

CHAPTER 7 – PLAN IMPLEMENTATION
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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7 PLAN IMPLEMENTATION

The 180/400 Foot Aquifer Subbasin (Subbasin) is subject to significant and unreasonable seawater intrusion due largely to long-term groundwater extraction in the inland portions of the Subbasin in excess of the sustainable yield, and has been identified by California Department of Water Resources (DWR) as being in a critical condition of overdraft (DWR 2016a). The purpose of this Groundwater Sustainability Plan (GSP) is to support regional efforts to address this condition and achieve 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 how the Groundwater Sustainability Plan (GSP) for the Marina Groundwater Sustainability Agency (MGSA) jurisdiction (MGSA Area) in the 180/400 Foot Aquifer Subbasin will be implemented and describes the main activities needed for GSP implementation. The primary activities are listed below and are described in the subsequent sections of this chapter:

- Monitoring and reporting groundwater data, including coordination with Monterey County Water Resources Agency (MCWRA), which is responsible for implementation of most of the data collection activities needed to support the monitoring programs described in this GSP;
- Addressing data gaps;
- Updating the data management system (DMS) to support ongoing data-driven GSP implementation as needed;
- Refining the GSP based on the upcoming release of the United States Geological Survey (USGS) Salinas Valley Integrated Hydrologic Model (SVIHM) and planned review and use of the SVIHM by Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) to update its GSP;
- Concurrent with the above update, refining the GSP based on the planned development of a locally-refined groundwater flow model by Marina Coast Water District (MCWD) GSA that is able to simulate solute transport and density-driven flow (these activities will also be coordinated with SVBGSA);
- Intra- and Inter-Basin coordination with SVBGSA and MCWD GSA, respectively; and
- Implementation of management actions, as appropriate and as triggered by thresholds identified in Chapter 6.

In general, MGSA (like all other GSAs) has the powers and authorities granted to GSAs set forth in Chapter 5 of SGMA, in California Water Code (CWC) §§ 10725 through 10726.9. Among other things, when implementing this GSP, MGSA (like all other GSAs) has the power and authority to:

- Adopt rules, regulations, ordinances and resolutions (§ 10725.2);
- Conduct investigations (§ 10725.4);
- Require registration (§ 10725.6);
- Require measurement and reporting of extractions (§ 10725.8);
- Implement the GSP (§ 10726.2);
- Regulate groundwater extraction (§ 10726.4);
- Enter into agreements with private parties (§ 10726.5); and
- Exercise judicial and enforcement authority (§§ 10726.6, 10732, 10732.2).

The implementation plan in this chapter is based on the understanding of the Subbasin presented in Chapters 2 and 3, an assessment of planned SVBGSA projects and MCWD GSA activities pertinent to the MGSA Area summarized in Chapter 6, and MGSA management actions described in Chapter 6. The current understanding of the Subbasin and details of projects and management actions will evolve over time based on additional data collection, release of the SVIHM and other tools and planned studies, activities to address data gaps by SVBGSA, MCWD GSA and others, and implementation of projects and management actions. This chapter addresses activities needed for MGSA GSP implementation between 2020 and 2040. However, it particularly focuses on activities between 2020 and 2025, at which point significant updates to the GSP are expected to be implemented in collaboration with SVBGSA and MCWD GSA. Implementation activities are described in Section 7.1. Implementation costs and schedules are described in Sections 7.2 and 7.3.

7.1 IMPLEMENTATION ACTIVITIES

The main activities for implementation of this GSP include the monitoring, evaluating, and reporting of sustainability conditions; the implementation of management actions; and the coordination of sustainable groundwater management activities with SVBGSA, MCWD GSA and MCWRA. MGSA will hire technical consultants, as needed, to evaluate the monitoring data and prepare reports.

7.1.1 ACTIVITY 1: MONITORING, REPORTING, AND OUTREACH

7.1.1.1 MONITORING

Monitoring of the six sustainability indicators will be initiated after adoption of the MGSA GSP as described in Chapter 5. Groundwater Dependent Ecosystems (GDEs) are beneficial users of the Dune Sand Aquifer and some are associated with vernal ponds and the Salinas River, and therefore associated with both the Chronic Groundwater Level Decline and Interconnected Surface Water sustainability indicators. They are discussed separately below. Most of the monitoring activities necessary to support

this GSP are currently being conducted by MCWRA; however, MCWD GSA is in the process of evaluating the adequacy of local monitoring networks and plans to construct a locally refined groundwater flow, solute transport and density driven flow to support preparation of its GSP. The results of these studies and investigations, and the availability of refined tools and monitoring networks, may lead to changes in local monitoring networks and approaches during GSP implementation or as part of the planned five-year GSP update. These activities will also be coordinated with SVBGSA.

Historical and current monitoring networks near the MGSA Area include eight clusters of nested monitoring wells constructed in the MGSA Area and its vicinity as part of the test slant well pumping test for the proposed Monterey Peninsula Water Supply Project (MPWSP), two clusters of monitoring wells constructed by USGS to investigate the Deep Aquifer approximately ½ mile south of the MGSA Area, and a number of supply wells completed in the 180-Foot, 400-Foot and Deep Aquifers that are included in various MCWRA monitoring programs. All of these wells are currently monitored by MCWRA as previously described in Chapter 5. Each MPWSP monitoring well cluster includes a shallow well completed in the Dune Sand Aquifer (DSA), a medium-depth well completed in the 180-Foot Aquifer, and a deep well completed in the 400-Foot Aquifer.

MCWRA plans to implement a groundwater level and quality monitoring program to comply with the Mitigation, Monitoring and Reporting Program (MMRP) for the MPWSP that includes all of the above wells, adds additional existing wells and includes installation and monitoring of five additional clusters of monitoring wells in the area surrounding the MGSA Area where data gaps have been identified (CPUC 2018, Zidar and Feeney 2019). These new wells will have similar screened intervals as the existing MPWSP test slant well monitoring wells and will be added to the existing monitoring network. The monitoring program adopted in this GSP includes the wells identified in the monitoring plan for the MPWSP MMRP. The specific wells used for assessing compliance with the groundwater level and quality measurable objectives and minimum thresholds described in Chapter 4 are identified in Chapter 5. Monitoring of the wells will be conducted by MCWRA. MGSA will compile and evaluate the monitoring results semiannually as described in Chapter 5 to determine if progress is being made toward sustainability or alternatively if management triggers have been reached and management actions need to be implemented. Data will be uploaded and maintained in the DMS. It should be noted that MGSA is currently working to develop an agreement with MCWRA to that includes provisions that, should the MPWSP not move forward, MGSA and MCWRA will work with other agencies with jurisdiction in the area to develop and maintain a suitable monitoring program in the nearshore area of the Subbasin.

7.1.1.1.1 GROUNDWATER ELEVATION MONITORING

Groundwater elevation monitoring will be conducted in the DSA, 180-Foot Aquifer, 400-Foot Aquifer and Deep Aquifer by MCWRA. Data include continuously recorded transducer data as well as quarterly (or more frequent) hand gaging data. The monitoring data will be compiled and evaluated semi-annually in accordance with the procedures described in Chapter 5 to assess the potential for significant and unreasonable impacts to beneficial groundwater users, including operators of existing wells and GDEs. The implementation of management actions is described in Section 7.1.6. The data will be

uploaded to the DMS and will be used to create tables and figures for MGSA’s annual report submitted to DWR.

7.1.1.1.2 GROUNDWATER STORAGE MONITORING

Groundwater elevation monitoring data, water quality data, and induction logging data collected from the monitoring wells identified in Chapter 5 will be compiled and evaluated semi-annually in accordance with the procedures identified in Chapters 5 and 6. If the data indicate that undesirable results may be occurring, then MGSA will implement a series of escalating management actions to further investigate the potential depletion of the zone with low total dissolved solids (TDS) groundwater underlying the DSA to determine whether it has been significantly and unreasonably depleted. The implementation of management actions is described in Section 7.1.6. In addition, groundwater extraction data will be provided by groundwater extractors in the MGSA Area and will be provided by MCWRA annually for supply wells in the surrounding area. These data will be evaluated annually to help assess the nature and cause of any observed depletions.

7.1.1.1.3 SEAWATER INTRUSION MONITORING

Water quality monitoring and induction logging to assess seawater intrusion will be conducted at least quarterly based on analysis of samples collected from the monitoring wells identified in Chapter 5 for TDS and chloride, and assessment of induction logs to evaluate potential changes in saline water depth and extent. The data will be compiled and evaluated semi-annually in accordance with the procedures identified in Chapters 5 and 6. The evaluation will include an assessment of whether the concentration and/or trend triggers investigation or management actions regarding the potential for significant migration of the saline water intrusion wedge underlying the area. The implementation of management actions is described in Section 7.1.6. Monitoring data will be uploaded to the DMS and will be used to create tables and figures for the annual report.

7.1.1.1.4 GROUNDWATER QUALITY MONITORING

Water quality monitoring to assess potential water quality degradation in the low TDS groundwater zone underlying the DSA will be conducted at least quarterly based on analysis of samples collected from the monitoring wells identified in Chapter 5 for TDS and chloride. The data will be compiled and evaluated semi-annually in accordance with the procedures identified in Chapters 5 and 6. The evaluation will include an assessment of whether the concentration and trend triggers management actions to further investigate the potential for significant water quality degradation. The implementation of management actions is described in Section 7.1.6. Monitoring data will be uploaded to the DMS and will be used to create tables and figures for the annual report.

In addition, MCWRA is tasked with assessing whether groundwater extraction related to the MPWSP (if implemented) causes additional migration of groundwater contamination associated with the Ford Ord Superfund Site Operable Unit Carbon Tetrachloride Plume (OUCTP) area, located about 1 mile southeast

of the MGSA Area. Data from MCWRA’s annual review will be provided to MGSA for review and consideration annually.

7.1.1.1.5 LAND SUBSIDENCE MONITORING

Land subsidence has not been reported in the Salinas Valley. Given that the risk of land subsidence results from lowered groundwater elevations, especially when groundwater elevations fall below historical lows in confined aquifer systems, MGSA will rely on the groundwater elevation monitoring data described in Section 7.1.1.1.1. In addition, in collaboration with SVBGSA, MGSA will obtain and review data regarding subsidence measurements from USGS, DWR, Jet Propulsion Laboratories (JPL) and others, including remote sensing Interferometric Synthetic Aperture Radar (InSAR) data.

7.1.1.1.6 INTERCONNECTED SURFACE WATER MONITORING

Interconnected surface water monitoring will be conducted at wells MW-6S and MW-9S, and will be used to augment regional monitoring and modeling studies planned by SVBGSA to assess surface-groundwater interaction along the Salinas River. Shallow groundwater data, along with river discharge and stage data will be assessed to evaluate the extent, nature and impacts of the interconnection of the Salinas River with the DSA and the underlying 180-Foot Aquifer.

7.1.1.1.7 GROUNDWATER DEPENDENT ECOSYSTEM MONITORING

The response of GDEs to groundwater level declines depends on a number of factors, including the tolerance of the vegetation species to seasonal, inter-annual and long-term groundwater elevation changes, and the availability and proximity of potential surface water sources. Monitoring of GDEs will rely on the shallow groundwater elevation and quality monitoring network described in Chapter 5. In addition, the baseline biological conditions of the vernal ponds near the MGSA Area will be assessed and documented, and a biological monitoring program will be implemented to evaluate the effect of groundwater level changes on GDE habitat composition and vigor once the baseline assessment is completed. The evaluation will include an assessment of whether triggers for management actions have been reached. The implementation of management actions is described in Section 7.1.6.

7.1.1.1.8 REPORTING

7.1.1.1.9 ANNUAL REPORTS

Regulation Requirements:

§ 356.2. Annual Reports

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan.

The annual report shall include the following components for the preceding water year:

- (a) General information, including an executive summary and a location map depicting the basin covered by the report.
- (b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:
 - (1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:
 - (A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.
 - (B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.

- (2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.
- (3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.
- (4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.
- (5) Change in groundwater in storage shall include the following:
 - (A) Change in groundwater in storage maps for each principal aquifer in the basin. (B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.
 - (c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

Annual reports will be prepared in accordance with 23 CCR § 356.2 as summarized above, and will be submitted to DWR starting April 1, 2021. The reports will include a summary of the monitoring and groundwater extraction data collected and an evaluation of the data compared to the sustainable management criteria as detailed in Chapter 4, and the management actions described in Chapter 6. Management actions will be adapted as necessary based on the evaluation of current conditions and the sustainability goal. It is anticipated that the annual reports will be prepared by technical consultants in coordination with MGSA staff. The estimated cost of the annual reports is presented in Table 7-1.

7.1.1.1.10 PERIODIC ASSESSMENTS

Regulation Requirements:

§ 356.4. Periodic Evaluation by Agency

Each Agency shall evaluate its Plan at least every five years and whenever the Plan is amended, and provide a written assessment to the Department. The assessment shall describe whether the Plan implementation, including implementation of projects and management actions, are meeting the sustainability goal in the basin, and shall include the following:

- (a) A description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives, interim milestones and minimum thresholds.
- (b) A description of the implementation of any projects or management actions, and the effect on groundwater conditions resulting from those projects or management actions.
- (c) Elements of the Plan, including the basin setting, management areas, or the identification of undesirable results and the setting of minimum thresholds and measurable objectives, shall be reconsidered and revisions proposed, if necessary.
- (d) An evaluation of the basin setting in light of significant new information or changes in water use, and an explanation of any significant changes. If the Agency's evaluation shows that the basin is experiencing overdraft conditions, the Agency shall include an assessment of measures to mitigate that overdraft.
- (e) A description of the monitoring network within the basin, including whether data gaps exist, or any areas within the basin are represented by data that does not satisfy the requirements of Sections 352.4 and 354.34(c). The description shall include the following:
 - (1) An assessment of monitoring network function with an analysis of data collected to date, identification of data gaps, and the actions necessary to improve the monitoring network, consistent with the requirements of Section 354.38.
 - (2) If the Agency identifies data gaps, the Plan shall describe a program for the acquisition of additional data sources, including an estimate of the timing of that acquisition, and for incorporation of newly obtained information into the Plan.
 - (3) The Plan shall prioritize the installation of new data collection facilities and analysis of new data based on the needs of the basin.

- (f) A description of significant new information that has been made available since Plan adoption or amendment, or the last five-year assessment. The description shall also include whether new information warrants changes to any aspect of the Plan, including the evaluation of the basin setting, measurable objectives, minimum thresholds, or the criteria defining undesirable results.
- (g) A description of relevant actions taken by the Agency, including a summary of regulations or ordinances related to the Plan.
- (h) Information describing any enforcement or legal actions taken by the Agency in furtherance of the sustainability goal for the basin.
- (i) A description of completed or proposed Plan amendments.
- (j) Where appropriate, a summary of coordination that occurred between multiple Agencies in a single basin, Agencies in hydrologically connected basins, and land use agencies.
- (k) Other information the Agency deems appropriate, along with any information required by the Department to conduct a periodic review as required by Water Code Section 10733.

Periodic assessment reports will be submitted to DWR every five years starting in 2025. The reports will be produced in accordance with 23 CCR § 356.4 as summarized above, and will include an evaluation of how well the MGSA GSP is meeting the sustainability goals. Management actions will be adapted as necessary based on the evaluation of current conditions and the sustainability goal. The assessment report will also include a description of significant new information and whether this information warrants any changes to the GSP including monitoring, measurable objectives, minimum thresholds, criteria defining undesirable results, or management actions. It is anticipated that the assessment reports will be prepared by technical consultants in coordination with MGSA staff. The estimated cost of the five-year assessment report is presented in Table 7-1. Because the SVIHM is expected to become available within the next five years and will provide an important new tool for assessment of groundwater flows, water budgets, projects and sustainability indicators, it is expected that the first five-year update will result in substantial revisions to the MGSA GSP in parallel with changes to the regional GSP developed by SVBGSA.

7.1.1.1.11 COMMUNICATION AND OUTREACH

MGSA will work to encourage the active involvement of diverse social, cultural, and economic elements of the community by keeping the community informed about progress in implementing the GSP. Federal, state, and local agencies, water providers, property owners, environmental stakeholders, and other interested parties will have opportunities, both formal and informal, to provide input to MGSA regarding implementation of this GSP. Such opportunities include, but are not limited to, public comment periods required by SGMA (*e.g.*, CWC § 10728.4) as well as opportunities for public comment during regular and special Marina City Council meetings, and at other times to be determined and noticed pursuant to CWC § 10727.8 (a).

MGSA will periodically provide information to the public about GSP implementation and progress towards groundwater sustainability on the city's website, <https://cityofmarina.org/918/Groundwater-Sustainability-Plan>. The MGSA webpage will be maintained on a regular basis, and provides a brief history of the formation of MGSA, a description of the MGSP Area, and plans for the future. Contact information for the MGSA Plan Manager is provided, as well as background information and related

documents. MGSA will post information and updates regarding MGSP implementation and progress on this webpage.

7.1.2 ACTIVITY 2: ADDRESS DATA GAPS

Chapters 3 identified the following main data gaps related to the hydrogeologic conceptual model (HCM) and the water budget:

1. **Groundwater elevation and quality data in the MGSA Area** – There is limited proximal data to the MGSA Area to characterize groundwater flow patterns in the vicinity of the MGSA Area and the low TDS water zone in the Dune Sand Aquifer and 180-Foot Aquifer. There is also a limited period of record for monitoring groundwater elevations and water quality in and near the MGSA Area (generally 2015 to present).
2. **Interconnection between the Salinas River and the DSA and underlying 180-Foot Aquifer** – The nature and degree of the interconnection between the lower reach of the Salinas River and the DSA and underlying 180-Foot Aquifer is unknown due to the limited amount of data.
3. **Effect of drawdown in the DSA on GDEs** – The effect of shallow groundwater drawdown on a GDE depends on the species present, the amount and rate of groundwater level decline, and hydrology of the GDE system and the extent to which it is groundwater dependent or supplemented by other sources. The linkage between groundwater level declines and the GDEs located near the MGSA Area has not been quantified, and the ability of the GDEs to recover from drawdown-induced stress is not known.
4. **Deep Aquifer system** – There is very little data regarding the nature and hydraulic properties of the Deep Aquifer system, and its potential connection to the overlying, seawater-intruded, 400-Foot Aquifer.
5. **Aquifer parameters** – There are very few measured aquifer parameters for the Dune Sand, 180-Foot, 400-Foot and Deep Aquifers.
6. **Depth discrete groundwater data** – There are long screened intervals in wells near the MGSA Area, particularly for the 180-Foot Aquifer (110 feet). These screen lengths are too long to resolve vertical variations in groundwater quality and gradients.
7. **Airborne Electromagnetic (AEM) geophysical survey data** – The available geophysical data are temporally limited. An AEM survey was recently completed that provided a snapshot in time of current subsurface conditions.
8. **Land Subsidence** – Although available data suggest that the vicinity of the MGSA Area has not experienced significant subsidence, the data are insufficient to assess the potential vulnerability of this area to future subsidence if groundwater extractions are increased.

9. **Potential MPWSP Impacts** – The tools to adequately assess the potential impacts of the proposed MPWSP on the minimum thresholds identified in Chapter 4 are not sufficiently refined to allow prediction of the sustainable yield of this project. If the MPWSP is fully approved and permitted, there would be a need for additional modeling and targeted data collection to evaluate and address any impacts the project would have on the sustainability goals.

These data gaps will be addressed as described below.

7.1.2.1 GROUNDWATER ELEVATION AND QUALITY DATA IN THE MGSA AREA

To increase the amount of groundwater elevation and quality data in the MGSA Area, MCWRA is planning to install five additional wells clusters in the DSA, 180-Foot Aquifer and 400-Foot Aquifer (Zidar and Feeney 2019). Data from these new wells and additional monitoring data from the existing wells will address spatial data gaps in the existing monitoring system. In addition, MCWD GSA will evaluate the adequacy of the existing monitoring networks in the area surrounding their jurisdiction in the Monterey and 180/400 Foot Aquifer Subbasins during preparation of the GSP for the Monterey Subbasin and address additional data gaps as needed. MGSA will review the outcome of this analysis and any additional studies, and the monitoring program of this GSP will be refined as needed to collaborate with MCWD GSA in meeting the sustainability goals of both GSAs. While the lack of historical groundwater elevation and quality monitoring data in and near the MGSA Area cannot be remedied, future monitoring will address the data gap related to a limited period of record over time.

7.1.2.2 INTERCONNECTION BETWEEN SALINAS RIVER AND THE DUNE SAND AQUIFER

SVBGSP has noted that the release of the calibrated USGS SVIHM will provide an important new tool and valuable additional data regarding the interconnection between the Salinas River and the DSA and other shallow aquifers, and the underlying 180-Foot Aquifer. Furthermore, SVBGSA has proposed a regional investigation to assess the level of interconnection using existing shallow wells located adjacent to the Salinas River (if any can be identified) and up to two new shallow wells along the Salinas River. MGSA will review the model results and the results of the SVBGSA investigation, perform supplemental local or regional evaluations as needed, and incorporate them into updates of the GSP.

7.1.2.3 BASELINE BIOLOGICAL ASSESSMENT OF GDES

As discussed in Sections 3.2.6.1.2 and 4.4.2.1, the ecological water requirements and thresholds of response to changes in groundwater levels differ among GDEs. The ability of such GDEs to adapt or recover from groundwater declines depends largely on the overall water budget and the degree to which the GDE is dependent on groundwater. The degree of interaction between wetlands and groundwater can vary greatly and depends on many factors including their position in the landscape, the permeability of the substrate, depth to the water table, and seasonal fluctuations in water inputs. GDEs develop in response to unique timing, duration, frequency and chemistry of water inputs. An analysis of historical evapotranspiration (ET) variability, groundwater levels and drawdown at the Armstrong Ranch ponds demonstrates a correlation between groundwater levels and biomass productivity in this GDE,

and illustrates its sensitivity to groundwater level declines. Biomass productivity rebounded with groundwater levels; however, it is not known whether the stress induced in the GDE resulted in a change in the vegetation community, habitat degradation, or habitat succession that is not readily reversible.

At this time, it is not possible to determine precisely what level of drawdown imposed on natural groundwater elevation fluctuations would have a significant and unreasonable impact on the GDEs near the MGSA Area. To address this data gap, MGSA will retain a qualified biologist to perform a baseline assessment of the vernal ponds that may be affected by groundwater elevation declines. The purpose of this baseline assessment will be to characterize these wetlands and their dependence on groundwater and potential sensitivity to groundwater elevation declines, and to establish baseline conditions for future comparison. Based on the findings of the baseline assessment, a monitoring plan will be developed to assess changes in the vigor and quality of the GDE habitats over time and allow correlation of changes to shallow groundwater elevations. Quantitative approaches, such as the development of habitat suitability index models, state and succession models, or similar assessment tools, will be developed to assess possible future changes in habitat quality, services and succession.

7.1.2.4 DEEP AQUIFER SYSTEM

MCWRA, MCWD GSA and SVBGSA 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 recognition that this important data gap must be addressed during the early stages of GSP implementation for the Subbasin to assure that this aquifer is sustainably managed. MGSA will cooperate with these efforts, review the investigation results and update the Hydrogeologic Conceptual Model (HCM), sustainable management criteria, monitoring program and management actions in this GSP, as appropriate. 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 leakage from the overlying upper aquifer system.

7.1.2.5 AQUIFER PARAMETERS

SVBGSA is proposing to conduct aquifer testing on up to three wells in the 180-Foot Aquifer and up to three wells in the 400-Foot Aquifer. These one-time aquifer tests are proposed to last for a minimum of 8 hours followed by a 4-hour monitored recovery period. Additional details regarding the aquifer tests can be found in Section 10.3 of SVBGSA's GSP for the Subbasin. Additional aquifer tests may be conducted by others, including in the DSA or the Deep Aquifer. MGSA will review the aquifer test results and update the GSP HCM.

7.1.2.6 DEPTH DISCRETE GROUNDWATER DATA

As discussed in Section 7.1.2.1, MCWD GSA will evaluate the adequacy of the existing monitoring networks in the area surrounding their jurisdiction in the Monterey and 180/400 Foot Aquifer Subbasins

during preparation of GSPs for those Subbasins and address additional data gaps as needed. This will include the limitations posed by long monitoring well screen intervals on the identification of vertical groundwater gradient and quality trends that influence seawater intrusion locally. This data gap is partially addressed through the induction logging of deep monitoring wells; however, additional monitoring wells completed at various vertically-discrete depths may be needed. MGSA will review the outcome of this analysis and any additional studies, and the monitoring program of this GSP will be refined as needed to collaborate with MCWD GSA in meeting the sustainability goals of both GSAs.

7.1.2.7 GEOPHYSICAL SURVEY DATA

Additional geophysical surveys may be needed to evaluate potential changes in groundwater elevations, groundwater quality, and/or seawater intrusion in the event that the MPWPS slant well pumping is approved and occurs as well as other projects in the vicinity of the MGSA. MGSA will coordinate with MCWD GSA regarding the need for additional surveys and with the evaluation of the survey results.

7.1.2.8 LAND SUBSIDENCE

Given the relatively low risk of subsidence near the MGSA Area, the monitoring of groundwater elevations and review of remote sensing data periodically published by DWR, USGS or others should be an adequate monitoring program for this sustainability indicator. However, some uncertainty remains regarding the potential vulnerability of the Subbasin to land subsidence, and MGSA will work with SVBGSA to address this data gap during GSP implementation.

7.1.2.9 POTENTIAL MPWSP IMPACTS

A groundwater model that can simulate solute transport and density-driven flow, and that incorporates the heterogeneity of the aquifer system in the Marina area is not available at this time. The potential effects of the proposed MPWSP on the local water budget, water quality and seawater intrusion cannot be adequately evaluated without such a model. If the MPWSP is fully approved and permitted, there would be a need for a locally-refined groundwater flow model that is able to simulate solute transport and density-driven flow, and for additional targeted investigation to conduct studies to address data gaps. MCWD GSA is currently planning to conduct such studies for the area that includes their GSA boundaries and the surrounding region, including the MGSA Area and beyond. MGSA will collaborate with and review these studies, and update the HCM, sustainable management criteria, monitoring networks and management actions in this GSP to assure the sustainability goals are met if the MPWSP is implemented. These activities will also be coordinated with SVBGSA.

7.1.3 ACTIVITY 3: UPDATE DATA MANAGEMENT SYSTEM

Regulation Requirements:

§ 352.6. Data Management System

Each Agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the Plan and monitoring of the basin.

As described in Chapter 5, a Microsoft Access DMS has been created to store GSP monitoring data. The DMS contains well construction details, well ownership information, GIS well coordinates including well elevation and top of casing, well production data, groundwater elevations, and groundwater quality data. Salinas River streamflow gauge data from USGS will also be stored in the database. MGSA's database has a simple structure which is shared with the DMS being developed by MCWD GSA in support of the GSP for the Monterey Subbasin, which abuts the MGSA Area to the south. In addition, MGSA is coordinating with database personnel from SVBGSA to assure compatibility with the DMS being developed by that agency. Both GSAs will rely extensively on the same monitoring data collected by MCWRA; therefore, it is anticipated that very little data transfer will actually need to occur. SVBGSA is considering development of a web-based DMS to facilitate basin-wide groundwater management. MGSA will cooperate with this effort, but will retain a relatively simple structure for its DMS that is not web-based. MGSA's DMS will be periodically updated with monitoring data as described in Section 7.1.1, and will be used to create tables for data evaluation, model inputs and calibration if needed, adaptive management and reporting to DWR.

7.1.4 ACTIVITY 4: REFINE GSP BASED ON FINDINGS FROM THE USGS SVIHM AND SVBGSP ADDENDUM

SVBGSA noted in its GSP that USGS anticipates releasing its fully calibrated SVIHM in late 2020 (SVBGSA 2019). The SVIHM, when available, will represent the state of the science when it comes to groundwater management tools in the Salinas Valley Basin. SVBGSA intends to update its GSP based on refined information regarding the groundwater flow system, water budgets and predictive capability of that model. SVBGSA intends to review and potentially update (if warranted) the following:

- Historical, current, and projected water budgets;
- Sustainable yield;
- Numerical minimum thresholds for the depletion of interconnected surface water; and
- Benefits of the proposed management actions and priority projects.

SVBGSA intends to incorporate their updates in either an addendum to their GSP for the 180/400 Foot Aquifer Subbasin, or in the 5-year GSP update report. For additional details on these expected updates, please refer to Chapter 10 of SVBGSA's GSP.

Because the MGSA Area is located at the seaward edge of the much larger 180/400 Foot Aquifer Subbasin area managed by SVBGSA, the data and HCM contained in SVBGSA's GSP provides important regional context and understanding for the MGSA GSP. In addition, MGSA has adopted the regional water budgets and several of the regional sustainable management criteria contained in SVBGSA's GSP. Therefore, MGSA intends to work in parallel with SVBGSA in its review of the calibrated SVIHM, and update this GSP at the same time. If the new information is significant for local groundwater management, MGSA will prepare an addendum or update report refining the following items in the MGSA GSP:

- The local Hydrogeologic Conceptual Model (HCM);
- Local historical, current, and projected water budgets;
- Local groundwater elevation and gradient changes potentially resulting from the implementation of regional priority projects; and
- Local sustainable yield estimates, minimum thresholds and other sustainable management criteria.

7.1.5 ACTIVITY 5: INTER AND INTRA BASIN COORDINATION WITH SVBGSA AND MCWD GSA

MGSA will attend coordination meetings with SVBGSA and MCWD GSA as the GSPs for the Subbasin are implemented. It is anticipated that during the first year, coordination meetings will be monthly and then quarterly in subsequent years. The meeting agenda for these coordination meetings will likely include a discussion of the implementation of regional priority projects and management actions, as well as the potential coordination of local data and management actions. As these projects and management actions are implemented, the meeting agenda will likely include the impacts of the actions and evaluation of how well the GSPs are meeting their mutual goals for sustainable management of the Subbasin.

7.1.6 ACTIVITY 6: LOCAL MANAGEMENT ACTIONS FOR SEAWATER INTRUSION AND GROUNDWATER QUALITY DEGRADATION AND GDE IMPACTS

MGSA will monitor and evaluate the potential for significant and unreasonable groundwater level decline that could affect GDEs, seawater intrusion, groundwater quality degradation and/or low-TDS groundwater zone storage depletion as a result of groundwater extraction in the MGSA Area. As discussed in Chapter 6, if the data indicate that undesirable results may occur as a result of these groundwater extractions, then MGSA will implement a series of escalating management actions using its powers and authorities in SGMA. The management actions for the Seawater Intrusion and Groundwater Quality Degradation sustainability indicators are described in Chapter 6 and include the following three general phases: (1) Detection Monitoring; (2) Investigation, Verification and Hydrogeologic Conceptual Model Update; and (3) Characterization, Action Planning and Implementation. For GDEs, the following three phases apply: (1) Detection Monitoring; (2) Biological Investigation and Verification; and (3) Action Planning and Implementation. The progression between each phase is set by a sequence of objective decision triggers which are described in detail in Chapter 6.

7.2 ESTIMATE OF GSP IMPLEMENTATION COSTS

Regulation Requirements:

§ 354.6. Agency Information

When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:

- (e) An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.

The estimated costs for the initial five years of GSP implementation are summarized in Table 7-1. These costs are estimates and will likely change in the future as more data becomes available. A 10% contingency has been added to the implementation costs since these costs are estimates. The overall estimated cost for MGSA for the first five years of implementation is \$1,100,000 with an average annual cost of \$220,000. The following assumptions have been incorporated into this estimate:

- Collection of groundwater elevation and quality data for the existing monitoring well network will be borne by MCWRA and is therefore not included in the GSP implementation costs; however, a line item for consultation and data management support by MCWRA is included.
- Performance of the baseline biological assessment and annual biological monitoring will be funded through MGSA.
- Analysis of monitoring data and uploading the data to the DMS will be funded through MGSA.
- Expansion of the monitoring well network by adding five cluster monitoring wells will be funded by MCWRA.
- Any additional future expansion of the monitoring well network in the area surrounding MCWD's service system will be funded by MCWD GSA. Investigation, characterization and expanded monitoring of the Deep Aquifer is expected to be performed collaboratively by MCWD GSA, SVBGSA and at their expense. A line item for MGSA collaboration with these activities is included in the budget.
- Annual reporting, a GSP Addendum Report (if needed), and the 5 Year Update Report will be funded through MGSA.
- Communication and Outreach will be funded through MGSA.
- The MGSA will attend coordination meetings with SVBGSA and MCWD GSA to sustainably manage the 180/400 Foot Aquifer Subbasin. MGSA participation in this activity will be funded through MGSA.
- If monitoring data indicate that seawater intrusion, water quality degradation, storage depletion or GDE impacts likely are occurring, then MGSA will implement the management actions described in Section 7.1.6 and Chapter 6. Initial funding for this oversight will be provided through MGSA; however, direct funding by the responsible groundwater extractors within the MGSA may be implemented.

As initial GSP implementation proceeds, MGSA will evaluate funding mechanisms, application of fees, and fee criteria. MGSA will implement an assessment to establish equitable contributions from groundwater extraction fees in the MGSA Area as authorized by SGMA in order to cover MGSA's expenses. MGSA will also evaluate potential funding from state and federal grant sources to support

GSP implementation. Appropriate grant funding sources will be pursued collaboratively with MCWD GSA, SVBGSA, MCWRA and others to fill data gaps and support the implementation of projects and management actions.

7.3 SCHEDULE FOR IMPLEMENTATION

Regulation Requirements:

§ 350.4. General Principles

Consistent with the State’s interest in groundwater sustainability through local management, the following general principles shall guide the Department in the implementation of these regulations.

- (f) A Plan will be evaluated, and its implementation assessed, consistent with the objective that a basin be sustainably managed within 20 years of Plan implementation without adversely affecting the ability of an adjacent basin to implement its Plan or achieve and maintain its sustainability goal over the planning and implementation horizon.

Figure 7-1 provides a summary of the schedule for the first five years of GSP implementation. The schedule includes the principal implementation activities described in Section 7.1, which are monitoring, reporting, communication and outreach, data management, addressing data gaps, and management actions. Many of these categories consist of ongoing activities that will be conducted throughout the GSP implementation. Annual reports will be submitted to DWR by April 1st of each year, starting in 2021. Periodic reports will be submitted to DWR by April 1st at least every 5 years or following major GSP amendments.

TABLE 7-1. MGSA GSP IMPLEMENTATION COSTS FOR THE FIRST FIVE YEARS

Activity	Estimated Cost	Cost Unit	Assumptions
Consultation and Data Management Support provided by MCWRA	\$17,000	Annual	Annual data and technical support from MCWRA
Data Analysis-Monitoring Groundwater Elevations, Groundwater Quality, and Seawater Intrusion	\$15,000	Annual	Reviewing data from MCWRA and other pertinent sources
Baseline Biological Assessment	\$50,000	One-Time Lump Sum	Biological assessment and documentation of existing GDE conditions and development of a monitoring plan
Biological Monitoring	\$10,000	Annual	Annual surveys of GDEs
Data Management	\$8,000	Annual	Updating database with new monitoring data
Annual Reporting	\$20,000	Annual	Preparing annual reports starting in 2021.
2 Year Addendum Report/Local Model development	\$100,000	One-Time Lump Sum	Assumes SVBGSA will be submitting an addendum report based on review of the USGS groundwater model. MGSA to coordinate with SVBGSA and MCWD GSA on model review and significant outcome. Assumes need for local dual density model developed primarily by MCWD in cooperation with MGSA.
Supplemental Monitoring Wells and Deep Aquifer Investigations	\$20,000	One-Time Lump Sum	MGSA will coordinate with MCWRA, SVBGSA and/or MCWD GSA as appropriate on the installation of additional monitoring wells to augment potential MPWSP wells, and/or investigate the Deep Aquifer
5 Year Update Report	\$80,000	One-Time Lump Sum	Preparing 5-year GSP update
Outreach and Education	\$10,000	Annual	Tasks related to City's outreach regarding GSP implementation progress
Coordination Meetings with SVBGSA and MCWD	\$12,000	Annual	Based on monthly meetings the first year (\$20,000) and then quarterly meetings subsequent years (\$10,000)
Coordination of Required Management Actions	\$50,000	Annual	This is an order of magnitude estimate; There is no conceptual engineering at this point.
Fee Assessment	\$30,000	One-Time Lump Sum	Rate study to establish equitable contribution for groundwater extraction fees in MGSA Area
Total Annual Costs (5 Years)	\$720,000		
Total One-Time Costs	\$280,000		
Contingency (10%)	\$100,000		Since costs are preliminary estimates
Total (First Five Years)	\$1,100,000		
Average Annual Costs for Five Years	\$220,000		



FIGURE 7-1

GSP Implementation Schedule for First Five Years

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

