CHAPTER 6 – PROJECTS AND MANAGEMENT ACTIONS Groundwater Sustainability Plan for the Marina GSA Area of the 180/400 Foot Aquifer Subbasin

City of Marina Groundwater Sustainability Agency Marina, California



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6 PROJECTS AND MANAGEMENT ACTIONS

Regulation Requirements:

- **§354.42 Introduction to Projects and Management Actions.** This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.
- §354.44(a) Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin
- (b) Each Plan shall include a description of the projects and management actions that include the following:
- (1) A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:
- (A) A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.
- (B) The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.
- (2) If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.
- (3) A summary of the permitting and regulatory process required for each project and management action.
- (4) The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.
- (5) An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.
- (6) An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.
- (7) A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.
- (8) A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.
- (9) A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.
- (c) Projects and management actions shall be supported by best available information and best available science.
- (d) An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.

6.1 Introduction

The 180/400 Foot Aquifer Subbasin (Subbasin) is subject to ongoing seawater intrusion due largely to long-term groundwater extraction in the inland portions of the Subbasin in excess of the sustainable yield. As a result, it has been identified by California Department of Water Resources (DWR) as being one of 21 basins in a condition of critical overdraft (DWR 2016a). Seawater intrusion was first identified in the area of Marina Groundwater Sustainability Agency (the MGSA Area) in the 1940s, and over the following decades progressed inland for a distance of over 7 miles in some areas. The purpose of this GSP is to support regional efforts to address this condition and return the Subbasin to sustainable groundwater management within 20 years, as required by the Sustainable Groundwater Management

Act (SGMA). MGSA will achieve this by supporting the projects and management actions that will be implemented by Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) under its regional Groundwater Sustainability Plan (GSP), and by assuring that local groundwater resources are managed sustainably to protect local and regional beneficial uses and users.

This chapter describes management actions that will be implemented by MGSA to assure sustainable groundwater management in the MGSA Area and prevent undesirable results. MGSA has not identified any feasible projects within the MGSA Area to promote sustainable groundwater management at this time, but will continue to evaluate potential projects. In addition, MGSA will consult and coordinate with SVBGSA and/or MCWD GSA to identify and support implementation of such projects in the future, as appropriate. Also included in this chapter is a brief description of SVBGSA projects and management actions for the Subbasin, some of which would provide regional benefits which include the MGSA Area and vicinity. MGSA will coordinate with and support SVBGSA in the implementation of projects and management actions it has determined to be locally and regionally beneficial, but they are not adopted and will not be implemented under this GSP. Additional details on SVBGSA's projects and management actions can be found in Chapter 9 of their GSP for the Subbasin (SVBGSA 2019).

6.2 MGSA MANAGEMENT ACTIONS

In this GSP, the term "groundwater management actions" refers to activities that prevent undesirable results and promote sustainable groundwater management that do not require infrastructure or capital improvements. They include, among other things, the exercise of the powers and authorities set forth in Chapter 5 of SGMA, California Water Code (CWC) §§ 10725-10726.9. Management actions will be implemented based on an objective system of pre-established monitoring triggers in order to respond to potentially adverse conditions and prevent undesirable results as defined in Chapter 4. MGSA's management actions are described below.

6.2.1 MGSA Management Action 1: Management of Seawater Intrusion and Groundwater Quality Degradation

6.2.1.1 DESCRIPTION

In the vicinity of the MGSA Area, the undesirable results of seawater intrusion, water quality degradation and groundwater level decline are related. Each is a function of the MGSA Area's setting on the seaward side of the interface between a dense saline water intrusion wedge and an over-riding zone of low-total dissolved solids (TDS) groundwater (< 3,000 milligrams per liter [mg/L] TDS) that is locally recharged through the Dune Sand Aquifer. Groundwater extraction in the MGSA Area has the potential to affect the dynamic equilibrium of this nearshore groundwater system and cause seawater intrusion through the migration of the saline water wedge, which could in turn lead to further seawater intrusion into the Dune Sand Aquifer, vertical seawater intrusion into the currently unintruded Deep Aquifer, or promote the lateral migration or persistence of seawater intrusion farther inland. Groundwater

extraction could also lead to water quality degradation in the low-TDS groundwater zone by causing mixing of saline and low-TDS groundwater.

As described in Chapter 5, MGSA will monitor and evaluate the potential for groundwater elevation and water quality changes that are indicative of the above undesirable results. If the data indicate that the triggers associated with the above undesirable results and included in this chapter may be reached as a result of these groundwater extractions, then MGSA will implement a series of escalating management actions. These management actions will include the following three general phases, with the progression between each phase set by a sequence of objective decision triggers:

- (1) Detection Monitoring;
- (2) Investigation, Verification and Hydrogeologic Conceptual Model Update; and
- (3) Characterization, Response Action Planning and Implementation.

The components of Management Action 1 are shown graphically in Figure 6-1, and may be summarized as follows. The Detection Monitoring phase presents the first tier of triggers that are specific to detecting groundwater quality degradation and related proxies for seawater intrusion, water quality degradation and low-TDS groundwater storage depletion at an early stage. Management Action 1 will be implemented if any of the following Tier 1 Trigger Thresholds are reached or exceeded:

- Trigger A For seawater intrusion into the Dune Sand Aquifer:
 - A decrease in the thickness of the low TDS zone of more than 5 feet (considering seasonal variability) identified by induction logging three or more wells in the induction logging monitoring well network; or
 - An increase in the thickness of the saline groundwater wedge of more than 5 feet identified by induction logging in three or more deep monitoring wells in the induction monitoring well network; and
 - A spatial distribution of groundwater level decline that indicates the logged changes identified above occur within the zone of drawdown influence of groundwater extraction in the MGSA Area.¹
- Trigger B For degradation of groundwater quality in the low-TDS groundwater zone in the Dune Sand Aquifer, 180-Foot Aquifer, 400-Foot Aquifer or Deep Aquifer:
 - A statistically significant (p < 0.1) increasing trend in groundwater concentrations of chloride or TDS in three or more wells in the water quality monitoring well network for any one aquifer at the 90% confidence level using an appropriate Mann-Kendall trend test (e.g. Seasonal Mann-Kendall) (US EPA 2009);

¹ This second requirement for the trigger threshold is included because MGSA only has authority to regulate groundwater extractions within its jurisdictional boundaries.

- A statistically significant increase (SSI) above baseline chloride or TDS concentration in three or more wells at the 90% confidence level using an appropriate statistical technique per EPA 2009; and
- A spatial pattern of groundwater level declines that indicates the statistically-significant water quality changes identified above occur within the zone of drawdown influence of groundwater extraction in the MGSA Area.

If Trigger A or B are reached or exceeded, then a Tier 1 Trigger threshold has been reached. Confirmation monitoring will be conducted to confirm that a Tier 1 Trigger event has occurred. If confirmed, a Tier 1 Trigger will either segue the management action into: (a) Tier 2 Investigation, Verification and Hydrogeologic Conceptual Model Updates for the Dune Sand, 180-Foot and 400-Foot Aquifer systems, or (b) if the Tier 1 Trigger event occurred in the Deep Aquifer, directly to the Characterization, Corrective Action Planning and Implementation phase.

The Investigation, Verification and Hydrogeologic Conceptual Model Update phase is in place to conduct additional investigation to determine the need for groundwater management (CWC § 10725.4), specifically, it consists of a focused evaluation to confirm that seawater intrusion or water quality degradation is occurring, and is causing or is likely to cause significant and unreasonable effects. The Investigation, Verification and Hydrogeologic Conceptual Model Updates phase requires updating and refining the three-dimensional Hydrogeologic Conceptual Model with historic and current data sources (e.g., groundwater elevation, groundwater chemistry, geophysical data, etc.), and using two- and three-dimensional quantitative geostatistical techniques to assess if: (a) the low-TDS groundwater zone is thinning over time; (b) the saline groundwater wedge is expanding over time; and/or (c) water quality is degrading in the low-TDS groundwater zone. Evaluations will be data-driven, consisting of space-time geostatistical evaluations and/or plume stability analysis.

If one or more of these three conditions is met, then the management action for the Dune Sand, 180-Foot and 400-Foot Aquifers segues from Phase 2 into the Characterization, Response Action Planning and Implementation phase. The second phase Hydrogeologic Conceptual Model Update will also help identify and localize critical data gaps, uncertainties and risks so they can be considered during planning for characterization and corrective action.

The third phase of MGSA Management Action 1 is Characterization, Response Action Planning and Implementation. The following activities constitute the third phase:

- Alternative cause investigation to confirm that groundwater extractions in the MGSA Area are responsible for causing the effects of concern;
- Further Hydrogeologic Conceptual Model refinement to fill critical data gaps, and groundwater model development;
- Response action evaluation and selection;
- Stakeholder consultation (i.e., SVBGSA, MCWD GSA, Monterey County Water Resources Agency [MCWRA], environmental groups, and others);

- Response action implementation; and
- Monitoring of response action effectiveness.

Alternative cause investigations are necessary to establish the mechanism and function of the observed seawater intrusion, groundwater quality degradation, and/or low-TDS zone storage depletion, and verify they are resulting from groundwater extraction within the MGSA Area. If the cause is due to groundwater extraction within the MGSA Area, then a response action by MGSA and the groundwater extractor is appropriate to prevent or correct undesirable results. Response action identification and implementation will likely require the development of a three-dimensional numerical groundwater model that is capable of simulating seawater intrusion through advective solute transport and density-driven flow (or use of such a model if it has been developed by MCWD GSA, as discussed in Section 4.3). The updated Hydrogeologic Conceptual Model developed during the Investigation, Verification and Hydrogeologic Conceptual Model Update phase will, in part, serve to support the conceptual design and parameterization inputs for constructing or refining the local groundwater model as needed.

The locally refined groundwater model and updated Hydrogeologic Conceptual Model will provide data-driven information to evaluate and select appropriate response action(s), including key design considerations and prediction of future implementation effectiveness and establishment of timetables. During the response action selection process, stakeholders including SVBGSA, MCWD GSA, MCWRA, environmental groups, and other interested parties will be consulted to provide input and coordinate implementation of response actions in their jurisdictional areas. Once implemented, criteria for monitoring action effectiveness will be data-driven and include multiple lines of evidence, such as, for example: (a) evaluating TDS and chloride temporal trend behaviors to see if trends shift from increasing to decreasing or insignificant; (b) determining if TDS/chloride concentrations reach baseline threshold levels and are stable over time; and/or (c) assessing if the TDS/chloride wedge and low-TDS zone thickness and storage become stable and/or improve over time. New Measurable Objectives and Interim Milestones would be established to achieve and maintain the sustainability goals of the GSP.

If the response action does not produce multiple lines of evidence showing the successful mitigation of the seawater intrusion, storage depletion and/or water quality degradation, or the new Measurable Objectives and Interim Milestones are not achieved, then the response action would be amended, reimplemented and monitored until the objectives are achieved. If implementation of the response action does achieve the Measurable Objectives, then a decision will be made to segue the groundwater program back into the first phase (Detection Monitoring). Detection Monitoring would then continue as described in this GSP.

6.2.1.2 RELEVANT MEASURABLE OBJECTIVES

The measurable objectives benefiting from this management action include:

• Groundwater storage reduction measurable objective. Effective response actions would assure that groundwater extraction within the MGSA would occur within the sustainable yield of the basin, without causing undesirable results.

- The seawater intrusion measurable objective. Effective response actions would prevent or reverse further seawater intrusion in the upper aquifer system and return it to stable conditions, and prevent or reverse seawater intrusion advancement into the Deep Aquifer.
- Groundwater quality measurable objective. Effective response actions would prevent or reverse
 degradation groundwater quality by TDS and chloride in the low-TDS zone of the Dune Sand,
 180-Foot and 400-Foot Aquifer, or in the Deep Aquifer, and return it to stable and/or improving
 trends.

6.2.1.3 EXPECTED BENEFITS AND EVALUATION OF BENEFITS

The primary benefit from implementing MGSA Management Action 1 is to avoid undesirable results related to seawater intrusion and groundwater quality degradation, protecting the current and future beneficial uses of groundwater.

6.2.1.4 CIRCUMSTANCES FOR IMPLEMENTATION

The management action will be implemented depending upon evaluation of monitoring data and if Tier 1 and Tier 2 Trigger Thresholds are reached.

6.2.1.5 Permitting and Regulatory Process

No permitting or regulatory processes are necessary.

6.2.1.6 IMPLEMENTATION SCHEDULE

Implementation will be dependent upon whether Tier 1 and Tier 2 Trigger Thresholds are reached. The Investigation, Verification and Hydrogeologic Conceptual Model Updates phase would take approximately six months to a year to implement, and the Characterization, Corrective Action Planning and Implementation phase would take approximately one to two years to implement, and could continue for a longer period of time if conditions warrant.

6.2.1.7 ESTIMATED COSTS

Estimated costs to coordinate implementation are approximately \$50,000 per year. Implementation costs would vary depending on the scope of investigation and corrective action, and would be developed prior to implementation and paid or reimbursed by the responsible groundwater extractors.

6.2.2 MGSA Management Action 2: Management of Impacts to Groundwater Dependent Ecosystems and Interconnected Surface Waters

6.2.2.1 DESCRIPTION

As discussed in Section 2.4.12, 3.2.6.1.2, and 4.4.2.2, an evaluation of available data regarding potentially sensitive habitat and groundwater conditions indicates there are several significant GDEs that could be affected by groundwater withdrawal within the MGSA Area. Potential GDE's were identified near the MGSA Area in the California Department of Water Resources (DWR) "NC Dataset Viewer" of the "Natural Communities Commonly Associated with Groundwater" database compiled by The Nature Conservancy in cooperation with DWR. Using best practices recommended by The Nature

Conservancy (TNC 2019), these GDEs were determined to likely be dependent on the presence of shallow groundwater within the Dune Sand Aquifer. The identified GDEs include palustrine and emergent wetlands (sometimes referred to as "vernal ponds") with protected habitat and species, and are located to the east, northeast and southeast of the MGSA Area. In addition, riparian vegetation and riverine wetlands were identified along the Salinas River that may be at least partly dependent on groundwater. Shallow groundwater drawdown induced by pumping in the MGSA Area could adversely affect these GDEs, harming or degrading protected habitat, and harming protected species.

As described in Chapter 5, MGSA will monitor and evaluate the potential for groundwater elevation changes that are indicative of the above undesirable results. If groundwater level monitoring collected from wells near identified GDEs reaches the trigger thresholds presented below, then MGSA will implement a series of escalating management actions. These management actions will include the following three general phases, with the progression between each phase set by a sequence of objective decision triggers:

- (1) Detection Monitoring;
- (2) Biological and Hydrologic Assessment; and
- (3) Response Action Planning and Implementation.

The components of Management Action 2 are shown graphically in Figure 6-2, and may be summarized as follows. The Detection Monitoring phase presents the first tier of triggers that are specific to detecting potential adverse impacts to GDEs at an early stage. The triggers are an elevation 1 foot above the 2015 low groundwater levels recorded in monitoring wells near GDEs in the vicinity of the MGSA Area.²

Confirmation evaluation will be conducted to verify that a Tier 1 Trigger event has occurred by conducting a biological reconnaissance to observe and document conditions in the potentially affected GDE, determining whether vegetation stress and habitat degradation is occurring that is distinguishable from conditions documented during the baseline assessment described in Section 7.1.2.3, and assessing whether the groundwater level decline observed near the GDE is likely attributable to groundwater extraction within the MGSA Area.³ If confirmed, a Tier 1 Trigger will segue the management action into Tier 2 Biological and Hydrologic Assessment.

The Biological and Hydrologic Assessment phase is in place to conduct additional investigation and focused evaluation to characterize the cause, nature and extent of the habitat degradation and assess whether significant and unreasonable impacts to the GDE are occurring or likely to occur as a result of

² This trigger threshold is an interim value for wells MW-4S, MW-7s and MW-8S until a baseline biological assessment as discussed in Section 7.1.2.3. Based on this baseline biological assessment, a biological monitoring plan will be developed and the minimum thresholds and measurable objectives described in Section 4.4 may be modified, and the triggers and management actions described in this section refined.

³ If the observed decline in groundwater levels is attributable to pumping outside the MGSA Area, SVBGSA will be advised.

groundwater extraction in the MGSA Area. This investigation will build on the baseline biological assessment discussed in Section 7.1.2.3, and determine whether changes in vegetation vigor, community composition, or habitat quality and structure are taking place, and to quantify them if possible. Targeted evaluations will be conducted as needed to establish linkages to climatic variability and groundwater fluctuations and drawdown, and to assess potential future GDE responses. Investigations will be data-driven, and will rely on quantifiable metrics, as appropriate. If the potential for significant habitat degradation or significant harm to protected species is identified, then the management will segue from the Assessment Phase into the Response Action Planning and Implementation Phase. The second phase will also help identify and localize critical data gaps, uncertainties and risks so they can be considered during planning for corrective action.

The third phase of MGSA Management Action 2 is Response Action Planning and Implementation. The third phase may include, but not be limited to, the following activities:

- Response action evaluation;
- Consultation with California Department of Fish and Wildlife (CDFW), other appropriate agencies and stakeholders;
- Response action implementation; and
- Monitoring of response action effectiveness.

The Biological and Hydrologic Assessment will provide data-driven information to evaluate and select appropriate response action(s), including performance objectives, mitigation alternatives, prediction of future implementation effectiveness and establishment of timetables. Once implemented, criteria for monitoring action effectiveness will be data-driven and include multiple lines of evidence, such as, for example: (a) evaluating groundwater elevation rebound; and (b) evaluating and comparing plant vigor, habitat quality and species quantities and diversity to baseline conditions to assess improvement and restoration. Measurable Objectives and Interim Milestones would be established to achieve and maintain the sustainability goals of the MGSA GSP.

If the response action does not produce multiple lines of evidence showing the successful mitigation of harmful impacts to the GDEs, or the Measurable Objectives and Interim Milestones are not achieved, then the response action would be amended, re-implemented and monitored until the objectives are achieved. If implementation of the response action does achieve the Measurable Objectives, then a decision will be made to segue the groundwater program back to the first phase (Detection Monitoring). Detection Monitoring would then continue as described in this GSP.

6.2.2.2 RELEVANT MEASURABLE OBJECTIVES

The measurable objectives benefiting from this management action include:

• Groundwater elevation measurable objectives for the Dune Sand Aquifer for protection of GDEs. Effective response action would reverse groundwater elevation decline and return groundwater

elevations to the normal range of seasonal values, protecting the GDE habitat from significant and unreasonable impacts.

6.2.2.3 EXPECTED BENEFITS AND EVALUATION OF BENEFITS

The primary benefit from implementing this management action is to avoid significant and unreasonable impacts to GDEs in the vicinity of the MGSA Area. These GDEs include designated environmentally sensitive habitat areas, wetland areas protected under mitigation agreements and laws, and habitats that support threatened, endangered, and other protected species. Implementation of the management actions will protect these valuable resources and help to assure compliance with state and federal regulations that govern them.

6.2.2.4 CIRCUMSTANCES FOR IMPLEMENTATION

The management action will be implemented depending upon evaluation of monitoring data and if Tier 1 and Tier 2 Trigger Thresholds are reached.

6.2.2.5 Permitting and Regulatory Process

Prior to adoption or implementation of response actions, informal consultation with CDFW will be undertaken. Informal consultation with United States Fish and Wildlife Service (USFWS) will be undertaken for any federally listed species.

6.2.2.6 IMPLEMENTATION SCHEDULE

Implementation will be dependent upon whether Tier 1 and Tier 2 Trigger Thresholds are reached. It is expected that the Biological and Hydrologic Assessment Phase will take approximately six months to complete and the Response Action Implementation Phase will take up to approximately one year to complete, depending on the necessary action any additional data needs that must be addressed.

6.2.2.7 ESTIMATED COSTS

The estimated costs to implement Tier 2 investigations or coordinate response action implementation are approximately \$50,000 per year. Implementation costs would vary depending on the scope of investigation and corrective action, and would be developed prior to implementation and paid or reimbursed by the responsible groundwater extractors.

6.3 LEGAL AUTHORITY

The CWC provides MGSA the following powers and authorities, among others, to implement the above management actions:

• CWC § 10725.4 (a) provides GSAs the authorities to conduct investigations to determine the need for groundwater management, and to monitor compliance and enforcement of a GSP.

- CWC § 10726.4 (a)(2) provides GSAs the authorities to control groundwater extractions by regulating, limiting, or suspending extractions from individual groundwater wells or extractions from groundwater wells in the aggregate.
- CWC § 10725.2. provides that a GSA may perform any act necessary or proper to implement the above authorities, and may adopt rules, regulations, ordinances, and resolutions as necessary to do so.

It is anticipated that, in the process of implementing the above authorities, MGSA may work with groundwater extractors to identify and implement alternative response actions that can comply with the Sustainable Management Criteria identified in this GSP.

6.4 Public Noticing

The City Council of the City of Marina administers MGSA and is responsible to consider and approve decisions regarding the implementation of the management actions described in this GSP. MGSA board meetings are held concurrently with City Council meetings on the first and third Tuesdays of each month in accordance with the Marina Municipal Code (Chapter 2.04) and City Ordinances: 2001-11 § 1 (2001), 78-12 § 1 (1978), and 75-2 § 1 (1975). The meetings are publicly noticed and agendas are made available on the City's website (https://www.cityofmarina.org/AgendaCenter). Open meetings may be preceded by a closed session if necessary and appropriate. As described in Section 1.5.1, resolutions presented to City Council are voted on and require a majority vote of a quorum to be passed and adopted. Open public hearings on specific resolutions may be held during meetings to allow for testimony from the public. City Council Members will consider public testimony prior to voting on specific resolutions.

As part of disseminating information to the general public, MGSA will post updates on its website to notify the public that the implementation of management actions is being considered or has been implemented. This will include a description of the actions to be taken. Additional noticing for the public will be conducted consistent as required in the case of the enactment of fees or assessments. Outreach may include public notices, meetings, website or social media presence, and email announcements.

6.5 SVBGSA AND MCWRA PROJECTS AND MANAGEMENT ACTIONS SUPPORTED BY MGSA

SVBGSA projects involve new or improved infrastructure to meet the regional Sustainable Management Criteria identified in SVBGSA's GSP for the Subbasin (SVBGSA 2019). MCWRA and others are proposing additional projects that will help to improve the understanding and sustainable management of groundwater resources in and near the MGSA Area. Several projects are discussed below based on their relevance to the MGSA Area and vicinity. Included are six projects that are planned for implementation or are already in progress (including four SVBGSA "Priority Projects"), and two SVBGSA "Alternative

Projects" that will be implemented only if they are deemed cost effective or necessary to achieve sustainability.

Management actions in SVBGSA's GSP were defined as new or revised non-structural programs or policies that are intended to reduce or optimize local groundwater use (SVBGSA 2019). Management actions will be implemented only if they are deemed cost effective or necessary to achieve sustainability. The four SVBGSA management actions discussed below are considered potentially relevant to achieving the sustainability objectives of the MGSA GSP in and near the MGSA Area. These management actions are not adopted as part of this GSP; however, MGSA will cooperate with and support them because they provide benefits to the MGSA Area.

The proposed SVBGSA projects and management actions will provide *in lieu* recharge and direct recharge benefits including "arresting the decline, or raising, groundwater elevations" (SVBGSA 2019). For the 180-Foot Aquifer, SVBGSA has estimated a groundwater elevation rise of about 3.5 feet in the vicinity of the Salinas River and 2 feet in the vicinity of the MGSA Area as a result of implementing these project and management actions (SVBGSA 2019). For the 400-Foot Aquifer, SVBGSA has estimated a groundwater elevation rise of about 3.5 feet in the vicinity of the Salinas River and 3 feet in the vicinity of the MGSA Area. Raising groundwater elevations could change groundwater flow gradients, and potentially flow directions, in the 180-Foot and 400-Foot Aquifers.

These projects and management actions are further described in the following subsections.

6.5.1 OPTIMIZE CASTROVILLE SEAWATER INTRUSION PROJECT OPERATIONS (SVBGSA GSP PRIORITY PROJECT 2)

The Castroville Seawater Intrusion Project (CSIP) system will be optimized to better accommodate diurnal and seasonal fluctuation in irrigation demand, maximizing use of water supplied from the Salinas Valley Reclamation Project (SVRP) and the Salinas River Diversion Facility (SRDF), thereby reducing the need for groundwater pumping in the CSIP service area, which includes area east and northeast of the MGSA Area (Figure 2-6). This project aligns CSIP irrigation with availability of water rather than demand, to ensure the available supply water can be used to a greater extent. Refer to Chapter 9 of SVBGSA's GSP (SVBGSA 2019) for further details.

The primary benefits from *in lieu* recharge projects such as CSIP optimization include reduction or avoidance of groundwater pumping from wells in the CSIP area throughout the year. This is beneficial to MGSA because of its proximity to the CSIP service area and because pumping reductions in these areas support measurable objectives related to groundwater elevation, groundwater storage and seawater intrusion. A direct correlation between CSIP optimization and changes in groundwater elevations, subsidence, or seawater intrusion is likely not possible to assess because this is only one among several similar management actions and projects that will be implemented in the Subbasin. This project is anticipated to take three years to implement.

6.5.2 IMPROVE SRDF DIVERSION (SVBGSA GSP PRIORITY PROJECT 3)

The SRDF Diversion improvements include installing a radial collector well to provide additional diversion capacity at the SRDF. The project includes installing additional water storage for the proposed 85 cubic feet per second (cfs) capacity of the SRDF. Refer to Chapter 9 of SVBGSA's GSP (SVBGSA 2019) for further details.

The primary benefits from in lieu recharge or Aquifer Storage and Recovery (ASR) projects such as SRDF expansion include provision of additional water supply to the CSIP system, allowing for its expansion into new service areas as well as providing a potential source of water for aquifer recharge. The expanded SRDF has the potential to yield up to 20,800 AFY if operated April through October. This is beneficial to the MGSA Area because of its proximity to the CSIP service area and because pumping reductions in these areas support measurable objectives related to groundwater elevation, groundwater storage and seawater intrusion. It is anticipated to take five to six years to implement this project.

6.5.3 Modify Monterey One Water Recycled Water Plant (SVRP Modifications) (SVBGSA GSP Priority Project 4)

Monterey One Water (M1W) is currently designing and permitting this project and SVBGSA intends to work closely with M1W on project implementation. M1W's Regional Wastewater Treatment Plant (RTP), located approximately 2 miles east of the MGSA Area, has a maximum capacity of 29.6 million gallons per day (mgd). Currently, the facility is only treating 16 to 18 mgd of influent wastewater. During the wet weather months, 100% of all secondary treated wastewater is discharged to the ocean, forgoing the opportunity for beneficial reuse. During the wet weather months, there is some demand for recycled water in the CSIP system; however, M1W cannot efficiently produce the tertiary treated water needed to meet agricultural demand during this time. As a result, growers turn to the groundwater basin for their irrigation needs during these months. Modifications are required at the M1W RTP in order to efficiently treat and store recycled water during the wet weather months. Refer to Chapter 9 of SVBGSA's GSP (SVBGSA 2019) for further details.

The primary benefits from *in lieu* recharge projects such as M1W SVRP Modifications is additional water supply to the CSIP system during low-demand wet weather months, reducing groundwater pumping. The M1W SVRP Modifications project has the potential to yield up to 1,100 AFY via *in lieu* recharge, providing an alternative to groundwater sources in the CSIP area. This is beneficial to MGSA because of its proximity to the CSIP service area and because pumping reductions in these areas support measurable objectives related to groundwater elevation, groundwater storage and seawater intrusion. This project will benefit other subbasins, such as the Monterey Subbasin by reducing pumping that impacts the neighboring subbasins. It is anticipated to take approximately two years to implement.

6.5.4 EXPAND AREA SERVED BY CSIP (SVBGSA GSP PRIORITY PROJECT 5)

The CSIP expansion project involves enlarging the system's service area, thereby increasing available water supplies in the spring and fall and lessening dependence on existing groundwater wells. It is likely

that the existing CSIP supplies are not sufficient to meet the summertime demand of the expanded CSIP area without a significant increase in water supply from the Salinas River Diversion Facility (SRDF) or another source. Refer to Chapter 9 of SVBGSA's GSP (SVBGSA 2019) for further details.

The benefits of this project are similar to SVBGSA Project 1, described above. The expanded service area would lessen groundwater pumping by an amount equal to the quantity delivered: approximated as 9,900 AFY. This is beneficial to MGSA because of its proximity to the CSIP service area and because pumping reductions in these areas support measurable objectives related to groundwater elevation, groundwater storage and seawater intrusion. This project is anticipated to take five years to implement.

6.5.5 CONSTRUCT ADDITIONAL NESTED MONITORING WELLS IN THE DUNE SAND AND 180/400-FOOT AQUIFERS NEAR THE MGSA AREA (PLANNED MCWRA PROJECT)

As part of its obligation to implement the Mitigation, Monitoring and Reporting Program (MMRP) for the proposed Monterey Peninsula Water Supply Project (MPWSP), MCWRA plans to install and monitor five additional clusters of monitoring wells in the area surrounding the MGSA Area where spatial groundwater monitoring data gaps have been identified (CPUC 2018, MCWRA 2019d). These new wells would have similar screened intervals to the existing monitoring wells installed at eight locations to monitor the effects of pumping the full slant well array for the proposed MPWSP if it is fully approved and implemented. At each location, three monitoring wells would be constructed: one each in the Dune Sand Aquifer, 180-Foot Aquifer and 400-Foot Aquifer. These wells would be added to the monitoring well network, for a total of 40 wells, and would be monitored quarterly or more frequently by MCWRA. MCWRA has indicated it plans to proceed with this project in the near future.

6.5.6 REGIONAL DEEP AQUIFER CHARACTERIZATION (POTENTIAL PROJECT BY MCWRA, SVBGSA AND MCWD)

MCWRA, SVBGSA and MCWD GSA are discussing plans to investigate the Deep Aquifer system in the Salinas Valley. Although no specific plans are proposed at this time, there is broad consensus that this important data gap must be addressed during the early stages of GSP implementation to ensure that this important aquifer is sustainably managed. It is anticipated that the investigation results will provide information regarding the nature and hydraulic properties of the Deep Aquifer system. Specifically, the groundwater flow patterns in the Deep Aquifer, the interconnection between the disparate aquifer units in this system, how they are recharged, and the extent of potential leakance from the overlying upper aquifer system is expected to be addressed. No specific scope or schedule has been proposed at this time. MGSA will provide comments on the scope and results of this study, and incorporate the results into a future update of this GSP.

6.5.7 AGRICULTURAL LAND AND PUMPING ALLOWANCE RETIREMENT (SVBGSA GSP MANAGEMENT ACTION 1)

SVBGSA water charges revenues would be used to acquire and retire irrigated land and/or pumping allowances (potentially including carryover credits and recharge credits) to reduce pumping. All acquisitions would be completed on a voluntary basis from willing sellers at negotiated market prices. SVBGSA would cease irrigation on acquired land to reduce pumping. SVBGSA would coordinate with other local agencies and stakeholders to determine beneficial uses of the acquired land (e.g. establishment of native vegetation). Landowners selling pumping allowances to SVBGSA separate from land would be permitted to convert their land to rural residential use. The number of *de-minimis* wells authorized on converted land would be based on the amount of pumping allowance sold to SVBGSA. The final ratio of sold pumping allowance to the number of *de-minimis* wells allowed will be agreed to in the final water charges framework.

The benefit from land or pumping allowance retirement will be reduced pumping and either arresting groundwater elevation decline or raising groundwater elevations. Depending on the location of the land retirement, ancillary benefits include reducing seawater intrusion rates. Because it is unknown how many landowners will willingly enter the land retirement program, it is difficult to quantify the expected benefits at this time. The option for land retirement will begin immediately after SVBGSA's water charges framework is finalized and adopted. Although the land retirement program would be ongoing, it will be reliant on willing sellers and will likely be implemented intermittently.

6.5.8 RESERVOIR REOPERATION (SVBGSA MANAGEMENT ACTION 2)

Reservoir reoperation entails a revised management scheme for the reservoirs that control the Salinas River flows. The purpose of this management action is to operate the reservoirs to achieve two goals:

- Allow surface flow releases to recharge groundwater in the various Salinas Valley Subbasins every winter; and
- Allow both natural and surplus flows to better reach the SRDF diversion.

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

Reservoir operations are managed by MCWRA, and would not be directly modified by SVBGSA. Over the next few years, MCWRA plans to prepare a Habitat Conservation Plan (HCP) that re-establishes the reservoir operating rules for the Salinas Valley. The HCP offers an opportunity for reservoirs to be explicitly operated for improved groundwater management as well as environmental flows and flood

control. SVBGSA will participate in developing the HCP to implement the reservoir operations in a way that promotes this strategy.

The primary benefit from reservoir reoperation is increased flows in the Salinas River in the winter, to allow for additional groundwater recharge in the subbasins and more flexible use of the groundwater in storage. A second benefit is the availability of water at the SRDF diversion to allow for greater surface water use in the CSIP area, and potentially allow for CSIP area expansion (see SVBGSA Priority Project 5). The reservoir reoperation management action schedule will be contingent upon the development and finalization of the HCP and other reservoir operations criteria. The implementation schedule will start as soon as new reservoir operations criteria are developed in collaboration with MCWRA.

6.5.9 RESTRICT PUMPING IN CSIP AREA (SVBGSA MANAGEMENT ACTION 3)

A number of the priority projects adopted by SVBGSA are designed to ensure a reliable, year-round supply of water to growers in the CSIP area. These projects will remove any need for groundwater pumping in the CSIP area. To promote use of CSIP water, SVBGSA may pass an ordinance preventing any pumping for irrigating agricultural lands served by CSIP. The benefit from the CSIP pumping restrictions is reduced Subbasin pumping and either arresting groundwater elevation decline or raising groundwater elevations. An ancillary benefit from shallower groundwater elevations may include reducing seawater intrusion. CSIP pumping restrictions would be implemented within one year of substantially completing the CSIP optimization projects.

6.5.10 SUPPORT AND STRENGTHEN MCWRA RESTRICTIONS ON ADDITIONAL WELLS IN THE DEEP AQUIFER (SVBGSA MANAGEMENT ACTION 4)

MCWRA Ordinance No. 5302 restricts drilling new wells in the Deep Aquifer in an Area of Impact that is generally northwest of Davis Road. Exceptions are made for replacement wells, domestic wells, and municipal supply wells. This is a temporary urgency ordinance pending development of permanent regulations and is intended to decrease the potential for seawater intrusion into the Deep Aquifer until sufficient information can be obtained to assess its sustainable yield. SVBGSA plans to work with MCWRA to strengthen the ordinance to prevent any new wells from being drilled into the Deep Aquifer until more is known about the Deep Aquifer's sustainable yield. MGSA will support this management action because it will promote groundwater sustainability as defined in this GSP. The Deep Aquifer pumping restrictions will be implemented within one year of MCWRA completing its Deep Aquifer study (described in Section 6.5.6).

Low TDS Groundwater= Groundwater with < 3,000 mg/L TDS

Selection

Modeling

FIGURE 6-1

Management Action 1 Workflow

Groundwater Sustainability Plan for the City of Marina GSA Area of the 180/400 Foot Aquifer Subbasin



SP\GIS\FormationLayers\MXD\Chapter6\Fig6-01_ManagementActionWorkflow1.mxd

Groundwater Elevation Trigger Exceedance in Dune Sand Aquifer Baseline Biological Assessment and Biological Monitoring Plan Development (Data Gap)

Tier 1 Trigger Event Biological Reconnaissance

Phase 2: Investigation, Verification and Hydrogeologic Conceptual Model Update

Biological Investigation

Quantitative Change Assessment

Impact Assessment

Tier 2 Trigger Event



Phase 3: Characterization, Response Action Planning and Implementation

Biological Characterization

Hydrologic Characterization Response Action
Evaluation and
Selection

Stakeholder and Agency Consultation

FIGURE 6-2

Management Action 2 Workflow

Groundwater Sustainability Plan for the City of Marina GSA Area of the 180/400 Foot Aquifer Subbasin

