a non-extractive beneficial use to prevent seawater intrusion.
4. **NSIP** – Permit 11043 water would be diverted at the Castroville Canal Intake location using a pumped direct diversion and conveyed to a surface storage reservoir at Merritt Lake. Stored water would then be treated and delivered directly to agricultural users in a new NSIP distribution system and could be combined with other water sources further discussed in the NSIP feasibility study.

Of these 4, the first 3 are included in this section, and NSIP results are included in Section 4.5.

Table 1 summarizes the infrastructure requirements for the 3 C&E Study project concepts.

Table 1. Summary of Infrastructure for C&E Study Project Concepts and Scenarios

	Eastside Recharge Basins				Northern Eastside Injection		Coastal Injection
<b>Diversion Rate</b>	400 cfs	200 cfs	100 cfs	50 cfs	100 cfs	50 cfs	50 cfs
<b>Average Annual Amount Diverted</b>	25,800 AFY	17,200 AFY	9,700 AFY	5,100 AFY	9,700 AFY	5,100 AFY	5,100 AFY
<b>Diversion Location</b>	Castroville Canal Intake				Castroville Canal Intake	Upstream of SRDF	Castroville Canal Intake
<b>Pipeline Lengths and Diameters</b>	30"–132"; 128,400'	30"–96"; 76,800'	48"–66"; 43,800'	48"; 24,700'	6"–18"; 133,900'	6"–24"; 133,400'	6"–18"; 62,300'
<b>Above Ground Storage</b>	Recharge basins serve as immediate buffering storage				25,000 AF at Gabilan Range Site	13,000 AF at Merritt Lake	25,000 AF at Gabilan Range site
<b>Treatment</b>	Sedimentation Basin				Treatment to drinking water standards, 13 mgd plant	Treatment to drinking water standards, 6.5 mgd plant	Treatment to drinking water standards, 13 mgd plant
<b>Recharge Basins/ Injection Wells</b>	40 recharge basins of 40 acres	20 recharge basins of 40 acres	10 recharge basins of 40 acres	5 recharge basins of 40 acres	23 injection wells at 13 mgd (20 cfs)	12 injection wells at 6.5 mgd (10 cfs)	10 injection wells at 6.5 mgd (10 cfs)

### 4.3.2 Cost Estimates

Planning-level cost estimates for the C&E project scenarios were developed by the engineering teams – see the C&E Study Appendix J for a greater detail. Project economic costs were developed using a standardized framework that includes and schedules out capital (construction and soft costs), O&M, and long-term replacement components. Project costs are expressed as the present value and the annualized cost per acre-foot of project water. The C&E project water is defined as the average annual volume of water that the project delivers to the groundwater

system through recharge or injection. These estimates are considered conceptual and are expected to be refined as project configurations, infrastructure requirements, and operational assumptions are further developed. Land acquisition costs are included.

Table 2 summarizes the standardized costs of the C&E scenarios. These estimates provide a consistent unit cost for each scenario. The results show that the Eastside Recharge Basin scenarios provide the lowest unit costs, with \$/AF decreasing as project scale increases, reflecting economies of scale in conveyance and recharge infrastructure. The injection-based project concepts (Northern Eastside and Coastal Injection) have substantially higher unit costs—over \$6,000/AF in some cases—due to added treatment, storage, and well infrastructure requirements.

Table 2. C&E Study Estimated Economic Lifecycle Costs

Cost Category	Eastside Recharge Basins				Northern Eastside Injection		Coastal Injection
	400 cfs	200 cfs	100 cfs	50 cfs	100 cfs	50 cfs	50 cfs
Total Construction Cost (\$M)	\$1,391	\$615	\$284	\$140	\$1,017	\$516	\$400
Annual O&M (\$M)	\$24	\$12	\$5	\$2	\$10	\$5	\$3
<b>Present Value Total Cost (\$M)</b>	<b>\$1,932</b>	<b>\$887</b>	<b>\$395</b>	<b>\$195</b>	<b>\$1,343</b>	<b>\$682</b>	<b>\$524</b>
Annualized Cost (\$M)	\$87	\$40	\$18	\$9	\$60	\$31	\$24
Annual Yield (Acre-feet)	26,800	17,200	9,700	5,100	9,700	5,100	5,100
<b>\$/Acre-Foot Cost</b>	<b>\$3,246</b>	<b>\$2,322</b>	<b>\$1,833</b>	<b>\$1,725</b>	<b>\$6,232</b>	<b>\$6,024</b>	<b>\$4,622</b>

### 4.3.3 Effect on Groundwater Conditions

The effect on groundwater conditions of each of the 7 scenarios was evaluated through groundwater modeling with the SVOM or SWIM, in addition to the NSIP scenario that is included in Section 4.6. Each was compared to the Baseline Scenario of the respective model used.

#### 4.3.3.1 Eastside Recharge Basins

All Eastside Recharge Basin scenarios—400 cfs, 200 cfs, 100 cfs, and 50 cfs diversion rates—show that diverting Salinas River water under Permit 11043 and sending it to recharge basins in the Eastside Subbasin leads to higher groundwater levels compared to the Baseline Scenario. These scenarios correspond to average annual diversions of 26,800 AF; 17,200 AF; 9,700 AF; and 5,100 AF.

The largest differences from baseline occur closest to the recharge basins and are larger in scenarios with higher diversion rates and more recharge. The higher-rate scenarios also include basins spread farther north and south of Quail and Alisal Creeks, which—together with the greater recharge volumes—generally helps groundwater level increases extend over a wider area. However, caution should be used with interpreting the 400 cfs scenario, as recharge basins to the northeast of Salinas resulted in mounding and groundwater level increases were not as widely distributed as from basins farther south.

Groundwater responses are not evenly distributed in all directions, reflecting differences in subsurface conditions and the influence of nearby streams. Groundwater level increases are also seen along the Salinas River, which could reduce seepage losses from the river and increase baseflow in some areas.

Figure 8 shows groundwater level differences from baseline for each of the Eastside Recharge Basin scenarios for the 2040-2041 evaluation period. It shows how within 5 years of project operation groundwater levels are higher than the Baseline Scenario across most of the Eastside Subbasin. The greatest differences are closest to the recharge basin locations; however, measurable increases also occur in adjacent 180/400 Subbasin. As described further in the C&E Study report and its Appendix I, differences from Baseline increase over time, varying for wet and dry years since river diversions do not occur in every year.

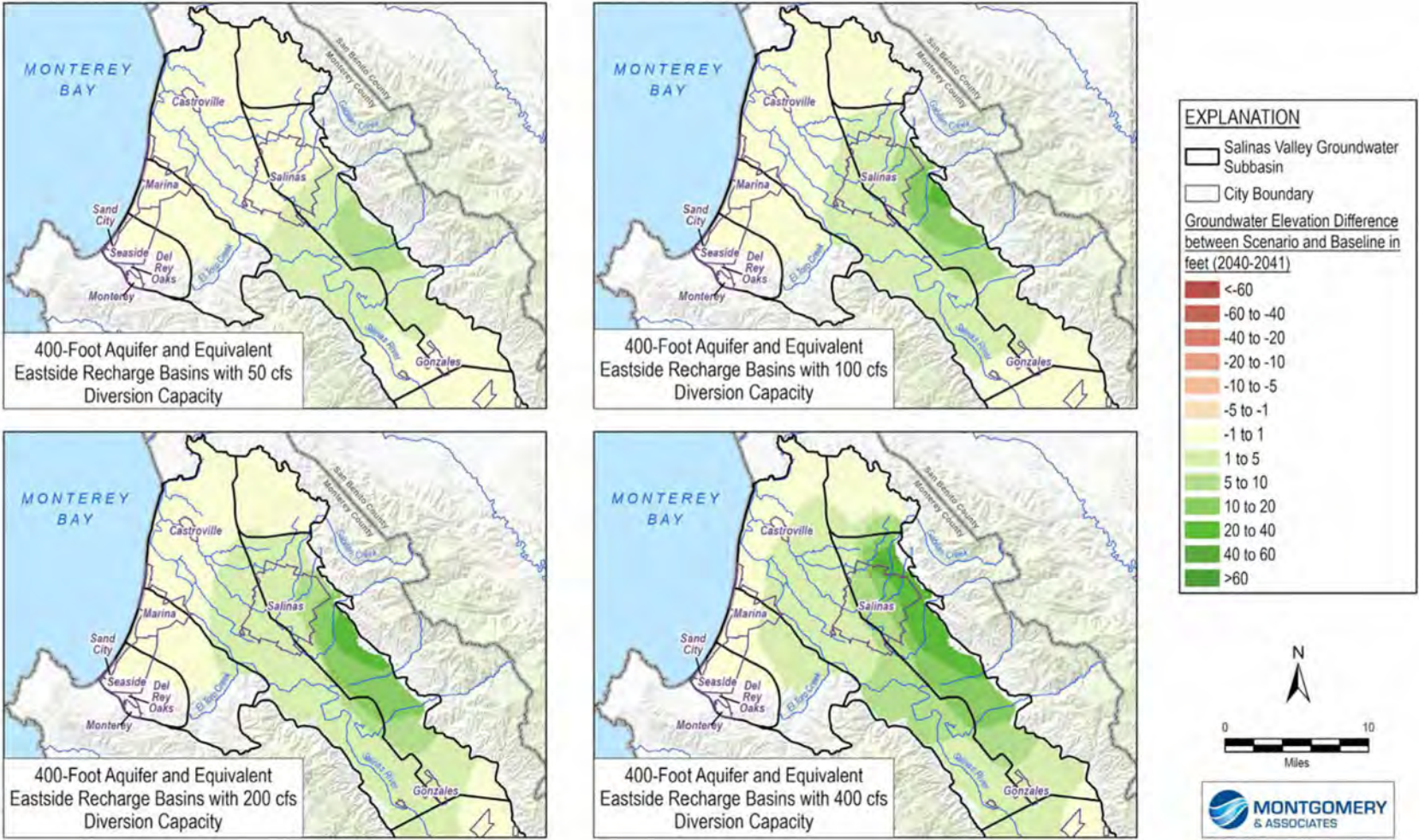


Figure 8. Eastside Recharge Basin Groundwater Elevation Difference from Baseline for the 400 cfs, 200 cfs, 100 cfs, and 50 cfs Scenarios

To evaluate SGMA compliance, projected groundwater levels of each scenario are compared to the Groundwater Level SMC. In many RMS wells, simulated groundwater levels rise above and fall below their minimum thresholds multiple times over the course of the simulation period. Figure 9 shows the percentage of RMS wells in the Eastside Subbasin that are below their minimum threshold under the Baseline and Eastside Recharge Basin scenarios. The relative improvements associated with the 4 potential diversion sizes vary from year to year. Correspondingly, this figure shows how there is minimal water available for diversion during drought years, as in those years there are more wells with groundwater levels below their minimum thresholds.

Whereas by 2040-2041 in the Baseline Scenario, 62% of RMS wells are below their minimum thresholds, far more than the 15% that constitute an undesirable result; the Eastside recharge basin scenarios lower this percentage to between 14% and 52%. In addition, the 180/400 Subbasin also sees modest improvements of 2% to 12%. As anticipated, with more water diverted and recharged, there are fewer wells with water levels below minimum thresholds.

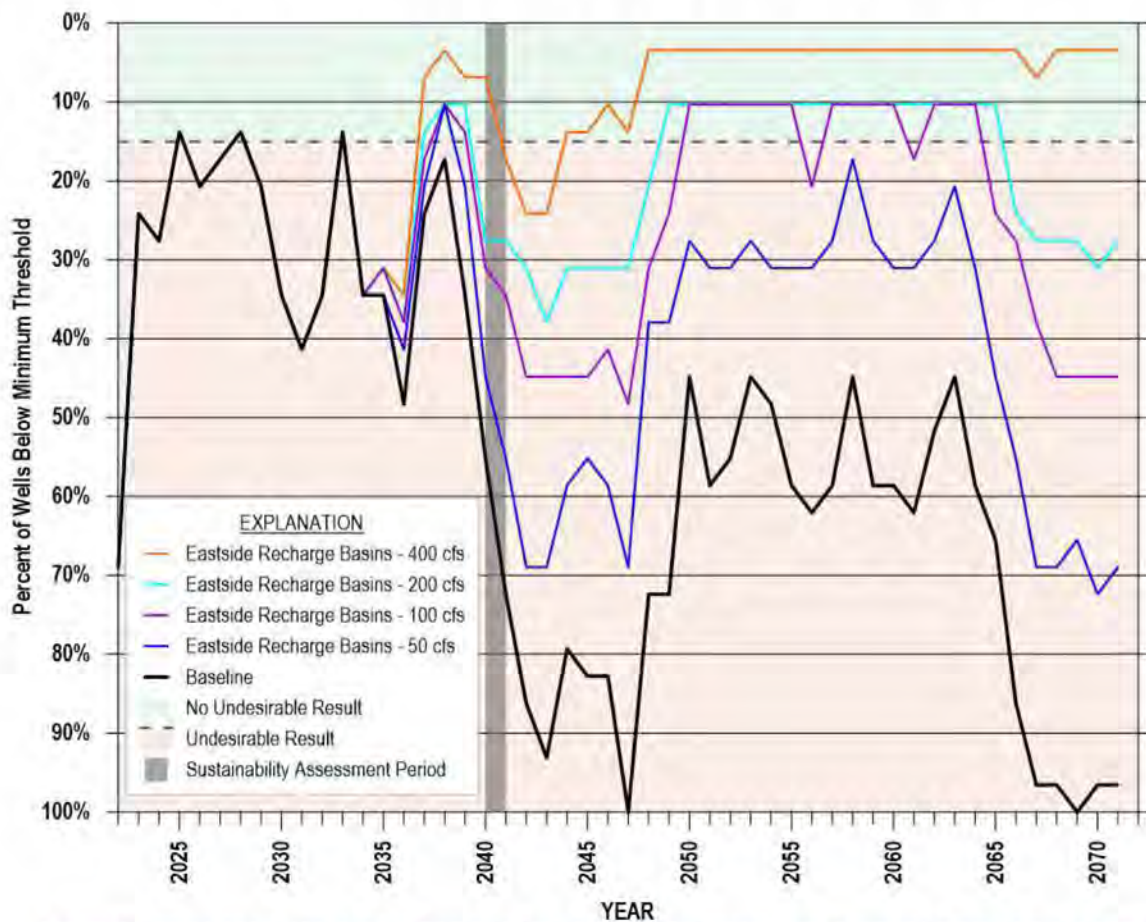


Figure 9. Percentage of Wells in the Eastside Subbasin with Simulated Groundwater Levels Below Minimum Threshold: Eastside Recharge Basins

#### **4.3.3.2 Northern Eastside Injection**

Instead of diverting water to recharge basins, the Northern Eastside Injection scenarios divert water to surface storage and then inject treated water. This scenario targets the groundwater depression on the northeastern side of the City of Salinas. Injection is needed in this area because shallow clay layers inhibit surficial recharge from recharge basins. Figure 10 shows the groundwater elevation difference from baseline for the 2 Northern Eastside Injection scenarios, 50 cfs and 100 cfs. Groundwater modeling projects that groundwater injection in the northern Eastside Subbasin raises groundwater levels near the injection wells, with greater increases under the 100 cfs scenario than the 50 cfs scenario. Groundwater level increases are most pronounced and localized near the injection sites, but some increases spread relatively quickly into adjacent subbasins, particularly where confined. The effects diminish westward where aquifer transmissivity increases. Only the 400-Foot Aquifer and its equivalent is shown here as an example because all aquifer depths experienced similar groundwater elevation change.

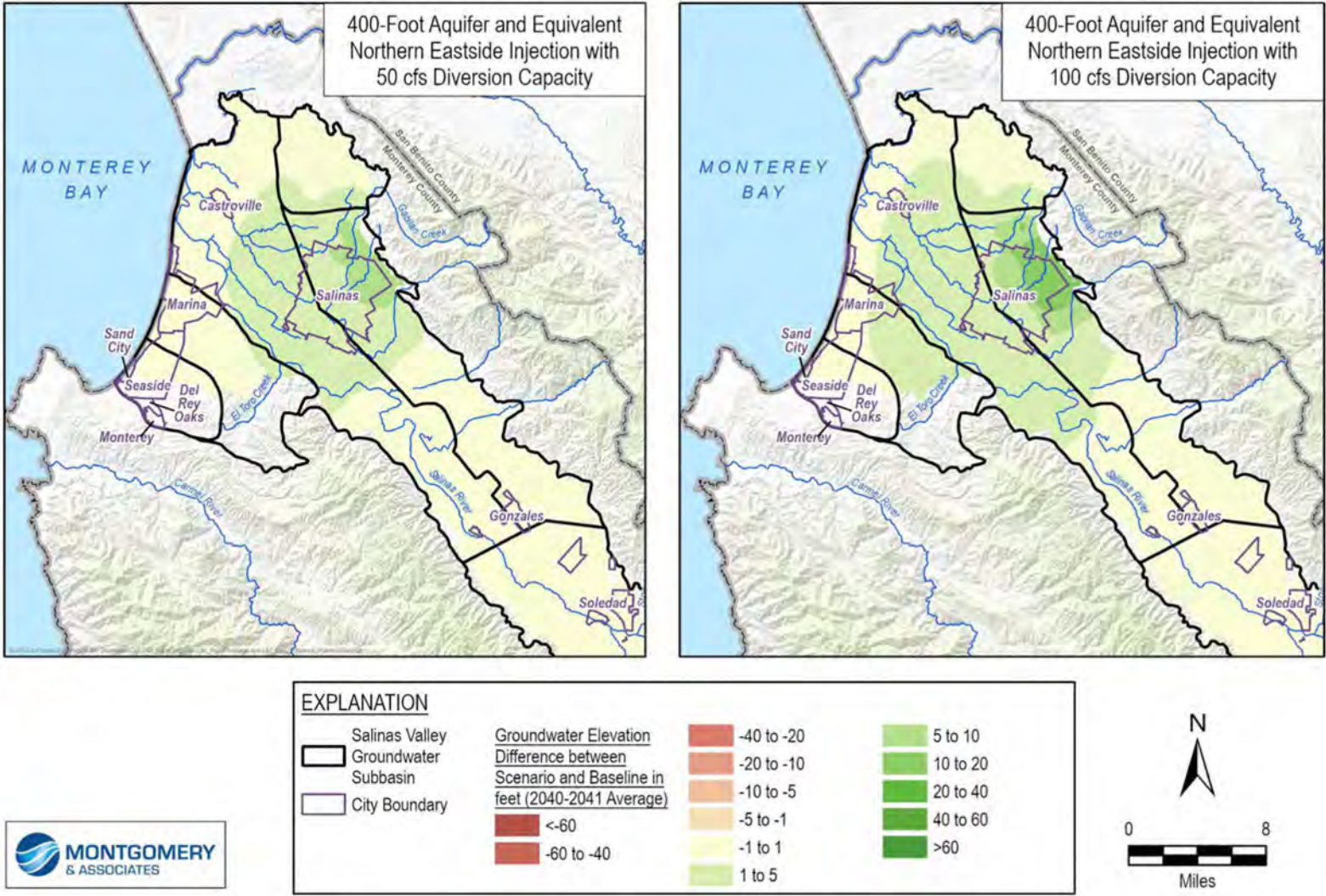


Figure 10. Northern Eastside Injection Grounwater Elevation Difference from Baseline for 50 cfs and 100 cfs Scenarios

Both Northern Eastside Injection scenarios lower the number of wells with groundwater levels below their minimum thresholds by the sustainability evaluation period of 2040–2041, with the larger project having a greater impact in both the Eastside and 180/400 Subbasins. However, neither scenario avoids undesirable results by the evaluation period. As compared to the Baseline Scenario, which had 62% of wells below minimum thresholds during the evaluation period, the Northern Eastside Injection Scenarios reduce this percentage to 55% for the 50 cfs scenario and 38% for the 100 cfs scenario. As with the recharge basin scenarios, the 180/400 Subbasin also shows modest improvements of 6% and 11%, respectively.

Figure 11 shows the percentage of Eastside RMS wells below the minimum threshold at the end of November for each simulated year under the Baseline and the Northern Eastside Injection scenarios. Relative improvements vary from year to year, in part because diversion, storage, and injection volumes are higher in wetter years than in drier years, which amplifies climate-driven patterns evident in the Baseline Scenario.

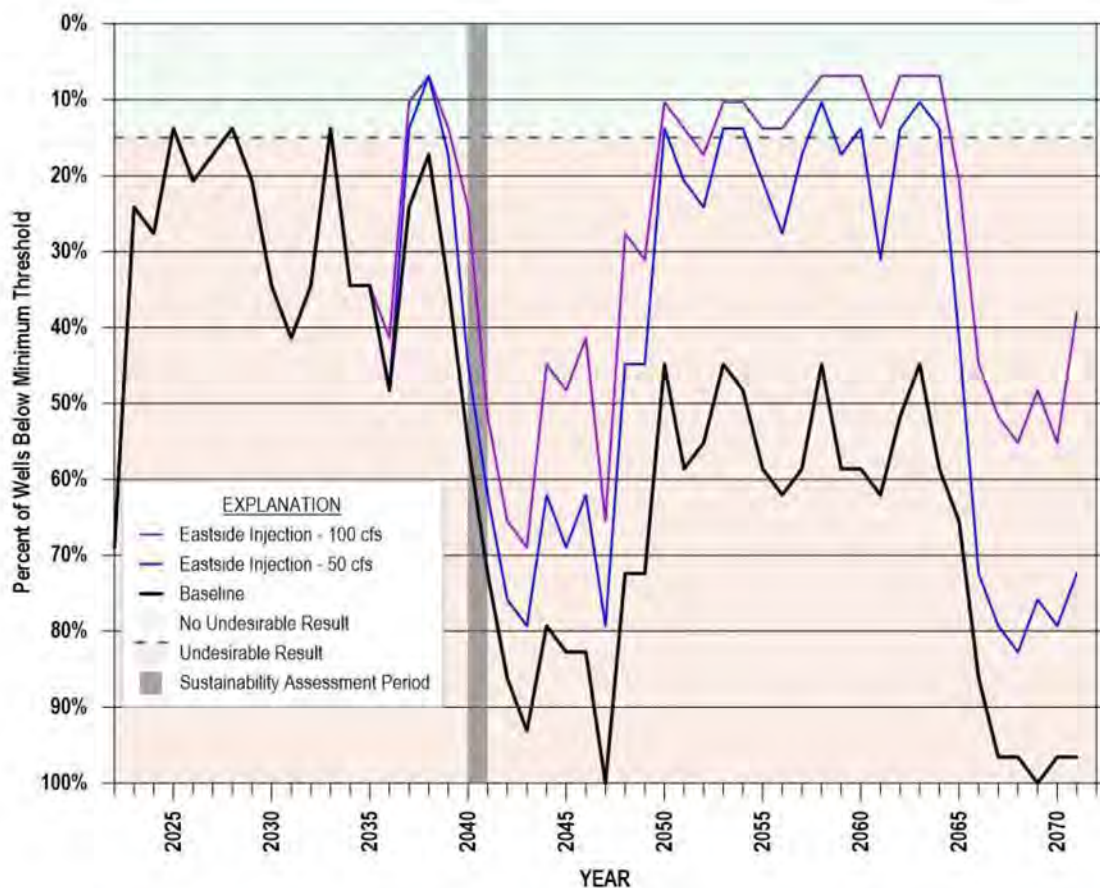


Figure 11. Percentage of RMS Wells with Simulated Water Levels Below the Minimum Threshold for 2022-2072:  
Northern Eastside Injection

#### 4.3.3.3 Coastal Injection

The Coastal Injection scenario targeted seawater intrusion and injected an average of 5,100 acre-feet per year (AFY) into the 400-Foot Aquifer based on a 50 cfs diversion. This scenario builds off Alternative 1a from the ASR Preliminary Feasibility Study (SVBGSA and M&A, 2025). Figure 12 shows the groundwater elevation difference from baseline for the 2040-2041 evaluation period for the 400-Foot Aquifer where injection occurs. It projects that after 5 years of operation, groundwater levels will be 1 to 5 feet above baseline. The primary purpose of this scenario was to address seawater intrusion rather than to explicitly achieve groundwater level SMCs. Nevertheless, the approach by which seawater intrusion is mitigated—increasing groundwater levels inland of the intrusion front—also moves conditions part of the way toward meeting groundwater level SMCs. Although the increase is highest closest to the injection wells, there is a smaller but more widespread increase in groundwater levels throughout the northern portions of the 180-Foot and 400-Foot Aquifers, as well as across the northern Eastside Subbasin.

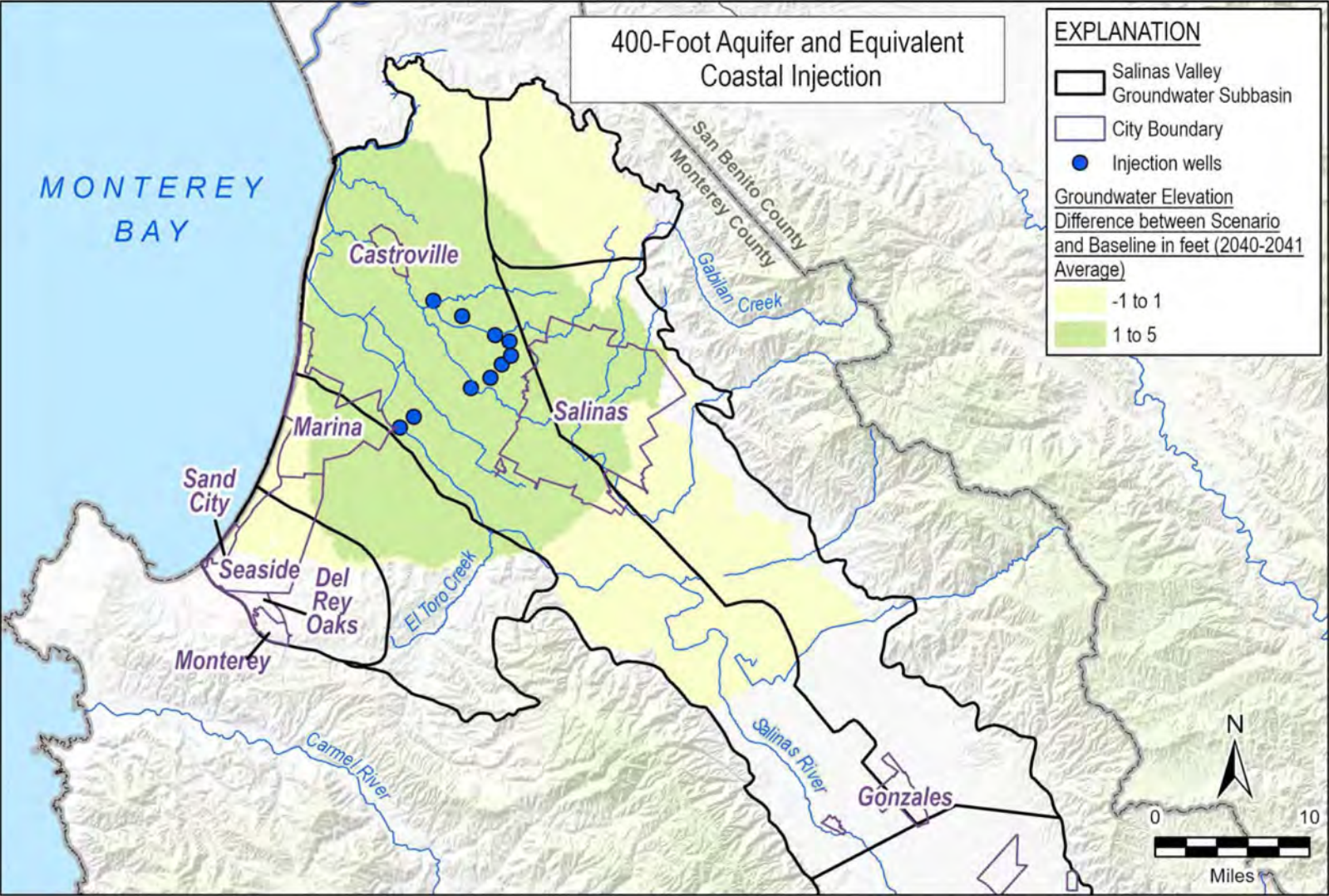


Figure 12. Coastal Injection Scenario Difference Groundwater Elevation Difference from Baseline for 400-Foot Aquifer

Figure 13 shows the simulated progression of the 500 mg/L chloride isocontour over time in the 400-Foot Aquifer for the Coastal Injection scenario. It shows only minor movement of the 500 mg/L chloride isocontour by 2040; the limited magnitude of this benefit is likely attributable to the relatively small diversion capacity (50 cfs), which was limited by the storage capacity at Merritt Lake. However, over time the simulated progression of seawater intrusion in the 400-Foot Aquifer begins to diverge from the Baseline Scenario. In later years, the project moderates the advancement of several significant parts of the seawater intrusion front to the northwest of the City of Salinas. Even though the chloride isocontour is not affected much by 2040, Figure 14 shows that the injection is starting to have an effect on decreasing the chloride concentration in the immediate vicinity of the wells and stopping the advancement toward Salinas of the 500 mg/L chloride isocontour.

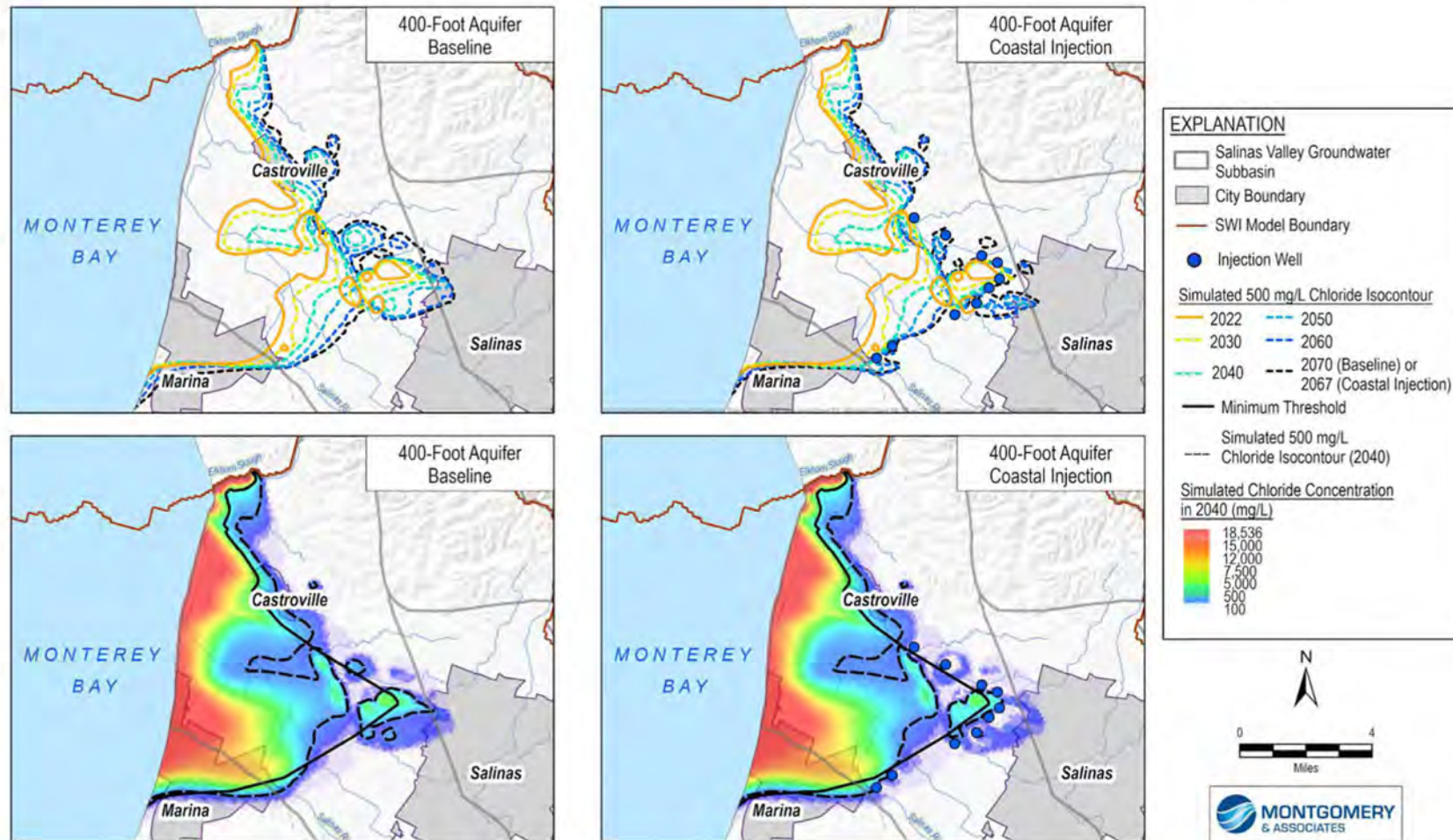


Figure 13. Coastal Injection Scenario Simulated Progression of Seawater Intrusion and Simulated Chloride Concentration Compared to Baseline

#### **4.3.4 Economic and Financial Feasibility Analysis**

The economic and financial feasibility analysis has not been developed for the C&E project scenarios. Preliminary cost estimates provide an initial basis for comparing scenarios, but additional analysis would be needed to evaluate economic and financial feasibility. This would include defining and monetizing the economic benefits of the project scenarios and comparing those benefits to the costs described in Table 2. An economic and financial feasibility assessment would be completed for any C&E project scenarios that are advanced as part of the IIS.

#### **4.3.5 Summary of Findings**

The C&E Study found that while Permit 11043 provides a potentially valuable mechanism for diverting Salinas River flows to address groundwater sustainability needs, several constraints limit its immediate use. The Permit remains active, but 2 longstanding petitions—a Petition for Extension of Time and a Petition for Change—must be resolved before any project can proceed. In its current form, the Permit requires that diverted water be applied to beneficial use within 30 days, preventing the seasonal or multi-month storage that would be necessary to bridge the gap between winter diversion opportunities and summer irrigation demands or managed recharge needs. For any project scenario to move forward, amendments to the Permit would likely be required, including the addition of storage (either in a surface reservoir and/or underground) beyond 30 days. Other permit modifications potentially worth considering include moving the point(s) of diversion location downstream and potentially changing the purpose of use. However, any petition process carries the risk of protests, added permit conditions, and significant timeline implications, and any modifications of the minimum flow or diversion requirements would significantly increase the complexity, risk, and timeline to complete.

Analyses of historical and projected Salinas River flows show that diversions consistent with the terms and conditions of Permit 11043 are expected to occur primarily from January through April, during which eligible diversion days represent less than 15% of each year. Even when diverting at the maximum allowable rate of 400 cfs, long-term average diversion volumes are expected to be well below the Permit's 135,000 AF/year permitted volume. Projected average yields range from approximately 5,100 AFY for a 50 cfs diversion to roughly 26,800 AFY for a 400 cfs diversion. These volumes offer meaningful support for targeted groundwater sustainability goals but are insufficient to independently halt seawater intrusion in the coastal 400-Foot Aquifer, or fully resolve all groundwater challenges, highlighting the importance of implementing, studying and comparing in coordination with other PMA concepts.

Groundwater modeling completed for the 3 project concepts (not including NSIP) demonstrate that Eastside recharge basins offer the broadest groundwater benefits of the evaluated scenarios. Under these scenarios, diverted flows recharged into shallow basins on the eastern side of the

Valley measurably improve groundwater levels throughout the central Eastside Subbasin and, to a lesser extent, the 180/400 Subbasin. Minimum threshold exceedances for Eastside RMS wells range from 52% at the 50 cfs scale to 14% at the 400 cfs scale, as compared to 62% in the Baseline Scenario. However, improvements in the northern Eastside Subbasin are limited unless large recharge volumes are applied farther north. The 400 cfs recharge scenario also raises feasibility concerns where modeled groundwater mounding in low permeability areas result in extreme groundwater level rises, suggesting that a more balanced distribution of recharge may be more practical.

The Northern Eastside Injection concept provides groundwater benefits concentrated in the persistent groundwater depression near Salinas. Injected water produces appreciable increases in groundwater levels and improvements propagate into the 180/400 and Langley Subbasins. While these scenarios reduce the number of Eastside RMS wells below minimum thresholds—to 55% under the 50 cfs scenario and 38% under 100 cfs—there are still undesirable results on average by the SGMA evaluation period. Compared to recharge basins, injection results in a greater share of the basin-wide storage benefit being distributed outside the Eastside Subbasin, underscoring the varied nature of inter-subbasin interactions.

The Coastal Injection concept aims to address seawater intrusion in the 400-Foot Aquifer. It results in modest but meaningful reductions in the advancement of seawater intrusion, which alone do not meet the seawater intrusion minimum threshold; however, the project could be combined with other efforts. Although the 50 cfs diversion capacity limits the short-term magnitude of benefit, model projections indicate a gradual divergence from baseline seawater intrusion progression over multiple decades.

Cost estimates developed at the planning level show notable variation among project concepts, reflecting differences in treatment requirements, conveyance distances, storage infrastructure, and the number of recharge basins or injection wells required. Recharge basin scenarios generally represent the lowest unit costs, while injection-based projects carry higher capital and operational costs due to treatment plant requirements and extensive distribution networks. Collectively, these findings illustrate that while multiple diversion-based pathways can support SGMA compliance, each comes with distinct benefits, limitations, and implementation challenges that must be weighed as part of future feasibility assessment and project selection.

Next steps to be taken if any of these C&E project concepts are to be further considered include:

- For Permit 11043, amendments to previously filed petitions are likely necessary; additional amendments will be needed if a project concept requires storage or other parameters not currently defined in the Permit Additional source water assessments for water quality (sampling/testing)

- Modeling scenarios under a range of climate conditions, including projected climate change
- Evaluation of storage feasibility and land availability for the Merritt Lake area and/or Gabilan Range Reservoir
- Discussions with regulatory agencies, including Division of Dam Safety the development of Merritt Lake and/or Gabilan Range Reservoir
- Economic and financial analysis
- Progression through preliminary design, environmental review (CEQA/NEPA), and final design and construction

#### **4.4 New Seawater Intrusion Project**

SVBGSA contracted Carollo Engineers to assess the feasibility of expanding CSIP or developing a new water supply and delivery system—referred to as the New Seawater Intrusion Project (NSIP)—to address ongoing seawater intrusion and groundwater overdraft in the Salinas Valley. This project could offset demands in the Deep Aquifers where it overlaps with the seawater intruded area. It would replace pumping in all aquifers, enabling groundwater levels to rise over time. These improvements to groundwater conditions in the 180/400 Subbasin may also improve groundwater conditions in adjacent subbasins.

The NSIP Evaluation<sup>3</sup> (Carollo, 2026a) identifies the need for supplemental, non-groundwater irrigation supplies to stabilize aquifer conditions and sustain agricultural productivity in the study area. Current groundwater demand in the study area averages approximately 28,000 AFY, with peak seasonal demands in summer months. Five-year monthly average demands for all wells in the study area are shown on Figure 15. However, available alternative water supplies—such as recycled water, river diversions, industrial wastewater, and agricultural drainage—are highly variable and largely concentrated in winter months, creating a mismatch between supply availability and irrigation demand.

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<sup>3</sup> Available at: <https://svbgsa.org/nsip/>

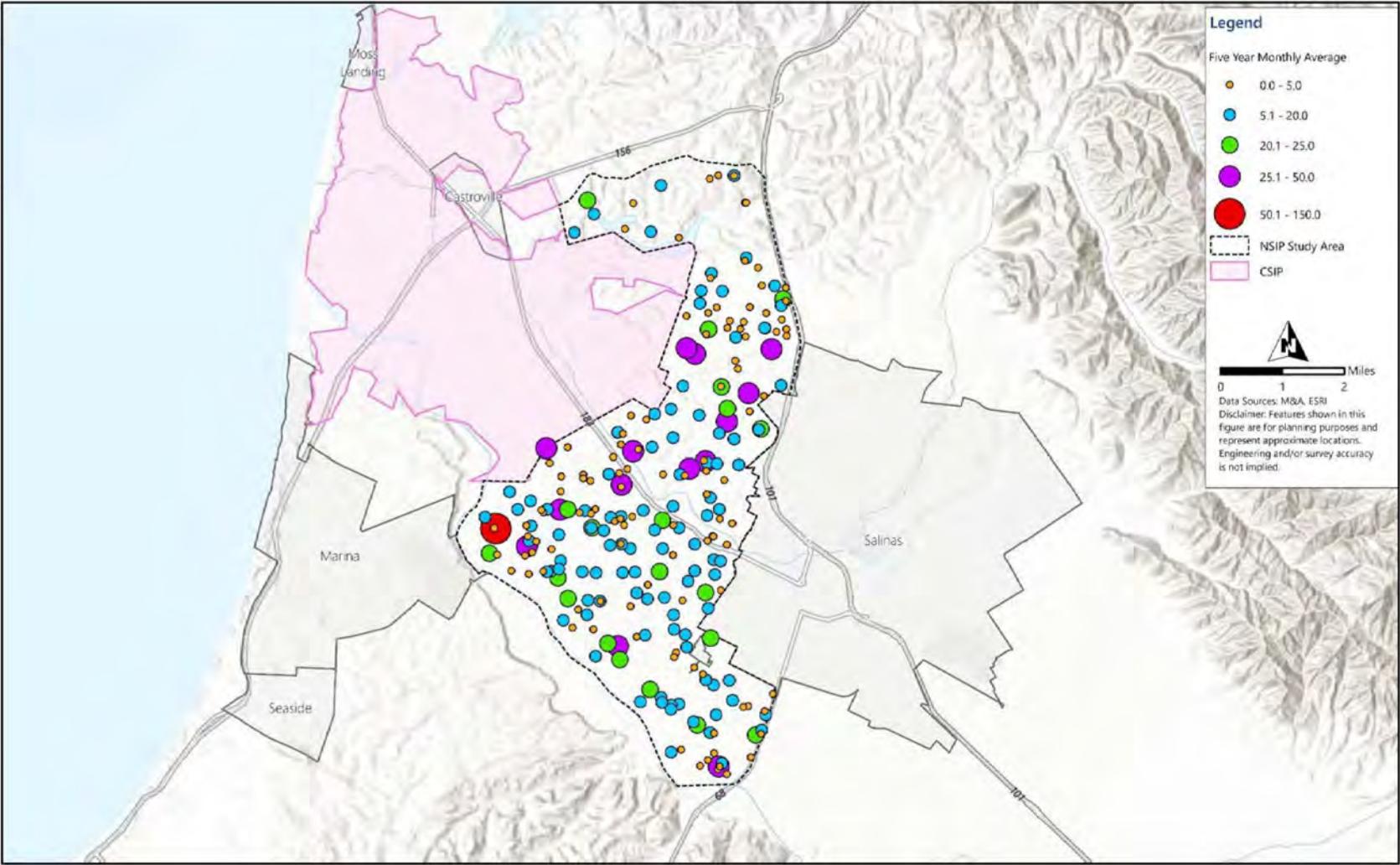


Figure 14. Five-Year Monthly Average Demand of All Wells in NSIP Study Area

To address this imbalance, the NSIP Evaluation assesses the availability, reliability, and water quality of multiple regional supply sources and assesses their ability to offset groundwater pumping. The analysis indicates that while sufficient total annual supply may be available under representative hydrologic conditions, seasonal variability necessitates substantial storage or demand management strategies to ensure reliable delivery during peak irrigation periods. Conceptual analysis identifies a storage requirement on the order of 15,000 acre-feet to balance seasonal supply and demand under full build-out.

MCWRA prepared a source water analysis focused on quantifying the volume, reliability, seasonality, and operational constraints associated with multiple candidate source waters under MCWRA control or influence. The evaluation is based primarily on historical hydrologic and operational data spanning approximately 2016 through 2025, supplemented with longer-term datasets where available. This approach captures a representative range of hydrologic conditions while reflecting current system operations and regulatory frameworks. Seven primary source water categories were evaluated:

- Secondary effluent from the Monterey One Water Regional Treatment Plant
- Industrial wastewater from the City of Salinas
- Excess reservoir releases available for rediversion at the SRDF
- Reclamation Ditch flows (Application A032263D)
- Tembladero Slough flows (Applications A032263C/D)
- Blanco Drain return flows (Application A032263D)
- Salinas River diversions under Permit 11043

For each source, MCWRA developed estimates of usable supply by applying water rights constraints, operational limitations, instream bypass requirements, diversion capacities, and data availability. Where direct measurement data were limited (e.g., Blanco Drain and Tembladero Slough), surrogate methods and prior technical studies were used to estimate flows, and data uncertainties are acknowledged in the analysis.

#### **4.4.1 Project Scenarios**

NSIP defined the study area as the area with agricultural users historically reliant on groundwater pumping in or near the seawater intruded area and from the Deep Aquifers. It targets the area of heavy agricultural use in the area between the City of Salinas, CSIP service area, and north of the Salinas River and south of the rural communities of Oak Hills and Prunedale. The 5-year total annual usage of the wells within the study area is between 27,000 and 30,000 AFY with peak uses in the summer months between April to November.

This study identifies 3 project scenarios:

- 1) **CSIP Expansion (Recycled Water Direct Delivery)** focuses on conveying excess recycled water from the SVRP directly to select new NSIP users. Given the limited capacity of the existing infrastructure, it would require a new, single recycled water conveyance system directly from SVRP to be used year-round with the available recycled water supplies. This provides a relatively low-cost, near-term option that primarily benefits winter demands and serves as a supplemental or first-phase project.
- 2) **Maximum (Max) Size NSIP (Standalone System)** envisions a fully independent regional system sized to offset all groundwater pumping within the NSIP area by serving approximately 248 wells. This scenario integrates multiple water sources, centralized treatment, and large-scale storage (e.g., Merritt Lake Reservoir with multiple source waters, centralized treatment, and substantial seasonal storage on the order of 15,000 AF) to reliably meet peak irrigation demands. For the Salinas River surface water source diverted using Permit 11043, there would need to be a permit modification to allow storage. The analysis considers supply availability ranges of high, medium, and low.
- 3) **NSIP Serving Wells Only Within 500 mg/L Chloride Isocontour Zone (Phased or Hybrid NSIP Implementation)** bridges these approaches by initially delivering recycled water directly to users and incrementally expanding infrastructure, storage, and treatment over time—potentially incorporating direct capture of available supplies during high-flow periods—to ultimately transition toward a comprehensive NSIP system while managing costs and adapting to supply availability and user needs. This targets service to regions within the NSIP Study Area that are affected by seawater intrusion in the 180- and 400-foot aquifers, as defined by the 500 milligrams per liter (mg/L) chloride isocontour. It includes surface water diverted using Permit 11043 as a source water under the current permit conditions (no storage over 30 days). The analysis considers supply availability ranges of high, medium, and low.

The key infrastructure components of these 3 configurations are summarized in Table 3.

Table 3. Summary of Infrastructure of NSIP Scenarios

	Expansion of CSIP	Max NSIP	Intruded Area Only
Number Wells Served	18	248	88
Demands Served, AFY	5,320 (19% of all wells within NSIP)	28,020	11,020
Supply Used	Recycled Water	All Supplies	All Supplies
Supply, AFY	5,320	25,080	25,780
Required Storage Volume	3.5 MG	≈ 15,000 AF	≈ 8,000 AF
Miles of Treated Water Transmission Lines	18	38	16
Miles of Raw Water Transmission Lines	6	14	14
Miles of Laterals	TBD	39	12
Treatment size, mgd	N/A	50	20

#### 4.4.2 Cost Estimates

Planning-level cost estimates for the NSIP project scenarios were developed by the engineering teams. Project economic costs were developed using a standardized framework that includes and schedules out capital (construction and soft costs), O&M, and long-term replacement components. Project costs are expressed as the present value and the annualized cost per acre-foot of project water developed and delivered. The NSIP project water is defined as the average annual volume of water that the project delivers. NSIP developed new or reallocated surface and recycled supplies that partially offset groundwater extraction. These estimates are considered conceptual and are expected to be refined as project configurations, infrastructure requirements, and operational assumptions are further developed.

NSIP could serve up to approximately 17,600 acres in the area between the existing CSIP system and the City of Salinas. Two project concepts—Intruded Area Only and Max NSIP—were developed with scenarios considering supply availability ranges of high, medium, and low. Due to the limited ability of the CSIP Expansion Scenario to offset demands in the seawater intruded zone, it was clear that this scenario would not meet minimum thresholds and therefore lifecycle costs for it as a standalone scenario were not developed.

The cost estimates for the Intruded Area Only and Max NSIP scenarios reflect preliminary construction costs organized by major infrastructure components. Storage costs include the improvements needed at Merritt Lake to provide the required impoundments and associated facilities. Treatment costs include on-site treatment facilities and related process infrastructure. These estimates are expressed in current dollars and include a 30% construction contingency, Monterey County sales tax of 7.75% applied to half of construction costs, and 15% for contractor general conditions, overhead, and profit. Land acquisition costs are not included.

Table 4 summarizes the standardized economic costs of the NSIP scenarios. The table shows total construction costs (including soft costs), annual O&M, and replacement costs. The NSIP scenarios (High, Medium, and Low) vary by the annual yield (acre-feet); O&M costs have been scaled by the corresponding yield for each scenario. The present value costs are shown, the annualized cost, and the cost per AF of project water. Economic costs range from \$2,957 per AF to \$7,434 per AF.

Table 4. Max NSIP and Intruded Wells Only Estimated Economic Lifecycle Costs

Cost Category	Intruded Only			Max		
	High	Medium	Low	High	Medium	Low
Total Construction Cost (\$M)	\$698	\$698	\$698	\$1,428	\$1,428	\$1,428
Annual Treatment O&M (\$M)	\$6	\$5	\$3	\$11	\$9	\$5
Annual O&M (\$M)	\$13	\$12	\$7	\$7	\$6	\$3
<b>Present Value Total Cost (\$M)</b>	\$1,120	\$1,087	\$910	\$1,840	\$1,761	\$1,618
Annualized Cost (\$M)	\$50	\$49	\$41	\$83	\$79	\$73
Annual Yield (Acre-feet)	11,020	10,160	5,512	28,020	22,570	12,790
<b>\$/Acre-Foot Cost</b>	<b>\$4,575</b>	<b>\$4,818</b>	<b>\$7,434</b>	<b>\$2,957</b>	<b>\$3,513</b>	<b>\$5,697</b>

Notes:  
 Lifecycle costs for 40 years of operations with replacement costs at 20 years of operations  
 The CSIP Expansion Scenario

### 4.4.3 Effect on Groundwater Conditions

The NSIP project concept was evaluated using the SWIM to assess its impact on seawater intrusion and groundwater levels, as described in Appendix D of the NSIP Evaluation. Only the Max NSIP High Scenario was modeled. NSIP operates by eliminating groundwater pumping within the seawater intrusion area and providing an alternative water supply beginning in 2035. Pumping outside of the NSIP area occurs as it does in the Baseline Scenario, including CSIP supplemental and private standby well pumping.

The elimination of up to 28,000 AFY of groundwater extraction under the Max NSIP scenarios resulted in substantial groundwater level increases. Figure 17 shows the groundwater levels compared to baseline for the 3 aquifers for the Max NSIP. By the 2040-2041 evaluation period, in the 180-Foot and 400-Foot Aquifers groundwater levels are up to 40 feet higher than in the Baseline Scenario in the proximity of the NSIP area. In the Deep Aquifers, groundwater levels are up to 5 feet higher than in the Baseline Scenario.

While the groundwater level response is substantial, results for seawater intrusion are more mixed and the Max NSIP scenario does not meet the seawater intrusion minimum threshold by 2040-2041. Along most of the 180-Foot Aquifer intrusion front, seawater progression is

modestly slowed relative to the Baseline Scenario, consistent with reduced landward hydraulic gradients across the NSIP area where pumping was eliminated. However, the prominent seawater intrusion bulge just west of the City of Salinas advances more rapidly under the NSIP Scenario than under baseline conditions, as shown on Figure 18. This localized outcome occurs in an area where seawater has already substantially intruded; modeling shows that groundwater level increases in this zone intensify gradients that drive chloride further inland rather than flushing it seaward. Changes in the chloride isocontour in the 400-Foot Aquifer are very slight, with only a slight bit less advancement than in the baseline near the City of Salinas in 2070. No change in seawater intrusion is simulated in the Deep Aquifers.

Figure 19 shows the chloride concentration in both the 180-Foot and 400-Foot Aquifers at 2040. It shows minimal difference from the Baseline Scenario. In both the 180-Foot and 400-Foot Aquifers, the 500 mg/L isocontour is far from the minimum threshold. The contrast between the Max NSIP's large groundwater level response and its mixed seawater intrusion outcomes reflects fundamental differences in how pumping removal and active injection near the intrusion front affect chloride movement.

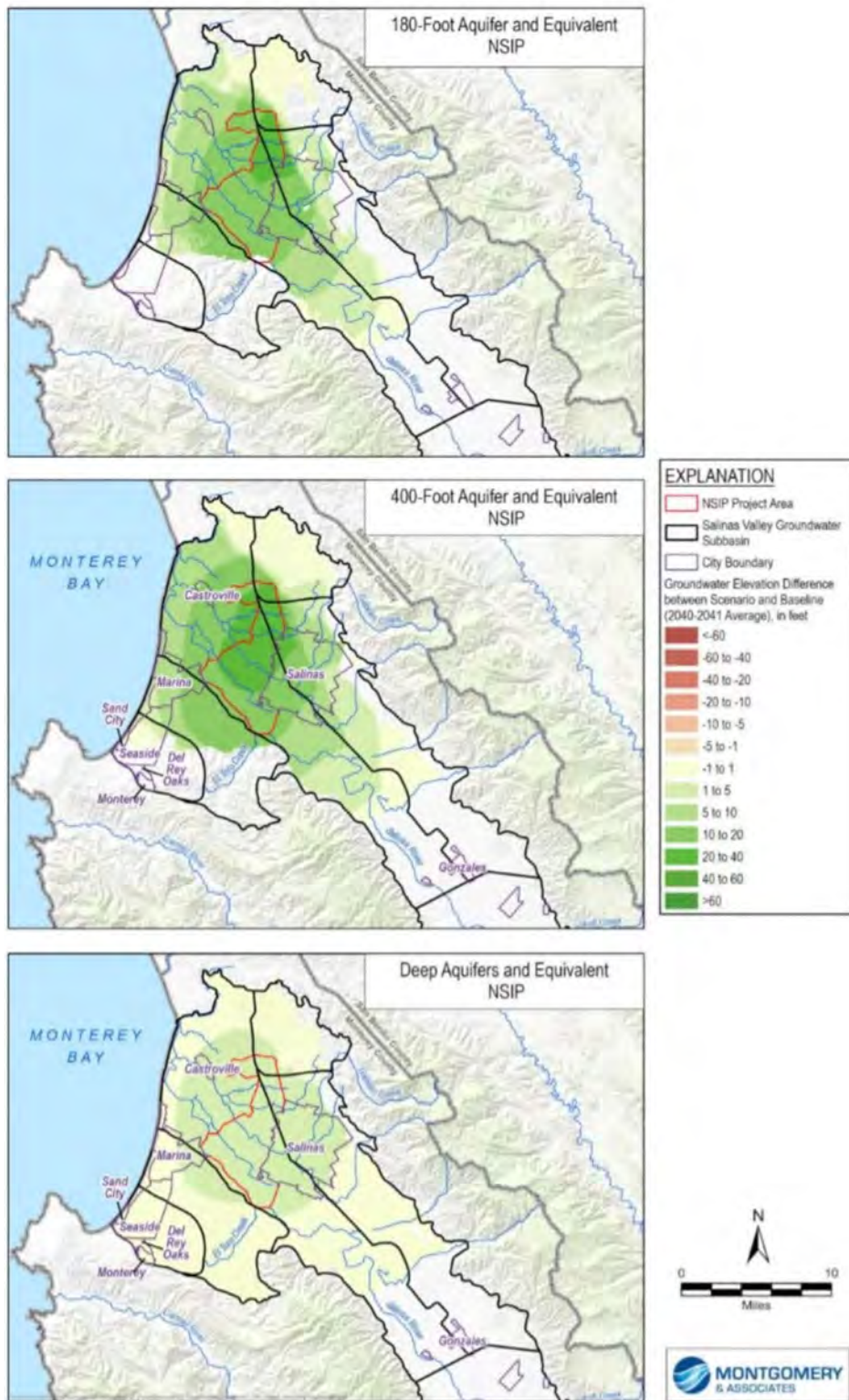


Figure 15. Max NSIP Scenario Groundwater Levels Difference from Baseline Scenario

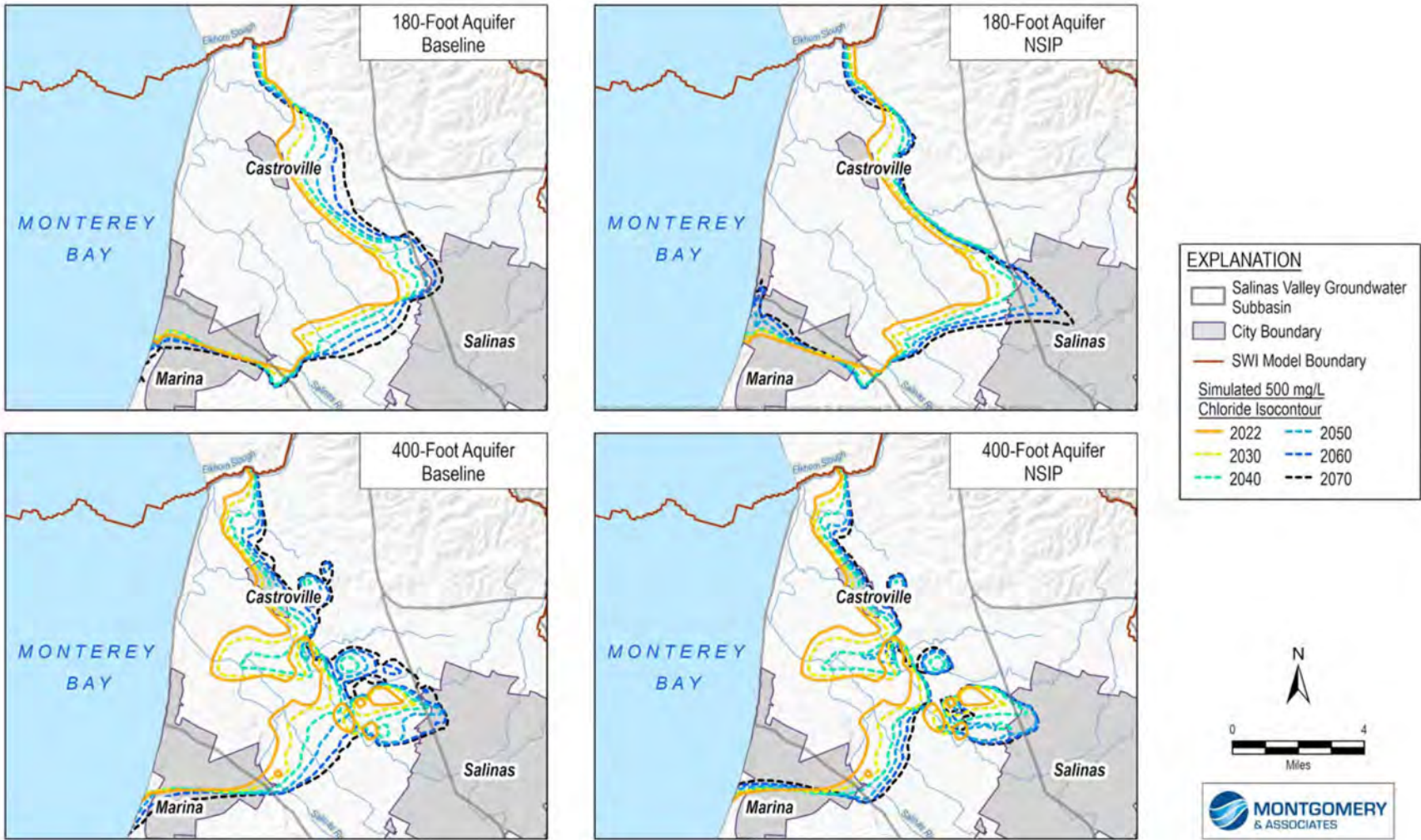


Figure 16. Max NSIP Scenario Simulated Progression of Chloride Isocontour

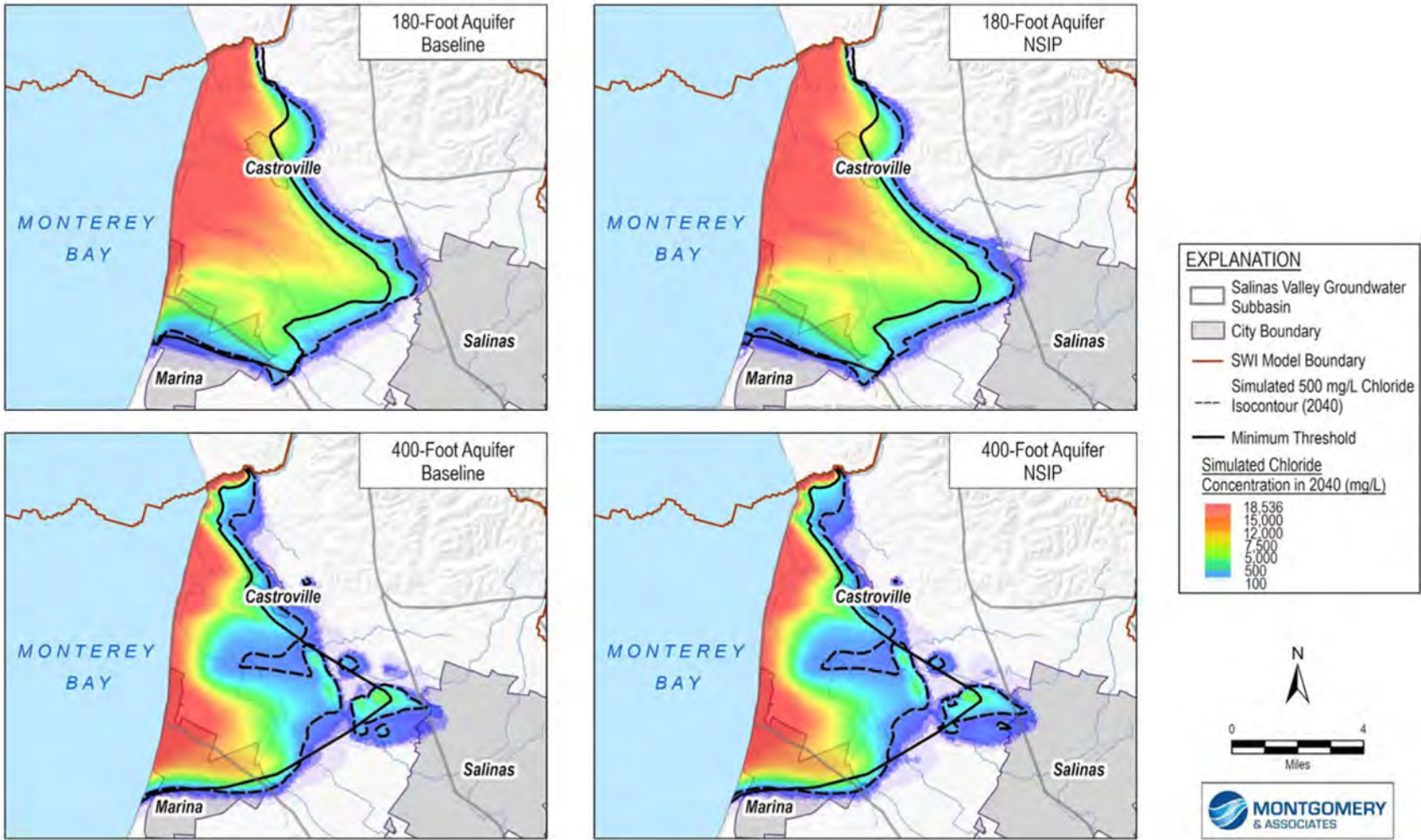


Figure 17. Max NSIP Simulated Chloride Concentration Compared to Baseline Scenario

#### 4.4.4 Economic and Financial Analysis

The economic and financial feasibility analysis has not been developed for the NSIP project scenarios. Preliminary cost estimates provide an initial basis for comparing scenarios, but additional analysis would need to be completed to evaluate economic and financial feasibility. This would include defining and monetizing the economic benefits of the project scenarios and comparing those benefits to the costs described above. An economic and financial feasibility assessment would be completed for any NSIP project scenarios that are advanced as part of the IIS.

#### 4.4.5 Summary of Findings

Across all scenarios, the NSIP analysis demonstrates that:

- Achieving sufficient supply for the NSIP area will require a combination of alternative supply development, storage, and operational flexibility.
- Recycled water is a critical and reliable component of supply but is insufficient as a standalone solution.
- Surface water and drainage-derived supplies are highly variable and dependent on hydrologic conditions.
- Even under optimized conditions, demand management or supplemental groundwater use may be required during extended drought periods.
- Since NSIP effectively reduced groundwater extraction, it enables groundwater levels to rise in the study area; however, seawater intrusion continues to progress inland at only a slightly slower rate than the Baseline Scenario.
- Water quality evaluation indicates that treatment to meet agricultural irrigation standards—particularly maintaining chloride concentrations below 500 mg/L to protect crop yields—is feasible using conventional treatment processes for blended surface supplies.

NSIP represents a scalable project to reduce groundwater extraction and mitigate seawater intrusion in the Salinas Valley. A phased implementation approach is possible, beginning with expansion of recycled water delivery and advancing toward a larger integrated system as additional supply reliability, storage, permitting, and funding pathways are developed.

Key next steps to be taken for any NSIP scenario to be further considered include:

- Refinement of source water availability and quality data

- Advancement of water rights and regulatory approvals
- Evaluation of storage feasibility (including Merritt Lake)
- Economic and financial analysis
- Progression through preliminary design, environmental review (CEQA/NEPA), and final design and construction

## 4.5 Brackish Groundwater Restoration Project

SVBGSA has prepared a U.S. Bureau of Reclamation (USBR) Title XVI Feasibility Study Report for Large, Recycled Water, or Desalination Projects (USBR Report)<sup>4</sup> for the BGRP (Carollo, 2026b). This project was originally conceptualized as 2 individual projects in the 180/400 Subbasin GSP: 1) a Seawater Intrusion Extraction Barrier and 2) a Regional Municipal Supply Project. The Regional Municipal Supply Project is also included in the Eastside, Monterey, and Langley GSPs.

Historical groundwater extractions created a landward hydraulic gradient from the ocean towards supply wells due that allowed seawater to migrate inland. The BGRP is intended to protect against further intrusion in the 180/400 and Monterey Subbasins, thus preventing seawater intrusion from reaching the Eastside or Langley Subbasins. It is designed to improve current groundwater quality within the existing seawater intruded area and push seawater intrusion back to the minimum threshold.

SVBGSA has proceeded with a feasibility study for a single combined project, renamed BGRP. The extraction barrier portion of the BGRP includes a series of extraction wells near the coastline in the 180/400 and Monterey Subbasins that continuously extract brackish groundwater (a mixture of freshwater and seawater) and form a hydraulic barrier by lowering groundwater levels and capturing seawater. This prevents seawater from advancing inland of the extraction well barrier. The BGRP would generate significant volumes of brackish water that could be desalted and used as a new potable or non-potable water supply, or for injection back into the 180-Foot and 400-Foot Aquifers.

Figure 20 is a conceptual diagram outlining the BGRP. The left side of the figure shows extraction wells drawing water from both the ocean and land sides, as depicted by the arrows. Extraction wells would be placed in the intruded zone where the seawater enters the groundwater basin and mixes with the freshwater. Both brackish water and seawater would be extracted from the barrier of several extraction wells to prevent seawater from continued progression inland toward the City of Salinas. The extracted water is then treated and can be used as a new regional water supply and/or for injection. The figure also shows how groundwater levels at the extraction

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<sup>4</sup> Available at: <https://svbgsa.org/wp-content/uploads/2026/04/BGRP-Feasibility-Study-20260331.pdf>.

barrier wells are lower than surrounding groundwater levels, preventing water from moving past the extraction barrier, while inland groundwater levels will rise due to injected water and offsetting pumping with the new supply.

The treated extracted brackish water could be used either in lieu of groundwater for potable or non-potable uses or for groundwater injection directly improving groundwater levels and helping to push the seawater intrusion back toward the ocean. As described below, the preferred scenario is to use the treated brackish water for injection only. This maximizes benefits to all groundwater users in the basin and is effective at raising groundwater levels.

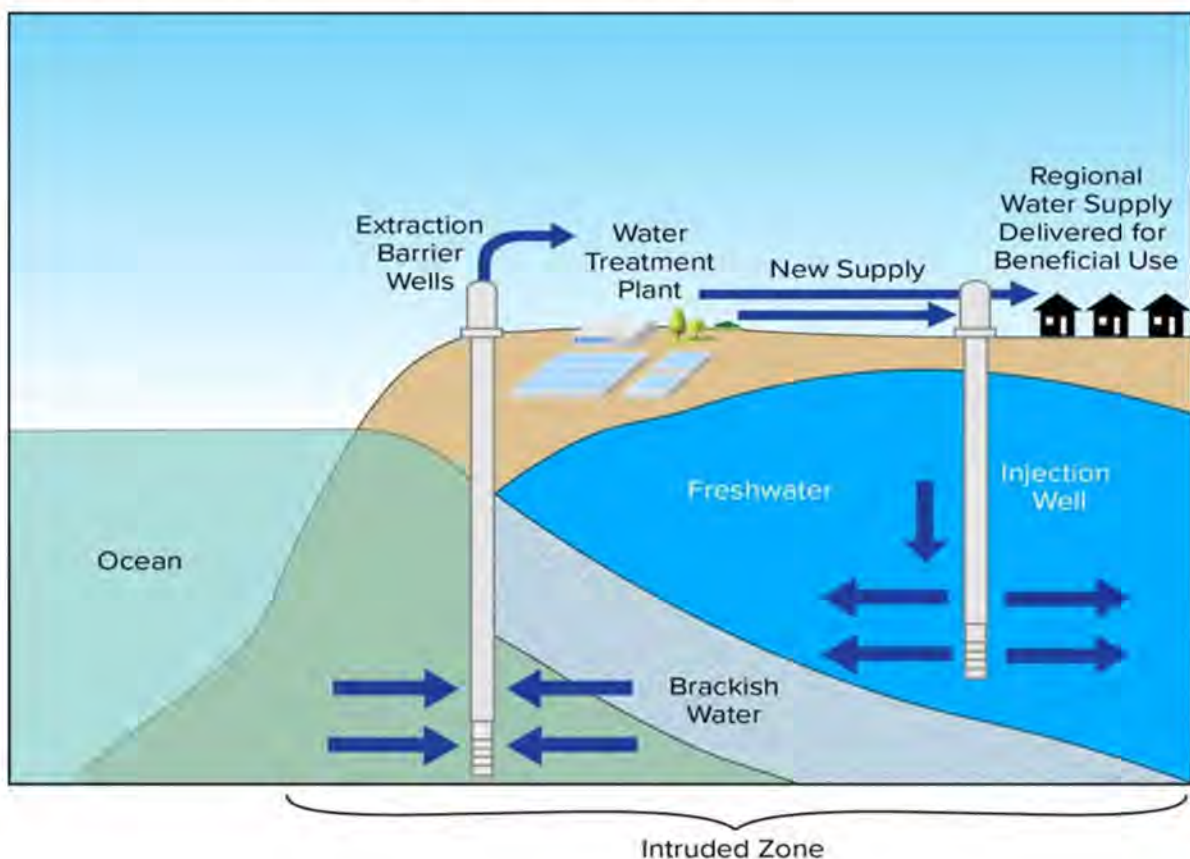


Figure 18. BGRP Concept

The USBR Report includes a refined preferred project scenario, an AWSP that also meets the seawater intrusion SGMA goals, and evaluation of a NAA as a non-infrastructure state intervention action that would likely occur if SVBGSA does not adequately meet SGMA requirements. SVBGSA has also completed a CEQA Initial Study that outlines what would need to be addressed in an Environmental Impact Report (EIR) for the BGRP.

The USBR Report includes information on the current supplies and demands in the northern area of the Salinas Valley, end user analysis, description of project alternatives, an economic analysis, an overview of why the injection only scenarios is the preferred project, as well as discussion on environmental considerations, water rights and legal requirements, project costs and potential funding sources, as well as research needs.

To support this effort, SVBGSA contracted Carollo Engineers to lead the effort and draft the USBR Report, M&A to provide technical support and groundwater modeling, and ERA Economics to complete an economic and financial analysis. In addition, Larry Walker Associates provided guidance on NPDES issues and outfall dilution modeling, LSA provided environmental permitting support, ConfluenceES provided groundwater and seawater intrusion mitigation strategy support, and Wallace Group Engineers worked with M&A to develop the AWSP Alternative. Minasian Law provided analysis of legal and institutional requirements for the BGRP.

The following sections describe the BGRP project scenarios developed during Phase 1, descriptions of the alternatives discussed in the USBR Report, cost estimates, modeled effects on groundwater conditions for each alternative, and key findings from the study.

#### **4.5.1 Phase 1 BGRP Scenarios**

Phase 1 evaluated effectiveness of 7 BGRP scenarios at stopping and pushing seawater intrusion back beyond the GSP minimum threshold line and toward the measurable objective line. Each scenario's production capacity (treated water for injection or direct delivery), hydrogeologic characteristics, conveyance and treatment infrastructure components, overall cost, and implementation strategies were developed and used to compare scenarios for effectiveness in meeting the GSP requirements. The BGRP Feasibility Study Phase 1 Report<sup>5</sup> (SVBGSA, 2025c), as well as in the Scenarios Analysis (Carollo, 2025) and Modeling Results Technical Memoranda (M&A, 2025) included these 7 scenarios:

1. Extraction, Treatment, and Direct Deliveries Plus Injection – Small
2. Extraction, Treatment, and Direct Deliveries Plus Injection – Medium
3. Extraction, Treatment, and Direct Deliveries Plus Injection – Large
4. Extraction, Treatment, and Injection Only
5. Extraction, Treatment, and Eastside Injection
6. Extraction North of the Salinas River, Treatment, and Direct Deliveries Plus Injection
7. Extraction From the 180-Foot Aquifer, Treatment, and Injection in the 400-Foot Aquifer

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<sup>5</sup> BGRP Phase 1 Reports are available on SVBGSA's website here: <https://svbgsa.org/brackish-groundwater-restoration-project/>

The 7 BGRP scenarios and No Project Scenario modeled during Phase I were simulated using SWIM v2; therefore, the No Project Scenario differs slightly from the Baseline Scenario presented in Section 4.2 above. The preferred scenario identified during Phase I was modeled using SWIM v3 and is presented in Section 4.5.2.2.

Figure 21 shows the chloride contours in 2040 for the 180-Foot Aquifer compared to Baseline Scenario. It is separated into 2 maps for clarity: the first contains the 3 direct delivery scenarios (Small, Medium, and Large), and the second shows the additional BGRP scenarios (Injection Only, Eastside Injection, North of River, and Extract in 180/Inject in 400). Figure 22 shows the chloride contours in 2040 for the 180-Foot Aquifer compared to Baseline Scenario. It is separated into 2 maps for clarity: the first contains the 3 direct delivery scenarios (Small, Medium, and Large), and the second shows the additional BGRP scenarios (Injection Only, Eastside Injection, North of River, and Extract in 180/Inject in 400).

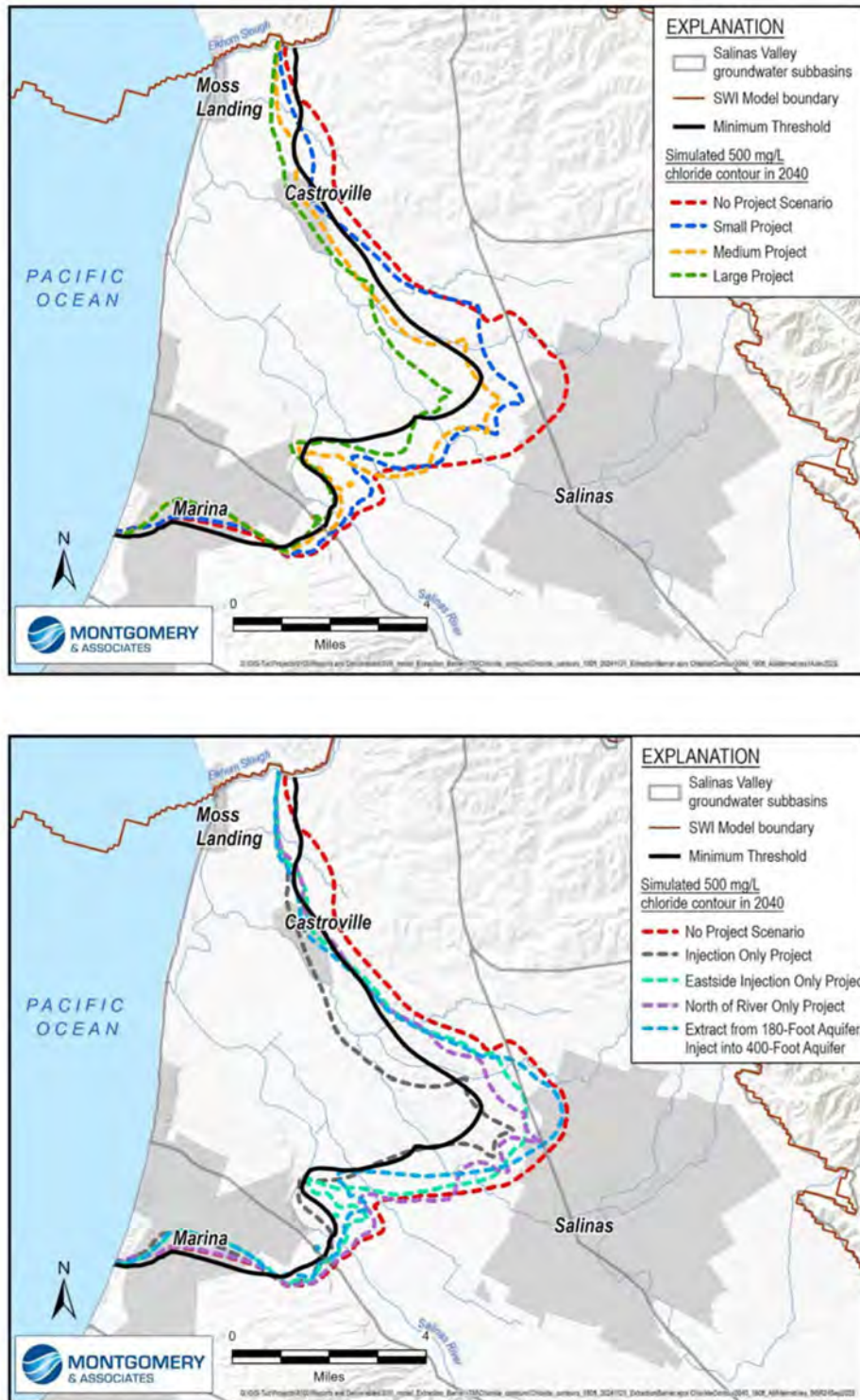


Figure 19. Chloride Isocontour for the 7 BGRP Scenarios Compared to Baseline Scenario and Minimum Threshold in the 180-Foot Aquifer

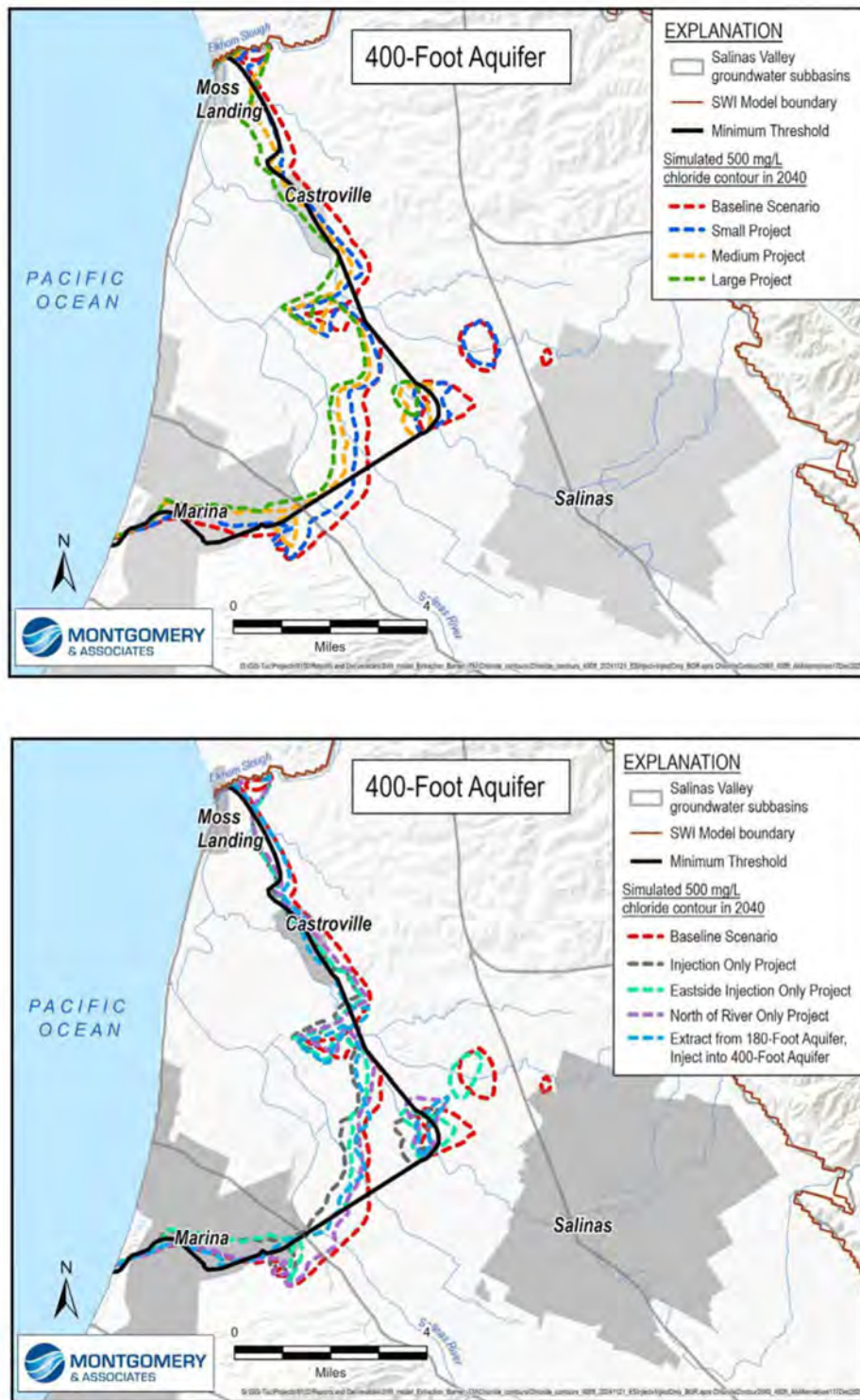


Figure 20. Chloride Isocontour for the 7 BGRP Scenarios Compared to Baseline Scenario and Minimum Threshold in the 400-Foot Aquifer

Standardized costs were developed for the 7 BGRP scenarios based on preliminary design and engineering cost estimates. Table 5 summarizes the standardized costs of the BGRP alternatives. The table shows total construction costs (including soft costs), annual O&M, and replacement costs. The present value costs are shown, the annualized cost, and the cost per AF of project yield. Project yield reflects injected water for the BGRP alternatives. Therefore, the \$/AF cost reflects the cost per acre-foot of injected water. Costs range from \$3,155 to over \$6,000 per AF.

Table 5. BGRP Phase 1 Scenarios Estimated Economic Lifecycle Costs

Cost Category	Small	Medium	Large	Injection Only	Eastside Injection	N of Salinas River	180 to 400-Foot
Total Construction Cost (\$M)	\$709	\$1,002	\$1,465	\$951	\$947	\$629	\$951
Annual Treatment O&M (\$M)	\$51	\$80	\$110	\$80	\$80	\$80	\$80
Annual O&M (\$M)	\$18	\$27	\$38	\$33	\$33	\$21	\$46
<b>Present Value Total Cost (\$M)</b>	<b>\$2,254</b>	<b>\$3,376</b>	<b>\$4,750</b>	<b>\$3,459</b>	<b>\$3,453</b>	<b>\$2,862</b>	<b>\$3,728</b>
Annualized Cost (\$M)	\$101	\$152	\$214	\$156	\$155	\$129	\$168
Annual Yield (Acre-feet)	28,000	46,900	67,800	46,900	46,900	20,900	29,000
<b>\$/Acre-Foot Cost</b>	<b>\$3,625</b>	<b>\$3,241</b>	<b>\$3,155</b>	<b>\$3,321</b>	<b>\$3,315</b>	<b>\$6,166</b>	<b>\$5,788</b>

In October 2025, SVBGSA’s Board supported the staff recommendation that the Injection Only Scenario, with refinements, be carried forward as the preferred BGRP scenario for further evaluation in the USBR feasibility study. Along with meeting the seawater intrusion minimum threshold, a key advantage of the Injection Only Scenario is that it does not require existing groundwater users to receive treated water in lieu of pumping. In the preferred BGRP project, treated water is injected inland of the seawater intrusion front to raise groundwater levels and replenish the groundwater. This approach does not deliver water to end users; instead, both urban and agricultural users continue to operate their own wells and water systems.

#### 4.5.2 Alternatives Included in the USBR Report

The description of alternatives included in the USBR Report begins with the Baseline Scenario described in Section 4.2.2. This is modeled with the SWIM Baseline Scenario for comparison of project effects. The USBR Report also identifies a NAA, which reflects expected future conditions in the absence of the planned PMA or any other engineered solution. Unlike the Baseline Scenario, which assumes continued pumping regardless if it causes undesirable results and does not meet SGMA sustainability requirements, the NAA considers compliance with existing laws (e.g., SGMA) and assumes the State will intervene and manage groundwater if local agencies fail to meet SGMA requirements. The USBR Report includes other projects that had been proposed in the GSPs, however, because none of these projects on their own achieve

the seawater intrusion minimum threshold, they are not considered to be equivalent projects and are not carried forward in the economic analysis of the alternatives. Because no other GSP projects achieved the seawater intrusion minimum threshold, an AWSP was developed as an alternative to BGRP. This AWSP provides similar effects on seawater intrusion and similar supply benefits to the region, as required by the USBR feasibility study guidelines.

Within each alternative, multiple project scenarios have been considered and identified. Alternatives refer to different project types, whereas scenarios refer to variations of the same project type.

#### **4.5.2.1 No Action Alternative (NAA)**

A NAA includes no new infrastructure. Without constructing a project, the seawater intrusion minimum threshold is projected to be exceeded, causing an undesirable result, and violating SGMA law. Therefore, the NAA considers what might happen with SWRCB intervention. SWRCB would not develop new structural solutions (i.e., projects), but it would impose management actions such as pumping limits. Accordingly, the assumptions underpinning the NAA are:

- Seawater intrusion continues and the minimum threshold is exceeded in the absence of a project.
- The SWRCB designates 1 or more subbasins as probationary and intervenes with management actions.
- SWRCB intervention includes administrative fees, pumping limits/reductions (location, timing, and magnitude not yet specified), and other management actions to address seawater intrusion.
- Because subbasins are hydraulically connected, the SWRCB may extend pumping limits beyond the 180/400 Subbasin.

The NAA assumes that the SWRCB would implement certain pumping reductions to manage seawater intrusion, recognizing that the minimum threshold may not be fully achieved by 2040. Domestic water users would be limited to the target of 42 gallons per capita per day (gpcd) for indoor use. Since the location and magnitude of agricultural pumping reductions are not known, a range of pumping reductions up to full cessation of pumping were considered.

Groundwater modeling was used to evaluate potential SWRCB pumping reductions to address seawater intrusion. The groundwater modeling shows that pumping reduction alone, even complete cessation of all agricultural pumping in the entire Salinas Valley, cannot meet the seawater intrusion minimum threshold by 2040. In addition to not meeting the seawater intrusion minimum threshold, the NAA assumption that all agricultural groundwater pumping is

eliminated in the 180/400 and other subbasins in the Salinas Valley does not appear to be politically plausible and certainly violates any notion of an economically sustainable solution. Therefore, because ceasing all agricultural pumping is not viable, a reasonable NAA was developed and applied to evaluate project economic benefits.

In summary, the NAA considers SWRCB 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 and then modified for the economic analysis.

### **NAA Groundwater Modeling**

Under the NAA, the SWRCB would only use demand management; however, where it would reduce pumping is unclear. To meet SGMA requirements, the SWRCB may need to reduce pumping in subbasins that are not currently seawater intruded.

The following 5 pumping reduction scenarios were modeled:

- No agricultural pumping in 180/400 and Monterey Subbasins
- No agricultural pumping in 180/400, Northern Eastside, and Monterey Subbasins
- No agricultural pumping in 180/400, Eastside, Monterey, and Langley Subbasins
- No agricultural pumping in 180/400, Eastside, Monterey, Langley, and Forebay Subbasins
- No agricultural pumping in all SVBGSA subbasins

Additionally, all 5 NAA scenarios limited municipal pumping to no more than 42 gallons per capita per day matching the California minimum indoor standard for 2030. Domestic pumping from *de minimis* users is not subject to pumping reductions.

The 5 NAA scenarios were all ineffective at moving the 500 mg/L chloride isocontour in the 180-Foot and 400-Foot Aquifers back to the required minimum threshold line by 2040. Figure 23 shows the simulated 500 mg/L isocontour in 2040 in the 180-Foot and 400-Foot Aquifers resulting from the 5 NAA scenarios. None of these meet the minimum threshold, which is shown by the black line.

Groundwater modeling of the NAA shows that it is not possible to meet the minimum threshold for seawater intrusion by 2040 even under the unrealistic scenario where all agricultural groundwater pumping is eliminated in the Salinas Valley and domestic pumping is limited to 42 gpcd. These scenarios are not intended to represent realistic or politically plausible solutions; rather, they investigate whether agricultural land fallowing by itself could meet the seawater intrusion minimum threshold by 2040. The scenarios do not meet the seawater intrusion

minimum threshold due to the slow process of natural recharge resulting from land fallowing, combined with the SGMA 2040 deadline.

As further shown in Appendix B of the USBR Report, over time land fallowing enables the 500 mg/L chloride isocontour to move toward the coast and to the north. With time, it becomes more evident that fallowing agricultural lands in the 180/400, Monterey, and northern portion of the Eastside Subbasins have the most significant effect on the progression of the 500 mg/L chloride isocontour. Fallowing agricultural lands in the Forebay, Upper Valley, and southern portion of the Eastside Subbasins have lesser, although measurable, effects on the progression of the 500 mg/L chloride isocontour. This study did not specifically address the relative effect of fallowing the limited agricultural lands in the Langley Subbasin.

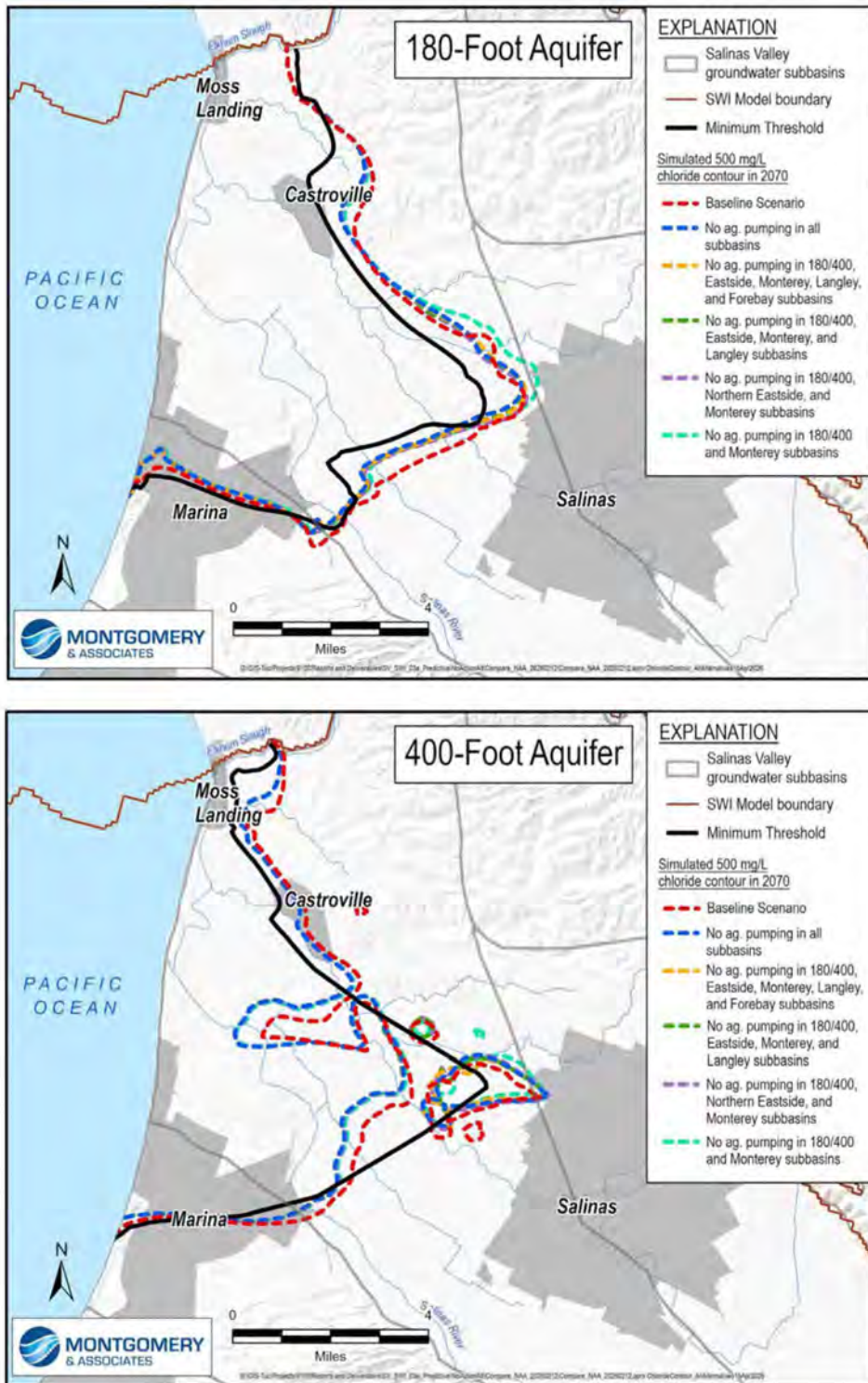


Figure 21. 2040 500 mg/L Chloride Contours Comparison of NAA to Baseline Scenario and Minimum Threshold

#### 4.5.2.2 BGRP Injection Only Alternative

The USBR Report carries forward the Injection Only Scenario as the BGRP Alternative, along with the AWSP. The BGRP and AWSP are both evaluated relative to the NAA. The BGRP Injection Only infrastructure is shown on Figure 24. The project infrastructure includes groundwater extraction wells located near Highway 1 parallel to the coastline to establish a barrier where seawater intrusion is observed in the 180/400 Subbasin and Monterey Subbasins. Instead of delivery of desalinated brackish groundwater to urban or agricultural end users coupled with injection, this project only includes injection into the 180-Foot and 400-Foot Aquifers inland of the seawater intrusion front.

The BGRP Injection Only Alternative includes a total of 20 extraction barrier wells, with 10 in the 180-Foot Aquifer and 10 in the 400-Foot Aquifer. The total volume extracted is 41,500 gallons per minute (gpm) or approximately 67,000 AFY. The extracted brackish water is then treated by Reverse Osmosis (RO). The total available treated water volume for injection is approximately 46,900 AFY. All extracted groundwater would be conveyed to a centralized brackish water treatment facility. The BGRP includes a 2-pass, multi-stage RO system to achieve the necessary removal of boron, which could have elevated concentrations in the influent water. Concentrate/Brine produced at the treatment facility is assumed to be discharged using the existing M1W ocean outfall. The injection only BGRP includes a reverse osmosis concentrate (ROC) storage pond that will be used to store ROC if the outfall is offline or is unable to accept additional flows during significant wet weather events. The distribution piping would convey treated brackish groundwater to inland injection wells. As shown on Figure 24, there are a total of 21 injection wells with 11 in the 180-Foot Aquifer and 10 in the 400-Foot Aquifer.

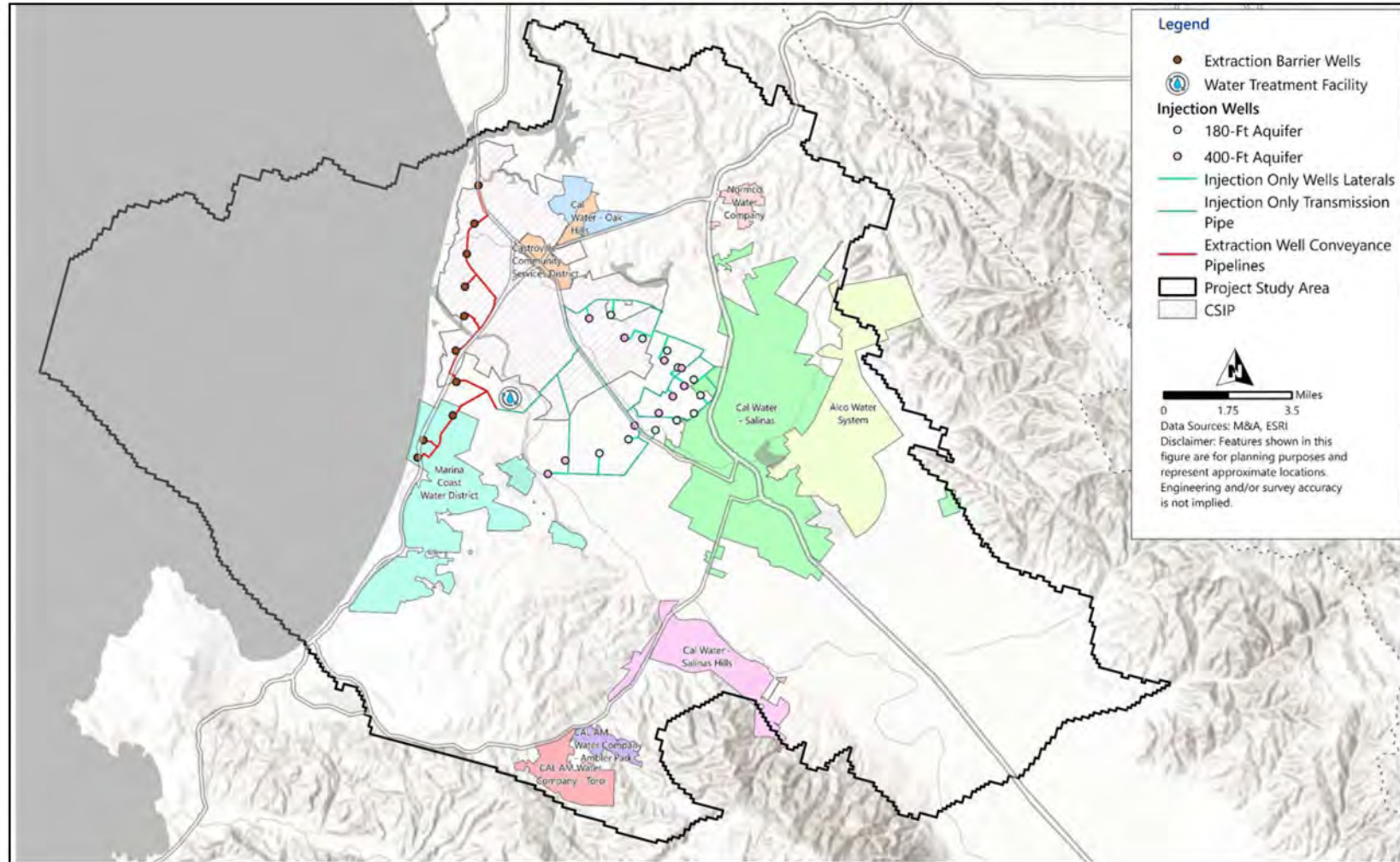


Figure 22. Conceptual Infrastructure Layout for the BGRP Injection Only Alternative

**BGRP Injection Only Costs**

Total project costs include both construction direct cost and soft costs. Soft costs included estimated costs for planning, design, administrative, legal, and construction management cost and are based on percentages of the direct construction costs subtotal. Construction costs have a 30% contingency applied on each line item, an escalation to midpoint of a 0.25% cost increase per month (3% annual escalation) on present day costs to a midpoint of construction date of July 2030, and sales tax on an assumed 50% of the total direct costs. The total lifecycle cost is calculated over 40 years of operations starting in 2036.

The BGRP addresses seawater intrusion by installing an extraction barrier near the coast with injection wells farther inland to create a freshwater mound. Seven BGRP scenarios were considered. Table 6 summarizes the standardized costs of the BGRP Injection Only Alternative. The table shows total construction costs (including soft costs), annual O&M, and replacement costs. The present value costs are shown, the annualized cost, and the cost per AF of project yield. Project yield reflects injected water for the BGRP Alternatives. Therefore, the \$/AF cost, \$3,321, reflects the cost per acre-foot of injected water.

Table 6. BGRP Injection Only Alternative Estimated Economic Lifecycle Costs

Cost Category	Injection Only
Total Construction Cost (\$M)	\$951
Annual Treatment O&M (\$M)	\$80
Annual O&M (\$M)	\$33
<b>Present Value Total Cost (\$M)</b>	<b>\$3,459</b>
Annualized Cost (\$M)	\$156
Annual Yield (Acre-feet)	46,900
<b>\$/Acre-Foot Cost</b>	<b>\$3,321</b>

**BGRP Injection Only Groundwater Modeling**

Groundwater modeling of the BGRP Injection Only Alternative was refined using the October 2025 updated version of the SWIM (v3). Due to updated planning and design timelines, the refined model pushed the project’s start date from 2030 to 2035. The modeling showed the impact of the BGRP Injection Only Alternative on seawater intrusion to be generally consistent with the previous modeling, with some local differences.

The BGRP Injection Only Alternative is effective at reversing seawater intrusion and avoiding undesirable results. Figure 24 shows the simulated 500 mg/L isocontour in 2040 in both the 180-Foot and 400-Foot Aquifers, resulting from the BGRP Injection Only Alternative. This figure additionally uses a black line to show the minimum threshold line that must be achieved by 2040, and a dashed red line to show the location of the 500 mg/L isocontour under the Baseline Scenario.

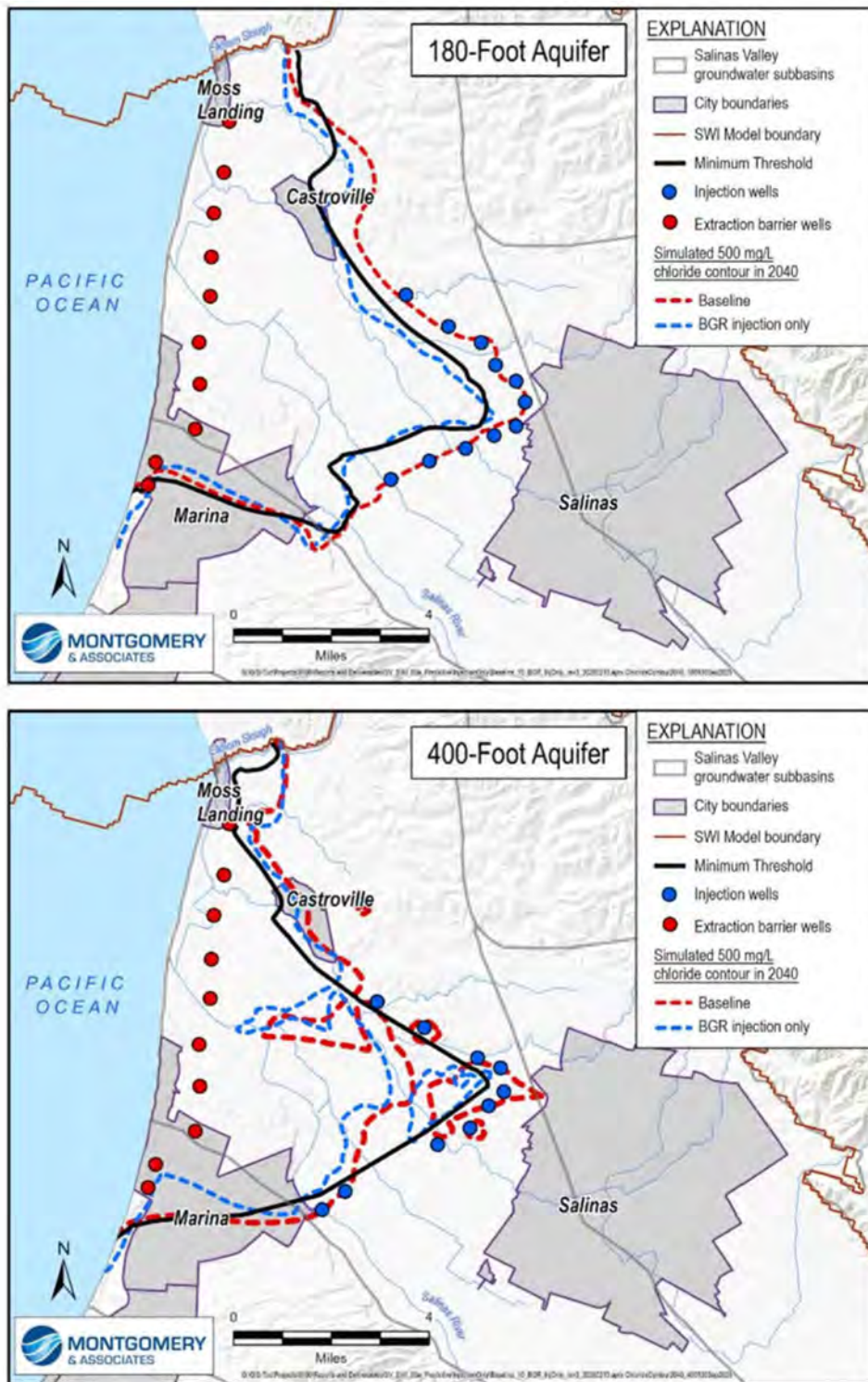


Figure 23. 2040 500 mg/L Chloride Contours Comparison of Preferred BGRP Alternative to Baseline Scenario and Minimum Threshold

#### 4.5.2.3 Alternative Water Supply Project (AWSP)

The USBR Report includes the AWSP. The AWSP is designed to provide benefits equivalent to the BGRP Injection Only Alternative. The BGRP Injection Only Alternative meets the seawater intrusion minimum threshold requirement of holding the 500 mg/L chloride line at, or seaward of, the 2017 extent of seawater intrusion by 2040. The AWSP must meet the same minimum threshold requirements.

The AWSP provides an injection barrier inland of existing seawater intrusion. Injection is more effective at halting seawater intrusion than providing in-lieu supplies to reduce pumping because injection directly and immediately targets the areas of seawater intrusion. Providing in-lieu supplies relies on the slower process of natural recharge and might not raise groundwater levels in the specific areas needed to control seawater intrusion. Therefore, any available water supplies are used for injection in this project. Any demand management is in the form of either limits on municipal pumping or permanent land fallowing.

The AWSP includes 4 sources of water: excess river water diverted under a modified Permit 11043 at its maximum capacity, agricultural tile drain water, Salinas industrial wastewater, and water currently passing the SRDF. It provides 44,000 AFY, just slightly less than the preferred BGRP scenario's 47,000 AFY. All of these supplies are used to increase recharge and raise groundwater levels through direct injection of the treated supplies into the groundwater subbasin.

A conceptual infrastructure layout and cost for collecting, treating, and injecting the AWSP water were developed. The conceptual AWSP infrastructure is shown on Figure 25. Diverting, treating, storing, and delivering water derived from Permit 11043 will require a 400 cfs diversion structure with fish screen, a sedimentation basin to remove the high turbidity of winter river flows, a pump station and conveyance piping to transfer water to the reservoir, a new 110,000 AF reservoir, and a 21 million gallon per day (MGD) surface water treatment plant to treat surface water diverted under Permit 11043. The other 3 water sources would share a new collection and conveyance piping system, new water tanks and storage ponds, and a 20 MGD brackish water RO plant to remove salt from the agricultural tile drain and Salinas Industrial Waste Pond sources. Stored and treated water from all 4 water sources would require distribution piping and 27 injection wells to inject the water into the 180-Foot and 400-Foot Aquifers.

Figure 26 shows the conceptual infrastructure layout for the AWSP.

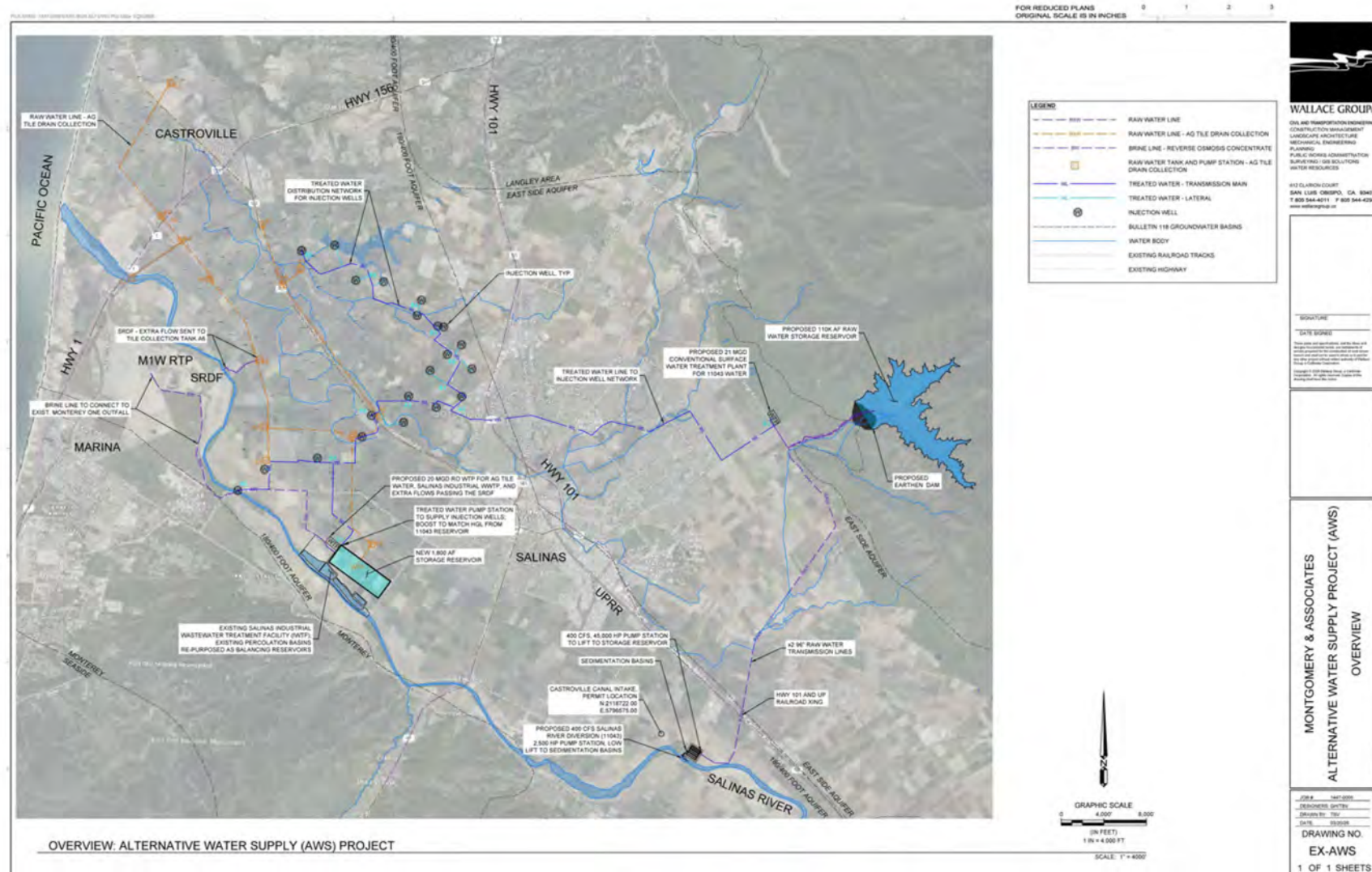


Figure 24. Conceptual Infrastructure Layout for the AWSP

**AWSP Cost Estimate**

Cost estimates for the AWSP are categorized as Class 5 under the Association for the Advancement of Cost Engineering (AACE) framework. Class 5 estimates represent the lowest level of project definition and accuracy, while Class 1 reflects the highest. The estimates provided here reflect an early project definition level of approximately 0–2% and are intended for concept-screening purposes.

The preliminary estimates are largely based on developing unit costs for major project components—such as dollars per unit of flow capacity for a low-lift river pump station, including the intake structure, pumps, electrical systems, and associated facilities—using data from comparable projects with known construction costs. As the project advances and more detailed design information becomes available, the estimates can be refined using more specific unit costs, material quantities, and other detailed inputs. The AWSP Alternative Costs are presented in Table 7. All costs include 30% construction contingency, Monterey County sales tax of 7.75% applied to 50% of costs, and 3% annual escalation to July 2030 as the estimated midpoint of construction. Costs are presented in current (2026) dollars.

Table 7. AWSP Estimated Economic Lifecycle Costs

Cost Category	AWSP
Total Construction Cost (\$M)	\$3,847
Annual Treatment O&M (\$M)	\$34
Annual O&M (\$M)	\$50
<b>Present Value Total Cost (\$M)</b>	<b>\$5,730</b>
Annualized Cost (\$M)	\$258
Annual Yield (Acre-feet)	44,208
<b>\$/Acre-Foot Cost</b>	<b>\$5,836</b>

**AWSP Groundwater Modeling**

While the AWSP was designed to only include injection, 3 AWSP scenarios were simulated to assess different options:

- AWSP with injection only
- AWSP with injection and land fallowing
- AWSP with injection and municipal pumping redistribution

Groundwater modeling showed that the land fallowing and municipal pumping redistribution had insignificant impacts on controlling seawater intrusion when coupled with the AWSP injection.

Therefore, only results from the AWSP with injection only scenario are presented in the comparison with the NAA and BGRP in the section below.

Figure 27 shows the simulated 500 mg/L isocontour in 2040 in both the 180-Foot and 400-Foot Aquifers, resulting from the 3 AWSP scenarios. This figure additionally uses a black line to show the minimum threshold line that must be achieved by 2040, and a dashed red line to show the location of the 500 mg/L isocontour under the baseline simulation. Results show that the AWSP project is generally as effective as the BGRP Injection Only Alternative at preventing the 500 mg/L isocontour from progressing beyond the minimum threshold line, although the BGRP Alternative is slightly more effective near the community of Castroville. All 3 AWSP scenarios result in about the same 500 mg/L chloride isocontour by 2040, as evidenced by how difficult it is to distinguish between them on the figure.

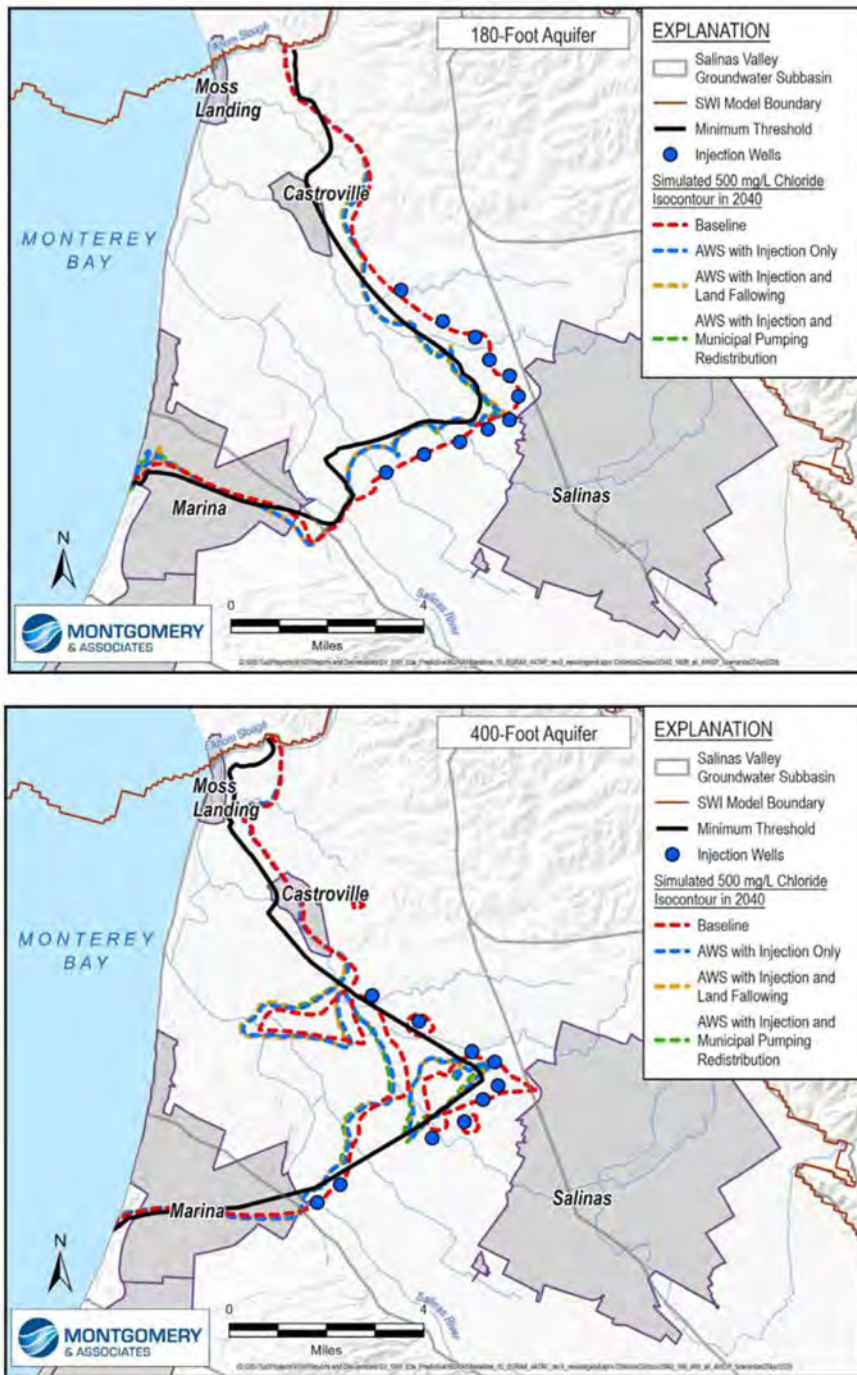


Figure 25. 2040 500 mg/L Chloride Contours Comparison of 3 AWSP Scenarios to Baseline Scenario and Minimum Threshold

### 4.5.3 Effect on Groundwater Conditions

Groundwater flows from areas of higher groundwater levels toward areas of lower groundwater levels. Under natural conditions, groundwater in this region flowed toward the ocean. However, as pumping lowered inland groundwater levels, the hydraulic gradient reversed and, for decades, groundwater has been flowing toward a depression northeast of the City of Salinas. This reversed gradient, coupled with a pathway for seawater to migrate inland, resulted in seawater intrusion.

The NAA, BGRP, and AWSP alternatives represent 3 different approaches to addressing seawater intrusion:

- NAA reduces extraction, allowing groundwater elevations to rise, which alters the steepness of the hydraulic gradient toward the Eastside groundwater level depression.
- AWSP injects water immediately inland of the intrusion to quickly alter the gradient affecting the leading edge of seawater intrusion.
- BGRP couples inland injection with extraction wells near the coast to pull back brackish groundwater and prevent further intrusion of higher saline water.

The figures below illustrate these dynamics through modeling comparisons of groundwater levels, chloride concentrations, and the seawater intrusion isocontour for the Baseline, NAA, BGRP, and AWSP. Although multiple scenarios were run, for the NAA the scenario with no agricultural pumping in all subbasins is shown, and for the AWSP, the scenario with injection only is shown. All 3 alternatives were modeled using SWIM v3.

Figure 28 shows how groundwater levels respond to the alternatives as of the 2040-2041 evaluation period, with the 180-Foot Aquifer displayed on the top set of maps and 400-Foot Aquifer displayed on the bottom set of maps. The Baseline Scenario maps show the prominent low groundwater levels of the Eastside groundwater level depression. In the NAA, groundwater levels rise relative to the Baseline across a broad area, raising it above sea level outside of the Eastside alluvial fans. In the AWSP, groundwater levels rise just in the vicinity of the injection wells, raising them to above sea level in the 180-Foot Aquifer; however, groundwater levels in the 400-Foot Aquifer are still below sea level, except in the immediate vicinity of the injection wells. In the BGRP, groundwater levels are raised near the injection wells, and the extraction barrier wells lower groundwater levels near the coast.

Figure 29 shows the chloride concentration at 2040 for each scenario, with red indicating concentrations close to seawater and the 500 mg/L chloride isocontour marked with a black dashed line. Chloride concentrations of the NAA are almost exactly the same as the Baseline Scenario. The AWSP and BGRP show how effective injection wells are at stopping and pushing the seawater intrusion back with sufficient volumes for injection. However, with the AWSP high

saline water continues to intrude, causing the chloride concentrations west of the injection wells to increase, while the BGRP decreases the chloride concentrations in the existing seawater intruded area east of the extraction barrier wells.

Figure 30 shows the progression of the 500 mg/L chloride isocontour over time. Seawater intrusion continued to progress in all scenarios before agricultural pumping was stopped or the project came online. Then, even by 2040, just 5 years into the BGRP and AWSP, the chloride isocontour is already pushed back to where it was in 2022.

Figure 31 shows where the 500 mg/L chloride isocontour is at 2040 for each alternative in comparison to the seawater intrusion minimum threshold. The seawater intrusion minimum threshold is set at the 2017 extent of seawater intrusion, and to compare model results to model results, the figures show the 2017 simulated extent. It shows that by 2040, the AWSP and BGRP have greater effect on the chloride isocontour than the NAA, pushing it close to the minimum threshold line. The differences from the Baseline Scenario become even more prominent over time, as illustrated by Figure 32, which shows the 2070 500 mg/L chloride isocontour.

The results across scenarios also illustrate a fundamental distinction between groundwater level and seawater intrusion responses to recharge and pumping changes. From a groundwater level standpoint, injecting a given volume near a pumping well is nearly equivalent to reducing pumping by that amount, regardless of source water quality or timing. Chloride concentration responses, however, are driven by flow paths and conduits for seawater intrusion, source water quality, and mixing and spreading processes in ways that are highly sensitive to the extraction and injection configuration and the timing of sources (including recharge and pumping reductions) and sinks (continued pumping). This means scenarios with similar groundwater level effects may produce markedly different chloride outcomes. For PMAs specifically targeting seawater intrusion, the details of well locations, timing, and water quality therefore matter considerably more than they do for groundwater level management.

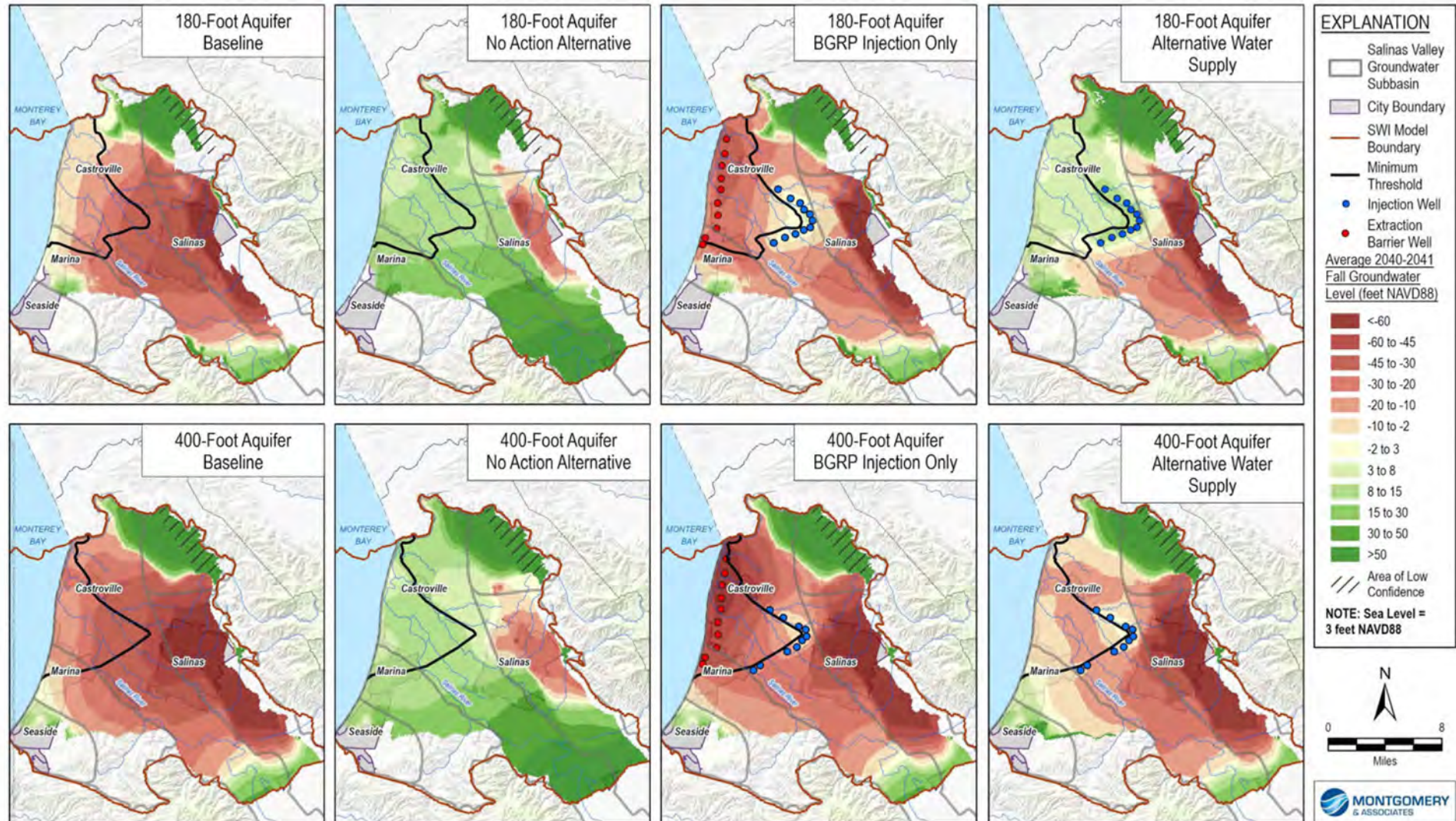


Figure 26. Groundwater Elevations for the Baseline Scenario, NAA, BGRP, and AWSP Alternatives

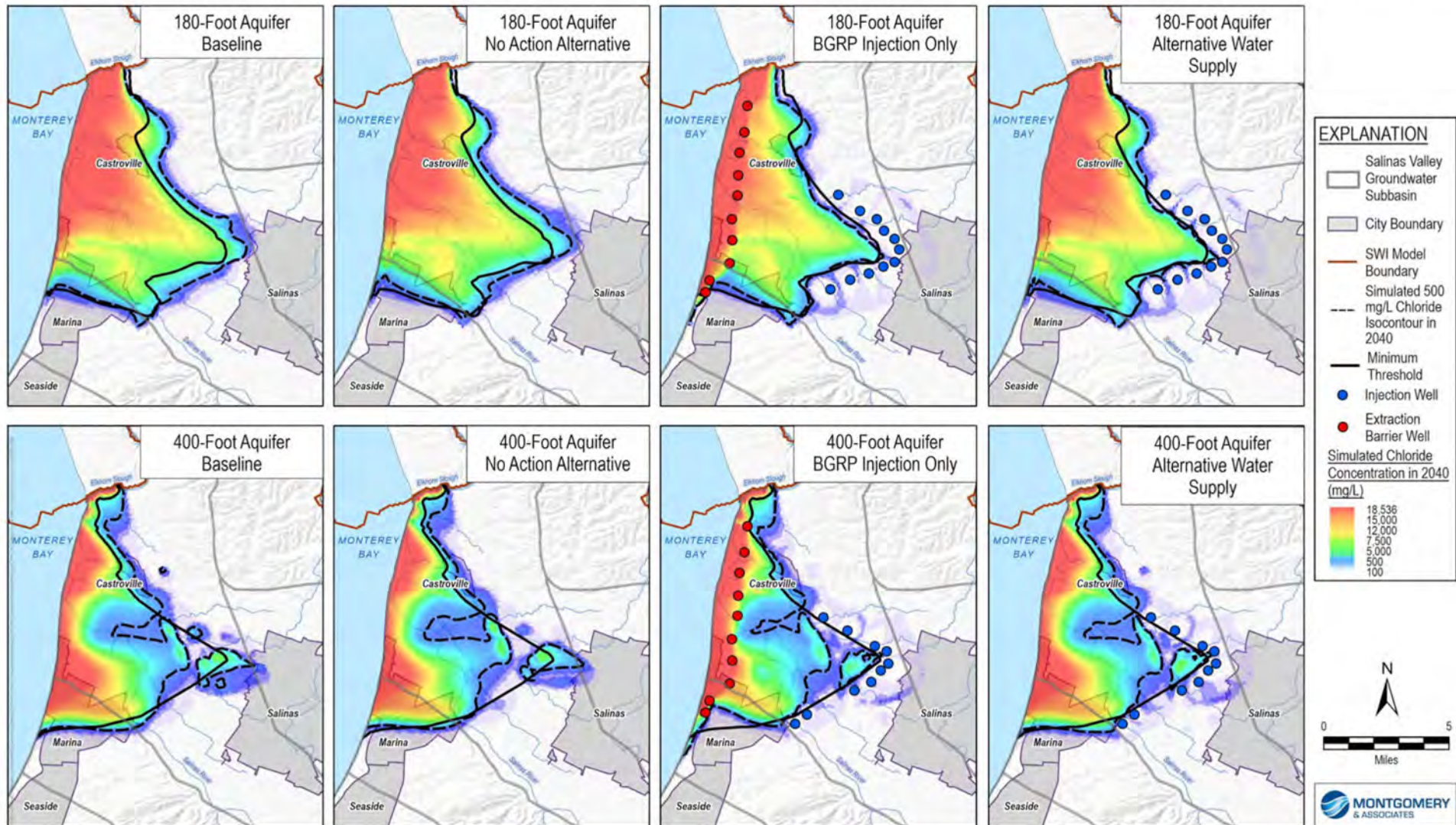


Figure 27. 2040 Chloride Concentrations for the Baseline Scenario, NAA, BGRP, and AWSP Alternatives

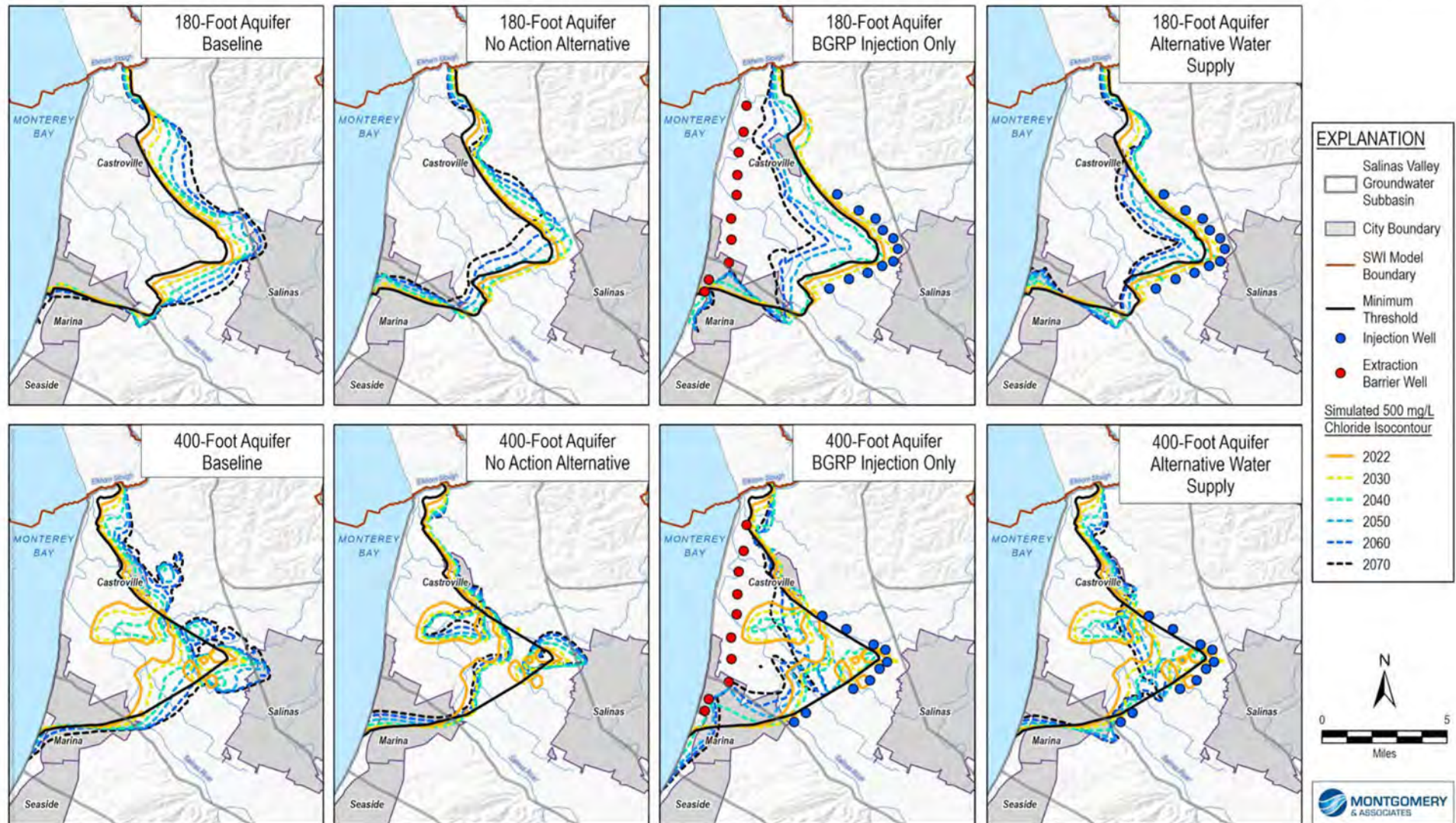


Figure 28. Simulated Progression of 500 mg/L Chloride Isocontour for the Baseline Scenario, NAA, BGRP, and AWSP Alternatives

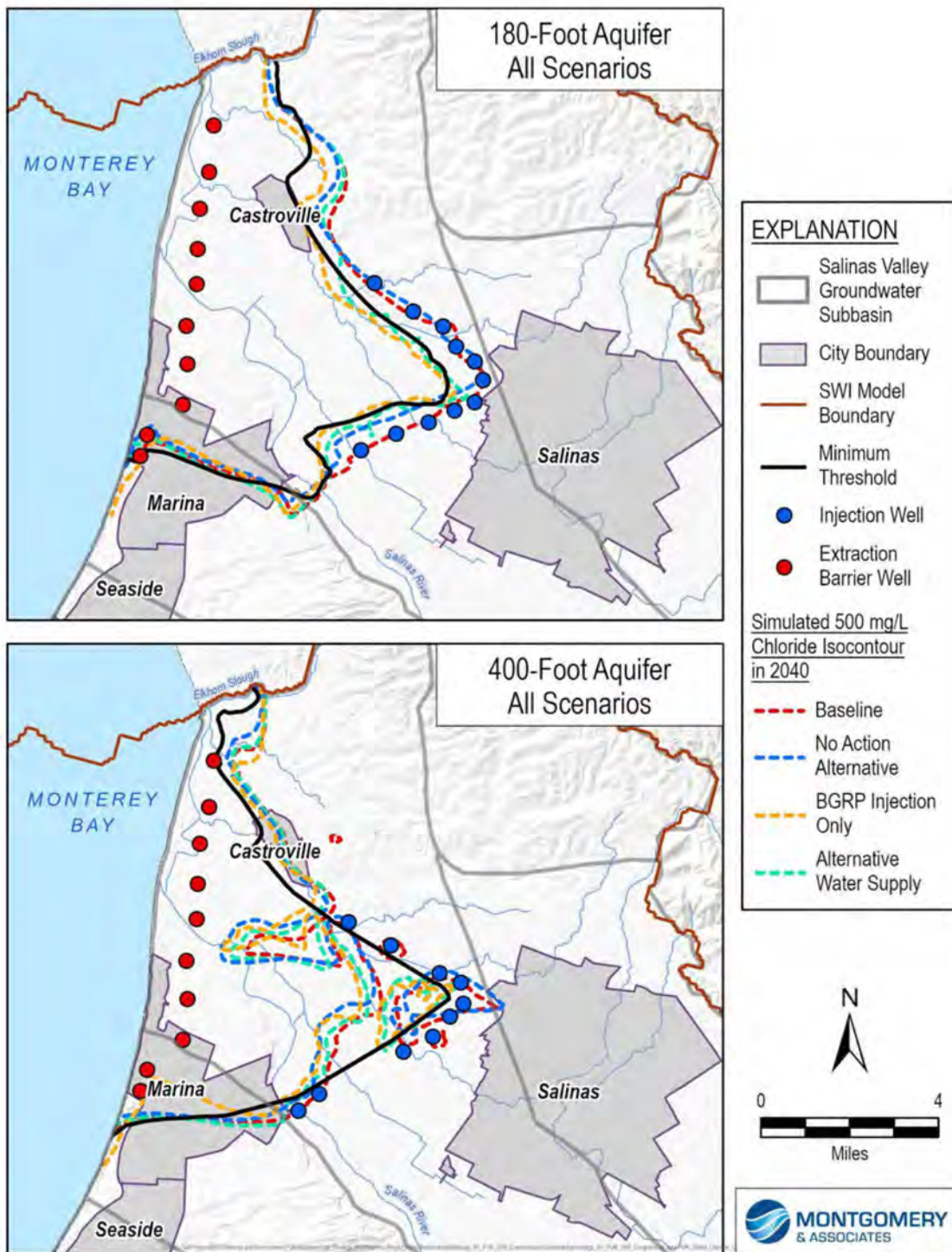


Figure 29. 2040 500 mg/L Chloride Isocontours Comparison of the NAA, BGRP, and AWSP to Baseline Scenario and Minimum Threshold

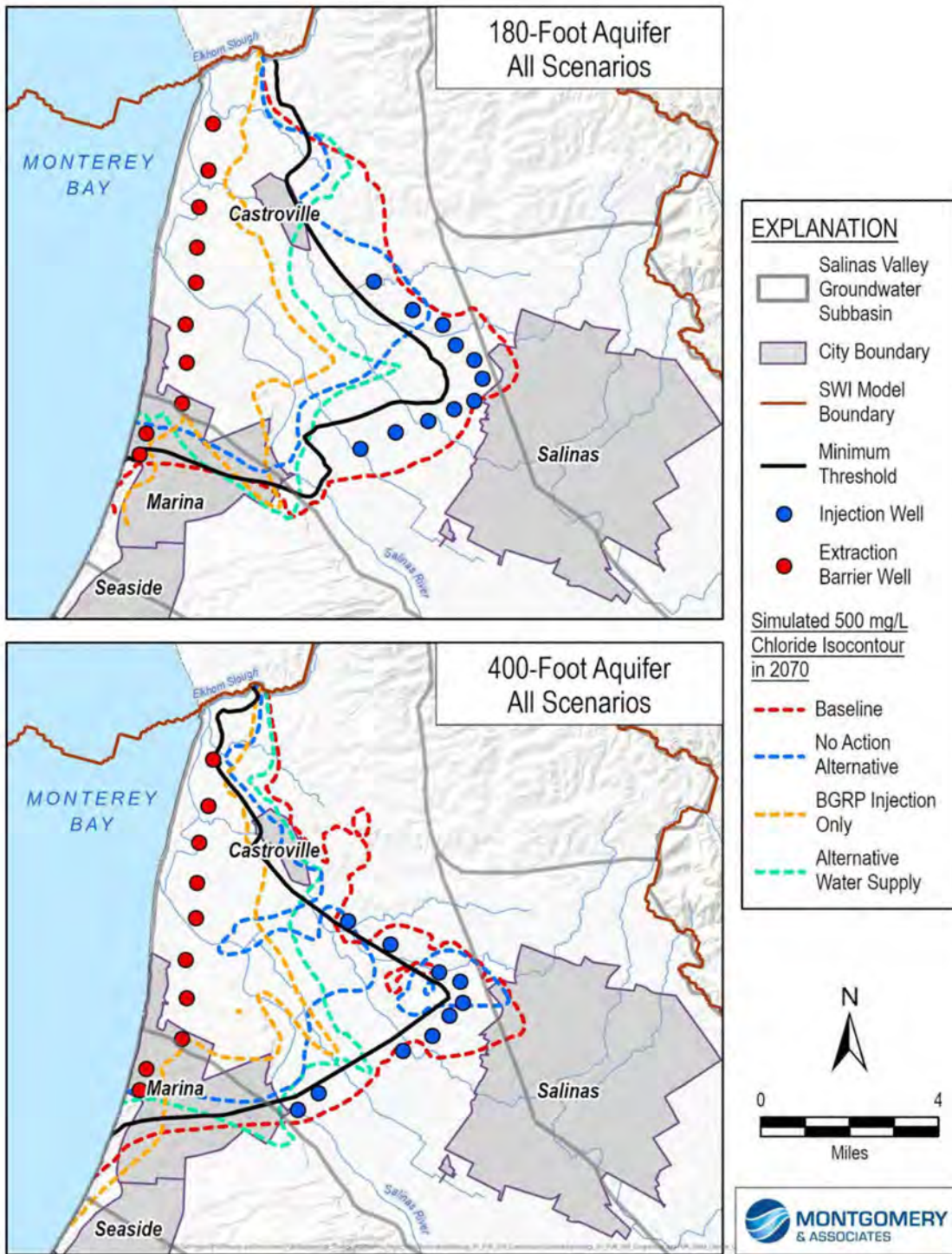


Figure 30. 2070 500 mg/L Chloride Isocontours Comparison of the NAA, BGRP, and AWSP to Baseline Scenario and Minimum Threshold

Table 8 compares simulated change in chloride mass and change in seawater intruded area between the Baseline, the BGRP, and the AWSP Scenarios. Both the BGRP and AWSP Scenarios reduce the chloride mass and seawater intruded area in the 180-Foot Aquifer. However, according to both metrics, only the BGRP Scenario results in reductions in the 400-Foot Aquifer. The BGRP Scenario results in the greatest reduction in both chloride mass and intruded area of the 3 options. Future studies will refine the project location and extraction and injection rates in association with further feasibility work.

Table 8. BGRP Modeling Results Summary Calculations

Model Run	180-Foot Aquifer		400-Foot Aquifer	
	2035-2040 Change in Chloride Mass (kg)	2035-2040 Change in Seawater Intruded Area (acres)	2035-2040 Change in Chloride Mass (kg)	2035-2040 Change in Seawater Intruded Area (acres)
Baseline Scenario	98,200	900	333,000	1,700
AWSP	-97,300	-1,500	172,200	400
NAA	-81,600	0	36,300	400
BGRP Injection Only	-643,800	-3,800	-320,100	-1,000

Note: Only addresses model areas with >500 mg/L concentration and east of the extraction barrier regardless of scenario (for comparison purposes).

kg = kilogram

Red cells in this table show areas where chloride mass or intruded area increases. Green cells in this table show areas where chloride mass or intruded area decreases.

Because the 180-Foot Aquifer is simulated by 3 model layers, the change in chloride mass sums the chloride mass in all 3 layers. The change in seawater intruded area is only for Layer 5, which corresponds to the Lower 180-Foot Aquifer and generally presents more advanced seawater intrusion.

#### 4.5.4 Economic and Financial Analysis

An economic feasibility analysis and financial analysis was developed for the BGRP and AWSP alternatives. 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 in Monterey County and is used to determine whether the project represents a justifiable use of resources by creating benefits that exceed the costs. The financial feasibility analysis evaluates whether sufficient resources are available to cover all construction and long-term 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 at this stage, and as such a preliminary financial analysis is presented.

Addressing seawater intrusion 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. The U.S. Department of Commerce Bureau of Economic Analysis (BEA) estimates the total gross domestic product (GDP) of Monterey County to be about \$36.86 billion as of 2023. Agriculture—a major industry in Monterey County—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 to other economic effects, and regional economic effects. These separate components (economic benefits, other economic effects, regional effects) are summarized in the following sections. Other economic effects and regional effects are not added to project economic benefits. 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 9 summarizes the economic benefits, other economic effects, regional effects, and other considerations attributable to the BGRP or AWSP.

Table 9. 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

The economic benefits of a project—BGRP or AWSP – are measured relative to the NAA. As described earlier, in the absence of a project there would be undesirable results that would trigger SWRCB intervention. Groundwater modeling was used to evaluate potential SWRCB pumping limits or reductions to address seawater intrusion. The modeling shows that pumping reduction alone, even complete cessation of all agricultural pumping in the Salinas Valley, cannot meet the seawater intrusion minimum threshold by 2040. An 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 SWRCB would implement certain pumping reductions to manage seawater intrusion recognizing that the minimum threshold may not be fully achieved by 2040. Domestic water users would be limited to the target of 42 gallons per capita per day (gpcd)<sup>6</sup>. Since the location and magnitude of agricultural pumping reductions are not known, a range of pumping reductions up to full cessation of pumping were considered in the economic analysis. The level of pumping reduction at which the economic cost of the reductions would exceed the cost of the project was determined. At this level of pumping reduction, any NAA that meets or exceeds that level of reductions is economically inferior to a structural alternative (e.g., BGRP or AWSP). This occurs at around a 30% cut in pumping (valley wide). The NAA range shows a 30% and 50% cut. This would result in economic costs that exceed the cost of the BGRP and AWSP alternatives.

In summary, the NAA considers SWRCB 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, with 30% and 50% shown here as the economic costs exceed the cost of the project alternatives.

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 include the avoided cost of:

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

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<sup>6</sup> 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.

Table 10 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% and 50% 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 10. Summary of NAA Scenario Benefits at 30% or 50% Pumping Reduction

Benefit (Avoided Cost)	30% Reduction	50% Reduction
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

Table 11 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 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% 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 \$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% 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 11. Summary of Project Alternatives Economic Evaluation

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

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.

There are other monetizable economic values generated by the project, but they are measured relative to baseline conditions (Baseline Scenario) 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 the following:

- 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

Table 12 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 (Baseline Scenario). The PV of BGRP economic effects equals \$220.54 million. The PV of AWSP economic effects equals \$160.64 million.

Table 12. Other Economic Effects Summary

Effect	BGRP		AWSP	
	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
<b>Total</b>	<b>\$9.93</b>	<b>\$220.54</b>	<b>\$7.24</b>	<b>\$160.64</b>

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.

Other economic outcomes of the project that were considered but not monetized include but are not limited to avoided deep aquifer pumping, improved regional water supply reliability,

operational value to broader conjunctive use of the regional water system, and other environmental 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. Full time equivalent jobs in local communities in Monterey County.
- Output value. A measure of the gross value of goods and services produced by a firm, industry, or economy.
- Value added. The net value that a producer creates for the Monterey County economy by transforming inputs into final goods or services.
- Income. The wage earnings generated in Monterey County from production activities.

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 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.

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% and 50% pumping reduction NAA scenarios.

Table 13 shows the regional effects of the project for the 30% pumping reduction 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% pumping reduction NAA scenario.

Table 13. NAA 30% 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
<b>Total</b>	<b>-9,495</b>	<b>-\$993</b>	<b>-\$1,559</b>	<b>-\$1,845</b>

Table 14 shows the regional effects of the project for the 50% pumping reduction NAA 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% pumping reduction NAA scenario.

Table 14. 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
<b>Total</b>	<b>-14,224</b>	<b>-\$1,501</b>	<b>-\$2,353</b>	<b>-\$2,781</b>

A financial feasibility analysis of the BGRP evaluates how the project would be funded, financed, and if it can be paid for. This includes identifying how project costs are allocated among stakeholders and determining potential funding sources such as grants, loans, or user fees. At this stage, detailed cost allocation methods and specific funding mechanisms have not been established. Therefore, illustrative financial estimates were developed for the estimated project capital costs, annual operating expenses, and borrowing, providing a preliminary basis for assessing affordability and guiding future financial planning.

The financial cost of the BGRP Alternative (the alternative with the greater benefit-cost ratio and net benefits) after 25% 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. Project financial cost change over time with debt repayment, inflation, and system replacement.

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 costs 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.

The economic benefits and other economic effects of addressing seawater intrusion 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%. 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 seawater intrusion in the Salinas Valley, and importantly, that the seawater intrusion minimum threshold cannot be achieved by pumping reductions alone. The BGRP and AWSP alternatives both raise groundwater levels, improve water quality, and help push seawater intrusion 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.

#### **4.5.5 Summary of Findings**

The BGRP Injection Only and AWSP Alternatives would meet the seawater intrusion goals outlined in the Salinas Valley GSPs by halting and reversing seawater intrusion in the 180/400 Subbasin and improving groundwater quality in the region. The BGRP Injection Only Alternative's capital cost of approximately \$950 million is less expensive than both the capital cost of the AWSP, which provides similar benefits, and the economic cost likely to occur if the SWRCB intervened as assessed with the NAA Alternative. While the BGRP Injection Only Alternative addresses the seawater intrusion minimum thresholds, and in some areas also groundwater level minimum thresholds, it would need to be modified or combined with other PMAs to address all groundwater goals in the Salinas Valley.

Several other findings in the USBR Report include:

- The configuration of the BGRP Injection Only Alternative offers flexibility to be increased in scale in the future to extend the seawater barrier with some expansion of infrastructure to potentially serve agricultural or urban end users.
- The BGR Injection Only Alternative allows the existing agricultural operations in the area and domestic well usage be maintained while also addressing seawater intrusion. Conversely, the NAA shows that even foregoing all pumping in the subbasins, which would have a critical impact on the agricultural economy in the area, was ineffective at moving the 500 mg/L chloride isocontour in the 180-Foot and 400-Foot Aquifers back to the required minimum threshold line by 2040.

- An EIR/Environmental Impact Statement (EIS) will be needed to address environmental considerations identified in the USBR Report and CEQA Initial Study, along with numerous regulatory permits. Significant environmental impacts and mitigation measures will be identified during the environmental review process.

#### 4.5.5.1 Groundwater Modeling Findings

Table 15 summarizes the findings from the groundwater modeling for the NAA, BGRP Injection Only, and AWSP Alternatives, as compared to the SWIM Baseline Scenario.

Table 15. NAA, BGRP, and AWSP Groundwater Modeling Summary

	Baseline Scenario	NAA	BGRP Injection Only Alternative	AWSP Alternative
<b>Projects' ability to meet the SGMA seawater intrusion minimum threshold</b>	Does not meet the SGMA seawater intrusion minimum threshold	Does not meet the SGMA seawater intrusion minimum threshold	Meets the SGMA seawater intrusion minimum threshold	Meets the SGMA seawater intrusion minimum threshold
<b>Compliance with SGMA</b>	No	Through the State Board intervention process	Yes, pushes seawater intrusion back to minimum threshold	Yes, pushes seawater intrusion back to minimum threshold
<b>Reduce chloride mass by 2040</b>	Significant increase in chloride mass	Significant increase in chloride mass	Largest decrease in chloride mass among all alternatives	Increase in chloride mass
<b>Reduce area of seawater intrusion by 2040</b>	Significant increase in area of seawater intrusion	Significant increase in area of seawater intrusion	Largest decrease in area of seawater intrusion among all alternatives	Small decrease in area of seawater intrusion

Additionally, the following observations from the SWIM modeling help guide the selection of projects for managing seawater intrusion.

- Injection helps raise groundwater levels immediately inland of the seawater intrusion front and reduce or reverse advancement.
- Coupling extraction barrier wells with injection wells helps counteract the strong inland groundwater gradient driving seawater intrusion, clean up existing intrusion, and prevent further intrusion of high chloride seawater.
- Supplementing treated water injection with redistributing municipal pumping or fallowing agricultural lands has minimal benefit to managing the location of the 500 mg/L chloride isocontour.

#### 4.5.5.2 Economic Analysis

The regional economic effects of the NAA have substantial 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 economic benefits and other economic effects of addressing seawater intrusion in the Salinas Valley exceed several billion dollars in present value terms. Both project alternatives in the USBR Report avoid SWRCB 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%. 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 16 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 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% 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 \$257.9 million, or \$5,826 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% 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 16. Summary of Project Alternatives Economic Evaluation

Item	BGRP	AWSP
<b>Present Value Cost</b>	<b>\$3,459M</b>	<b>\$5,730M</b>
<b>Annualized Cost per AF</b>	<b>\$3,321 (\$/AF)</b>	<b>\$5,826 (\$/AF)</b>
<b>30% Agricultural Cut, 42 gpcd domestic, SWRCB Fees</b>		
PV Benefit	\$4,880M	\$4,880M
B/C Ratio	1.41	0.85
NPV	\$1,420M	-\$850M
<b>50% Agricultural Cut, 42 gpcd domestic, SWRCB Fees</b>		
PV Benefit	\$8,108M	\$8,108M
B/C Ratio	2.34	1.49
NPV	\$4,650M	\$2,378M
<b>B/C Ratio Range</b>	<b>1.41 - 2.34</b>	<b>0.85 - 1.42</b>

The economic feasibility analysis finds that the BGRP alternative 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. The USBR Report also discusses other economic effects, and regional economic effects, some of which are monetized and others with a qualitative assessment.

The analysis illustrates that there are economic benefits from managing seawater intrusion in the Salinas Valley, and importantly, that the seawater intrusion minimum threshold cannot be achieved by pumping reductions alone. The BGRP Injection Only and AWSP Alternatives both raise groundwater levels, improve water quality, and help push seawater intrusion back toward the coast.

#### **4.5.5.3 Legal and Institutional Requirements**

The proposed project involves several state, federal, and local regulatory approvals and other discretionary actions necessary to construct and begin operations. While complex, the BGRP is legally feasible and capable of successful implementation. Key to navigating the myriad third-party approvals is early coordination and collaboration with the various decision-making agencies, especially prior to the development of an EIR under the CEQA and EIS under the NEPA.

The CEQA and NEPA analyses could serve as the clearinghouse for the collection of technical support, environmental impact analyses and mitigation, and other information gathering necessary for each third-party agency to exercise discretion on approval of the proposed BGRP. A multi-party memorandum of understanding setting forth coordination and collaboration in the development of the CEQA and NEPA documents and other information may be necessary for each party to consider approval of the BGRP.

#### **4.5.5.4 Next Steps**

If the BGRP is further pursued, key next steps to be taken include:

- Collection of more data to refine project:
  - Drill monitoring wells and collect soil for aquifer characterization in extraction zone
  - Use monitoring wells to collect water quality in extraction zone and perform RO modeling with water quality data
  - Drill injection wells to pilot injection rates
  - Pilot RO if can collect water from extraction zone
- Refinement of project based on data collected in a Basis of Design Report (BODR) (Conceptual Design)
  - Number of extraction and injection wells

- Location of extraction and injection wells
- Design criteria for RO
- Identify location for treatment and alignment of pipelines
- Update project economic benefits as project operations, costs, and alternatives are refined
- Prepare project financial feasibility analysis including cost allocation, financial planning, and funding
- Identify project partners and governance structure
- Prepare an EIR/EIS

## 4.6 Demand Management

In contrast to supply augmentation projects, demand management focuses on actively managing net pumping to keep groundwater in balance. Effective demand management requires controlling net groundwater pumping to maintain long-term balance and avoid undesirable results.

As part of its broader planning for potential SGMA compliance tools, SVBGSA initiated evaluation of demand management in 2022 with a stakeholder assessment (California State University, 2023). Based on the results and direction from the Board, SVBGSA proceeded with several tasks to complete broader outreach and engagement and assess the viability of demand management measures to meet SGMA goals. To support this effort, SVBGSA contracted directly with Dave Ceppos, who conducted the Stakeholder Assessment, to provide continued facilitation, along with Miller Maxfield for communications and outreach assistance, Minasian Law for legal analysis, ERA Economics for a Valley-wide economic analysis, and M&A for technical support and groundwater modeling.

Through this multi-year effort, SVBGSA evaluated a range of demand management measures and developed a comprehensive strategy that expanded from outreach workshops to a coordinated Valley-wide framework. Subbasin-level planning began with the 180/400 Committee under the SGM R1 Grant, with SGM R2 Grant funding supporting similar efforts in the remaining 5 Salinas Valley subbasins. This approach ensured that input from all subbasins informed development of the Valley-wide Demand Management Framework.

The Demand Management Framework was complemented by groundwater modeling to evaluate the effect of reduced pumping on groundwater levels, as well as an economic analysis to assess potential regional impacts of activating demand management measures.

In addition, SVBGSA developed the Water Efficiency Pilot Program (WEPP) to support rural residents. The WEPP is described below as an example of a demand management measure

implemented by SVBGSA and represents a management action well suited to the Langley Subbasin.

#### 4.6.1 Demand Management Strategy and Framework

SVBGSA advanced demand management planning through several related efforts:

- Community workshops “Our Water Future in the Salinas Valley: Planning for Uncertainty” (2024)
- Demand management dialogue process with subbasin committees (2024-2025)
- A Legal White Paper (2024) summarizing demand management considerations under California law
- Development of the Valley-wide Demand Management Framework (2024–2025)

The Board directed SVBGSA staff to hold public outreach workshops and expand demand management outreach to a Valley-wide dialogue prior to development of policies. Demand management outreach began with community workshops designed to emphasize the importance of demand management and expand public understanding of the wide range of available demand management measures. These workshops were complemented by subbasin-specific dialogues with subbasin committees, which provided focused input on demand management measures appropriate to each subbasin. Together, these efforts gathered input that informed development of the Demand Management Framework (SVBGSA *et al.*, 2025). Table 17 summarizes the Valley-wide public outreach workshops and the public subbasin committee meetings.

Table 17. Summary of Public Outreach Workshops and Subbasin Committee Meetings

Public Outreach Workshops						
Public Outreach Workshops	4/12/24 – Castroville	4/19/24 – Salinas	5/3/25 – Greenfield	5/10/24 – King City	5/11/24 - Salinas	
Subbasin Committee Meetings						
Subbasin Meetings	Meeting #1	Meeting #1b	Meeting #2	Meeting #3	Meeting #3b	Meeting #4
180/400	9/5/24 - Salinas	10/3/24 - Salinas	11/21/24 - Salinas	4/14/25 - Salinas	5/20/25 - Salinas	9/24/25 - Salinas
Eastside	9/27/24 - Salinas		10/14/24 - Salinas			
Forebay	4/28/25 Greenfield		7/16/25 Greenfield			9/26/25 Greenfield
Upper Valley						
Monterey	12/18/24 - Salinas		2/26/25 - Salinas	6/25/25 - Salinas		9/25/25 - Salinas
Langley	3/5/25 - Salinas		6/4/25 - Salinas			9/25/25 - Salinas

In parallel with the public input process, SVBGSA retained Dustin Cooper from Minasian Law to summarize demand management considerations under California law and prepare the Demand Management Legal White Paper<sup>7</sup> (SVBGSA, 2025d). This analysis provides legal considerations to support informed decision making related to demand management.

In fall 2025, informed by the subbasin committee dialogues, SVBGSA staff and consultants prepared the Demand Management Framework<sup>8</sup> (ERA Economics *et al.*, 2025). The Framework provides an overview of demand management, potential measures for application in the Valley, and a process for evaluating and activating measures as needed. It includes a summary of 10 stakeholder-identified demand management options and a demand management economic analysis.

The Demand Management Framework defines potential measures or options for managing net groundwater pumping identified as appropriate to the Salinas Valley: 6 agricultural measures and 4 domestic measures, as summarized in Table 18.

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<sup>7</sup> The Legal White Paper is available at: <https://svbgsa.org/wp-content/uploads/2025/05/Demand-Management-White-Paper-2025.pdf>.

<sup>8</sup> The Demand Management Framework is available at: [https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/3727939/6.4\\_DM\\_Framework\\_2025-11.pdf](https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/3727939/6.4_DM_Framework_2025-11.pdf).

Table 18. SVBGSA Demand Management Framework Measures

Category	Measure	Type	Description
Agriculture	On-farm Water Use Efficiency	Irrigation efficiency	Incentivize water efficiency practices through technical assistance or financial support
	Demand Management Fee	Financial incentives	Tiered pricing or per-acre-foot extraction fees to disincentivize pumping
	Rotational Fallowing / Fallow Bank	Temporary fallowing	Incentivize temporary fallowing of land
	Land Repurposing	Permanent fallowing	Develop programs to incentivize transition of land use to less water-intensive beneficial uses
	Pumping Limits / Allocation System	Temporary fallowing	Design and implement pumping limits, such as through a groundwater allocation system
	Penalty Charges	Financial incentives	Charges applied for pumping above allocated amounts, may be tied to replacement cost
Domestic	Education and Outreach	Water use efficiency	Provide resources and guidance to support household water efficiency
	Incentivized Efficiency	Water use efficiency	Rebates or incentives for indoor and outdoor efficient appliances or practices
	Mandatory Efficiency	Water use restrictions	Required efficiency standards for landscape, appliances, or plumbing
	Water Pricing Mechanisms	Financial incentives	Tiered pricing or rebate structures to encourage water efficient behavior

Along with describing the 10 identified demand management measures, key elements of the Framework include:

- **Stages and Triggers** is a system for classifying subbasin conditions (Stages 0–4) tied to groundwater conditions and SMC, used to guide the timing, scale, and type of demand management measures.
- **Baseline Conditions** is an overview of baseline water use by sector and region in the Salinas Valley to provide context for the value of these industries, the importance of reliable water supplies, and future evaluation of the cost of demand management measures.
- **Global Implementation Elements** provides an overview of core requirements applicable to all measures, including administration, measurement and monitoring, water accounting, enforcement, and adaptive management. The Framework does not establish these elements; it describes the process for establishing each element.

- **Economic and Financial Considerations** is a preliminary assessment of relative costs and economic implications for agencies, water users, and the broader regional economy. This element of the Framework includes a qualitative overview of the cost of demand management measures. In coordination with the groundwater modeling of demand management, the analysis evaluates the cost and economic impact of demand management.
- **Process for Program Development** is a transparent pathway for refining measures through additional technical analysis, stakeholder engagement, policy development, and Board consideration before activation of any measure occurs.

The Demand Management Framework does not activate any demand management measures. Rather, it provides the foundation for the Board to evaluate and prioritize demand management measures, define program rules, establish funding mechanisms, and align demand management actions with groundwater conditions and SGMA compliance requirements.

#### 4.6.2 Effect on Groundwater Conditions

Demand management groundwater modeling focused on assessing the effect of demand management on groundwater levels for each individual subbasin. The goal was to develop an estimate for the approximate amount of pumping reductions needed for any individual subbasin to avoid undesirable results for groundwater levels. The modeling assessed groundwater level change across each respective subbasin, fluctuations over time and across wet and dry years, and changes to groundwater flows when pumping reductions occurred. As discussed in Section 4.5, the NAA pumping reduction scenarios showed little effect on seawater intrusion in the short term and this assessment is only in reference to groundwater level impacts.

Full details of the groundwater modeling and results are described in the Groundwater Impacts of Demand Management Technical Memorandum (M&A, 2026c).<sup>9</sup>

For these subbasin-specific demand management modeling scenarios, agricultural pumping was reduced in each subbasin 1 at a time, with all other subbasins maintaining the same agricultural land use, and therefore approximately the same amount of agricultural pumping, as in the Baseline Scenario. In subbasins where the Baseline Scenario produced undesirable results in some years, agricultural pumping was reduced by increments of approximately 10%. Actual percentage reductions modeled were typically not exact increments of 10, particularly once municipal pumping was accounted for. For example, applying a 30% reduction in agricultural pumping resulted in a scenario with 75% of total pumping on average with municipal pumping unchanged. Scenarios are named according to the average amount of pumping as compared to the Baseline Scenario. The modeling scenarios held reservoir releases and SRDF the same as in the Baseline Scenario to isolate the effect of pumping reductions; however, the model still

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<sup>9</sup> Available at: <https://svbgsa.org/wp-content/uploads/2026/04/TM-DM-Groundwater-Impacts-2026-03-06.pdf>.

dynamically simulates surface water-groundwater interaction and groundwater recharge from the river. However, demand reductions in subbasins along the river resulted in higher groundwater levels and reduced recharge from the river, so the scenarios would likely result in less water released from the reservoirs and greater carryover storage in the reservoirs if releases from the reservoirs occurred according to the reservoir operational rules. This is not shown in these model simulations, as these scenarios were intended to isolate the effect of pumping reductions.

Groundwater level differences compared to the Baseline Scenario for the 2040-2041 evaluation period for representative modeling scenarios are shown on Figure 33 through Figure 35.

In the 180/400 Subbasin, the model distributes the pumping reductions between the aquifers based on well screen depths and aquifer parameters. Pumping reductions between 18 and 27% are needed to avoid undesirable results for groundwater levels in the 180-Foot Aquifer, and 27%-36% in the 400-Foot Aquifer. Figure 33 shows the 64% of pumping scenario for the 180/400 Subbasin because it avoided groundwater level undesirable results for both the 180-Foot and 400-Foot Aquifers. Even at 45% pumping reductions, the Deep Aquifers had undesirable results, indicating a greater level of reductions is needed. As shown on Figure 32, pumping reductions of 36% raises groundwater levels 10-20 feet as compared to the Baseline Scenario across much of the 180/400 and Eastside Subbasin.

In the Eastside Subbasin, the scenario with 75% of total pumping avoided undesirable results, as shown in Figure 34, indicating a 17%-25% reduction is needed. Modeled pumping reductions resulted in groundwater levels 10-20 feet above the Baseline Scenario across the Eastside and 180/400 subbasins, and up to 40 feet in some areas of the Eastside Subbasin. Even a 9% reduction in pumping significantly reduced the number of RMS wells with groundwater levels below their minimum thresholds, showing that small reductions can have significant, quick effects on SGMA sustainability indicators.

In the Forebay Subbasin, undesirable results related to groundwater levels were avoided with a 9% reduction in pumping, suggesting that a reduction in the range of 0-9% may be sufficient under normal conditions. However, undesirable results still occur during drought periods, indicating an ongoing vulnerability to drought.

The Upper Valley Subbasin did not have an undesirable result in the 2040-2041 evaluation period; therefore no pumping reduction scenarios were analyzed. The Langley Subbasin has limited agricultural pumping, so pumping reductions have minimal effect on whether there is an undesirable result; however, agricultural reductions could help raise groundwater levels in the southern portion of the subbasin. No pumping reduction scenarios for the Langley Subbasin are reported because the fractured granite aquifer system increases the uncertainty of groundwater modeling results. Finally, pumping reductions in the Corral de Tierra Area of the Monterey

Subbasin will be simulated with the SWIM after the version 4 update is complete, as the updated version has improved calibration in that area.

The groundwater modeling shows that demand management can be an effective tool for improving groundwater levels in certain areas of the Salinas Valley. However, beginning pumping reductions in 2030 provides only 10 years for groundwater levels to rise above minimum thresholds. As a result, modeling indicates significant reductions would likely be required if demand management were the only strategy used to achieve SGMA groundwater level goals, or if reductions were implemented in only a single subbasin. In contrast, applying pumping reductions across multiple subbasins is expected to reduce the percentage reduction required in each individual subbasin, particularly across the 180/400 and Eastside Subbasins. Because groundwater level improvements accrue over time, initiating pumping reductions earlier could significantly reduce the magnitude of reductions needed in the future.

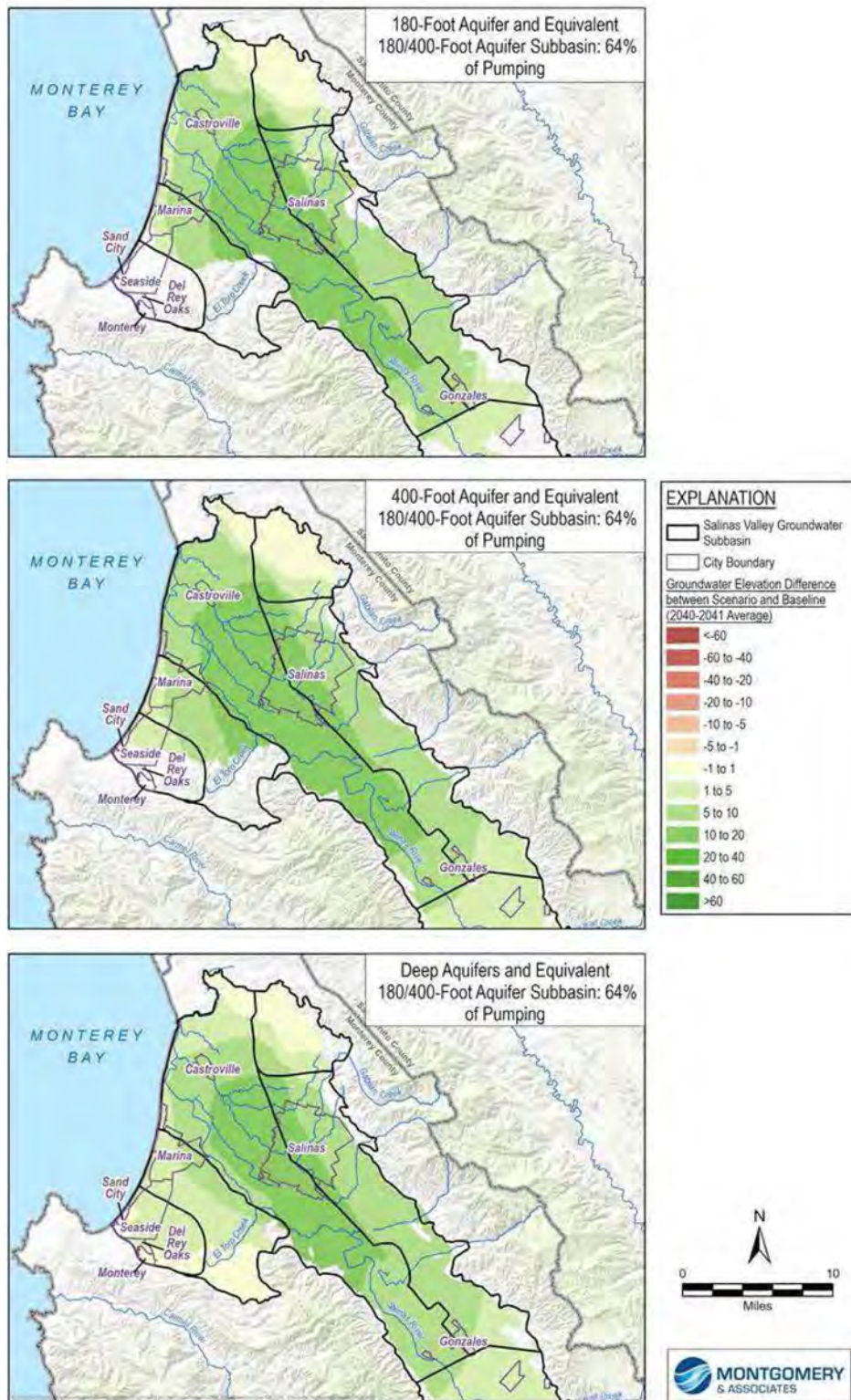


Figure 31. 180/400 Subbasin 64% of Pumping Scenario Groundwater Level Difference from Baseline

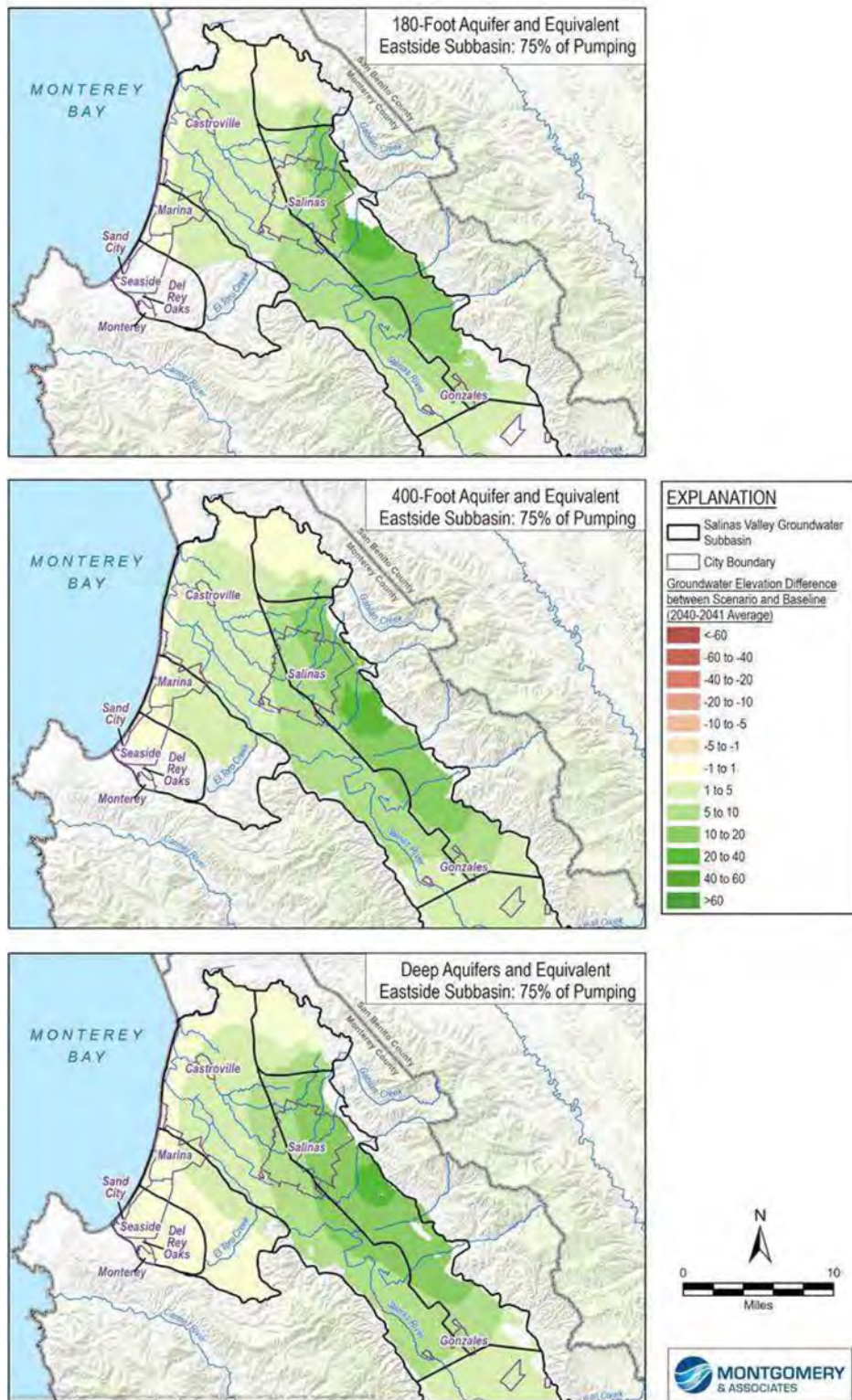


Figure 32. Eastside Subbasin 75% of Pumping Scenario Groundwater Level Difference from Baseline

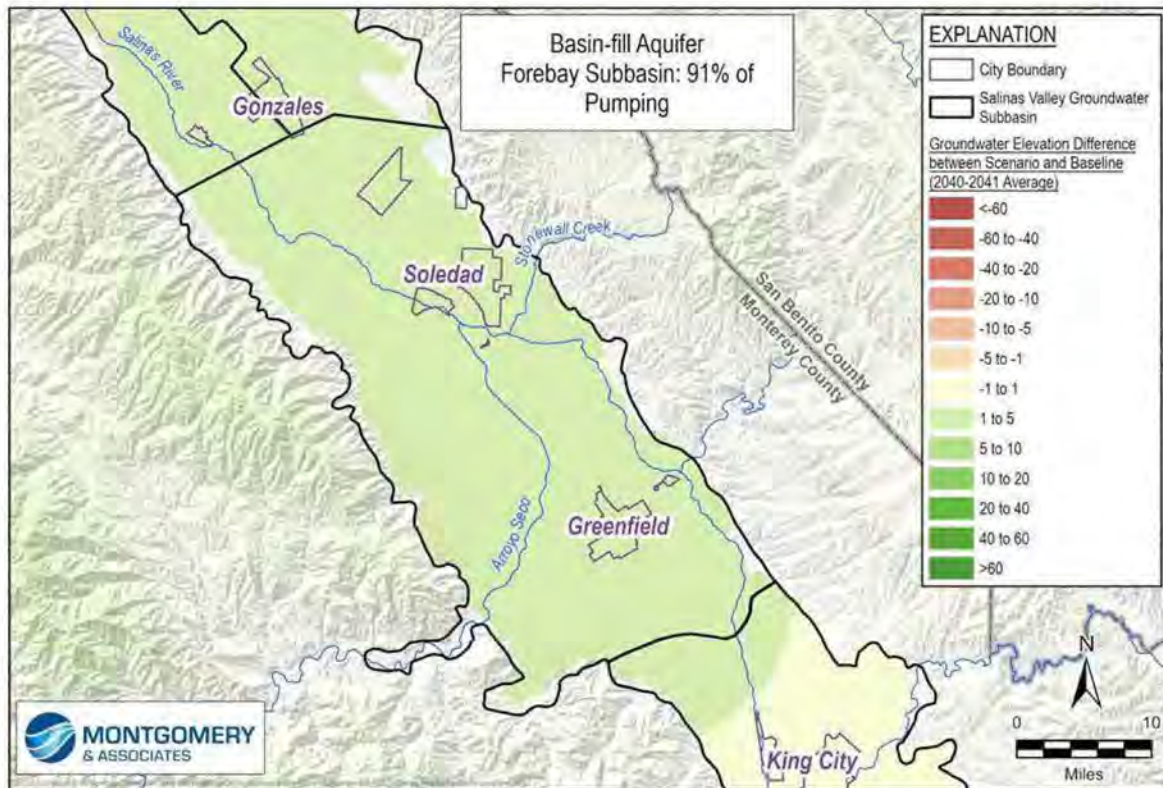


Figure 33. Forebay Subbasin 91% of Pumping Scenario Groundwater Level Difference from Baseline for 2041-2041 Evaluation Period

The demand management groundwater simulations using the SVOM did not specifically evaluate effects on seawater intrusion; however, 2 related feasibility studies provide insight into the potential impacts. For the BGRP USBR Report, the NAA scenarios simulated the effects of land fallowing and reduced municipal pumping on seawater intrusion. The NAA scenarios showed little effect on seawater intrusion in the short term; however, reductions in pumping can influence seawater intrusion over longer time horizons. Similarly, the NSIP Scenario reduced groundwater extraction in areas receiving an alternative irrigation water supply. Groundwater modeling indicated that the project resulted in increased groundwater levels, but it had minimal impact on the seawater intrusion isocontour during the approximately 5 years between project implementation and the SGMA sustainability deadline.

#### 4.6.3 Direct Costs of Demand Management Measures

The cost of a demand management measure depends on its timing, scale, location, and other site-specific factors. For example, reducing water use on a ranch that has already invested in irrigation technology is likely to be more costly than on a ranch with fewer prior efficiency improvements. Similarly, a household with substantial outdoor irrigation can often reduce use at lower cost than a household whose demand is primarily indoors.

Table 19 illustrates the potential range of costs for measures included in the Demand Management Framework. The cost to domestic users is measured as the cost of investments in water efficiency practices and appliances, and as the loss in consumer value (also called welfare or surplus) that occurs when a household must reduce water use below its preferred level because supply is constrained. The cost to agricultural users is the cost of investments in efficient irrigation practices or the cost of taking irrigated land out of production. For agricultural measures, estimated unit costs range from about \$100 to more than \$2,100 per AF for irrigation efficiency, \$1,400 to more than \$2,300 per AF for temporary fallowing, and \$450 to more than \$1,045 per AF for permanent fallowing. For domestic measures, estimated unit costs range from about \$100 to more than \$3,500 per AF for water use efficiency and \$135 to more than \$1,015 per AF for water use restrictions. Financial incentives for both agricultural and domestic users are not expressed as a single unit cost because the effect depends on the magnitude and design of the price signal.

Table 19. Demand Management Measures Cost Example Range by Measure Type

Category	Type	Cost (\$/AF) Range	Notes
<b>Agriculture</b>	Irrigation efficiency	\$100 - \$2,100+	Lower cost alternatives include irrigation management and practices, with higher cost options including comprehensive technologies for soil moisture monitoring and irrigation scheduling
	Temporary fallowing	\$1,400 - \$2,300+	Costs depend on scale of pumping limits, timing, and location, with higher unit costs in the northern portions of the Salinas Valley
	Permanent fallowing	\$450 - \$1,045+	Permanent is slightly lower cost than temporary fallowing, depending on the productivity of the land and location within the Salinas Valley
	Financial incentives	n/a	Pricing signals to encourage more efficient water use depend on the magnitude of the price increase
<b>Domestic</b>	Water use efficiency	\$100 - \$3,500+	Costs vary depending on the technology, equipment, rebates, and indoor and outdoor uses
	Water use restrictions	\$135 - \$1,015+	Shortage cost to households from changing water use in response to limits, with costs varying by scale and location of restrictions
	Financial incentives	n/a	Pricing signals to encourage more efficient water use depend on the magnitude of the price increase

The direct cost of implementing different demand management measures shows the cost to the user. For example, the lifecycle cost of equipment, O&M, and replacement for irrigation efficiency technologies and improvements. An economic impact analysis was developed to evaluate how affected industries respond and measure direct and indirect economic losses to different industries and the greater Monterey County economy. A demand management scenario

was defined based on combining groundwater modeling scenarios for specific pumping reductions by subbasin and sector.

#### 4.6.4 Economic Impact of Demand Management

The economic analysis evaluates the direct and secondary (indirect and induced) impacts of demand management. The analysis applies a pumping limit (pumping cut or reduction) for each subbasin and aquifer based on SVOM groundwater modeling to avoid the groundwater level minimum threshold. The groundwater modeling changes only agricultural pumping in the target subbasin, leaves domestic pumping at baseline levels, and applies incremental reductions beginning in 2030 under a repeating historical climate Baseline Scenario with no added PMAs. Importantly, groundwater modeling evaluates the effect of demand management in each subbasin individually, with other subbasins continuing the same pumping as in the Baseline Scenario. Implementing pumping reductions in multiple subbasins simultaneously would affect groundwater levels because subbasins are hydrologically connected. If demand management were to be implemented in multiple subbasins simultaneously then the pumping reduction in any individual subbasin would likely be less.

Table 20 summarizes the modeled pumping reductions by subbasin and aquifer for the low and high scenario. Modeled reductions to avoid undesirable results for groundwater levels range from less than 9% in the Forebay Subbasin to over 45%<sup>10</sup> in the 180/400 Subbasin Deep Aquifers.

Table 20. Demand Management Scenarios Summary by Subbasin and Aquifer

Subbasin	Low Pumping Reduction Scenario	High Pumping Reduction Scenario
180/400 Subbasin – 180-Foot Aquifer	18%	27%
180/400 Subbasin – 400-Foot Aquifer	27%	36%
180/400 Subbasin – Deep Aquifers	30%	45%
Eastside Subbasin	17%	25%
Forebay Subbasin	4.5%	9%
Upper Valley Subbasin	Not currently needed	Not currently needed
Monterey	Included with 180/400	Included with 180/400
Langley	Not applied	Not applied

The economic analysis applies pumping reductions to each subbasin individually, but simultaneously. The pumping reductions are assumed to apply to each subbasin/aquifer and are assumed to be enforceable limits that apply to annual pumping. An economic model of Salinas Valley agriculture was applied to quantify direct economic impacts of demand management to

<sup>10</sup> Groundwater modeling shows that a cut greater than 45% would be needed in the Deep Aquifers to avoid undesirable results for groundwater levels.

Salinas Valley agriculture. An input-output model, IMPLAN, was applied to evaluate the resulting indirect and induced (also called secondary) economic impacts to Monterey County. The model was calibrated to water use and market conditions in the Salinas Valley. The analysis illustrates the potential range and magnitude of economic impacts.

No specific demand management measure has been defined at this time. A range of potential impacts is presented along with preliminary estimates and a discussion of the distributional considerations underlying each measure. Economic effects (e.g., the effect of fallowing on crop prices and the distribution of production) will continue to be reviewed and revised as SVBGSA planning for demand management and other PMAs progresses.

Measures of economic impact include:

- **Direct.** Changes in acreage, crops, gross farm revenues, and market conditions. A measure of economic impact at the farm.
- **Indirect.** Changes in related expenditures on input suppliers and related industries.
- **Induced.** Changes in expenditures by employees in the directly and indirectly affected industries.

The total economic impact is the sum of the direct, indirect, and induced impacts. Values are in current dollars, expressed as annual losses, and the present value of the future stream of annual losses is reported for some economic metrics.

Table 21 summarizes the results of the direct economic impact analysis under the low and high scenarios across all Salinas Valley subbasins. The net pumping cut is between 41,000 and 61,000 AF annually across all subbasins. Total fallowing is between 37,000 and 54,000 acres. Gross farm revenue losses are between \$509 million and \$717 million annually.

Table 21. Annual Direct Economic Impact Summary, Salinas Valley Total

Measure	Low Pumping Cut Scenario	% Change	High Pumping Cut Scenario	% Change
Net pumping cut / reduction (AF)	41,000	-9%	61,000	-14%
Acres fallow (acres)	37,000	-11%	54,000	-17%
Gross revenue loss (\$M)	\$509	-9.5%	\$717	-13.4%

There are regional differences underlying the total effect for the entire Salinas Valley. Economic impacts are concentrated in subbasins where pumping limits are imposed. As production decreases due to agricultural land fallowing this causes a modest increase in the price of some commodities. Some production shifts to areas with greater water supply, which affects total pumping, and gross revenues increase for remaining production. The economic analysis

illustrates a range of potential outcomes that will need to be further refined through ongoing SVBGSA demand management planning efforts.

Secondary (i.e., indirect and induced) impacts are a result of direct losses in farm production and changes that ripple through the broader Monterey County economy. When irrigated acreage declines and growers reduce output, businesses that depend on agriculture—such as farm labor contractors, input suppliers, equipment services, processors, packers, haulers, and distributors—also experience lower demand. That in turn reduces business revenue, household income, and consumer spending across the region. In Monterey County, where agriculture supports roughly 1 in 5 jobs and is linked to a broader network of related industries and community spending, demand management can produce measurable indirect and induced impacts in employment, wage income, and local economic activity. The total economic impact is the sum of the direct and secondary (indirect and induced) effects.

Table 22 summarizes the total economic impact under the high and low scenarios. Total economic impacts include a preliminary estimate of the effect on forward linked industries (e.g., processing and distribution) that are not typically included in IMPLAN input-output analysis. Total jobs (FTE), which is 2-3 seasonal jobs), income, value added, and output value losses and are presented as a range to provide the reader with an understanding of potential outcomes. Total annual losses range from 5,835 to 8,230 FTE jobs, \$571 million to \$803 million in labor income, \$915 million to \$1.291 billion in value added, and \$1.358 billion to \$1.932 billion in total output.

Table 22. Total Annual Economic Impact Summary, Salinas Valley Total

Measure	Low Pumping Cut Scenario	High Pumping Cut Scenario
Jobs lost (FTE)	5,835	8,230
Income lost (\$M)	\$571	\$803
Value added loss (\$M)	\$915	\$1,291
Output value loss (\$M)	\$1,358	\$1,932

Demand management has important market effects. The timing, scale, and structure of demand management that results in pumping reductions can substantially change the direct economic cost. Limits imposed in 1 area can affect crop prices, shift where crops are grown, affect groundwater use in other regions, and ultimately affect land values.

The economic effects of demand management also depend on how it is implemented (e.g., the “rules” applied to reduce pumping). For example, pumping limits may define factors such as spatial and temporal rules, ramp-down schedules, incentives, and enforcement provisions that can materially change outcomes. These implementation details were not defined in the economic analysis because they would need to be developed through future public processes. The economic analysis is intended to provide an understanding of the range of potential direct and

indirect economic impacts and may be refined as additional data are developed, and additional details for potential demand management measures are proposed.

#### **4.6.5 Example Demand Management Measure: Water Efficiency Pilot Program (WEPP)**

In the fall of 2024, SVBGSA staff designed the WEPP to assess what progress could be made by increasing water use efficiency among rural residents. The WEPP was established to achieve the following objectives:

- Build awareness on water use efficiency among rural residential users.
- Leverage successful urban water efficiency strategies for rural application.
- Increase adoption of water-efficient practices.
- Empower rural residents to contribute to sustainable water management.

SVBGSA identified that while large water systems (3,000+ connections) were required to provide water efficiency resources to their users per the Urban Water Management Planning Act, private water systems (1-4 connections), state small water systems (5-14 connections), small public water systems (15-199 connections), and medium public water systems (200-2,999 connections) did not have the same regulatory requirement. This presents an opportunity to make gains in water efficiency that had previously been underexplored. Staff identified the target audience for WEPP as households in rural residential areas where many residents are served by either a private well or water systems with less than 3,000 connections. WEPP has a 3-pronged approach: a water use efficiency webpage, a water use survey, and home assessments.

##### **4.6.5.1 Water Efficiency at Home Webpage**

The water use efficiency webpage launched in February 2025 on the SVBGSA website. The page provides general information on water efficiency and its importance, ways to improve home water efficiency, links to water efficiency tools, and links to additional resources. The webpage serves as a central hub connecting WEPP participants and the broader public to water efficiency tools relevant to their household water systems. With information about the survey and the home assessments, the general WEPP landing page had 1,500 views and 971 unique visitors.

##### **4.6.5.2 Water Use Survey**

The water use survey was launched in September 2025 and was designed to collect basic information from residents regarding their water usage and water efficiency concerns. It was purposely designed to be brief (about 5 minutes) to maximize participation. The survey was live

on the SVBGSA website from September 2025 to February 2026 and was completed by 79 respondents. The survey's results include the following:

- Responses from 5 Subbasins—180/400, Eastside, Forebay, Langley, and Monterey—with Langley being the most common.
- 83% of respondents identified as the property owner.
- For 46% of respondents, water came from wells and 53% from a water system
- 99% of respondents try to be efficient with water at home, 99% are familiar with water efficiency, and 61% would like to learn more about ways to save water. However, only 31% of respondents track their water usage.
- In the open-ended responses the most requested resources were financial assistance, technical assistance, and educational materials.

#### **4.6.5.3 Home Assessments**

The third component of WEPP was a home assessment program that provided residents with free evaluations of their indoor and outdoor water use. SVBGSA partnered with WaterWise Consulting, Inc. to provide indoor and exterior water-use assessments. The indoor water-use assessment included inspection of water fixtures and checking for leaks. The exterior water-use assessment included inspections of irrigation systems, timers and a general landscape review. After assessments were completed, WaterWise staff provided and installed kitchen and bath aerators, shower heads, sprinkler nozzles, and irrigation controllers free of charge for the residents as needed. These devices help residents make immediate efficiency improvements in their home and were also highlighted in the advertisements to draw interest to the program. Over the course of 6 months, the home assessment program had 10 applicants, 8 of whom qualified and 5 of whom have had assessments completed.

#### **4.6.5.4 Lessons Learned**

SVBGSA identified takeaways and lessons learned from the pilot project. First, participation was lower than anticipated. SVBGSA, with support from communications consultants Miller Maxfield Inc. extensively advertised the program through newsletters, social media, radio advertising, and mailed postcards. There was less interest than expected and SVBGSA was not able to collect as much information as initially hoped for. The home assessments reports indicated that most of the residents were already quite water efficient.

Participants provided feedback that while receiving free sprinkler heads, irrigation timers, and aerators was appreciated, they noted that receiving assistance with more costly appliances would be more helpful. The devices that were installed were ones they could more easily purchase; the

residents indicated that financial assistance with or installation of water efficient clothes washers, dishwashers, water softeners, reverse osmosis systems, and water heaters would be ideal since they have a higher financial barrier and a larger potential impact on their water usage. Of the large water systems in the Salinas Valley Basin, currently only California Water Service, Marina Coast Water District, and the City of Gonzales provide rebates. Providing rebates or large device installation could be a way to attract more residents for a potential future program. Another suggestion is to provide irrigation efficiency assessments to small farms and family farms.

## **4.7 Enhanced Recharge Along the River**

Much of the Salinas River contributes recharge to the groundwater basin through both managed reservoir releases and natural high-flow events. In the Upper Valley and Forebay Subbasins, most aquifers are unconfined, allowing river water to readily infiltrate and recharge the groundwater basin. In contrast, the Salinas Valley Aquitard confines most of the 180/400 Subbasin; however, there are locations where the Salinas Valley Aquitard thins out, potentially permitting surficial recharge.

Two investigations focused on improving understanding of where additional recharge might occur along the River. While these efforts were not as comprehensive as the previously mentioned feasibility studies and did not fully evaluate potential impacts on groundwater conditions, they still offer valuable insight into the extent to which certain PMAs identified in the GSPs could help advance groundwater sustainability.

### **4.7.1 Somavia Road Recharge Evaluation**

Near Somavia Road, the Salinas River is hypothesized to have more direct hydraulic connection with the principal aquifers due to potential thin spots or gaps in the Salinas Valley Aquitard. Project descriptions for the Irrigation Supply Project in the Eastside and 180/400 GSPs propose to increase aquifer recharge in the Somavia Road area using extraction wells to induce additional surface water recharge. To begin to evaluate the recharge potential, the SVBGSA contracted Balance Hydrologics (Balance) to conduct a surface water study along the Salinas River corridor between the Chualar gage and Jenson's Bluff, and contracted M&A to examine how the surface water findings relate to groundwater data. Together, these efforts aimed to improve understanding of recharge processes and recharge potential in this area. More details on the results summarized below can be found in Balance Hydrologics (2026) and M&A (2026d).

The purpose of the data evaluation is to assess the extent of recharge—and, where possible, the recharge potential—from the Salinas River to the 180-Foot Aquifer near Somavia Road. If surface water and groundwater are more directly connected at this location, recharge through aquitard gaps may occur. The surface water study focused on identifying where streamflow losses occur and estimating infiltration rates. Historically, losses have been observed between the

Chualar gage and downstream monitoring locations (T&A and Spreckels); however, these data do not pinpoint losses within the specific Somavia Road reach where Salinas Valley Aquitard gaps are hypothesized. Well logs and geophysical data indicate possible aquitard thinning, but they do not definitively locate these gaps or confirm whether river water is infiltrating past the Shallow Sediments and into the 180-Foot Aquifer.

To narrow down the potential recharge zones, the study conducted synoptic flow surveys and installed temporary stream gages to collect a year of data. The team also collected shallow and deep piezometer water-level measurements at the 1 main river bends of interest and performed ring infiltrometer tests. These efforts were combined with an analysis of long-term streamflow gage records.

Results from the surface water study show that most streamflow loss occurs near Bend 1 (Figure 35). This area corresponds with locations where previous studies identified thin Salinas Valley Aquitard intervals or potential gaps. The study also observed that the reach has historically remained stable, with the river flowing in a single-thread channel at baseflow, while the bends appear to be particularly dynamic during flood flows. Sand within the active channel is regularly mobile while substantial amounts of fine sediments (clays and silts) often settle in overbank areas and alternate channels.

The ring infiltrometer tests further demonstrated the variability of near-surface conditions. Balance tested infiltration rates near the "Bend 1" gage in a recently scrapped overbank area with sandy sediments present and in an untouched area with stiff silt-clay overlying the alluvial sands. The infiltration results indicate the well-sorted alluvial sand exhibited high permeability (13–43 ft/day), while silt-clay acted as a total barrier with zero infiltration. This contrast indicates that infiltration capacity changes over time as sediment conditions shift and as secondary channel maintenance occurs, both of which can strongly influence local recharge potential.

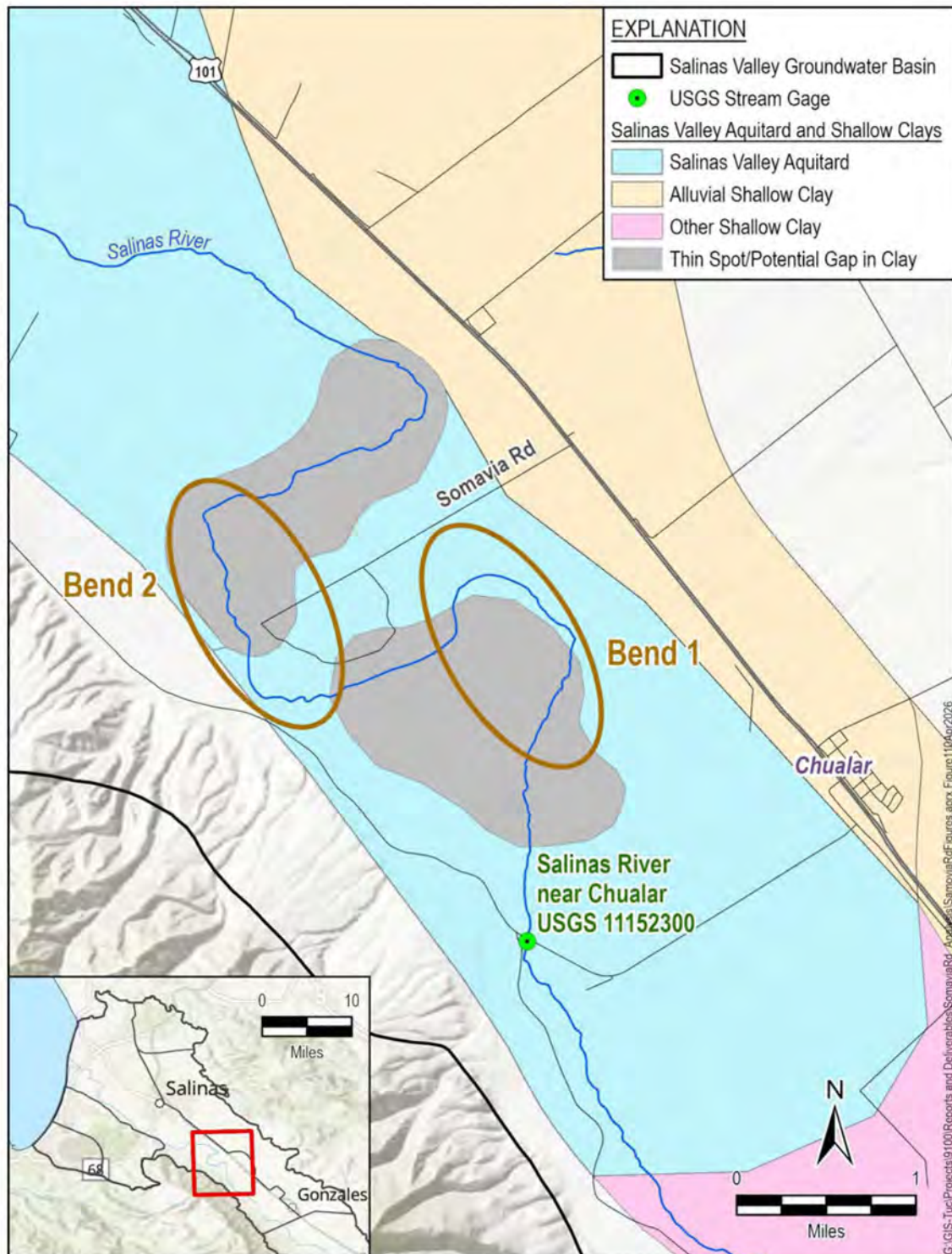


Figure 34. Somavia Road Study Area

The groundwater portion of the investigation incorporated available groundwater data to evaluate if more direct local surface water–groundwater connections exist in the Somavia Road area and if such connections could potentially support increased recharge through a project like the Irrigation Supply Project. A key factor in assessing the viability of such a project is timing: when pumping and irrigation demand occur, how long groundwater-level drawdown persists, and when additional recharge from the River would be expected.

Groundwater and surface water data from the Chualar gage to Jenson’s Bluff indicate that the Salinas River and the shallow subsurface are hydraulically connected. Surface water data show that river losses are greatest between the Chualar gage and Bend 1. However, the degree to which this infiltrating water reaches the underlying 180-Foot Aquifer is less certain.

Groundwater levels in the 180-Foot Aquifer rise throughout the wet winter season at all monitored wells in the Somavia Road area, indicating that recharge does occur. Yet the precise rate, source, and location of recharge remain uncertain. Trends in the data from the Somavia Recharge Evaluation suggest that much of the recharge reaching the 180-Foot Aquifer may originate from upgradient rather than directly beneath the Somavia Road study reach. Although river losses clearly occur in the study area, insufficient data on the Shallow Sediments overlying the 180-Foot Aquifer prevent determining if the losses migrate downward into the 180-Foot Aquifer.

All wells in the Somavia Road area showed clear seasonal declines during the irrigation season, with groundwater levels dropping through August. Meanwhile, with managed releases from the Reservoirs, the Salinas River stage remained relatively steady across the study reach during this period. These seasonal groundwater level declines indicate that pumping during irrigation season exceeded any recharge occurring at that time.

After the irrigation season ended, groundwater levels in all wells rose, initially due to rebound from the nearby confined aquifer conditions and later due to winter recharge. The data suggest somewhat more direct recharge pathways near Bend 1, consistent with findings from the surface water study. However, data limitations prevent definitively concluding that Bend 1 experiences direct recharge from the River. Overall, the groundwater data indicate that recharge to the 180-Foot Aquifer primarily occurs where shallow clays are absent, largely in the Forebay Subbasin. Regional recharge appears to influence groundwater levels in the study area, masking any potential signal of local direct recharge. As a result, the evidence does not conclusively suggest there could be rapid, additional recharge at Somavia Road.

The purpose of this data evaluation was to determine if recharge to the 180-Foot Aquifer occurs through Salinas Valley Aquitard gaps near Somavia Road in support of an induced-recharge project (i.e., increasing pumping in the 180-Foot Aquifer to induce additional River recharge). The findings show that although recharge is occurring regionally, the data do not conclusively

demonstrate direct recharge from the River to the 180-Foot Aquifer at this location. Moreover, the Recharge Evaluation indicates that additional pumping during the growing season is unlikely to increase infiltration or recharge rates.

A full feasibility assessment—such as modeling if increased drawdown could persist long enough to enhance winter recharge—was beyond the scope of this study and would require groundwater model simulations. The Irrigation Supply Project concept assumes that increased summer pumping would deepen drawdown sufficiently to induce recharge from the River. Such a project would need to avoid adverse impacts to groundwater-dependent ecosystems or downstream users, including the Salinas River Diversion Facility. To capture potential winter recharge, drawdown would need to remain until winter storms generate additional river flow, typically between January and March. Initial insights from this analysis suggest that drawdown does not persist into winter because groundwater levels rebound in the fall due to cessation of pumping and regional recharge from up-Valley. Additionally, groundwater declines during the growing season show that pumping currently outpaces recharge, indicating that infiltration is limited by sediment permeability and is unlikely to increase beyond physical constraints regardless of additional pumping.

#### **4.7.2 Multi-Benefit Stream Channel Improvements**

One of the potential projects identified in the GSPs is the Multi-Benefit Stream Channel Improvements project. Targeted stream maintenance and floodplain enhancement can improve stream function both morphologically and biologically, while also potentially increasing groundwater recharge. In addition, off-channel detention basins could potentially be used to impound surface water flows for groundwater recharge and flood detention. The Stream Maintenance Program (SMP)<sup>11</sup> was developed in collaboration between the MCWRA, the Salinas River Stream Maintenance Program River Management Unit Association (growers and landowners), the Grower Shipper Association of Central California, the Nature Conservancy, Conservation Collaborative, the Resource Conservation District of Monterey County (RCDMC) and other local entities and contractors. The primary goals of the SMP are to minimize flood risk and improve riparian habitat for wildlife. Building on the Salinas River SMP and *Arundo donax* removal efforts by the RCDMC, this project employs a 3-pronged approach to stream channel improvements with a goal of increasing groundwater recharge: vegetation management in secondary channels, sediment removal in bypass channels, and floodplain enhancement or off-channel recharge basins to increase the potential for groundwater recharge (RCDMC, 2026).

The SMP is conducted voluntarily by individual property owners, growers, and municipalities (Participants) along the main stem of the Salinas River and 3 select tributaries, collectively

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<sup>11</sup> More details on the SMP can be found at: <https://www.rcdmonterey.org/salinas-river-stream-maintenance-program>.

referred to as the Program Area. The Program Area is further broken down into the 7 River Management Units (RMUs) shown on Figure 36. SMP activities are conducted in accordance with existing environmental permits.

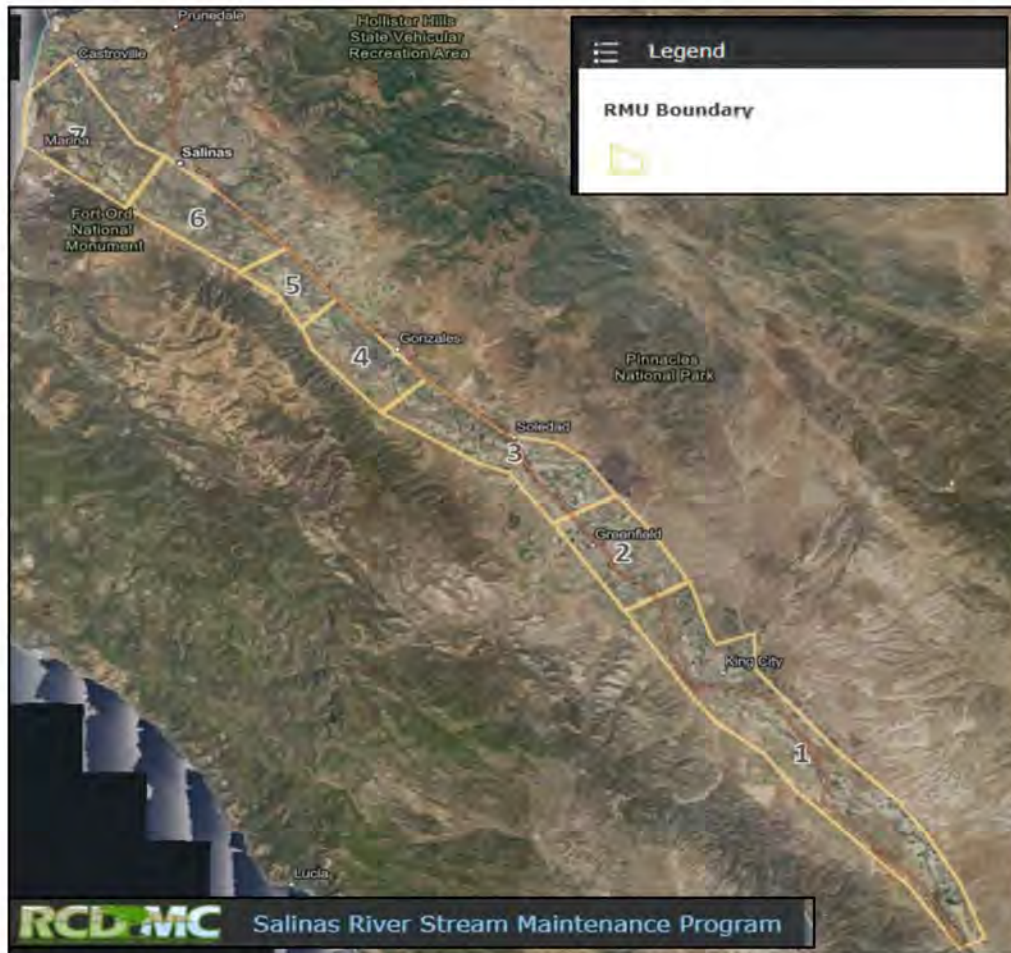


Figure 35. SMP RMU Boundaries

To support the existing SMP and *Arundo donax* removal and assess opportunities for additional groundwater recharge, SVBGSA partnered with FlowWest to update the Salinas River HEC-RAS model and conduct HEC-RAS modeling with the improved model, and with M&A to investigate the potential groundwater recharge benefits of improvements along the Salinas River.

Two sets of scenarios were analyzed to evaluate the potential for increased groundwater recharge. The first scenario assessed the recharge benefits of full SMP implementation where secondary channel vegetation management and enhancements increased inundation during frequently occurring low-to-moderate flows (100–5,000 cfs). The second scenario evaluated the potential groundwater recharge from off-channel detention basins during high flow events (above 22,000 cfs). HEC-RAS results were used together with historical streamflow records and

a range of infiltration rates to estimate potential groundwater recharge benefits under each scenario.

**SMP Secondary Channel Enhancements**

The HEC-RAS model was used to assess the effect of low-flow conditions on flood potential and groundwater recharge. The HEC-RAS analysis (FlowWest, 2026) compared "smoothed" and "excavated" channels against current conditions at different flow rates. Excavated represented the removal of approximately 390,000 cubic yards of soil to create the bypass channels. The analysis found that excavated secondary channels with vegetation management generally increased the "wetted area" during 100–5,000 cfs flow events, but not uniformly. The increased area was then multiplied by an average number of days at each flow to get the wetted acre days shown on Figure 37 (FlowWest, 2026). Especially evident in the upstream RMUs 1-3, this greater duration of inundation increases groundwater recharge potential while reducing flood risks. At higher flow rates of 5,000 cfs, SMP implementation effectively reduces inundation in developed and agricultural overbank areas, providing a localized flood reduction benefit. The wetted acre days from SMP assessment was then used to estimate groundwater recharge.

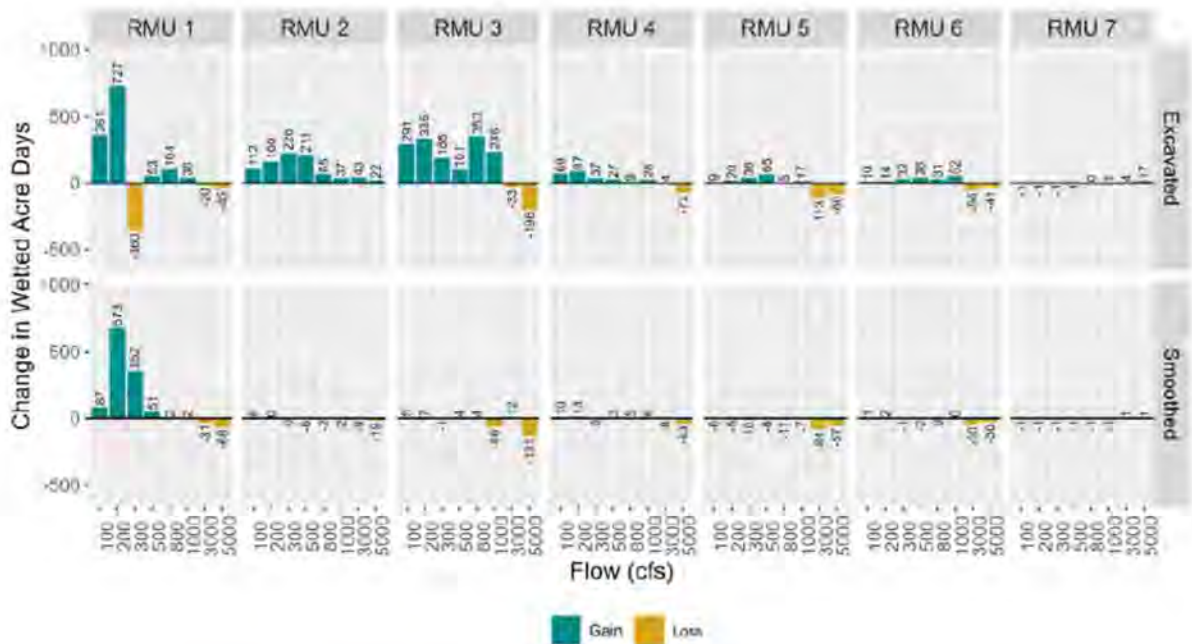


Figure 36. Wetted Day Results from SMP Secondary Channel Enhancements

To estimate the groundwater benefits of both the secondary channel enhancement, as well as the off-channel basin scenarios, HECRAS results were combined with additional hydrologic records and regional geospatial layers, including:

- Historical daily streamflow data for the Salinas River from USGS gages at Chualar and Soledad, which characterize the frequency and magnitude of flows
- Geospatial data of the mapped extent of the Salinas Valley Aquitard and presence of shallow clays identified areas where recharge from surface inundation may be limited by subsurface conditions
- Soil Agricultural Groundwater Banking Index (SAGBI; O'Geen *et al.*, 2015) of infiltration suitability classified relative suitability for groundwater banking on agricultural lands.
- 4 double ring infiltrometer tests at a river bend downstream of the Chualar Bridge provided a useful reference for infiltration capacity and the discussion on uncertainty (Balance Hydrologics, 2026).

For the secondary channel enhancement scenario, potential groundwater recharge was estimated by combining the change in inundated area with the frequency at which each modeled flow rate occurs and an assumed infiltration rate. To account for uncertainty in soil infiltration capacity, each scenario was evaluated across a range of hypothetical infiltration rates, from 0.5 to 4 feet per day. Across the range of infiltration capacities considered, total estimated recharge ranges from approximately 370 to 3,000 AFY when all RMUs are included. RMUs 5 and 6 (Somavia Road - Spreckels area) exhibit net negative recharge under this approach, reflecting a reduction in inundated areas at higher flow rates that outweigh gains at lower flow rates. RMUs 2 and 3, which span the Forebay Subbasin and northern part of the Upper Valley Subbasin, account for the large majority of estimated recharge, exceeding all other units by more than an order of magnitude across all infiltration rates, as shown in Table 23. Results in Table 23 are presented for infiltration capacities up to 4 feet per day. Although the highest rate measured in the Somavia Road ring infiltrometer tests was approximately 45 feet per day (Balance Hydrologics, 2026)—which would imply an estimated 33,147 AFY—subsurface layering, sediment clogging, and stream-aquifer gradient constraints make it unlikely that rates of that magnitude would be realized as effective areal-averaged infiltration capacities.

Table 23. Estimated Average Annual Infiltration from Secondary Channel Enhancement, by RMU and Infiltration Rate<sup>1</sup>

Infiltration rates (feet / day)	Total (AFY)								Total (AFY) – removing negative RMUs
	RMU 1	RMU 2	RMU 3	RMU 4	RMU 5	RMU 6	RMU 7	Total (all RMU)	
0.5	6	199	198	18	-54	-12	14	369	435
1	11	398	395	35	-108	-24	28	737	868
2	22	796	791	70	-215	-48	57	1,473	1,736
4	45	1,592	1,582	141	-430	-96	113	2,946	3,473

<sup>1</sup> Source: Montgomery & Associates (2026c).

### **Off-Channel Basins**

A HEC-RAS spatial analysis was used to identify river-adjacent parcels with high potential for recharge and seasonal flood detention. By modeling a 22,000 cfs flow and comparing simulated water surface elevations with terrain data, the analysis identified 62 parcels—totaling over 13,000 acres—that lie lower than the river but are currently disconnected by levees. Areas near river miles 32–35, 15–18, and 50–55 were highlighted as having particularly strong potential, where removal or modification of barriers (e.g. removing levees or raising berms) could significantly increase off-channel potential recharge.

From these parcels, 6 sites were selected for a proof-of-concept recharge analysis based on storage capacity and subsurface stratigraphy. The modeled basins encompass approximately 2,000 acres and include berms less than 6 feet high. Using HECRAS results for the 22,000 cfs flow, the volume of water that could be captured during qualifying high flow events was estimated. Historical streamflow records were then used to determine the frequency of such events (M&A, 2026e). Because flows exceeding 22,000 cfs occur, on average, once every 5 to 10 years between 1968 and 2025, the resulting recharge estimates represent average annual values; recharge from any individual qualifying event would be substantially higher.

Recharge estimates (Table 24, M&A, 2026e) are presented for assumed infiltration capacities of up to 4 feet per day and distinguish between recharge occurring during active flow events and recharge occurring post-event. While ring infiltrometer testing near Somavia Road measured infiltration rates as high as approximately 45 feet per day—which would imply total recharge on the order of 12,600 AFY—such rates are unlikely to occur. Subsurface stratigraphy, sediment clogging, and hydraulic gradients are expected to substantially limit effective, areal averaged infiltration rates. Notably, since reservoir reoperations under the Salinas Valley Water Project, the only post-2010 flow event exceeding 22,000 cfs occurred in 2023 at the Soledad gage.

Table 24. Total Average Annual Off-Channel Basin Recharge by Infiltration Rate

Infiltration Capacity (ft/day)	Active-Flow Recharge (AF/year)	Post-Event Recharge (AF/year)	Total Recharge (AF/year)
0.5	138	229	368
1	276	229	506
2	553	229	782
4	1,105	229	1,335

Active-flow recharge estimates span a wide range and are highly sensitive to assumptions, with additional variability expected from year to year. While the results indicate potentially meaningful recharge—particularly in RMUs 2 and 3 associated with secondary channel enhancements—several factors suggest that realizable recharge would be well below the upper-range estimates. Streambed infiltration measurements are sparse, localized, and highly variable, and short-term surface tests likely overestimate basin-scale infiltration capacity. Subsurface clay layers can further restrict vertical flow, even where near-surface soils are permeable, and fine sediment deposition poses long-term challenges for maintaining infiltration capacity in off-channel basins.

In addition, net recharge is likely moderated by stream–aquifer interactions not explicitly captured in this analysis. During high-flow events, elevated groundwater levels may reduce infiltration rates, and post-event recharge from off-channel basins may offset natural stream recharge that would otherwise occur. As a result, net groundwater gains are expected to be a fraction of the gross recharge estimates presented here. Quantifying that fraction would require dedicated, integrated hydrologic modeling.

## 5 KEY PMA GROUNDWATER CONDITION EFFECTS ON EACH SUBBASIN

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The feasibility studies and analyses summarized in this report focus on addressing groundwater levels and seawater intrusion. They differ in the specific area and/or aquifer they target, as well as the mechanisms through which the PMAs work. Groundwater modeling results of each feasibility study are summarized in the Section 4 effect on groundwater conditions subsections. This section synthesizes the key results and potential of the PMAs studied to address the groundwater conditions of each subbasin and meet SGMA sustainability goals.

PMAs have varying effects on seawater intrusion and groundwater levels across the Valley due to differences in aquifer parameters and conditions. For example, the effects of reduced extraction depend largely on local hydraulic properties, stream-aquifer interaction, and groundwater levels in surrounding areas. In parts of the Valley without shallow aquitards or clay layers, recharge from surficial recharge basins could raise groundwater levels. In contrast, where shallow aquitards or clays slow or inhibit downward infiltration, groundwater injection is a more effective means of increasing groundwater levels. Some areas, such as the Eastside alluvial fans, exhibit highly heterogeneous conditions and would require extensive field investigations to identify suitable project locations and to refine estimates of potential project impacts. In the Forebay and Upper Valley, areas that have not had chronic declines in groundwater levels, sustainability efforts have focused more on setting thresholds at which they would need to develop and activate PMAs, rather than feasibility studies.

Some of the PMA feasibility studies provide unique solutions to managing seawater intrusion. While low groundwater elevations have drawn seawater inland, reversing this trend is complex. Key challenges include the following:

- **Project Scale:** Seawater intrusion occurs along a roughly 11-mile length of the coastline, and seawater has intruded over 7 miles inland at the furthest point.
- **Time Lag:** Project benefits may take years or decades to fully manifest.
- **Unique Seawater Intrusion Difficulties:** Balancing the groundwater budget might stabilize groundwater levels but is insufficient to reverse seawater intrusion. PMAs that do more than simply balance the groundwater budget are needed to reverse seawater intrusion.
- **Mixing and Density Effects:** Seawater and freshwater have different densities, affecting flow patterns of seawater intrusion.
- **Continued Pumping:** Even with interventions, ongoing pumping alters gradients and salinity distribution.

Given these complexities, groundwater modeling using density-dependent groundwater flow models is the most reliable method for determining the effectiveness of PMAs on seawater intrusion and groundwater elevations.

Groundwater modeling was completed for the 4 main feasibility studies: C&E Study, NSIP, BGRP—which includes the AWSP and NAA Scenarios—and demand management. The river recharge efforts were not full feasibility studies, but rather studies and analyses that needed to be completed prior to conducting feasibility studies. Other than the river recharge analyses, groundwater modeling was used to assess the relative effectiveness of the PMA on groundwater levels and seawater intrusion. Scenarios were compared to the SVOM and SWIM Baseline Scenarios that represent the status quo if pumping continues, similar to recent historical rates without new projects or management actions.

The following sections summarize key groundwater level and seawater intrusion model results for each subbasin. Details about the model simulations are provided in technical memoranda associated with each feasibility study.

## **5.1 Upper Valley Subbasin**

None of the feasibility studies focused on the Upper Valley Subbasin because there are no undesirable results for groundwater levels at the 2040-2041 evaluation period based on the Baseline Scenario. However, this Subbasin is still susceptible to droughts and periods with low river flow. No demand management scenarios were modeled; however, targeted demand reductions during droughts and periods of low river flow could help reduce undesirable groundwater levels and impacts from reduced recharge during those periods.

The FlowWest SMP secondary channel analysis comparing "smoothed" and "excavated" channel alternatives against current conditions found that excavated bypass channels with vegetation management generally increased the "wetted area" within the riparian corridor during frequent, low-flow events. While the low-flow event scenarios resulted in an increase in wetted acre-days in RMU 1 within the Upper Valley Subbasin, there were fewer wetted acre-days than RMUs 2 and 3, and therefore a smaller potential groundwater recharge benefit.

## **5.2 Forebay Subbasin**

The Multi-benefit Stream Channel Improvements analyses that estimated potential recharge along secondary channels showed the greatest number of wetted acre-days in RMUs 2 and 3, which are located in the Forebay Subbasin. This indicates the Forebay Subbasin is the subbasin with the greatest potential for groundwater recharge from secondary channel enhancements.

One demand management groundwater modeling scenario was simulated for the Forebay Subbasin to develop an estimate for the approximate amount of pumping reductions needed to avoid undesirable results for groundwater levels in the future. At 91% of pumping as compared to the Baseline Scenario, it showed that pumping reductions resulted in 1-5 feet higher groundwater levels than the Baseline Scenario, as well as minor decreases in stream recharge, groundwater in storage, and inter-subbasin flow to the downstream subbasins. Similar to the Upper Valley Subbasin, the Forebay Subbasin is susceptible to periods of drought and low river flow, and those years still experience undesirable results even at 91% of pumping.

### **5.3 Eastside Subbasin**

Several of the PMA feasibility studies could help the Eastside Subbasin meet SGMA groundwater sustainability goals, either directly or indirectly. Of the PMAs evaluated, the 2 that most directly affect Eastside groundwater levels are demand management and recharge using Salinas River water diverted under Permit 11043.

Demand management groundwater modeling shows that, if implemented alone and limited to the Eastside Subbasin, substantial pumping reductions would be required to avoid groundwater level undesirable results by the SGMA deadline. Reductions on the order of 17%–25% of baseline pumping would raise groundwater levels by approximately 10–20 feet across most of the subbasin, with increases of up to 40 feet in some areas. These gains occur even though reduced pumping results in large decreases in subsurface inflow from the 180/400 Subbasin to the Eastside Subbasin. Notably, within just 10 years, even an 8% reduction in pumping results in the number of RMS wells below their minimum thresholds to drop by 28%, indicating that even relatively modest reductions can quickly produce meaningful improvements in groundwater levels.

For the C&E Study, 2 of the 4 project concepts focused on increasing groundwater levels in the Eastside Subbasin. Salinas River water diverted under Permit 11043 would capture winter/spring flows; however, given the low demand at this time, the Permit would need to be amended to add storage. For the recharge basin project concept, 4 scenarios were developed with river diversions ranging from 50 cfs to 400 cfs. All scenarios produced groundwater levels higher than the Baseline Scenario, though the magnitude and location of benefit varied. Only the 400 cfs scenario avoided undesirable results during the SGMA evaluation period; however, those results should be interpreted with caution due to simulated groundwater mounding near the northern recharge basin sites. Overall, recharge basins provided broad groundwater level benefits at lower costs than other C&E scenarios with comparable diversion rates.

In the northern Eastside Subbasin, where shallow clay layers would limit recharge basin effectiveness, injection scenarios of 50 cfs and 100 cfs were evaluated instead. These scenarios produced groundwater level increases of a similar overall magnitude to the recharge basin

scenarios, but the benefits were more localized around the injection wells. In addition, these injection projects would require surface reservoir storage and treatment to drinking water standards, significantly increasing project costs.

Some limited Eastside Subbasin benefits also occur when groundwater levels are raised in the 180/400 Subbasin. For example, the C&E Study's Coastal Injection scenario, NSIP, BGRP, NAA, AWSP, and demand management: when those projects raised groundwater levels, the modeling showed some corresponding benefit in the Eastside Subbasin. However, these benefits were largely concentrated along the western edge of the subbasin, where alluvial fans interfinger with the 180-Foot, 400-Foot, and Deep Aquifers. This is true of both PMAs that reduced pumping and injected water. However, only projects that included injection had a substantial effect on limiting seawater intrusion from reaching the Eastside Subbasin. For the NSIP and NAA Alternatives, pumping reductions were not enough to stop the leading edge of seawater intrusion from reaching the Eastside Subbasin boundary by 2040 and intrusion advanced farther inland in subsequent decades.

## **5.4 180/400 Subbasin**

PMA options to address conditions in the 180/400 Subbasin are the most extensively studied, reflecting both the availability of SGM R1 grant funding and the urgent need to address seawater intrusion and declining groundwater levels. This report builds on previous analyses of ASR, the BGRP, and demand management.

The 180/400 Subbasin Project Update Report (SVBGSA, 2025b) documents recent CSIP improvements and analyses for CSIP optimization. These include completed system improvements, updates to the CSIP hydraulic model, and the identification of 3 capital improvement projects (CIPs) through hydraulic modeling. The CSIP optimization goals are to reduce reliance on supplemental groundwater wells during peak summer irrigation demand, improve hydraulic reliability, and enhance system redundancy to support seawater intrusion management. Preliminary engineering designs and cost estimates for these projects are provided in a Basis of Design Report (BODR).

The BGRP USBR Report carries forward the Injection Only Scenario as a preferred BGRP scenario from the Phase 1 analysis completed in October 2025. The USBR Report illustrates how demand reductions, injection, and extraction barriers influence groundwater levels and seawater intrusion under the NAA, AWSP, and BGRP Alternatives. The NAA shows drastic pumping reductions, ranging from the seawater intruded subbasins to all subbasins. While the NAA raises groundwater levels compared to baseline conditions, it has minimal effect on the inland extent of the seawater intrusion isocontour by 2040. In contrast, the AWSP identifies new water supplies for injection and is effective at halting and reversing the seawater intrusion front to meet the minimum threshold. However, chloride concentrations continue to increase within already

intruded areas, and the capital cost of the AWSP is nearly 4 times that of the BGRP Injection Only Alternative.

The BGRP Alternative combines an extraction barrier with injection of treated water. This configuration pushes the seawater intrusion front back to the minimum threshold by 2040 and reduces chloride concentrations between the extraction and injection wells. However, the extraction wells also lower groundwater levels near the coast relative to both baseline conditions and the AWSP Alternative. Economic and financial analyses indicate that neither the NAA nor the AWSP are financially viable. By contrast, the BGRP Alternative has a benefit–cost ratio exceeding 1.41 and generates net benefits ranging from \$1.4 to \$4.6 billion, exceeding those of the AWSP Alternative.

Another injection alternative evaluated in the C&E Study was the Coastal Injection Scenario, which updated Alternative 1a from the ASR Preliminary Feasibility Study. This scenario was limited to an average injection rate of 5,100 AFY, constrained by available storage at Lake Merritt. Injection was limited to the 400-Foot Aquifer and was insufficient to meet the seawater intrusion minimum threshold.

The NSIP focused on meeting agricultural water demands by supplying irrigation water within the seawater-intruded area, including offsetting pumping from the Deep Aquifers where they overlap with intrusion. Although the project resulted in higher groundwater levels than the Baseline Scenario, it had little effect on the seawater intrusion front. Together with the other seawater intrusion scenarios, the NSIP results highlight that chloride concentrations respond differently than groundwater levels to PMAs. These responses are driven by flow paths, source water quality, and mixing and spreading processes that are highly sensitive to the configuration and timing of recharge and pumping.

Similarly, demand management scenarios that reduced agricultural pumping in the 180/400 Subbasin while other subbasins continued baseline pumping resulted in higher groundwater levels. Although these scenarios were not evaluated using SWIM, their effects would be less pronounced than the more extensive pumping reductions assumed under the NAA Alternative.

Although not formal feasibility studies, analyses of enhanced recharge along the Salinas River provide additional context. The Somavia Road Recharge Evaluation found that while stream losses and regional recharge are occurring, available data do not conclusively demonstrate direct recharge from the river to the 180-Foot Aquifer at that location. Furthermore, the analysis indicated that additional pumping during the growing season—similar to the concept underlying the Irrigation Supply Project—is unlikely to increase infiltration or recharge rates. Under the Multi-benefit Stream Channel Improvements analysis, HEC-RAS modeling was used to estimate potential recharge associated with secondary channels and detention basins under the SMP. While some recharge benefits were identified, the presence of the Salinas Valley Aquitard limits

recharge from the river in the coastal region. As a result, these projects may help raise groundwater levels in the southern portion of the 180/400 Subbasin but are unlikely to have a substantial effect on seawater intrusion.

Finally, while no feasibility study focused exclusively on the Deep Aquifers independent of other sustainability issues, several of the evaluated PMAs provide insight into options for raising groundwater levels in the Deep Aquifers. Both NSIP and demand management scenarios increase groundwater levels in these aquifers. In parallel, SVBGSA has been working with partner agencies through the Deep Aquifers Agency Working Group. Together they drafted a Deep Aquifers Memorandum, which makes recommendations for managing the Deep Aquifers within existing statutory authorities and SGMA planning processes. The memorandum identifies interim actions and long-term projects that may be evaluated and adopted by responsible agencies. In addition, MCWRA prepared the Deep Aquifers Monitoring Plan for the Deep Aquifers Working Group to guide collaborative data collection and data exchange. These documents and the ongoing collaboration are further described in the Monterey Project Update Report.

## **5.5 Monterey Subbasin**

SVBGSA and MCWDGSA are continuing collaboration in the Monterey Subbasin. PMAs to address groundwater levels and seawater intrusion in the Monterey Subbasin are described further in the Monterey Project Update Report. It includes Marina-Ord Area PMAs, Corral de Tierra PMAs, and regional PMAs that would have effects on the Monterey Subbasin.

## **5.6 Langlely Subbasin**

Few of the feasibility studies evaluated PMAs with direct effects on groundwater conditions in the Langlely Subbasin. Because land use in the Langlely Subbasin is predominantly rural residential, agricultural demand management measures would be applicable only in the southern portion of the subbasin.

Demand management scenarios were not included in the demand management modeling for 2 primary reasons. First, reductions in agricultural pumping had limited influence on the occurrence of undesirable results, as there is only 1 well-calibrated RMS well in the southern portion of the subbasin represented in the SVOM. Second, the fractured granite aquifer system underlying the Langlely Subbasin introduces substantial uncertainty into groundwater modeling results. As a result, future assessments of demand management in the Langlely Subbasin may require alternative, non-model-based evaluation approaches. Nevertheless, reductions in agricultural pumping could raise groundwater levels in the southern part of the subbasin. Given the predominantly rural residential land use in the Langlely Subbasin, the WEPP provides assistance to rural residents to improve water-use efficiency and could reduce groundwater

pumping. In addition, several feasibility studies focused on the 180/400 and Eastside Subbasins showed that projects which raised groundwater levels in those areas also produced modest increases in Langley Subbasin groundwater levels compared to baseline conditions.

## 6 SUMMARY AND RECOMMENDATIONS

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Project selection is ultimately based on an assessment of technical, environmental, economic, and financial criteria in combination rather than on any single metric. For example, a project or project alternative may have the lowest capital cost but may fail to adequately address core objectives—such as reducing seawater intrusion or increasing groundwater levels. The selected portfolio will need to achieve a balance that integrates technical performance to meet SGMA deadlines, environmental requirements, and economic feasibility.

Selection of PMAs for the next phase of GSP implementation must account for multiple criteria. Beyond the ability to meet SMC and financial considerations, the degree of challenges and uncertainties each project faces must be carefully weighed. Projects will be evaluated not only for technical feasibility, but also for legal and permitting requirements, political viability, and resilience under varying conditions. This includes considering the extent to which projects can adapt to uncertainty while still delivering measurable progress toward groundwater sustainability. SVBGSA plans to incorporate this work into the IIS that supports implementation of the selected PMA portfolio and achievement of groundwater sustainability in all subbasins with SVBGSA’s jurisdiction.

Key considerations are outlined below.

The selection process to be completed in 2026 comprises the following steps:

- SVBGSA staff will develop and analyze several integrated implementation scenarios based on completed feasibility studies and groundwater modeling.
- Evaluation of the integrated scenarios will consider several factors including SGMA performance, reliability and risk, economic impacts, implementation feasibility, and equity and policy considerations.
- SVBGSA Advisory Committee will serve as the primary advisory body, reviewing scenarios, receiving stakeholder input, and developing recommendations.
- Board of Directors will consider those recommendations and select the preferred implementation scenario(s).
- Coordinate with other local water management agencies including other ASGSA, MCWDGSA, and MCWRA. Align project objectives and costs across projects selected for GSP implementation (as described throughout this report) and other water resources management efforts and projects in the county (e.g., CSIP improvements, wastewater treatment, dam repairs, and other capital investments).

- Combine results and continue project feasibility studies as needed and where appropriate. Projects will be advanced to the next phase of development based on their ability to demonstrate strong technical and economic justification as well as viable funding pathways.
- Integrate the outcome into the SVBGSA funding strategies work that explores how projects could be funded and financed, supporting the phased implementation process.

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