CHAPTER 3
SUSTAINABLE MANAGEMENT CRITERIA

3.1 SUSTAINABILITY GOAL

The sustainability goal for the Plan Area[1] is to manage groundwater resources in a way that facilitates long-term sustainable use of groundwater in the San Jacinto Groundwater Basin. Long-term sustainable management includes:

- Maintaining sufficient groundwater in storage to allow for ongoing groundwater production that meets the operational demands of groundwater users in the Plan Area.
- Protecting beneficial uses such as municipal and domestic supplies of fresh groundwater resources in the Lakeview and Perris North Groundwater Management Zones (GMZs) to the extent feasible, by minimizing the northward and eastward migration of brackish groundwater from the Perris South GMZ.
- Avoiding subsidence related to groundwater production that substantially interferes with surface land uses.
- Ensuring that groundwater production does not result in significant and unreasonable loss of groundwater dependent ecosystems (GDEs).

The sustainability goal for the Plan Area was developed using historical data that included groundwater elevations, groundwater in storage, and groundwater quality. These data are discussed in detail in Chapter 2 of this GSP. Over the past 30 years groundwater in storage has been increasing in the Plan Area (see Section 2.5.3.2 Change in Annual Volume of Groundwater in Storage) and water levels have been rising (see Section 2.4.1 Groundwater Elevation Data). The lack of long-term overdraft, and observed storage increase over the last 30 years, indicates that EMWD has been managing Plan Area sustainably under its Groundwater Management Plan since 1995 (EMWD 1995).

EMWD has worked with the Santa Ana Regional Water Quality Control Board (RWQCB) to address areas in which TDS and nitrate concentrations exceed the Basin Plan Objectives, by extracting brackish groundwater and treating it at the Perris and Menifee desalters. EMWD is expanding its existing desalters and constructing additional desalter facilities that will both improve the water quality in the Plan Area in areas where high TDS groundwater could migrate into areas with potable groundwater (See Chapter 2).

[1] The sustainability goal and sustainability management criteria defined in this chapter apply only to the Plan Area, which is the non-adjudicated part of the SJGB, because the remaining areas of the SJGB, or Basin, are under the oversight of a Court appointed watermaster.

In 2017 the EMWD Board of Directors became the Groundwater Sustainability Agency (GSA) for the Plan Area. Acting as the West San Jacinto GSA, the EMWD Board of Directors has the ability, authority, and responsibility to continue to ensure long-term sustainable management of the groundwater resources within its jurisdiction. This authority includes monitoring and adjusting groundwater production from all wells, not just EMWD wells in the Plan Area. The undesirable results, minimum thresholds, and measurable objectives discussed in this Chapter (see Sections 3.2 Undesirable Results through 3.4 Measurable Objectives) are intended to provide the metrics by which EMWD will decide if pumping adjustments are necessary. EMWD will continue to work with stakeholders and regulatory agencies to further improve groundwater conditions within the Plan Area throughout the 50-year GSP planning and implementation horizon.

3.2 UNDESIRABLE RESULTS

Under the Sustainable Groundwater Management Act (SGMA), undesirable results occur when the effects caused by groundwater conditions occurring throughout the Plan Area cause significant and unreasonable impacts to any of six sustainability indicators. The definition of significant and unreasonable for each of the six indicators is determined by the GSA using the processes and criteria described in this GSP. The GSA is required to characterize undesirable results for each indicator, unless "undesirable results to one or more sustainability indicators are not present and are not likely to occur in the basin," (23 CCR 354.26 (d)). Of the six sustainability indicators, seawater intrusion does not apply to the Plan Area (or the SJGB) because, at its closest point, the Pacific Ocean is over 30 miles west of the Plan Area. General undesirable results in the Plan Area would be:

- Chronic Lowering of Groundwater Levels
- Significant and Unreasonable Reduction of Groundwater in Storage
- Significant and Unreasonable Degradation of Water Quality
- Significant and Unreasonable Land Subsidence resulting from groundwater withdrawal
- Significant and Unreasonable Reduction of Interconnected Surface Water and Groundwater

Undesirable results could occur within the Plan Area if groundwater production exceeds the sustainable yield. Projected groundwater production is anticipated to be approximately 45,100 AFY in the Plan Area. At this rate of production, incorporating additional assumptions about future underflows to the Hemet-San Jacinto Management Area, return flows, mountain front recharge, seepage from Lake Perris, and precipitation recharge, groundwater in storage is projected to decline by approximately 2,400 AFY in the future (see Section 2.5.6.3 Projected Water Budget). At the projected rate of decline, groundwater in storage and groundwater elevations in the Plan Area are not anticipated to reach the minimum thresholds discussed in Section 3.3 and undesirable results are not anticipated to occur in the Plan Area. However, based on the projected conditions in the Plan Area, the approximate sustainable yield of the Plan Area roughly equals the planned

future groundwater extractions of 45,100 AFY. Future extractions that exceed this volume may cause undesirable results.

A description of the undesirable results applicable to the remaining sustainability indicators is provided in Sections 3.2.1 through 3.2.6. Each section describes the cause of groundwater conditions throughout the Plan Area that would lead to undesirable results and the potential effects of undesirable results on the beneficial uses and users of groundwater in the Plan Area.

The criteria used to define groundwater conditions at which undesirable results occur is described in Section 3.2.7. These criteria are based on a quantitative combination of minimum threshold exceedances for each sustainability indicator.

3.2.1 Chronic Lowering of Groundwater Levels

Chronic lowering of groundwater levels indicating a depletion of groundwater supply is an undesirable result applicable to the Plan Area. The primary cause of groundwater conditions that would lead to chronic lowering of groundwater levels is groundwater production in excess of natural and artificial recharge over a period that contains both wet and dry water years.

Chronic lowering of groundwater levels is also associated with a reduction of groundwater in storage that may be significant and unreasonable, and may also contribute to subsidence. Under projected operations, groundwater in storage is expected to decrease in the Plan Area over the 50-year planning and implementation horizon for this GSP (see Section 2.5.6 Quantification of Current, Historical, and Projected Water Budget). Reductions in groundwater storage are desirable to mitigate the effects of rising groundwater levels and for the operation of water quality management projects that mitigate water quality degradation in the Plan Area. Land subsidence may occur in the Plan Area if water levels drop below historical low water levels for a sufficient time to allow for the collapse of pore-structures and settling of clay rich sediments, which are prone to subsidence (see Section 3.2.4 Land Subsidence). The Plan Area has a low risk for future land subsidence resulting from groundwater withdrawals (DWR 2014). There are few clay layers in the areas of groundwater production, and groundwater elevations are not anticipated to fall below historical low groundwater elevations over the planning and implementation timeframe.

Chronic lowering of groundwater levels may impact projects and beneficial uses of groundwater in the Plan Area. Chronic lowering of groundwater levels in the Moreno Valley Production Area may impact operations of the Perris North Basin Groundwater Contamination Prevention and Remediation Program, which aims to contain and remediate a series of co-mingled plumes (EMWD 2019a). In the South Perris and Moreno Valley Production Areas, chronic lowering of groundwater levels may impact operations of the Perris South Desalination Project, which is designed to limit northward and eastward migration of the brackish groundwater plume into regions of the potable aquifer. The Perris South Desalination Project also supplements water

supplies in the SJGB as a whole by treating and serving brackish groundwater within the Plan Area and is part of a regional effort to manage groundwater salinity throughout the Santa Ana River watershed (RWQCB 2019).

The entirety of the Plan Area lies within the service area of EMWD, WMWD, Nuevo Water Company, the City of Perris, or the Box Spring Mutual Water Company (see Section 2.1.1.2 Water Agencies Relevant to the Plan Area), and the groundwater quality in much of the Plan Area is currently treated before delivered for consumption (see Section 2.4.4 Groundwater Quality). Therefore, chronic lowering of groundwater levels in the Plan Area could cause undesirable results if groundwater levels drop to elevations below which:

- Water quality degradation management projects' effectiveness is impaired
- The volume of groundwater available is insufficient for agricultural and municipal/ industrial supplies
- Subsidence that substantially interferes with land use is induced

However, in addition to the municipal/ industrial and agricultural wells in the Plan Area, there are several domestic wells identified in DWR's well completion report database (Figure 3-1; DWR 2021). If these wells are active and are producing potable groundwater, domestic well users may also be impacted by groundwater elevation declines. During GSP implementation, the status of these wells will be confirmed and domestic well users that are impacted by groundwater elevation declines will have the option to connect to the appropriate potable water supplier in their area.

Production well construction information, production history, and historical water levels from municipal / industrial and agricultural wells indicate that chronic lowering of groundwater levels indicating a depletion of groundwater supply would occur when the average aquifer saturation[2] within the Plan Area falls below 65% of the potential aquifer saturation. At this saturation, the pump would have to be lowered in 11 of 18 (61%) of EMWD's current wells in the Plan Area. While there is room to lower the pump in these wells, there is added cost associated with lowering the pumps and further characterization of the water quality in the deeper parts of the aquifer may be required. Therefore, the criterion used to define undesirable results associated with chronic groundwater level declines is groundwater elevations that correspond to an average aquifer saturation below 65% throughout the Plan Area. Groundwater elevations that correspond to an aquifer saturation of 65% are lower than historical low water levels. Groundwater elevations that drop below historical low water levels may be required in certain areas to maintain operational flexibility for water quality management projects, protect potable aquifer, and ensure ongoing beneficial use of groundwater for agricultural and municipal/ industrial supplies.

[2] Aquifer saturation is defined as the saturated aquifer thickness divided by the total aquifer thickness.

3.2.2 Significant and Unreasonable Reduction of Groundwater Storage

Significant and unreasonable reduction of groundwater in storage is an undesirable result applicable to the Plan Area. Reduction of groundwater in storage is related to chronic lowering of groundwater levels (Section 3.2.1 Chronic Lowering of Groundwater Levels). The primary cause of a reduction of groundwater in storage is groundwater production in excess of natural and artificial recharge during a period containing both wet and dry water years. Significant and unreasonable reduction of groundwater in storage would impact beneficial uses and users of groundwater in the Plan Area by limiting the volume of groundwater available for domestic, agricultural and municipal/ industrial supplies, as well as limiting the operational capacity and flexibility of water quality management projects.

Groundwater elevations in the Plan Area will be used to determine whether significant and unreasonable reduction of groundwater storage occurs. Groundwater elevations, and the corresponding volume of groundwater in storage, have historically increased in the Plan Area (see Section 2.4 Historical Groundwater Conditions). The SJFM-2014 groundwater model indicates that groundwater management between 1985 and 2018 has resulted in a groundwater storage increase of approximately 473,000 AF.

Well construction information, production history, and historical water levels indicate that significant and unreasonable reduction of groundwater in storage would occur when the average aquifer saturation within the Plan Area falls below 65% of the potential aquifer saturation. Therefore, the criterion used to define significant and unreasonable results associated with reduction of groundwater storage is groundwater elevations that result in an average aquifer saturation below 65% throughout the Plan Area. Groundwater elevations that correspond to an aquifer saturation of 65% are lower than historical low water levels. However, reduction of groundwater storage beyond that previously experienced in the Plan Area may be required to maintain operational flexibility for water quality management projects, protect potable aquifer, and ensure ongoing beneficial use of groundwater for municipal/industrial and agricultural supplies.

3.2.3 Significant and Unreasonable Degradation of Water Quality

Impacts to groundwater supplies from migration of brackish groundwater into areas of fresh groundwater is an undesirable result applicable to the Plan Area. Migration of brackish groundwater is related to groundwater elevation differences within and between GMZs. Significant and unreasonable migration of brackish groundwater into areas of fresh groundwater would impact beneficial uses and users of groundwater in the Plan Area by reducing the volume of fresh groundwater available for agricultural and municipal/industrial supplies.

Historical agricultural practices and land use in the Plan Area have contributed to concentrations of TDS and nitrate in the Perris North GMZ, Perris South GMZ, Menifee GMZ, and portions of the Lakeview GMZ that exceed the Basin Plan Objectives for those constituents (EMWD 2019b; RWQCB 2019). The current extent of impaired groundwater in these GMZs is generally associated with the 1,000 mg/L TDS iso-concentration contour, which extends from the Menifee GMZ into the Perris South, Perris North, and Lakeview GMZs (Figure 2-44; EMWD 2019b). Groundwater in these GMZs is used for municipal, agricultural, and industrial supplies.

Since 1995, EMWD has managed and operated the Perris South Desalination Project, a system of 15 groundwater extraction wells and two reverse osmosis treatment facilities, in order to remove salts, improve groundwater quality, and manage brackish groundwater migration in the Plan Area. To facilitate additional brackish water management in the Basin, EMWD is currently constructing the Perris II Reverse Osmosis Treatment Facility (ROTF).

Both the Perris South Desalination Project and the Perris II ROTF Project control groundwater elevation differences within and between GMZs by varying production in the network of groundwater wells that supply the desalters. In this way EMWD is able to influence the hydraulic gradient within the area of impaired groundwater and limit, or prevent, further northeastward migration of the brackish water into the Lakeview GMZ. The Perris II ROTF is expected to have a total treatment capacity of 5.4 MGD, providing EMWD the ability to extract and treat larger volumes of brackish groundwater from the Perris South and Menifee GMZs. Design, construction, and implementation of the Perris II ROTF is being developed in coordination with the California State Water Resources Control Board (EMWD 2019b). Because maintaining hydraulic control of the brackish groundwater plume is a critical component of both the Perris South Desalination Project and the Perris II ROTF Project, undesirable results and minimum thresholds related to groundwater elevation take into account the operational flexibility required to avoid undesirable results related to groundwater quality.

In the Perris North GMZ, potable regions of the aquifer may be impacted by the southerly and easterly migration of co-mingled VOC, nitrate, and perchlorate plumes (Figure 2-44). Because there is limited data currently characterizing the source(s) of contamination and migration rates for the co-mingled plumes, undesirable results specific to the migration of contaminated groundwater within the Perris North GMZ are not defined in this GSP. EMWD has begun implementation of the Perris North Basin Groundwater Contamination Prevention and Remediation Project, which is intended to prevent the spread of contamination, accelerate cleanup of the contamination, and preserve potable aquifer supplies by removing and treating contaminants at three well clusters located within the co-mingled plumes (EMWD 2019a). Ongoing field investigations and updated numerical groundwater modeling will better define the extent of the contaminated groundwater, the appropriate remedy, and the quantifiable goals for the project. To the extent possible, the improved understanding of the water quality concerns in the Perris North

GMZ and the goals of the Perris North Basin Groundwater Contamination Prevention and Remediation Project will be incorporated into the future GSP updates. Evaluation of the need to define specific undesirable results related to migration of the co-mingled plumes in the Perris North GMZ will be assessed as part of the 5-year plan review process.

Based on the current understanding of the extent of impaired groundwater and consistent with the Water Quality Control Plan for the Santa Ana River Basin (RWQCB 2019), the criteria used to define undesirable results for degraded water quality is the current location of the 1,000 mg/L TDS iso-concentration contour (EMWD 2019b). Northeasterly migration of the 1,000 mg/L TDS iso-concentration contour within the Lakeview GMZ is an undesirable result associated with degraded water quality.

3.2.4 Significant and Unreasonable Land Subsidence Resulting from Groundwater Withdrawal

Land subsidence resulting from groundwater withdrawal is an undesirable result applicable to the Plan Area. Groundwater levels that are below historical conditions may cause subsidence because groundwater acts to reduce the effective stress needed to maintain pore-structures in the aquifer. As groundwater levels decline, pressure on the aquifer matrix increases, which may cause the pore-structure to collapse, causing the land surface to subside. Land subsidence resulting from groundwater withdrawal that substantially interferes with surface land uses has the potential to impact beneficial uses and users of groundwater in the Plan Area by negatively impacting surface infrastructure including roads, pipelines, and buildings.

Historical records of land subsidence in the Plan Area do not indicate that past groundwater production has caused land subsidence that substantially interfered with surface land uses. Within the Plan Area, groundwater extraction-induced subsidence has historically been localized to the area between the Bernasconi Hills and Mystic Lake. This area is underlain by laterally extensive, thick clay layers (see Section 2.3.1 Geology; EMWD 2011a) and lies within the San Jacinto Valley, a pull-apart valley that formed between strands of the San Jacinto Fault (see Section 2.4.5 Subsidence). Historical subsidence in the area between the Bernasconi Hills and Mystic Lake, which has been attributed to a combination of groundwater extraction and tectonic movement, did not damage infrastructure, or substantially interfere with surface land uses. Current rates of subsidence in this region of the Plan Area are attributed to tectonic activity rather than groundwater withdrawals (see Section 2.4.5 Subsidence). DWR considers the SJGB as a whole to be at low risk for future land subsidence because few areas contain extensive clay layers that are prone to subsidence related to groundwater withdrawal (DWR 2014).

Tectonically induced land subsidence in the Plan Area cannot be prevented, and land subsidence that does not substantially interfere with surface land uses is not an undesirable result. Therefore, the

undesirable result for land subsidence is defined as land subsidence resulting from groundwater withdrawals in the Plan Area that substantially interferes with surface land uses. Water levels will be used as a proxy for direct measurement of land subsidence.

3.2.5 Significant and Unreasonable Seawater Intrusion

The Plan Area lies more than 30 miles inland from the Pacific Ocean and is hydraulically disconnected from surrounding basins. Because operations in the Plan Area do not impact groundwater elevations near the coast, seawater intrusion is not defined as an undesirable result in the Plan Area.

3.2.6 Significant and Unreasonable Reduction of Interconnected Surface Water and Groundwater

There are no surface water bodies in the Plan Area that connect directly to groundwater. Therefore, there is no significant and undesirable reduction of interconnected surface and groundwater in the Plan Area. Loss of interconnected surface water and groundwater due to groundwater withdrawals would be an undesirable applicable to the Plan Area if declines in groundwater levels result in a loss of interconnected surface water and groundwater that result in significant and unreasonable loss of GDEs. Groundwater and surface water are not connected along the stream channels and storm drains that run through the Plan Area (see Section 2.4.6 Groundwater-Surface Water Connections). However, there are three GDEs in the developed areas west of MARB, where groundwater is actively monitored and remediated in an effort to protect potable aquifer supplies, and there are several potential GDEs along the margins of the Plan Area where little is known about groundwater elevations (see Section 2.4.7 Groundwater Dependent Ecosystems; Figure 2-52).

Groundwater level declines have the potential to negatively impact the GDEs west of MARB. However, these GDEs, which cover a combined area of approximately 5.4 acres (<0.01% of the Plan Area), are areas of low ecological value that are at low risk of changing water level conditions relative to the baseline conditions (see Section 2.4.7.1 GDEs). Because the GDEs west of MARB have not been designated as critical habitat, potential conversion of these areas from the current vegetation type to a prior vegetation type in the event that groundwater elevations decline is not considered to be a significant and unreasonable loss of GDE habitat in the Plan Area.

In addition to the three positively identified GDEs in the Plan Area, there are several potential GDEs for which groundwater levels are not known. The potential GDEs are located on the margins of the Plan Area, and are not near existing or currently planned groundwater extraction wells. Therefore, it is not anticipated that groundwater elevations in the vicinity of these potential GDEs will be impacted by groundwater production. Additionally, groundwater elevations elsewhere in the Plan Area are typically greater than 30 feet bgs. Therefore, it is likely that the vegetation communities that compose these potential GDEs rely on infiltrating surface water, rather than groundwater.

Because the potential loss of a total of 5.4 acres of degraded habitat in the Plan Area is not considered to result in a significant and unreasonable loss of GDEs and the remaining potential GDEs in the Plan Area are not adjacent to current or planned groundwater production zones, specific undesirable results related to interconnected surface water and groundwater are not defined in this GSP. However, in the event that future groundwater production is planned within a mile of a potential GDE, additional investigations should be performed to identify whether the potential GDE relies on groundwater, and whether the planned production may negatively impact the potential GDE.

3.2.7 Defining Undesirable Results

Groundwater conditions in the Plan Area are currently monitored with a network of 165 wells (see Section 3.5.2 Description of Existing Monitoring Network). Eleven of these wells were selected as representative monitoring points (RMPs) for the Plan Area (see Section 3.5.6 Representative Monitoring). Although groundwater elevation and groundwater quality measurements will continue to be collected from the broader monitoring network, minimum thresholds used to assess whether the Plan Area is experiencing undesirable results were only selected at the 11 RMPs. Undesirable results in the Plan Area will be identified by comparing groundwater elevation and groundwater quality measurements from these 11 RMPs to the respective minimum threshold for the applicable sustainability indicator (Table 3-1). Undesirable results related to chronic declines in groundwater elevation, significant and unreasonable loss of groundwater in storage, and significant and unreasonable land subsidence resulting from groundwater withdrawal will be determined using seven of the 11 RMPs (Table 3-1). Undesirable results related to significant and unreasonable degradation of water quality will be determined using five of the 11 RMPs (Table 3-1). The Nutrilite 07 RMP is the only RMP for which a minimum threshold was defined for both groundwater elevation and groundwater quality.

Table 3-1
Representative Monitoring Points in the Plan Area

RMP Casing Name	Location [a]	Screen Interval (s) (ft bgs)	Sustainability Indicator(s) [b] Monitored
EMWD 74	Menifee Production Area	220-640	Levels, Subsidence, Storage
EMWD A1	South Perris Production Area	290-575	Levels, Subsidence, Storage
EMWD Skiland 05	South Perris Production Area	313-567	Levels, Subsidence, Storage
EMWD 52	North Perris Production Area	290-665	Levels, Subsidence, Storage
UCR Scott	Moreno Valley Production Area	*Unknown*	Levels, Subsidence, Storage
EMWD 94	Nuevo/Lakeview Production Area	185-380;420-580	Levels, Subsidence, Storage
Nutrilite 07	Nuevo/Lakeview Production Area; Lakeview GMZ	390-697	Levels, Subsidence, Storage, Quality

Table 3-1
Representative Monitoring Points in the Plan Area

RMP Casing Name	Location [a]	Screen Interval (s) (ft bgs)	Sustainability Indicator(s) [b] Monitored
Nutrilite 02[c]	Lakeview GMZ	*Unknown*	Quality
Nutrilite 04 [c]	Lakeview GMZ	170-186;198-220;262-275;282-292;310-342;372-480	Quality
Nutrilite 08 [c]	Lakeview GMZ	*Unknown*	Quality
Bootsma, John	Lakeview GMZ	350-650	Quality

[a] Location is defined by production area for wells that are used to monitor water levels, and by groundwater management zone for wells that are used to monitor groundwater quality.
[b] Levels = Chronic Decline in Groundwater Levels, Subsidence = Land Subsidence resulting from groundwater withdrawals, Storage = Reduction of Groundwater Storage, Quality = Degradation of Water Quality
[c] Nutrilite 02, 04, and 08 are monitored as Sentinel Wells as part of the Perris II Reverse Osmosis Treatment Facility monitoring and reporting program

3.2.7.1 Groundwater Elevation Undesirable Results

Groundwater elevations measured at wells EMWD 74, EMWD A1, EMWD Skiland 05, EMWD 52, UCR Scott, EMWD 94, and Nutrilite 07 will be used to assess whether an undesirable result associated with chronic lowering of groundwater levels ("Levels", Table 3-1), significant and unreasonable reduction of groundwater storage ("Storage", Table 3-1), and land subsidence related to groundwater withdrawals that substantially interferes with surface land uses ("Subsidence", Table 3-1) has occurred in the Plan Area (Figure 3-2). These seven wells were chosen based on their proximity to areas of active groundwater production, well construction, and records of measurement (see Section 3.5.6 Representative Monitoring). Historical groundwater elevations at these wells are representative of groundwater conditions in each of the production areas and reflect the increase of groundwater levels and storage experienced throughout the Plan Area between 1985 and 2018 (Figures 2-32 through 2-36).

Because groundwater levels are locally impacted by agricultural production, municipal/ industrial extractions, and operations of water quality management projects, a groundwater level minimum threshold exceedance at a single well is not considered undesirable. In addition, because groundwater levels in the Plan Area respond to changing production patterns and periods of elevated groundwater recharge, minimum threshold exceedances during a single monitoring event would not be indicative of undesirable results in the Plan Area.

If groundwater elevations decline below the minimum thresholds in multiple production areas within the Plan Area, beneficial uses and users of groundwater could be impacted by no longer having access to groundwater using existing infrastructure. It should be noted, however, that

existing groundwater quality in the Plan Area currently requires treatment prior to consumption, and characterization of the groundwater quality in the deeper portions of the aquifer may be required. In order to prevent groundwater elevations from declining below the minimum thresholds throughout the Plan Area, and in order to quantitatively determine the point at which undesirable results for chronic lowering of groundwater levels, significant and unreasonable reduction of groundwater in storage, and land subsidence resulting from groundwater withdrawals that substantially interferes with surface land uses occur, the Plan Area is anticipated to experience undesirable results if groundwater elevations are below the minimum threshold at three out of the seven water level representative monitoring points for two consecutive spring monitoring events.

3.2.7.2 Groundwater Quality Undesirable Results

Groundwater quality will be measured at five representative monitoring points to characterize undesirable results associated with degradation of water quality ("Quality", Table 3-1). These five wells are located in the Lakeview Groundwater Management Zone (GMZ), on the eastern side of the 1,000 mg/L TDS iso-concentration contour (Figure 3-3).

Nutrilite 07, Nutrilite 02, and Nutrilite 08 are sentinel wells for the Perris II ROTF monitoring and reporting program (EMWD 2019b). To supplement monitoring at these sentinel wells, wells Nutrilite 04 and John Bootsma were also selected as RMPs for water quality for this GSP. These wells are located to the northeast of the 1,000 mg/L TDS iso-concentration contour in the Lakeview GMZ.

Since the early 1990s, the TDS concentration in groundwater samples collected from these wells has ranged from approximately 410 mg/L at the John Bootsma well to 970 mg/L at Nutrilite 08 (Figure 3-4). TDS concentrations are close to or below the Basin Plan Objective of 520 mg/L at wells Nutrilite 04, Nutrilite 07 and John Bootsma (Figure 3-4; EMWD 2019b). TDS concentrations exceed the Basin Plan Objective of 520 mg/L at wells Nutrilite 02 and Nutrilite 08 (Figure 3-4). Groundwater quality at these wells has followed similar trends as the three Sentinel wells and provide additional characterization of representative water quality in the principal aquifer underlying the Lakeview GMZ.

The Plan Area would be experiencing undesirable results related to significant and unreasonable degradation of water quality if the concentration of TDS exceeds 1,000 mg/L at three of the five water quality representative monitoring points for two consecutive annual water quality sampling events.

3.3 MINIMUM THRESHOLDS

This section describes the minimum thresholds established for chronic lowering of groundwater levels, significant and unreasonable reduction of groundwater in storage, degraded water quality, and land subsidence related to groundwater withdrawals that substantially interferes with surface land uses.

Minimum thresholds for seawater intrusion and interconnected surface water are not established in this GSP (see Sections 3.2.5 Seawater Intrusion and 3.2.6 Interconnected Surface Water).

Table 3-2
Minimum Thresholds

RMP	Chronic Decline in Groundwater Levels (ft MSL)	Reduction of Groundwater Storage (ft MSL)	Land Subsidence (ft MSL)	Degradation of Water Quality (TDS – mg/L)
EMWD 74	1200	1200	1200	NA
EMWD A1	1200	1200	1200	NA
EMWD Skiland 05	1200	1200	1200	NA
EMWD 94	1200	1200	1200	NA
Nutrilite 07	1100	1100	1100	1000
EMWD 52	1200	1200	1200	NA
UCR Scott	1300	1300	1300	NA
Nutrilite 02	NA	NA	NA	1000
Nutrilite 04	NA	NA	NA	1000
Nutrilite 08	NA	NA	NA	1000
Bootsma, John	NA	NA	NA	1000

Interconnected surface water-groundwater and seawater intrusion minimum thresholds are not established because they are not undesirable results applicable to the Plan Area.

The minimum thresholds discussed below are groundwater elevations and TDS concentrations that avoid undesirable results (Table 3-2). As discussed in Section 3.2.7 Defining Undesirable Results, undesirable results are defined as:

- Groundwater elevations that result in the average aquifer saturation declining below 65% of the total potential aquifer saturation in the Plan Area.
- TDS concentrations that exceed 1,000 mg/L east of the current 1,000 mg/L TDS iso-concentration contour in the Lakeview GMZ.

Groundwater level minimum thresholds were established based on historical groundwater elevation data, well construction information, future project operations, and an analysis of projected groundwater levels based on simulation results from the SJFM-2014 groundwater model. Projected groundwater levels were simulated over the 52-year period from water year 2019 to 2070 and incorporate the impact of future climate change scenarios (see Section 2.5.6.3 Projected Water Budget).

Water quality minimum thresholds were established based on drinking water standards, the basin plan objective historical groundwater quality data, and the current extent of brackish water in the Plan Area (EMWD 2019b).

The data reviewed and analyzed during determination of minimum thresholds for chronic declines in groundwater levels, significant and unreasonable reduction of groundwater in storage, land subsidence related to groundwater withdrawal that substantially interferes with surface land uses, and degradation of water quality are discussed in Sections 3.3.1 through 3.3.4.

3.3.1 Chronic Lowering of Groundwater Levels

Minimum threshold groundwater elevations established at the seven RMPs coincide with the water levels at which 65% of the aquifer remains saturated within the Plan Area (Table 3-2). The water level minimum thresholds provide operational flexibility for projects in the Plan Area that aim to mitigate water quality degradation while ensuring ongoing beneficial use of groundwater by maintaining the volume of groundwater available for domestic, municipal, industrial, and agricultural supplies. By definition, the minimum threshold groundwater elevations will prevent chronic lowering of groundwater levels because they provide a lower limit on groundwater elevation declines within the Plan Area.

Projected water levels calculated using the SJFM-2014 indicate that future operations of the Plan Area will result in groundwater level declines in the Moreno Valley Production Area, North Perris Production Area, South Perris Production Area, and Menifee Production Area (Figures 3-5 through 3-11). Under the Future Baseline, and the Future Baseline with Climate Change (2030 and 2070 change factors) scenarios, the SJFM-2014 predicts that groundwater elevations in the RMPs will decline at rates that range from 0.3 feet per year (Figure 3-8) to approximately 2.2 feet per year (Figure 3-5). Groundwater elevations are projected to remain above historical low conditions in all the Production Areas, except the Menifee Production Area. Although projected groundwater elevations in the Menifee Production Area may be as much as 75 ft lower than the historical low water level, they remain above the established minimum thresholds throughout the future simulations at all seven of the water level RMPs, including those in Menifee (Figure 3-5). Therefore, chronic lowering of groundwater levels is not anticipated to occur within the Plan Area.

Over the 50-year planning and implementation horizon, the groundwater elevation minimum thresholds allow for groundwater extractions that exceed historical levels while protecting against long-term aquifer supply depletion. Projected extractions in the Plan Area exceed historical extraction rates by approximately 24,800 to 25,900 AFY, depending on climate conditions. Approximately 4,100 AFY of this increase is from the Lake Perris Seepage Recovery Project, 9,900 AFY of the increase is from the combination of the Perris North Basin Groundwater Contamination Prevention and Remediation Program, expansion of the Perris South Desalination Project, and ongoing operations of the EGETS wells at MARB, and the remaining 10,800 AFY is from projected increases in groundwater production at existing wells (Table 2-34; Section 2.5.6 Quantification of Current, Historical, and Projected Water Budget).

Groundwater elevations measured at each of the RMPs will be reported to DWR in the annual reports that will follow the submittal of this GSP. As funding becomes available, it is recommended that each of these wells be instrumented with a pressure transducer capable of recording daily groundwater levels. The groundwater elevation in each well will be compared to the minimum threshold to determine whether the Plan Area is experiencing undesirable results associated with chronic declines of groundwater levels.

3.3.2 Significant and Unreasonable Reduction of Groundwater Storage

Minimum threshold groundwater elevations established at the seven RMPs coincide with the water levels at which 65% of the aquifer remains saturated within the Plan Area (Table 3-3). Reduction of aquifer saturation below 65% of the total potential aquifer saturation in the Plan Area would be an undesirable result. The same data and criteria used to evaluate undesirable results associated with chronic lowering of groundwater levels were used to define significant and unreasonable reduction of groundwater storage.

Table 3-3
Aquifer Saturation at Proposed Water Level Minimum Thresholds

Water Level RMP	Production Area	Proposed MT (ft MSL)	Aquifer Saturation at Proposed MT (%)	MT Above or Below Historical Low WL
EMWD 74	Menifee	1200	>60%	Below
EMWD A1	South Perris	1200	>70%	Below
EMWD Skiland 05	South Perris	1200	>70%	Below
EMWD 94	Nuevo/Lakeview	1200	>70%	Below
Nutrilite 07	Nuevo/Lakeview	1100	>70%	Below
EMWD 52	North Perris	1200	>60%	At Historical Low
UCR Scott	Moreno Valley	1300	Varies from North to South (<10% to >60%)	Below

Groundwater elevations that result in an average aquifer saturation of less than 65% throughout the Plan Area are lower than historical low water levels. The operational requirements of water quality management projects, historical groundwater conditions in the Plan Area, and local well construction information were used to evaluate the aquifer saturation at which undesirable results occur. This analysis suggests that maintaining an average aquifer saturation of 65% will protect against long-term aquifer supply depletion and provide necessary operational flexibility for domestic, municipal, industrial, and agricultural groundwater users.

Simulation results of future projected conditions using the SJFM-2014 indicate that groundwater elevations are expected to remain above the water level minimum thresholds throughout the 50-

year planning and implementation horizon (Figures 3-5 through 3-11). Cumulative storage loss over the 50-year projected simulations ranges from approximately 122,000 AF to approximately 278,000 AF, depending on climate conditions (see Section 2.5.6 Quantification of Current, Historical, and Projected Water Budget). For comparison, the cumulative storage gained between 1985 and 2018 was estimated to be approximately 473,000 AF. The maximum projected reduction of groundwater storage of approximately 278,000 AF would leave a surplus of approximately 195,000 AF over 1985 conditions.

Groundwater levels measured at the seven representative monitoring points used to set minimum thresholds for reduction of groundwater in storage will be reported to DWR in the annual reports that will follow the submittal of this GSP. As funding becomes available, it is recommended that each of these wells be instrumented with a pressure transducer capable of recording daily groundwater levels. The groundwater elevation in each well will be compared to the minimum threshold assigned in Table 3-2 to determine whether the Plan Area is experiencing undesirable results.

3.3.3 Significant and Unreasonable Degradation of Water Quality

Water quality standards vary based on end use, i.e., groundwater that has suitable water quality for industrial process water may not be suitable for agricultural and/or landscape irrigation. Similarly, groundwater that has suitable water quality for agricultural and/or landscape irrigation may not be suitable as a source of drinking water. Thus, the degree to which water quality degradation is considered significant and unreasonable depends on multiple factors, including its ultimate use, and the technological and economic feasibility of blending and/or treating it to the appropriate standards. For this GSP, degradation of groundwater quality is considered significant and unreasonable if groundwater that is currently suitable for use becomes unsuitable due to expansion of the 1,000 mg/L iso-concentration contour in the Lakeview GMZ.

The minimum threshold for degraded water quality is a groundwater concentration of 1,000 mg/L TDS at the five-groundwater quality RMPs in the Lakeview GMZ (Table 3-2). A concentration of TDS in the groundwater equal to 1,000 mg/L corresponds to the upper secondary maximum contaminant level for TDS established by the California State Water Resources Control Board. The water quality minimum threshold concentrations in the Lakeview GMZ protect against the degradation of potable aquifer supplies by ensuring that the currently impacted groundwater does not migrate to the northeast and reduce the volume of potable water in the aquifer. TDS concentrations are currently below 700 mg/L at four of the five water quality representative monitoring points, and below 1,000 mg/L at all five RMPs (Figure 3-4).

Groundwater elevation and TDS concentration are not correlated in the Plan Area. Therefore, water level thresholds cannot be used as a proxy for groundwater quality thresholds. However, the water level minimum thresholds were established to provide sufficient operational flexibility for

EMWD's Perris South Desalination Project and Perris II ROTF. These projects are part of a regional effort overseen by the RWQCB to manage groundwater salinity in the Santa Ana River Watershed. The Perris South Desalination Project is also EMWD's primary mechanism to protect beneficial use of groundwater in the Lakeview GMZ.

TDS concentrations in groundwater sampled from the five-groundwater quality representative monitoring points will be reported to DWR in the annual reports that will follow submittal of this GSP. TDS concentrations measured in each well will be compared to the minimum threshold assigned in Table 3-2 to determine whether the Plan Area is experiencing undesirable results associated with degraded water quality.

3.3.4 Significant and Unreasonable Land Subsidence Resulting from Groundwater Withdrawals

Land subsidence related to groundwater withdrawal has not been measured in any part of the Plan Area, except Mystic Lake (see Section 2.4.5 Subsidence). Currently there is little groundwater production in the Mystic Lake area, and groundwater levels are projected to rise in this area in the future. Because subsidence rates related to groundwater withdrawal cannot be directly measured in most of the Plan Area, the minimum thresholds for groundwater elevations are used as a proxy for direct measurements of land subsidence related to groundwater withdrawal in the Plan Area. The minimum threshold groundwater elevations that correspond to an average aquifer saturation in the Plan Area of approximately 65%, are adopted as the minimum thresholds to prevent significant and unreasonable land subsidence resulting from groundwater withdrawal.

The minimum threshold water levels at the seven RMPs used to assess chronic lowering of groundwater levels and significant and unreasonable reduction of groundwater storage are lower than historical low conditions, and therefore introduce the potential for future land subsidence related to groundwater withdrawal. However, fine grained deposits in the subsurface tend to be thin and discontinuous (see Section 2.3.2 Principal Aquifers and Aquitards). As a result, DWR has designated the Plan Area has having a low risk for future land subsidence resulting from groundwater withdrawals (DWR 2014). Because the subsurface geology presents a low risk for future subsidence, and land subsidence related to groundwater withdrawal was not induced when historical water levels were lower than current water levels, the minimum thresholds developed for chronic declines in groundwater and reduction of groundwater in storage were adopted for groundwater related land subsidence as well. The use of groundwater elevation minimum thresholds as a proxy for groundwater related land subsidence will be reviewed with each 5-year GSP evaluation to ensure that they adequately protect the Plan Area from experiencing undesirable results related to groundwater related land subsidence.

As discussed previously, the established water level minimum thresholds are anticipated to maintain beneficial uses of groundwater in the Plan Area by limiting the declines of groundwater storage, protecting domestic, municipal/ industrial and agricultural groundwater supplies, and providing sufficient operational flexibility to water quality management projects in the Basin. Additionally, the current hydrogeological conceptual model for the Plan Area (see Section 2.3 Hydrogeologic Conceptual Model) suggests that these minimum thresholds will prevent significant and unreasonable land subsidence related to groundwater withdrawal.

Groundwater levels measured at the seven RMPs will be reported to DWR in the annual reports that will follow submittal of this GSP. The groundwater elevation in each well will be compared to the minimum threshold assigned in Table 3-2 to determine whether the Plan Area is experiencing undesirable results.

3.3.5 Significant and Unreasonable Seawater Intrusion

Minimum thresholds for seawater intrusion were not established for the Plan Area, which is located over 30 miles from the Pacific Ocean (see Section 3.2.5 Seawater Intrusion).

3.3.6 Significant and Unreasonable Reduction of Interconnected Surface Water and Groundwater

Minimum thresholds for interconnected surface water were not established for the Plan Area because there is no known significant groundwater production within a mile of any of the potential GDEs identified in the Natural Communities Commonly Associated with Groundwater database (see Sections 2.4.7 Groundwater Dependent Ecosystems and 3.2.6 Interconnected Surface Water). If future groundwater production in the Plan Area is planned within 1 mile of the identified potential GDEs, additional characterization of interconnected surface water, and subsequent reassessment of interconnected surface water minimum thresholds, may be required.

3.4 MEASURABLE OBJECTIVES

Measurable objectives are “quantifiable goals for the maintenance and improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin” (23 CCR §351. Definitions). Based on the sustainability goal (see Section 3.1 Sustainability Goal) and undesirable results (see Section 3.2 Undesirable Results) in the Plan Area, measurable objectives were set for the sustainability indicators relevant to the Plan Area.

Table 3-4
Measurable Objectives in the Plan Area

RMP	Historical Low Groundwater Level (ft MSL)	Date of Historical Low Groundwater Level	Chronic Declines in Groundwater Levels (ft MSL)	Reduction of Groundwater Storage (ft MSL)	Land Subsidence (ft MSL)	Water Quality Degradation (TDS – mg/L)
EMWD 74	1321	10/4/2004	1250	1250	1250	NA
EMWD A1	1312	6/8/1994	1250	1250	1250	NA
EMWD Skiland 05	1246	3/27/1990	1250	1250	1250	NA
EMWD 94	1253	12/16/1999	1250	1250	1250	NA
Nutrilite 07	1151	10/15/1999	1150	1150	1150	520
EMWD 52	1145	7/19/1977	1250	1250	1250	NA
UCR Scott	1339	7/19/1977	1350	1350	1350	NA
Nutrilite 02	NA	NA	NA	NA	NA	520
Nutrilite 04	NA	NA	NA	NA	NA	520
Nutrilite 08	NA	NA	NA	NA	NA	520
Bootsma, John	NA	NA	NA	NA	NA	520

NA – Not applicable
Interconnected surface water-groundwater and seawater intrusion measurable objectives are not established because they are not undesirable results applicable to the Plan Area

Historical water levels, well construction details, projected domestic, municipal/ industrial and agricultural groundwater demands, and projected water level declines were analyzed during the selection of the measurable objectives for chronic declines in groundwater levels, groundwater in storage, and land subsidence related to groundwater withdrawal. The water level measurable objectives, which are 50 feet higher than the water level minimum thresholds, provide a reasonable margin of operational flexibility under adverse conditions, by allowing for changes to groundwater production to occur before the water levels reach an elevation at which undesirable results would occur. The water level measurable objectives are approximately equal to or higher than historical low groundwater levels at five of the seven RMPs in the Plan Area (Figures 3-5 through 3-11).

Groundwater quality measurable objectives were established using the Basin Plan Objective for TDS concentrations in the Lakeview-Hemet North GMZ (EMWD 2019b). The Basin Plan Objective for TDS in the Lakeview-Hemet North GMZ is 520 mg/L, which is based on the historical water quality in the Lakeview-Hemet North GMZ (SAWPA 2017).

A description of the data reviewed and analyzed during determination of the measurable objectives for chronic declines in groundwater levels, reduction of groundwater in storage, land subsidence, and degradation of water quality related to groundwater withdrawal are discussed in Sections 3.4.1 through 3.4.4.

3.4.1 Groundwater Levels

The measurable objectives for groundwater levels are static groundwater elevations (based on March measurements) that maintain an average aquifer saturation in the Plan Area of approximately 70%. These elevations correspond with historical low water levels at EMWD 94, EMWD Skiland 05, and Nutrilite 07 (Table 3-4). Measurable objective groundwater elevations that correspond to an average aquifer saturation of 70% are 70-feet lower and 60-feet lower than historical low water levels measured at EMWD 74 and EMWD A1, respectively.

The groundwater aquifer in the vicinity of wells EMWD 74 and EMWD A1 is impacted by non-point source contamination of TDS, nitrate, and perchlorate (EMWD 2019b). Water levels near EMWD 74 and EMWD A1 may need to fall below historical low groundwater elevations in order to manage the hydraulic gradient and prevent further migration of degraded groundwater (see Section 3.2.3 Degraded Water Quality). Accordingly, water level measurable objectives at these two wells provide operational flexibility for EMWD to manage TDS, nitrate, and perchlorate contamination in the Plan Area.

Current groundwater levels in the Plan Area are an average of 100 feet higher than the established measurable objectives. The SJFM-2014 projects that water levels will remain above the water level measurable objectives throughout the 50-year planning and implementation period at all representative monitoring points except EMWD 74. At EMWD 74, SJFM-2014 predicts that water levels will decline to the measurable objective between 2065 and 2090, depending on climate conditions. It would take approximately another 25-30 years after reaching the measurable objective before water levels would reach the minimum threshold, if operations in the Basin remain unaltered beyond 2070. This 25-30-year period provides sufficient operational flexibility for the ongoing beneficial use of groundwater during adverse conditions without the onset of undesirable results associated with chronic lowering of groundwater levels.

Interim Milestones for Groundwater Levels

Interim milestones for chronic lowering of groundwater levels were not established because water levels in the Plan Area are currently higher than the measurable objective water levels.

3.4.2 Groundwater in Storage

The measurable objectives for groundwater in storage are static water levels that correspond to an average aquifer saturation of 70% in the Plan Area (see Section 3.4.1 Groundwater Levels). Results from the future baseline and future baseline with climate change scenarios performed using the SJFM-2014 indicate the future operations in the Plan Area may result in a reduction of approximately 122,000 to 278,000 AF of groundwater in storage relative to the current conditions in the Plan Area (see Section 2.5.6 Quantification of Current, Historical, and Projected Water Budget). These reductions of

groundwater in storage would leave a surplus of approximately 195,000 to 351,000 AF of groundwater in storage relative to 1985 conditions (see Section 2.5 Water Budget).

The established water level measurable objectives ensure sufficient groundwater supply for ongoing beneficial use in the Plan Area during adverse conditions without experiencing significant and unreasonable loss of groundwater storage.

Interim Milestones for Reduction of Groundwater Storage

Interim milestones for groundwater levels (the indicator for groundwater in storage) were not selected because water levels in the Plan Area are currently higher than the established measurable objective water levels.

3.4.3 Water Quality

The water quality measurable objectives for the Plan Area are based on a TDS concentration of 520 mg/L at each of the five-water quality RMPs. This TDS concentration equals the water quality objective for the Lakeview-Hemet North GMZ established in the Santa Ana River Basin Plan (RWQCB 2019).

Planned path to reach the water quality measurable objective

EMWD currently partners with the Army Corp of Engineers, State Water Resources Control Board, the Metropolitan Water District of Southern California, and the U.S. Bureau of Reclamation to address non-point source contamination in the Perris South and Menifee GMZs through the operation of the Perris South Desalination Project. In addition, EMWD works closely with the State Water Resources Control Board and the Santa Ana Regional Water Quality Control Board throughout operation, and future implementation, of groundwater desalination efforts in the Plan Area. Current operations of the project utilize a network of 15 groundwater extraction wells to remove brackish groundwater from the Basin in an effort to: (1) reduce the areal coverage of TDS concentrations that exceed 1,000 mg/L, (2) prevent migration of contaminated water into the potable aquifer, (3) restore beneficial uses, and (4) expand local water supply reliability. To achieve these goals, EMWD extracts brackish groundwater from across the Perris South and Menifee GMZs and treats the brackish water at the Perris I and Menifee desalination facilities (desalters) located in the City of Menifee. The Perris I and Menifee desalters produce up to 8 MGD of potable water from locally derived brackish groundwater.

EMWD is currently in construction for an expansion to their desalination programs with a third desalination plant, the Perris II ROTF, located in the city of Menifee. The Perris II ROTF is anticipated to expand EMWD's brackish water treatment capacity by 5.4 MGD. The Perris II ROTF will further

enhance EMWD's remedial efforts to address contamination, and migration, of TDS, nitrate, and perchlorate in the Perris South and Menifee GMZ.

EMWD anticipates that operation of the Perris II ROTF will address brackish water contamination along the border of the Perris South GMZ and Lakeview GMZ (EMWD 2019b). Remedial actions in this area directly impact EMWD's ability to reach water quality measurable objectives at the five wells located in the Lakeview GMZ. To address contamination in this region, EMWD aims to produce up to 4,000 AFY of potable water from the Plan Area's brackish water zone by 2023 (EMWD 2019b). Through operation of the Perris II ROTF, EMWD aims to remove up to 734 million pounds of salts from the Plan Area via brine discharge.

EMWD works closely with the State Water Resources Control Board and the Santa Ana Regional Water Quality Control Board throughout operation, and future implementation, of groundwater desalination efforts in the Plan Area. EMWD's desalination efforts are part of a larger, regional effort to manage groundwater salinity and restore beneficial use in the Santa Ana River Basin (RWQCB 2019). Because EMWD's operation of this program is overseen by the Santa Ana RWQCB, separate interim milestones for water quality degradation were not established as part of this GSP.

3.4.4 Land Subsidence

The measurable objectives for land subsidence related to groundwater withdrawal are static groundwater elevations (measured in March) that equal or are greater than the historical low groundwater elevations at five of the seven RMPs. These elevations correspond to an average aquifer saturation of approximately 70% (Section 3.4.1 Chronic Lowering of Groundwater Levels; Table 3-4). Water level measurable objectives that are below historical low groundwater elevations at wells EMWD 74 and EMWD A1 are required to ensure operational flexibility for the Perris South Desalination Project (Section 3.4.1 Chronic Lowering of Groundwater Levels). As previously noted, the Plan Area is designated as a low risk area for future subsidence (DWR 2014). Accordingly, water level objectives below historical lows at EMWD 74 and EMWD A1 are not anticipated to induce subsidence that interferes with land use.

Interim Milestones for Land Subsidence Related to Groundwater Withdrawal

Interim milestones for groundwater related land subsidence were not set because groundwater elevations in the Plan Area are currently higher than the water level measurable objectives.

3.4.5 Seawater Intrusion

Measurable objectives were not established for seawater intrusion because undesirable results associated with seawater intrusion are not applicable to the Basin.

3.4.6 Interconnected Surface Water and Groundwater

Measurable objectives for interconnected surface water and groundwater were not established for the Plan Area because there is no known significant groundwater production within a mile of any of the potential GDEs identified in the Natural Communities Commonly Associated with Groundwater database (see Sections 2.4.7 Groundwater Dependent Ecosystems and 3.2.6 Interconnected Surface Water). If future groundwater production in the Plan Area is planned within one mile of the identified potential GDEs, additional characterization of interconnected surface water, and subsequent reassessment of interconnected surface water measurable objectives, may be required.

3.5 MONITORING NETWORK

3.5.1 Monitoring Network Objectives

The objective of the monitoring network in the Plan Area is to track and monitor parameters that demonstrate groundwater conditions, and associated factors that influence groundwater conditions, in the Plan Area. In order to accomplish this objective, the monitoring network must be capable of:

- Monitoring changes in groundwater conditions
- Monitoring groundwater conditions relative to the sustainable management criteria
- Quantifying annual changes in water budget components

The SJGB has an existing network of wells used to monitor groundwater conditions. This network includes both dedicated monitoring wells and production wells. The current network is capable of representing groundwater conditions in the Plan Area. The network will continue to be used to monitor groundwater conditions to assess long and short-term trends in groundwater elevation and groundwater quality.

3.5.2 Description of Existing Groundwater Network

The existing monitoring network was established by the West San Jacinto Groundwater Basin Groundwater Management Plan (see Section 2.1.2.2 Groundwater Elevations). As of 2019, the monitoring network established by the West San Jacinto Basin Groundwater Management Plan included 174 wells (Figure 3-12 and Table 3-5). Of these, three wells are outside the boundaries of the SJGB, and an additional six wells are outside the Plan Area. Therefore, a total of 165 wells associated with the existing monitoring network for the West San Jacinto Basin Groundwater Management Plan are available for monitoring groundwater conditions within the Plan Area (EMWD 2019c). Additionally, there are 361 monitoring wells at MARB, which are associated with groundwater cleanup efforts overseen by the RWQCB, the U.S. Environmental Protection Agency, and the

California Department of Toxic Substances Control. These wells are not included in the discussion of the monitoring network for the GSP because they are typically shallow wells that do not adequately characterize broader groundwater conditions in the Plan Area (AFCEC 2019).

Table 3-5
Monitoring Network Wells by Location and Measurement Type

	Number of Wells by Measurement Types							
	Extraction	*Extraction-Level*	*Extraction-Level-Quality*	*Extraction-Quality*	*Level*	*Level-Quality*	*Quality*	*Total*
Production Areas								
Menifee	5	2	4	1	12	14	0	38
Moreno Valley	0	0	0	0	8	5	0	13
North Perris	0	0	3	4	8	3	0	18
Nuevo/Lakeview	4	4	5	11	21	12	1	58
South Perris	1	1	8	1	5	22	0	38
Total	**10**	**7**	**20**	**17**	**54**	**56**	**1**	**165**

Historically, the number of wells measured or sampled in any given year has varied due to changes in access to the wells. These changes stem from either physical limitations such as flooding in the vicinity of specific wells, that prevent access or from changes to access agreements for private wells. Because participation by private well owners in the Plan Area is voluntary, EMWD has worked with stakeholders to secure access to private wells. Stakeholders that participate in the program are provided with a copy of the annual report, as well as copies of water quality analyses, water level measurements, and groundwater extractions for their wells. EMWD intends to continue this practice when moving to monitoring under this GSP.

Approximately one-third (38%) of the wells in the monitoring network lack well construction information, such as screen intervals and depths. Since there is only one principal aquifer in the Plan Area, well construction information is not critical for understanding general groundwater conditions. However, as projects are implemented in the Plan Area, new monitoring wells will be constructed, and it may become possible to discern additional data on depth discrete groundwater conditions within the principal aquifer. Table 3-6 describes the maximum depth of the screens of the wells by production areas.

Table 3-6
Maximum Screen Depth of Wells in Monitoring Network

	Wells with No Screening Information	Bottom of Screen in Feet Below Ground Surface (bgs)				
		<100	*100- 300*	*300 - 500*	*500 - 1,000*	*>1,000*
Total	**63**	**9**	**20**	**32**	**37**	**4**
Menifee Production Area	12	7	6	5	8	0
Moreno Valley Production Area	4	2	3	2	2	0
North Perris Production Area	6	0	2	5	5	0
Nuevo/Lakeview Production Area	26	0	0	10	18	4
South Perris Production Area	15	0	9	10	4	0

EMWD regularly assesses the sufficiency of the existing monitoring network (EMWD 2019c). In order to increase precision and efficiency, EMWD initiated a Key Well Program that identifies areas with data gaps (EMWD 2019c). This program also identifies potential parcels on which new monitoring wells could be installed and identifies potential sources of funding to purchase and install transducers in existing wells.

3.5.2.1 Groundwater Monitoring

The Plan Area is divided into five production areas: Menifee, Moreno Valley, North Perris, Nuevo/Lakeview, and South Perris. The density of both monitoring and production wells varies in each production area (Figures 3-13 and 3-14, Figure 2-26). The majority of the wells in the monitoring network have been measured for groundwater level and quality semi-annually over the last 10 years. Of these, many have been measured at a consistent time of year, which allows for more accurate annual comparisons in water level or water quality at specific monitoring sites.

The monitoring network tracks groundwater elevation, groundwater quality, and groundwater extractions. The measurement or measurements taken from each well in the monitoring network depend on the well type, and whether or not the well is incorporated into additional monitoring programs beyond that which was established under the Groundwater Management Plan. The 2019 monitoring network shown in Figure 3-12 is divided into seven categories that describe the measurement or measurements taken at each well: Extraction, Extraction-Level, Extraction-Level-Quality, Extraction-Quality, Level, Level-Quality, and Quality. The majority of the wells are monitoring wells and agricultural/irrigation wells; however, the network also includes desalination, municipal, and domestic extraction wells (Table 3-7).

Table 3-7
Types of Wells in The Existing Monitoring Network

	MONITORING	AGRICULTURAL/ IRRIGATION	DOMESTIC	MUNICIPAL	DESALINATION
All Wells	75	60	4	11	15
Menifee Production Area	22	14	0	0	2
Moreno Valley Production Area	10	2	0	1	0
North Perris Production Area	4	5	1	8	0
Nuevo/Lakeview Production Area	16	33	3	2	4
South Perris Production Area	23	6	0	0	9

Groundwater Elevation

Groundwater levels are measured semi-annually, in the spring and fall, to characterize the differences in seasonal groundwater elevations and to evaluate groundwater gradients, which drive groundwater flow in the Plan Area. Of the 165 wells in the monitoring network, 137 (or 83%) of the wells in the Plan Area were used to demonstrate the groundwater elevation conditions. The coverage of the groundwater level measurements by production area is summarized in Table 3-8.

Table 3-8
Well Distribution and Coverage for Water Level Measurements in the Plan Area

	First Water Level Record	# of Wells Measured in 2019	% of Area Within 1 mile of Water Level Measurement	# of 2019 Wells Regularly Measured Between 2008-2018	# of 2019 Wells Regularly Measured Within the Same Quarter	# of 2019 Wells Measured Seasonally
Menifee	1993	32	84%	31	31	31
Moreno Valley	1977	13	49%	10	9	9
North Perris	1942	14	52%	14	14	14
Nuevo/Lakeview	1941	42	79%	40	41	40
South Perris	1981	36	79%	33	32	32

Based on the density of the monitoring network wells in each production area, the length of the historical record at each well, and the demonstrated use of the monitoring network to ensure sustainable management of the groundwater resources in the Plan Area, the spatial and temporal coverage of the existing monitoring network is sufficient to characterize the groundwater conditions in the Plan Area. The current network will be used to demonstrate continued sustainable use of the groundwater resources in a way that is consistent with the sustainability goal.

Groundwater Quality

Groundwater quality sampling is performed annually. Samples are collected after a three well volume purge using a dedicated pump or mobile pump. The samples are collected using standardized procedures established by EMWD and tested for a variety of constituents to track water quality parameters such as cations, anions, nitrogen, metals, alkalinity, pH, TDS, and more (EMWD 2019c). Groundwater quality samples were measured in 57% of the wells in the Plan Area and 45% of the non-extraction wells (Table 3-9).

Table 3-9
Well Distribution and Coverage for Water Quality Measurements in the Plan Area

	First Water Quality Record	# of Wells Measured in 2019	% of Area Within 1 Mile of Water Quality Measurement	# of 2019 Wells Measured between 2008-2018	# of 2019 Wells Measured Within the Same Quarter
Menifee	1989	18	50%	16	6
Moreno Valley	1968	5	25%	4	0
North Perris	1959	10	48%	9	7
Nuevo/Lakeview	1965	29	61%	12	5
South Perris	1955	31	74%	25	10

Groundwater Extraction

Groundwater extractions in the Plan Area have been monitored by EMWD as part of the West San Jacinto Groundwater Management Plan since 1996 (EMWD 1995). In 2018, 57 major extraction wells, or approximately 33% of the wells in the monitoring network, were monitored for groundwater extractions. Of these wells, 43 had meters in 2018. Extraction wells that produce greater than 25 AFY are included in the estimate of the total extraction from the Plan Area, whether they have meters or not. Extractions from wells without meters are estimated by EMWD based on property acreage, crop type, and livestock count (EMWD 2019c). Additionally, private well owners who produce more than 25 AFY of groundwater are asked to submit an Annual Notice of Recordation to EMWD. These notices are used by EMWD to identify differences between estimated and reported groundwater production at private wells.

3.5.2.2 Surface Monitoring Conditions

In addition to monitoring groundwater conditions in the Plan Area, EMWD uses surface water flow and precipitation data collected by other agencies, including the USGS and the Riverside County Flood Control and Water Conservation District (RCFCWCD), to monitor the parameters that influence recharge to the Plan Area groundwater.

Surface Flow

The USGS manages four stream gauges within the Plan Area (Figure 2-5). Two stream gauges are located on the San Jacinto River, a third is located on the Perris Valley Storm Drain, and the fourth is located on Salt Creek (see Section 2.2.2 Surface Water and Drainage Features). These stream gauges record daily average flow rates as well as peak flowrates during storm events. Groundwater elevations in the vicinity of the San Jacinto River, Perris Valley Storm Drain, and Salt Creek, suggest that the surface water drainages are disconnected from the underlying aquifer (see Section 2.4.6 Groundwater-Surface Water Connections). Recharge to the aquifer through the channel beds occurs only in wetter than average precipitation years, during brief periods of flow along the drainages. The stream gauges, which are located on every major drainage within the Plan Area, provide adequate spatial coverage for monitoring streamflow conditions that may influence groundwater recharge.

In addition to providing adequate spatial coverage, the stream gauge monitoring network also provides adequate temporal coverage to determine the short-term, seasonal, and long-term surface flow conditions in the SJGB. Current stream gauges in the Plan Area record daily average flow rates. Daily flow records can be used to characterize short-term and seasonal flow conditions in the Plan Area. Additionally, within the SJGB as a whole, daily stream flow measurements on the San Jacinto River have been recorded since 1951. Within the Plan Area, the streamflow record at USGS Gauge 11070270 on the Perris Storm Drain begins in 1990 and the record at USGS Gauge 11070210 on the San Jacinto River begins in 2000 (see Section 2.2.2 Surface Water and Drainage Features). The 20 to 30-year long record from these gauges is adequate to determine long-term trends in surface water conditions in the Plan Area.

Precipitation

The precipitation monitoring program currently utilizes five precipitation stations within the Plan Area managed by the Riverside County Flood Control and Water Conservation District (see Section 2.2.3 Historical, Current, and Projected Climate). Precipitation is recorded at these stations daily, which provides adequate temporal resolution to evaluate short-term and seasonal impacts of precipitation on groundwater conditions in the Plan Area.

Of the currently active precipitation stations in the Plan Area, the Lake Perris Station has the longest continuous record of precipitation, with measurements dating back to 1965 (Figure 2-14). The length of this record is adequate to determine long-term trends in precipitation within the Plan Area. Additionally, the Lake Perris record can be compared to the record of precipitation measured at the San Jacinto Station, which begins in 1916 (Figure 2-13), to assess trends in precipitation throughout the SJGB over the past 100 years.

3.5.3 Monitoring Network Relationship to Sustainability Indicators

The existing groundwater network will be used to monitor and document changes in groundwater conditions related to the four sustainability indicators relevant to the Plan Area. This network includes the wells that have been designated as RMPs for reporting purposes to DWR. Minimum thresholds and measurable objectives were established for the RMPs. An assessment of groundwater conditions and the potential for undesirable results will be based on the conditions measured at the RMPs. The broader groundwater monitoring network, including the RMPs, will be used to document conditions in the Plan Area and provide support for recommendations and findings based on the conditions recorded at the RMPs.

3.5.3.1 Chronic Lowering of Groundwater Levels

The groundwater monitoring network must accomplish the following to adequately monitor conditions related to chronic lowering of groundwater levels:

- Track short-term, seasonal, and long-term trends in groundwater elevation.
- Demonstrate groundwater elevations in mid-March and mid-October for the aquifer system.
- Record groundwater elevations at RMPs for which minimum thresholds and measurable objectives have been identified.

Spatial Coverage

The groundwater elevation monitoring well density in the Plan Area is approximately 1 well per square mile (Figure 3-13). The distribution of the monitoring wells is not even across the Plan area, with the highest density of wells occurring in Nuevo/Lakeview and South Perris Production Areas. The South Perris Production Area has 36 groundwater level monitoring wells in a 25 square mile area. However, 14 of these monitoring wells are located in the center of the production area within a 2 square mile area (Figure 3-13). The Nuevo/Lakeview Production Area has one cluster of seven wells within one square mile while the remaining 34 square miles have between four to zero monitoring wells per square mile (Figure 3-13). The Moreno Valley Production Area has the lowest density of groundwater level monitoring wells, with 13 wells in 46 square miles (Figure 3-13).

DWR guidelines recommend a well network with a density of one observation per 16 square miles (DWR 2016a). The monitoring well density recommended by CASGEM Groundwater Elevation Monitoring Guidelines ranges from one to 10 wells per 100 square miles (DWR 2010). The density of monitoring wells in the Plan Area exceeds the guidance and provides adequate spatial coverage to assess whether the Plan Area is experiencing chronic lowering of groundwater levels.

Temporal Coverage

Groundwater elevation data will be collected from the network of groundwater wells to provide groundwater elevation conditions in the spring and fall of each year. Further discussion of the monitoring schedule is provided in Section 3.5.4, Monitoring Network Implementation.

3.5.3.2 Reduction of Groundwater Storage

The groundwater monitoring network must accomplish the following to monitor conditions related to significant and unreasonable reduction of groundwater storage:

- Track short-term, seasonal, and long-term trends in groundwater in storage.
- Calculate year-over-year (mid-March to mid-March) change in storage.
- Provide data from which lateral hydraulic gradients within the aquifer can be calculated.

The requirements for documenting reduction in groundwater storage are similar to those for chronic lowering of groundwater levels (see Section 3.5.3.1), because these two sustainability indicators are related through groundwater elevations.

The spatial and temporal density of groundwater elevation data necessary to document groundwater storage changes in the Plan Area is the same as that necessary to document groundwater elevation changes. The current network of wells is capable of documenting changes to both sustainability indicators.

3.5.3.3 Degraded Water Quality

The groundwater monitoring network must accomplish the following to adequately monitor conditions related to degradation of water quality in the Plan Area:

- Track short-term, seasonal, and long-term trends in the hydraulic gradient.
- Track long-term trends in groundwater quality for a wide range of constituents.
- Measure TDS concentrations at the five RMPs for which minimum thresholds and measurable objectives have been identified.

Spatial Coverage

The network of wells used to assess groundwater quality in the Plan Area includes public and private wells, many of which are monitored as part of EMWD's efforts to improve groundwater quality. The existing network will be used to assess groundwater quality degradation related to groundwater production as part of this GSP. The primary area of concern for groundwater quality

degradation relating to groundwater production in the Plan Area is in the Lakeview GMZ, where ongoing northeastward migration of the 1,000 mg/L iso-concentration contour was defined as an undesirable result (see Section 3.2.3 Degraded Water Quality). The approximate density of water quality monitoring wells is two wells for every three-square miles (Figure 3-14). The density of the monitoring points is not even across the Plan Area, with the highest density of water quality monitoring wells in Lakeview GMZ and the lowest density of water quality monitoring wells in the San Jacinto Lower Pressure GMZ. Lakeview GMZ has approximately three wells for every two square miles and San Jacinto Lower Pressure GMZ has approximately one well for every four-square miles. The spatial density of the existing monitoring network is sufficient to document changes in groundwater quality in the Lakeview GMZ, and throughout the rest of the Plan Area.

Temporal Coverage

Groundwater quality samples have been collected annually from wells in the existing monitoring network since 1995. Annual groundwater quality sampling provides an adequate temporal coverage to assess trends in groundwater quality.

3.5.3.4 Land Subsidence

The groundwater monitoring network must be able to track long-term trends in groundwater elevation in order to adequately monitor conditions related to land subsidence that results from groundwater withdrawals. Groundwater elevations are being used as a proxy for land subsidence related to groundwater withdrawals in the Plan Area, because land subsidence that results from groundwater withdrawals is directly related to groundwater elevations (see Section 3.2.4 Land Subsidence). Because projected future groundwater elevations are expected to remain above historical low groundwater elevations throughout the majority of the Plan Area with the exception of the Menifee Production Area (see Section 3.3.1 Chronic Lowering of Groundwater Levels), and because fine grained sediments prone to subsidence tend to occur in thin discontinuous layers in the subsurface of the Plan Area, direct monitoring of subsidence rates is not currently required in the Plan Area. Instead, the network of groundwater monitoring wells discussed in Sections 3.5.2 will be used as a proxy to determine if groundwater conditions throughout the Plan Area may induce land subsidence related to groundwater production.

3.5.3.5 Depletions of Interconnected Surface Water

Surface waters within the Plan Area are not connected to groundwater (see Section 2.4.6 Groundwater-Surface Water Connections), and no known groundwater production occurs within one mile of the potential GDEs identified in the NCCAG database. Therefore, specific sustainability criteria for interconnected surface water have not been defined in this GSP and no specific monitoring for depletion of interconnected surface water is required. However, surface water flows will continue to be monitored as described in Section 3.5.2.2 Surface Monitoring Conditions.

3.5.4 Monitoring Network Implementation

3.5.4.1 Groundwater Elevation Monitoring Schedule

Following the guidance provided by DWR (DWR 2016a), groundwater elevation measurements will be collected from all accessible wells in the monitoring network two times per year in order to capture the spring high and fall low groundwater levels. Spring groundwater levels will be collected during the month of March and fall groundwater levels will be collected during the month of October. By conducting the groundwater sampling for each seasonal event within a single month time period, the water level data can be used to generate groundwater elevation contours and assess the hydraulic gradient in the aquifer. Data collection over longer time periods are less useful for analyzing the hydraulic gradient and groundwater elevation contours that are intended to represent a discrete period of time.

3.5.4.2 Groundwater Storage Monitoring Schedule

Groundwater storage is directly linked to groundwater elevation. Therefore, the groundwater elevation monitoring network and schedule will be used to monitor changes in groundwater storage.

3.5.4.3 Water Quality Monitoring Schedule

EMWD will continue to conduct groundwater quality sampling throughout the Plan Area. Groundwater quality samples will be collected annually for all accessible wells identified in the monitoring network as water quality sampling wells. In 2018, groundwater samples were collected from 105 wells in the monitoring network. Currently, EMWD staff collect water quality samples throughout the calendar year, making sure each well is sampled at least once within a given calendar year. However, staff availability and well access do not necessarily result in a sample collected from each well every 12 months. EMWD is reviewing the potential to make practicable changes to groundwater quality collection that would shift groundwater quality sampling to occurring on a water year basis, rather than a calendar year basis, and prioritizing sample collection from wells in which groundwater samples have not been collected within the previous 12 month period.

3.5.4.4 Groundwater Extraction Monitoring Schedule

Groundwater extraction rates are monitored monthly at all extraction wells within the Plan Area. EMWD wells are continuously monitored by meters that report the data automatically and daily manually read meters. EMWD also has agreements with some, though not all, private well owners in the Plan Area to have EMWD staff read meters on private property on a monthly basis. The private wells with meters are read by EMWD staff within the first week of the month. These extraction rates are recorded in EMWD's data management system within a few weeks after collection. For wells without meters, or wells for which EMWD does not have permission to record

groundwater production meter readings, EMWD has historically estimated extraction rates based on land use, crop type, and/or quantity of acres or livestock, and private well owners have provided a record of groundwater production to EMWD in the spring of each year for the previous calendar year extractions. EMWD provides labor and materials to install meters on extraction wells currently identified as producing more than 25 AFY when the well owner allows EMWD to monitor the well. Future monitoring efforts will expand the well metering program to include wells that produce greater than 2 AFY. EMWD will work with private and municipal well owners to schedule meter installation and establish meter reading procedures for wells that EMWD has received permission from the well owner. Well owners who do not provide permission for EMWD staff to read production meters will be required to provide EMWD with documentation of the annual production from the well, on a water-year basis. Until meters are installed, EMWD will continue with the current groundwater extraction monitoring schedule and is analyzing the process required to transition from a calendar year reporting program to a water year reporting program.

3.5.5 Monitoring Protocols

Protocols for groundwater level measurements and water quality samples are identified in the *Monitoring Protocols, Standards, and Sites Best Management Practices* BMP published by DWR (DWR 2016b). Currently, EMWD measures groundwater elevations twice a year using the measurement protocols outlined in the *Water Level Monitoring Plan for the San Jacinto Groundwater Basin* (EMWD 2011b). These protocols are similar to those suggested in the *Monitoring Protocols, Standards, and Sites Best Management Practices* BMP, and EMWD will adopt the best practices of each document for future monitoring events.

Consistent with the *Monitoring Protocols, Standards, and Sites Best Management Practices* BMP, depth to groundwater measurements are currently taken from surveyed reference points at the top of the well casing or sounding tube and are measured to a minimum accuracy of 0.1 foot. Currently depth to groundwater measurements are collected over a period of several months. Moving forward, efforts will be made to minimize the timeframe over which depth to groundwater measurements are collected such that the spring groundwater levels will be collected during the month of March, and the fall depth to groundwater measurements are collected during the month of October. The *Monitoring Protocols, Standards, and Sites Best Management Practices* BMP recommends depth to groundwater measurement be collected within as short a time as possible (DWR 2016b).

Some wells in the monitoring network are also extraction wells. For these wells, the pump will be turned off for 24 hours prior to taking a depth to groundwater measurement in order to obtain a static water level. If operational constraints prevent shutting the pump off for 24 hours during the sampling window of March or October, a depth to water measurement will not be collected at that well during the sampling event. The groundwater levels are measured manually with an electric sounding tape that is decontaminated after measuring each well. Some wells in the monitoring

network are instrumented with pressure transducers for higher temporal resolution sampling. The depth to groundwater data is entered into EMWD's database after undergoing a quality assurance and quality control review conducted by EMWD staff.

EMWD collects groundwater quality samples in accordance with EMWD's standard operating procedures. Samples are collected, using either a mobile or dedicated pump after depth to groundwater has been recorded, and a minimum of three (3) well volumes of water have been purged from the well. Groundwater quality samples are collected in dedicated bottles and are transported to EMWD's on-site state-certified laboratory. Typical samples are analyzed for 25 different constituents, including nitrate as nitrogen, and TDS. EMWD will continue to use the existing groundwater quality monitoring protocols when collecting groundwater quality samples as part of the reporting requirements for this GSP.

3.5.6 Representative Monitoring

Representative monitoring points (RMPs) for the Plan Area were selected from the wider network of monitoring wells established by EMWD and used to document groundwater conditions as part of the Groundwater Management Plan for the West San Jacinto Basin (EMWD 2019c). The broader network of wells that have been used to monitor conditions in the Plan Area are a mix of dedicated monitoring wells, groundwater production wells used for water supply, and groundwater extraction wells whose primary use is to improve the water quality of the Plan Area.

The criteria used for selection of the RMPs were:

- Primary designation as a monitoring well
- Length of historical data record at the RMP
- Inclusion of RMP in additional monitoring programs
- Geographic location of the RMP within the Plan Area
- Vertical distribution of well screen intervals for each RMP
- Long-term accessibility and well ownership considerations.

Using the criteria listed above, seven groundwater elevation RMPs and five groundwater quality RMPs were selected from the wells in the monitoring network (Figures 3-2 and 3-3; Table 3-1). Groundwater elevation RMPs are located in each of the groundwater production zones in order to capture groundwater conditions throughout the Plan Area. Groundwater quality RMPs are located in the Lakeview GMZ, in order to assess whether the current extent of 1,000 mg/L TDS iso-concentration contour is migrating to the north and east (see Section 3.2.3 Degraded Water Quality).

The RMPs were selected to ensure that the conditions measured at each site reflect the general conditions in the area. Historical groundwater elevations were reviewed in selecting the groundwater level RMPs (Figures 2-32 through 2-36) and historical groundwater quality data were reviewed when selecting the groundwater quality RMPs (Figure 3-4).

3.5.6.1 Groundwater Elevation RMPs

Seven wells: EMWD 74, EMWD 52, EMWD A1, EMWD Skiland 05, EMWD 94, Nutrilite 07, and UCR Scott, were selected to be RMPs for groundwater elevations in the Plan Area. With the exception of well EMWD 94, in which groundwater elevations were first measured in 2020, both absolute groundwater elevations and groundwater elevation trends at the seven groundwater elevation RMPs are representative of the groundwater elevations and trends in each of the groundwater production areas (Figures 2-32 through 2-36).

Groundwater elevation is related to groundwater in storage through the SJFM-2014 (EMWD 2016). Therefore, use of groundwater elevation as a proxy for groundwater in storage is adequate to assess groundwater conditions in the Plan Area. Groundwater elevation is also used as a proxy for land subsidence induced by groundwater production. Land subsidence in the Plan Area has the potential to occur both as a result of tectonic forcing and as a result of groundwater withdrawal (see Section 2.4.5 Subsidence). As a result, measuring groundwater elevations is a better proxy for land subsidence induced by groundwater withdrawals than measuring total land subsidence, because the tectonic and groundwater elevation components of the total subsidence measurement cannot be separated from each other.

In addition to the existing wells identified as RMPs for groundwater elevation, EMWD will construct several dedicated groundwater monitoring wells as part of the Perris North Basin Groundwater Contamination Prevention and Remediation Project (EMWD 2018). After construction, these wells will be incorporated into the broader groundwater elevation monitoring network. Data from these wells will be analyzed annually and one or more of these wells may be incorporated as a groundwater elevation RMP for the GSP in the future. Any well that is added to the current groundwater elevation RMPs must have a record of sufficient length to establish that groundwater conditions at that well are representative of groundwater conditions measured at other nearby wells.

EMWD will also evaluate the ongoing representativeness of the current RMPs during the 5-year GSP evaluation and update process. Current RMPs may be removed in the event that groundwater elevations at that RMP are found to no longer represent groundwater conditions in the surrounding aquifer, or if changes are made to access agreements or well construction. In the event that an RMP must be removed from the list, EMWD will undertake a review of potential replacement wells in the vicinity.

3.5.6.2 Groundwater Quality RMPs

Five wells: Nutrilite 07, Nutrilite 02, Nutrilite 04, Nutrilite 08, and John Bootsma, were selected to be RMPs for water quality in the Plan Area. TDS concentrations at the groundwater quality RMPs vary based on proximity to the 1,000 mg/L iso-concentration contour in the Lakeview GMZ (Figures 3-3 and 3-4). These wells are screened throughout the groundwater aquifer and adequately represent TDS concentrations in the area north and east of the 1,000 mg/L iso-concentration contour in the Lakeview GMZ (Table 3-10). This area is not currently experiencing groundwater quality impairment from TDS, and the groundwater quality RMPs were selected to act as sentinel wells that would provide data to assess whether the 1,000 mg/L iso-concentration contour is migrating to the north and east. Three of the groundwater quality RMPs, wells Nutrilite 02, Nutrilite 07, and Nutrilite 08 are also designated sentinel wells in the Perris II ROTF Monitoring and Reporting Plan (EMWD 2019c).

Table 3-10
Well Construction, Maximum TDS Concentration, and Mann-Kendall Trend Analysis at the Water Quality RMPs

RMP	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Maximum TDS Concentration (mg/L)	Maximum TDS Concentration Year	Mann-Kendall Trend
Nutrilite 07	390	700	860	2013	Decreasing
Nutrilite 02	-	-	645	1994	No Trend
Nutrilite 04	170	480	710	1996	Decreasing
Nutrilite 08	-	-	970	2013	Increasing
Bootsma, John	350	650	526	2018	Increasing

As discussed above, the representativeness of the water quality data collected from the current water quality RMPs will be evaluated during the 5-year GSP evaluation and update process. Current RMPs may be removed in the event that groundwater quality data at that RMP are found to no longer represent groundwater quality in the surrounding aquifer, or if changes are made to access agreements. In the event that an RMP must be removed from the list, EMWD will undertake a review of potential replacement wells in the vicinity of the RMP that was removed.

Groundwater quality RMPs may be added in the Perris North GMZ after operation of the Perris North Basin Groundwater Contamination Prevention and Remediation Project has begun. During implementation of the Perris North Basin Groundwater Contamination Prevention and Remediation Project, EMWD will collect data that will refine the current understanding of the lateral extent and migration potential of the co-mingled plumes in this area. These data will also be evaluated in the context of the GSP to determine if additional groundwater quality RMPs are required in the Perris North GMZ.

3.5.7 Monitoring Network Improvements

While the existing monitoring network satisfies the requirements to track groundwater conditions in the Plan Area and verify progress toward the sustainability goals, there are improvements that can be made to improve local spatial coverage.

3.5.7.1 Dedicated Monitoring Wells

The existing monitoring network includes long-screen production and agricultural wells, as well as dedicated monitoring wells. The network could be improved by constructing additional dedicated monitoring wells to supplement the understanding of groundwater quality and groundwater elevations in the aquifer. With additional dedicated monitoring wells, the existing production wells would be used for monitoring groundwater production and composite groundwater quality in the Plan Area.

3.5.7.2 Temporal Data Gaps in Water Level Measurements

The DWR Monitoring Protocol BMP (DWR 2016a) states the following:

> Groundwater elevation data … should approximate conditions at a discrete period in time. Therefore, all groundwater levels in a basin should be collected within as short a time as possible, preferably within a 1 to 2-week period.

The DWR Monitoring Networks BMP (DWR 2016b) states the following:

> Groundwater levels will be collected during the middle of October and March for comparative reporting purposes.

Groundwater elevation monitoring currently occurs over a longer time period than the two-week window recommended by the DWR guidance documents. EMWD will collect seasonal groundwater elevations within a single month, March for the spring, and October for the fall, but staffing constraints currently prohibit collection of groundwater elevations from the entire monitoring network within a two-week period. EMWD will endeavor to collect groundwater elevations from the RMPs within a two-week period in March and October.

Installation of pressure transducers capable of recording daily groundwater conditions in key monitoring wells could alleviate the need for staff to take manual measurements from every well in the monitoring network within a two-week window. Pressure transducers could be downloaded after the two-week window has passed and recorded data from within the two-week window would be incorporated into groundwater elevation maps and calculations of groundwater in storage. In the event that funding becomes available and pressure transducers can be installed in select monitoring wells, the recommended two-week window during which groundwater elevations should be collected is March 9 to 22 for the spring and October 9 to 22 for the fall.

3.5.7.3 Groundwater Extraction Metering

Currently groundwater extraction volumes are metered at 43 of the 57 major production wells in the Plan Area (EMWD 2019c). Groundwater extractions at the remaining wells are estimated by EMWD based on property acreage, crop type, and livestock count (EMWD 2019c). In order to better characterize the aquifer response to groundwater production, EMWD is planning to require meters be installed (or offer to install meters) on all wells that produce greater than 2AFY from the Plan Area.

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EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin Groundwater Sustainability Plan

Legend

- San Jacinto Groundwater Basin
- Plan Area

Median Household Income

- DAC
- SDAC

- Representative Monitoring Points
- Domestic Wells with Screened Interval Information
- Domestic Wells Missing Screen Interval

UCR Scott
1464.3
1300/1350
Well Name
November 2018 Water Level (ft MSL)
Minimum Threshold/Measurable Objective

1941 - 1789 Top of Screen - Bottom of Screen (ft MSL)

** Water Level Elevation taken from nearby well Bean Reservoir/12th*

1775 - 1555
1849 - 1689
1870 - 1790
1847 - 1822
1791 - 1771
1867 - 1707
1835 - 1485
1893 - 1726
1862 - 1687
1667 - 1262
1828 - 1663
1708 - 1638
1703 - 1498
1678 - 1558
1785 - 1665
1785 - 1685
1782 - 1602
1637 - 1464
1890 - 1690
1651 - 1478
1760 - 1700
1523 - 1444
1552 - 1402
1457 - 1417
1562 - 1322
UCR Scott
1464.3
1300/1350
1466 - 1424
1210 - 760
1217 - 1017
1068 - 728
1093 - 661
1437 - 1357
1167 - 607
1262 - 942
1421 - 1061
Nutrilite 07
1241.5
1100/1150
Mead Valley
EMWD 52 Follico
1390.8
1200/1250
1333 - 1231
1303 - 1103
Lakeview
EMWD 94
1435.0*
1200/1250
1331 - 1151
1282 - 1022
EMWD Skiland 05
1345.5
1200/1250
1338 - 1268
UCR Scott
1464.3
1300/1350
EMWD A1
1365
1200/1250
Romoland
Homeland
1580 - 1565
1572 - 1540
1588 - 1578
1599 - 1565
1571 - 1554
1583 - 1539
1317 - 1227
1254 - 1184
1372 - 1252
1285 - 1145
1286 - 1226
1379 - 1299
1310 - 1250
1408 - 1348
1489 - 1479
1336 - 1098
Winchester
1366 - 1304
EMWD 74 Menifee 04
1355.8
1200/1250
1359 - 1179
1377 - 1177
1271 - 1041
1484 - 1464
1403 - 1283
1359 - 1259
1295 - 1235
1168 - 1088

SOURCE: California Department of Water Resources, Esri

0 1 2 Miles

FIGURE 3-1

Domestic Wells in the Plan Area

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan

Legend

- San Jacinto Groundwater Basin
- Plan Area
- Production Area

Adjudicated Areas

- Hemet-San Jacinto Basin
- San Bernardino Basin Area
- Santa Margarita River Watershed

2018 Monitoring Network Type

- Quality
- Level
- Quality, Level
- Quality, Extraction
- Level, Extraction
- Extraction
- Quality, Level, Extraction

2018 GW Extractions [AF]

- < 100
- 100 - 250
- 250 - 500
- 500 - 1000
- >1000

Water Level Representative Monitoring Points

Moreno Valley Production Area

Nuevo/Lakeview Production Area

North Perris Production Area

South Perris Production Area

Menifee Production Area

UCR Scott

Nutrilite 07

EMWD 52 Follico

EMWD 94

EMWD Skiland 05

EMWD A1

EMWD 74 Menifee 04

Moreno Valley
Loma Linda
Bryn Mawr
Grand Terrace
Box Springs Mountain Reserve
San Timoteo Canyon Park
Norton Younglove Reserve
Badlands Landfill
Oak Valley Golf Club
Morongo Golf Club
March Air Reserve Base
Lake Perris State Recreation Area
Lake Perris
Nuevo
Perris
Homeland
Sun City
Quail Valley
Menifee
Menifee Lakes Country Club
Canyon Lake
Elsinore
Kabian Park
Double Butte Park
Winchester
Diamond Valley Lake
Hemet-Ryan Airport
Perris Valley Airport
THE BADLANDS
LAKEVIEW MOUNTAINS
SAN JACINTO
DOUBLE BUTTE
MEAD VALLEY
PERRIS VALLEY
MENIFEE VALLEY
DIAMOND VALLEY

SOURCE: EMWD 2019

0 1 2 Miles

FIGURE 3-2

Water Level Representative Monitoring Points

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan

Legend

- San Jacinto Groundwater Basin
- Plan Area
- Groundwater Management Zone

Adjudicated Areas

- Hemet-San Jacinto Basin
- San Bernardino Basin Area
- Santa Margarita River Watershed

- 2018 Water Quality Monitoring Network
- >1,000 mg/L TDS
- Water Quality Representative Monitoring Points

Perris North GMZ

San Jacinto Lower Pressure GMZ

Lakeview GMZ

Perris South GMZ

Menifee GMZ

Nutrilite 04

Nutrilite 07

Bootsma, John

Nutrilite 08

Nutrilite 02

SOURCE: EMWD 2019

FIGURE 3-3

Water Quality Representative Monitoring Points

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

emwd EASTERN MUNICIPAL WATER DISTRICT

0 1 2 Miles

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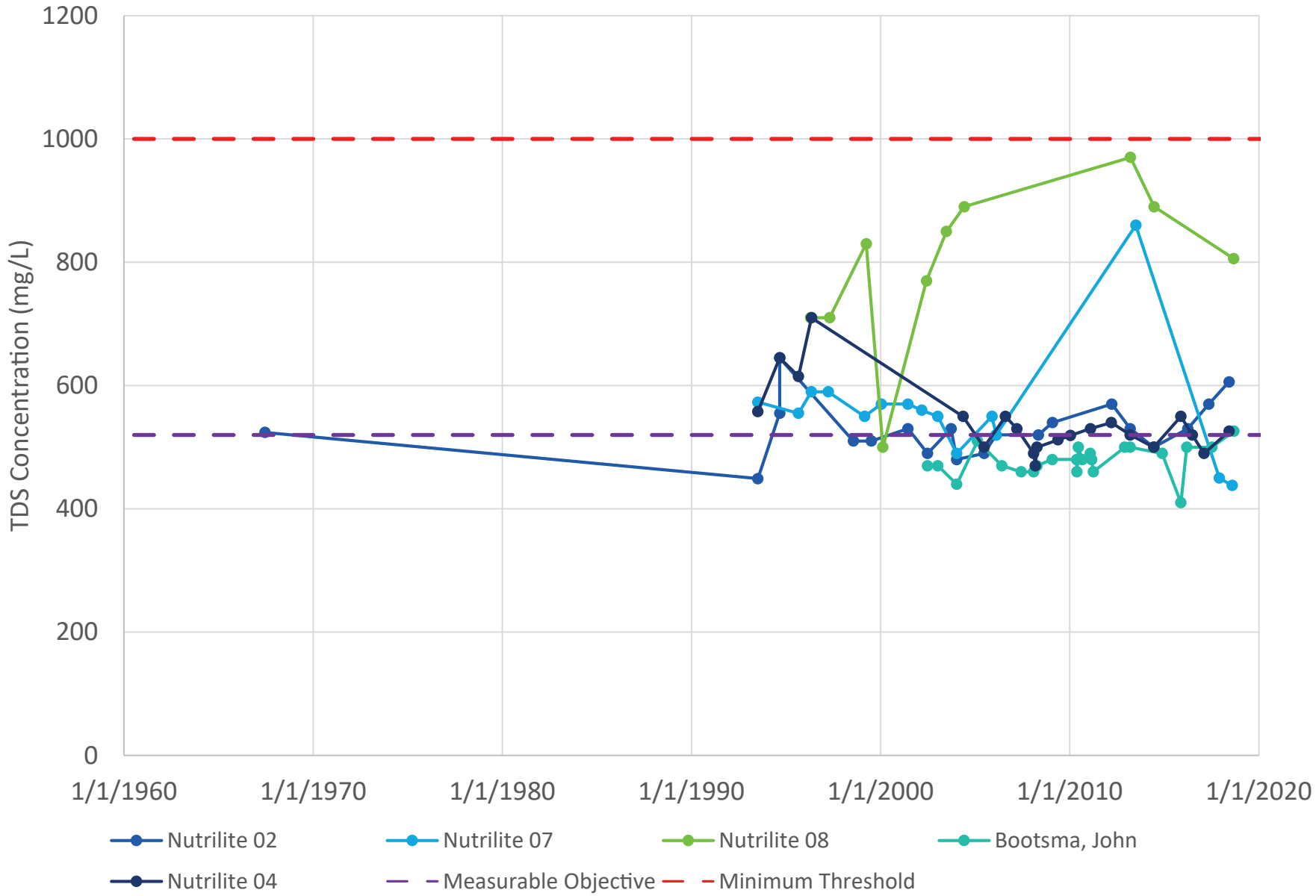

SOURCE: EMWD

FIGURE 3-4

Representative Monitoring Point TDS Water Quality Hydrographs

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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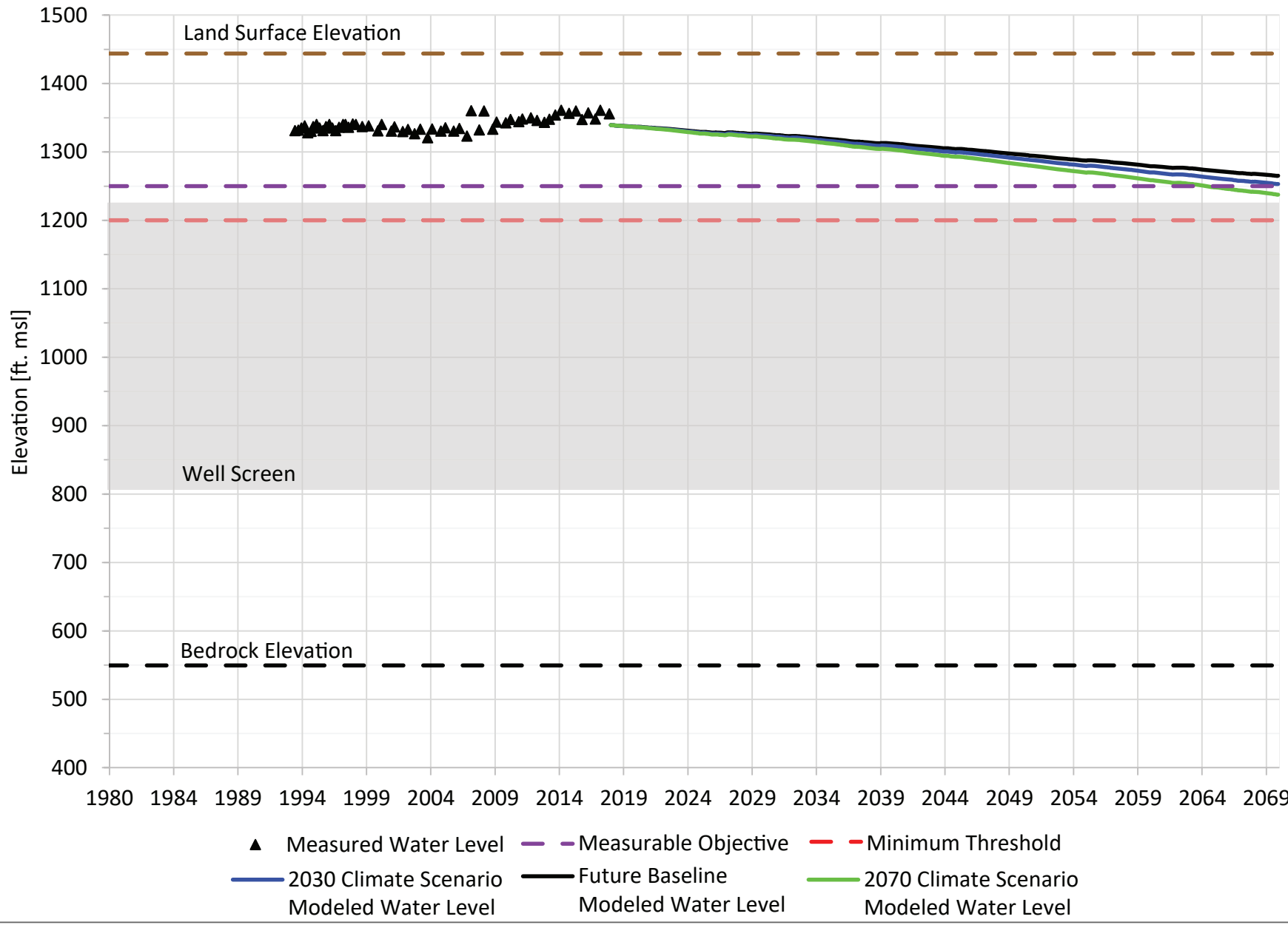

SOURCE: EMWD

FIGURE 3-5

Historical and Projected Water Levels at EMWD 74 Menifee 04

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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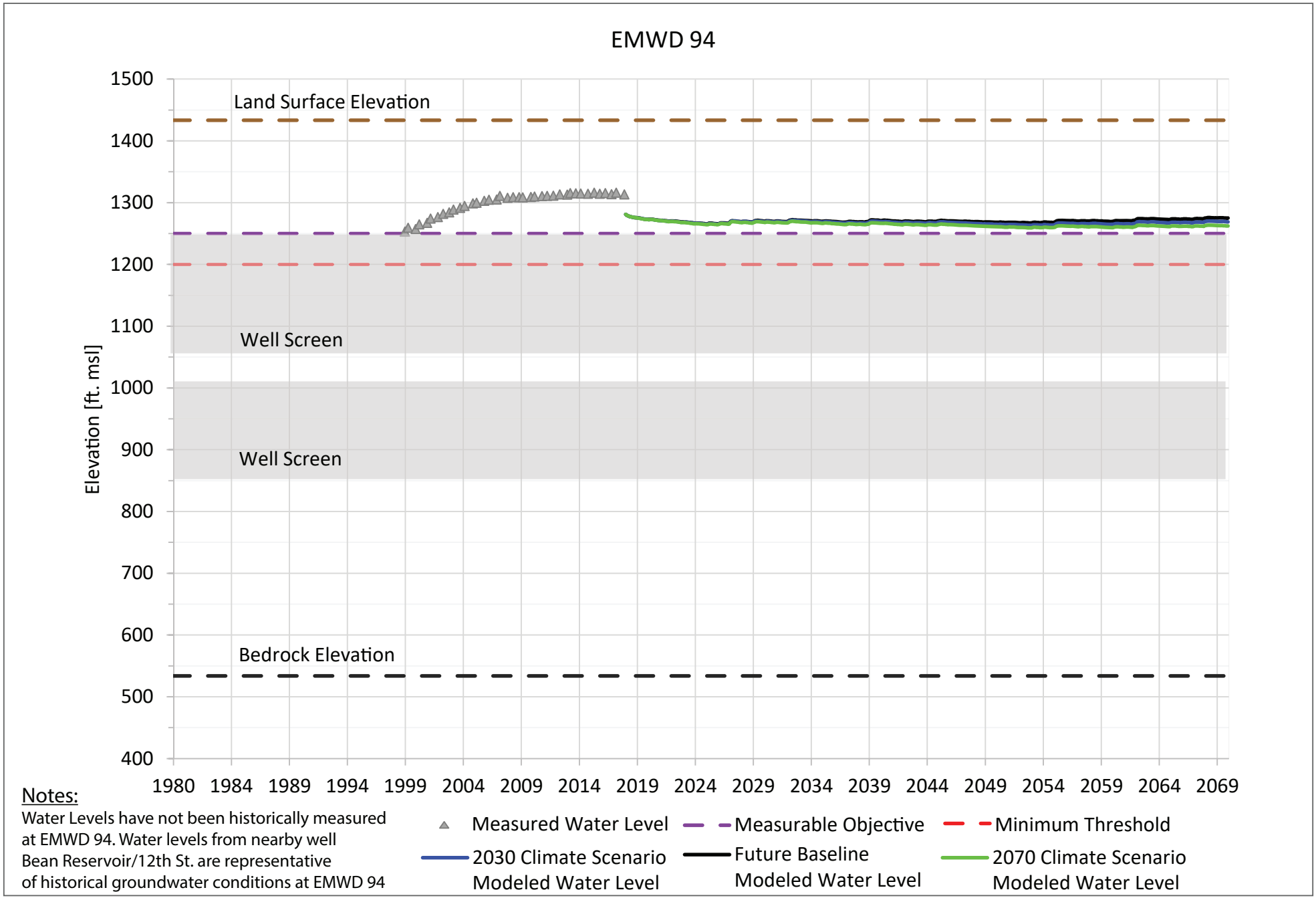

SOURCE: EMWD

FIGURE 3-6

Historical and Projected Water Levels at EMWD 94

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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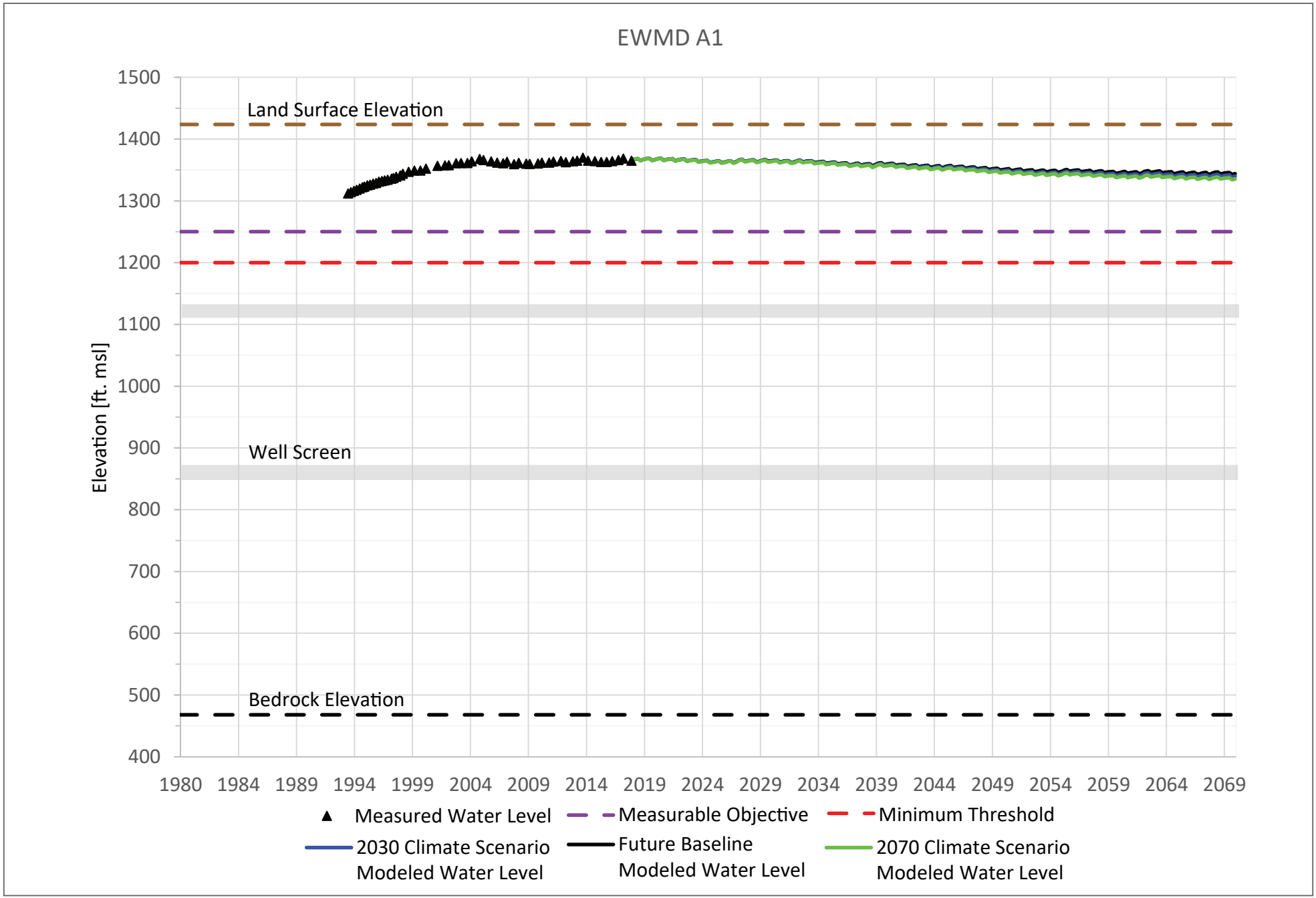

SOURCE: EMWD

FIGURE 3-7

Historical and Projected Water Levels at EMWD A1

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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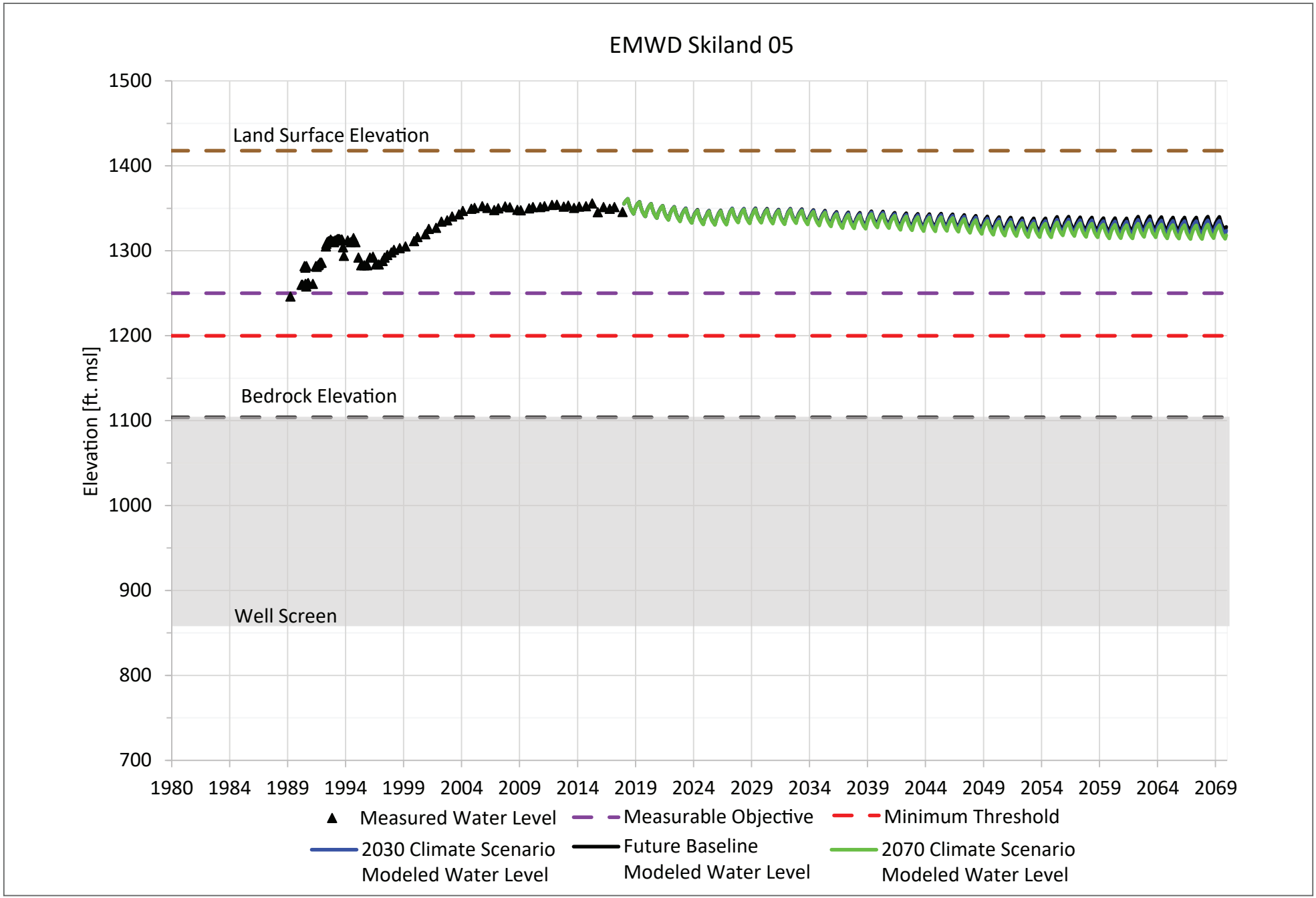

SOURCE: EMWD

FIGURE 3-8

Historical and Projected Water Levels at EMWD Skiland 05

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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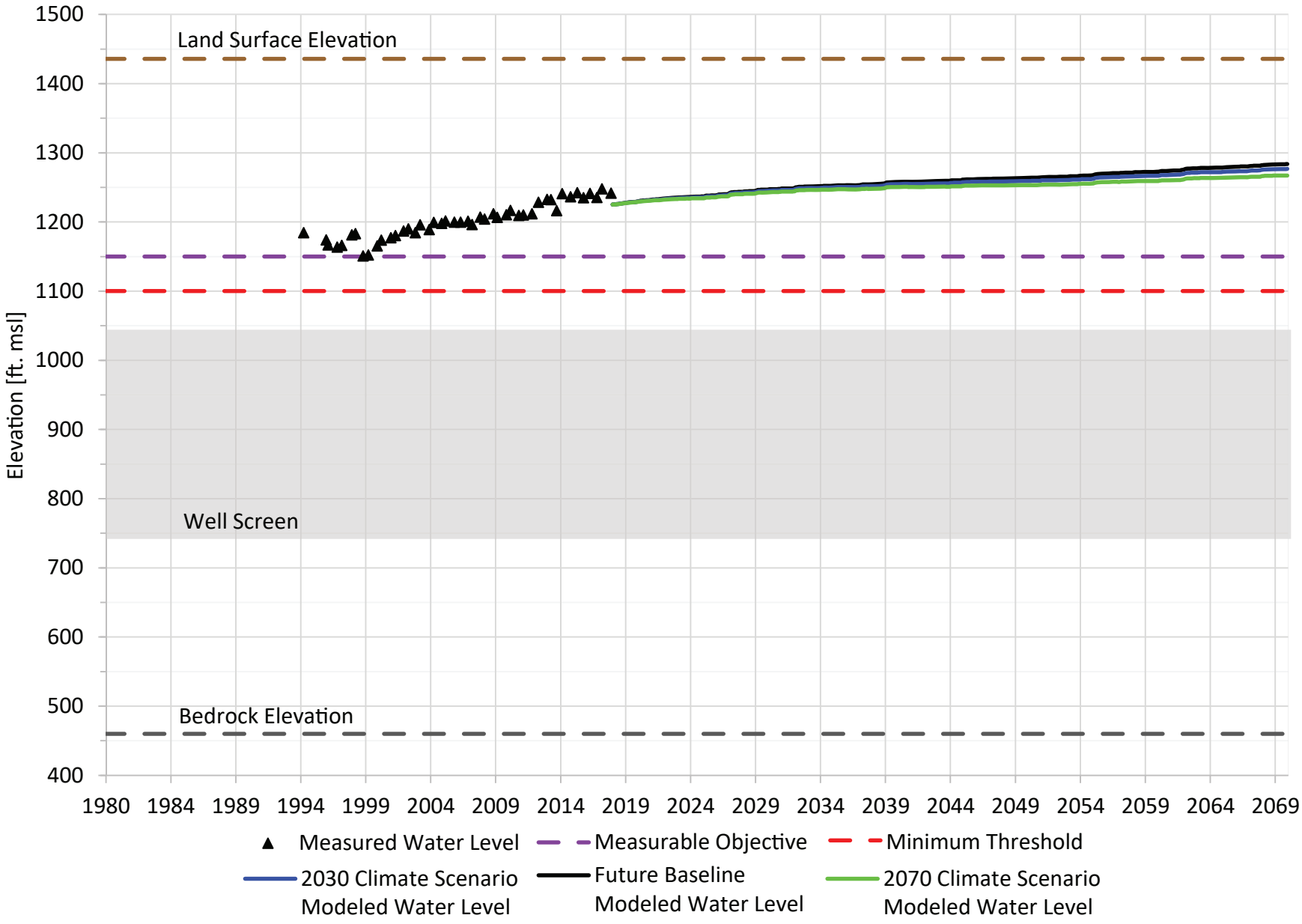

SOURCE: EMWD

FIGURE 3-9

Historical and Projected Water Levels at Nutrilite 07

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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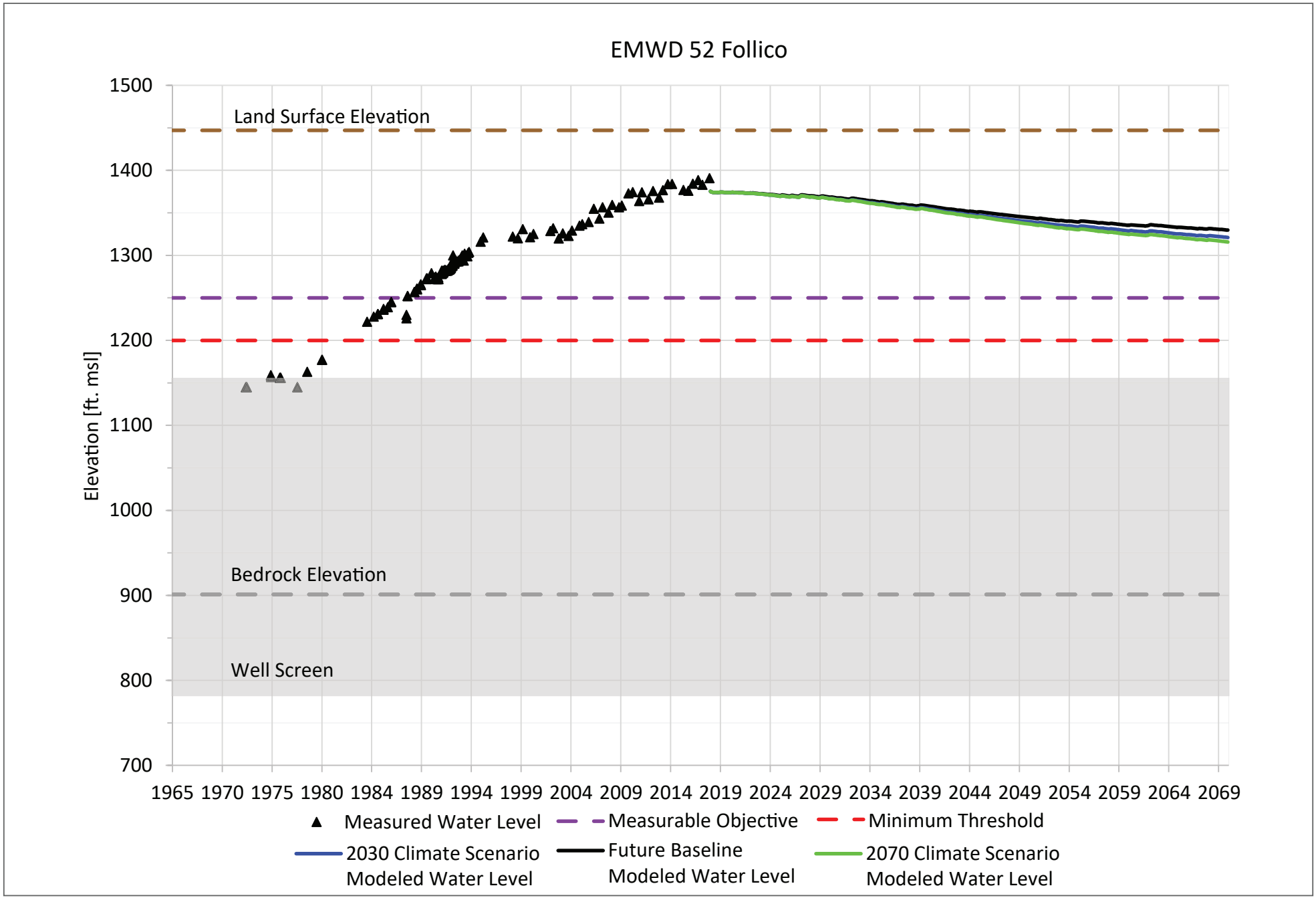

SOURCE: EMWD

FIGURE 3-10

Historical and Projected Water Levels at EMWD 52 Follico

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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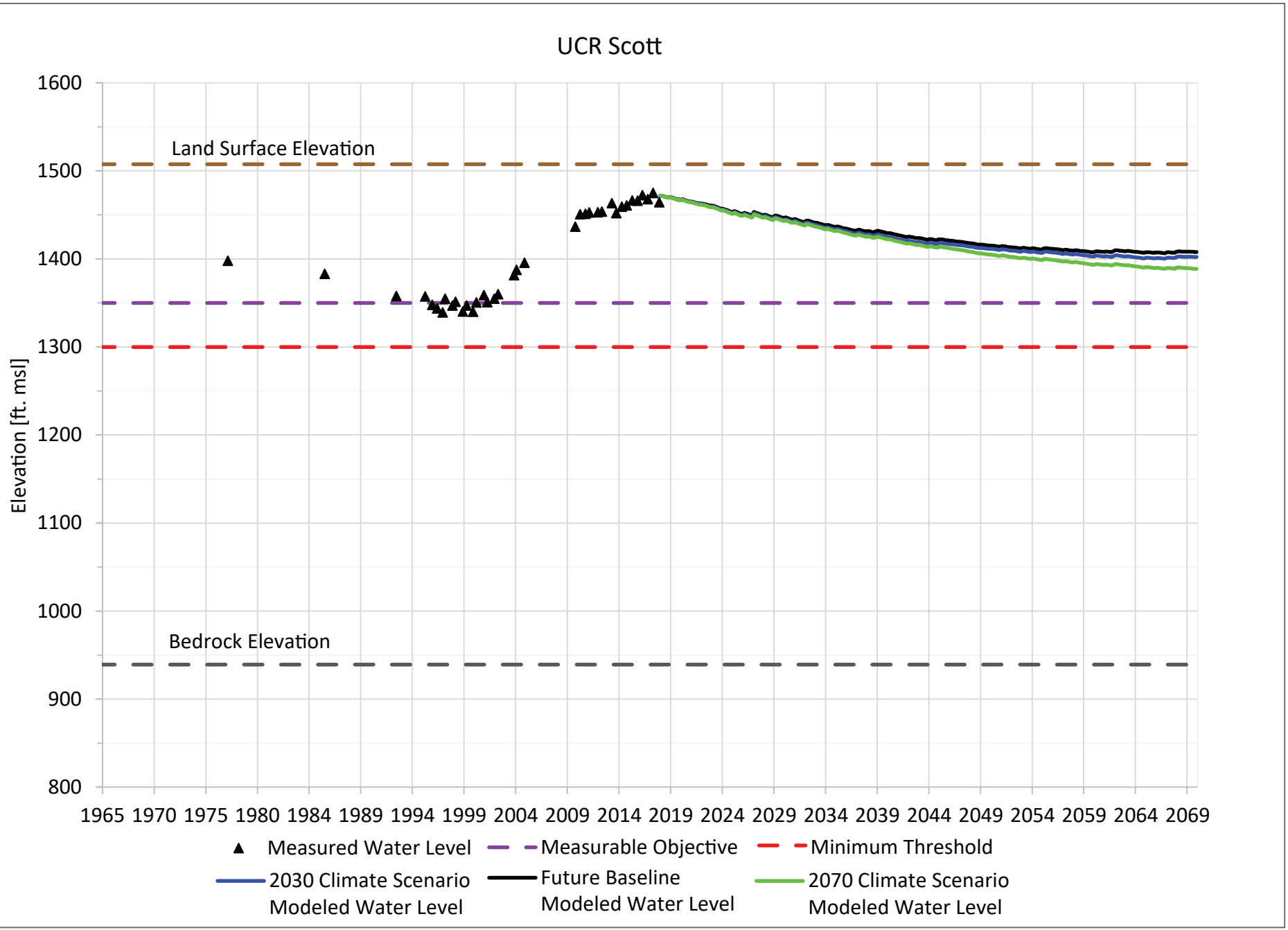

SOURCE: EMWD

FIGURE 3-11

Historical and Projected Water Levels at UCR Scott

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin

Groundwater Sustainability Plan

Legend

- Plan Area
- San Jacinto Groundwater Basin
- Production Area
- MARB wells

EMWD Monitoring Wells 2019

- Level
- Quality
- Level / Quality
- Extraction
- Extraction / Level
- Extraction / Level / Quality
- Extraction / Quality

SOURCE: EMWD

0 1 2 Miles

FIGURE 3-12

Plan Area Groundwater Monitoring Network

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin

Groundwater Sustainability Plan

Legend

- Plan Area
- San Jacinto Groundwater Basin
- Production Areas
- 1 square mile grid
- Groundwater Monitoring Network - Water Level

Water Level Monitoring Well Density

Number of Wells Per Square Mile

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Moreno Valley Production Area

Nuevo/Lakeview Production Area

North Perris Production Area

South Perris Production Area

Menifee Production Area

SOURCE: Esri, EMWD

0 1 2 Miles

FIGURE 3-13

Groundwater Monitoring Network Density - Water Level

Groundwater Sustainability Plan for the San Jacinto Groundwater Basin

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EASTERN MUNICIPAL WATER DISTRICT

San Jacinto Groundwater Basin
Groundwater Sustainability Plan

Legend

- Plan Area
- San Jacinto Groundwater Basin
- Groundwater Management Zone
- 1 square mile grid
- Groundwater Monitoring Network - Water Quality

Water Quality Monitoring Well Density

Number of Wells Per Square Mile

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Perris North

San Jacinto Lower Pressure

Lakeview

Perris South

Hemet South

Menifee

Moreno Valley

SOURCE: Esri, EMWD

emwd EASTERN MUNICIPAL WATER DISTRICT

0 1 2 Miles

FIGURE 3-14

Groundwater Monitoring Network Density - Water Quality

Groundwater Sustainability Plan for theSan Jacinto Groundwater Basin

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