

Appendix 3.10-2

**Evaluation of Potential Effects of Construction and
Operational Water Demand on Regional Groundwater
Supply**

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TECHNICAL MEMORANDUM

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From: Andy Kopania

Subject: Evaluation of Potential Effects of Construction and Operational Water Demand on
Regional Groundwater Supply
Las Camas Solar Project

Summary

Construction and Operational water for EDP Renewables' Las Camas Solar Project (the "Project") will be provided by an existing irrigation well on AKT's Mid-Cal property (referred to herein as the Mid-Cal well). The most recent records available indicate that the Mid-Cal well produces approximately 502 acre-feet per year for irrigation. Construction water demand for the Project is estimated to be 370 acre-feet over an approximately 70-week period, equivalent to 275 acre-feet per year for 1.35 years. Operational water demand is estimated to be five acre-feet per year over an approximate 30-day period each year. The Mid-Cal well is in the Delta-Mendota Subbasin of the San Joaquin Valley Groundwater Basin and within the Northern and Central Delta Mendota Groundwater Sustainability Plan area. Construction water demand and irrigation water demand would occur simultaneously during the Project construction period, such that there would be no effect on irrigation and agricultural production.

The first-year (i.e., 2024) construction water demand for the Project is estimated to be 245 acre-feet, and is equivalent to approximately 0.14 percent and 0.24 percent of the total groundwater inflow and annual average groundwater pumping volume, respectively, for the Northern and Central Delta Mendota Groundwater Sustainability Plan area. The 2025 construction water demand for the Project of 125 acre-feet is equivalent to half the 2024 amount. The five acre-feet per year operational water demand is less than 0.003 percent and 0.005 percent of the total groundwater inflow and annual average groundwater pumping volume, respectively, in the Northern and Central Delta Mendota Groundwater Sustainability Plan area. These values represent such a small proportion of the groundwater inflow and average annual pumping that the Project's effects on groundwater volumes and groundwater sustainability within the Subbasin are considered to be de minimis. Therefore, use of the Mid-Cal well to supply water

for the Project would not substantially decrease groundwater supplies or interfere with groundwater recharge, such that the Project would not impede sustainable groundwater management and would not conflict with or obstruct implementation of the Groundwater Sustainability Plan.

An analytical assessment comparing the volume of groundwater pumping from the Project on changes in groundwater storage, as defined in the GSP, was conducted to quantify the effects of Project water use on sustainability criteria established for the Upper Aquifer in the nearest GSP monitoring well to the Project site and Mid-Cal well. The findings of this analytical assessment indicate that the cumulative effects of groundwater pumping for the Project would lower groundwater levels by less than 1.5 feet compared to no-project conditions. The Project water demand would not chronically or persistently cause a lowering of groundwater levels and would not cause levels to fall below quantitative sustainability criteria any more frequently than they would without the Project. Thus, the groundwater demand for the Project would not conflict with the GSP and would not interfere with sustainable management of the GSP area.

Most of the water use for the Project would occur outside of the boundaries of the groundwater Subbasin, such that a groundwater export permit consistent with Merced County's Groundwater Mining and Export ordinance may be required. No new wells will be drilled and no existing wells will be modified to provide the Project water needs. Use of the Mid-Cal well to provide the construction and operational water for the Project would not result in groundwater "mining" as defined in the County Code. Therefore, issuance of a groundwater export permit by the County Division of Environmental Health for the Project is appropriate and consistent with the County Code.

Analysis

Construction and Operational water for EDP Renewables' Las Camas Solar Project (the "Project") will be provided by an existing irrigation well on AKT's Mid-Cal property (referred to herein as the Mid-Cal well). The Mid-Cal well is located just to the southeast of the intersection of State Route 33 and McCabe Road, north of Santa Nella in Merced County, California. The well currently provides water to irrigate corn used for dairy cattle feed. The Mid-Cal well is reported by AKT to be approximately 100 feet deep and to produce approximately 1,000 gallons per minute (gpm). Pumping records provided by AKT for August 2021 to August 2022 show that the Mid-Cal well was pumped for approximately 14 days in February, 17 days in March, 14 days in May, 54 days in late June to mid-September, and 14 days in late November to early December. The total volume pumped was approximately 502 acre-feet. During use of the Mid-Cal well to supply water for the Project, irrigation will not be curtailed or reduced in any way, such that there will be no effect on agricultural production.

The Mid-Cal well is located within the Delta-Mendota Subbasin (Subbasin) of the San Joaquin Valley Groundwater Basin, identified as Subbasin No. 5-022.07 as defined by the California Department of Water Resources (DWR, 2016). The entire subbasin encompasses approximately 765,000 acres (NCDM, 2022). The Delta-Mendota Subbasin is classified as a high-priority, critically-overdrafted basin under the Sustainable Groundwater Management Act (DWR, 2020). The Delta-Mendota Subbasin has been divided into several groundwater sustainability plan (GSP) areas for administration and management purposes. The Mid-Cal well is located in the Northern and Central Delta Mendota GSP Group boundary (referred to herein as the GSP Area) (DWR, 2022), which occupies approximately 316,000 acres of the Delta-

Mendota Subbasin (see Figure 1). As indicated on Figure 1, the GSP Area extends over 100 miles from north to south, primarily along the west side of the Subbasin, and includes diverse and discontinuous regions. The Mid-Cal well is within the part of the GSP Area administered by the Central Delta-Mendota Groundwater Sustainability Agency (GSA) and is also within the planning boundaries of the Santa Nella County Water District. Part of the Project site is also within the same GSP Area within the Subbasin, as indicated on Figure 2.

The subbasin has two principal aquifers separated by an aquitard referred to as the Corcoran Clay. The Upper Aquifer occurs above the Corcoran Clay and is typically unconfined. The Lower Aquifer is confined below the Corcoran Clay. The depth to the Corcoran Clay in the subbasin ranges from 150 feet to 350 feet below ground surface (ft bgs). The Corcoran Clay is deepest to the south and extends west to the area of the O'Neill Forebay to the southwest of Santa Nella (see Figure 3). Based on information in the NCDM (2022) GSP, the Mid-Cal well produces groundwater from the unconfined Upper Aquifer. The depth to the Corcoran Clay in the area of the Mid-Cal well is approximately 100 ft bgs to 150 ft bgs.

Groundwater elevation data are available for several wells in the vicinity of the Mid-Cal well (DWR, 2022). Figures 4 through 6, below, are hydrographs from three wells located approximately 1,200 feet northeast, 2,000 feet northwest, and 200 feet west of the Mid-Cal well, respectively. These three wells combined provide water level data from 1958 to 1991 and from 2004 to 2007. Data within one mile of the Mid-Cal well covering 1991 to 2004 were not available from DWR or the U.S. Geological Survey at the time this analysis was prepared.

For the well to the northeast (Site Code 371174N1210143W001), data are available from 1958 to 1981. As shown on Figure 4, the groundwater elevation in this well varied between elevations of 130 ft and 143 ft¹ over the period of record. The depth to groundwater varied from 10 to 23 ft bgs. The groundwater elevations generally increased from the early 1960s until 1976 but then decreased by six to eight feet due to the 1976-1977 drought. After the 1976-1977 drought, the groundwater levels increased through 1981.

For the well to the northwest (Site Code 371202N1210166W001), data are available from 1958 to 1991. As shown on Figure 5, the groundwater elevation in this well varied more than in the other two wells (Figures 4 and 6). From 1958 to 1976, the groundwater elevation increased from 136 ft to 149 ft (depths to water of about 14 ft bgs to 1.5 ft bgs). The groundwater elevation then dropped 17 feet during the 1976-1977 drought to an elevation of 133 ft. After the 1976-1977 drought, groundwater levels remained relatively stable at an elevation of about 141 ft (depth to water of 10 ft bgs) until 1988. From 1988 to 1991, which was part of a significant multi-year drought period, groundwater elevations decreased by 15 feet, to an elevation of 126 ft, or a depth to groundwater of 25 ft bgs.

For the well to the west (Site Code 371152N1210157W001), data are available from 2004 to 2007. As shown on Figure 6, the groundwater elevation from this well was consistently within about 0.5 foot of elevation 140 ft, or a depth of approximately 14 ft bgs. This elevation is comparable to non-drought groundwater levels in the other two wells (Figures 4 and 5).

¹ No datum was provided by DWR (2022). However, based on the dates of the measurements, it is presumed that the elevation data are relative to the NGVD29 datum.

While the groundwater elevation in the Upper Aquifer has risen to elevations that are close to the ground surface, the GSP (NCDM, 2022) does not identify any interconnected surface water systems or groundwater-dependent ecosystems in the vicinity of the Mid-Cal well.

According to the GSP (NCDM, 2022), the Upper Aquifer within the Delta-Mendota Subbasin has a historic water budget of -42,000 acre-feet per year over the period from 2003 to 2012 (i.e., groundwater outflows have exceeded groundwater inflows by 42,000 acre-feet on average each year). The current water budget for the Upper Aquifer is estimated to be -73,000 acre-feet per year. However, incorporating potential effects of climate change and the results of Projects and Management Actions identified in the GSP (NCDM, 2022), the Upper Aquifer water budget is projected to improve to -4,000 acre-feet per year on average over the period from 2014 to 2070. As shown in Table 5-33 of the GSP (NCDM, 2022), the groundwater budget analysis from 2014 to 2070 includes wet, normal, single dry, and multiple dry year conditions. Thus, comparison of the Project water demands with the long-term groundwater budget presented in the GSP (NCDM, 2022) is an appropriate approach to evaluate the available groundwater supply in accordance with the requirements of Senate Bills 610 and 1262 for the Water Supply Assessment report.

As discussed above, the GSP Area extends over 100 miles from north to south along the west side of the San Joaquin Valley. Thus, groundwater conditions can vary appreciably in different parts of the Subbasin. For example, while land subsidence due to excessive withdrawals of groundwater is of major concern in the southern part of the Subbasin and GSP Area, the GSP (NCDM, 2022) shows that there has been no appreciable land subsidence within at least 10 to 15 miles of the area of the Mid-Cal well (see Figure 5-114 of NCDM, 2022).

Likewise, the hydrographs in Figures 4 through 6 do not show long-term declines in groundwater elevations. To the contrary, from at least 1958 to 1976, groundwater levels in the vicinity of the Mid-Cal well were stable to slightly increasing. While drought periods resulted in temporary declines in groundwater levels of as much as 17 feet, the groundwater levels in the vicinity of the Mid-Cal well appear to consistently rebound to an elevation of approximately 140 ft after the drought periods. The rebound of the groundwater levels to a common elevation demonstrates that overdraft is not occurring in the area of the Mid-Cal well and that the Upper Aquifer water budget is in balance. This conclusion is further supported by the numerous hydrographs provided on Figure CC-42 of the GSP Common Chapter (Woodard & Curran, 2022, which is Appendix B of NCDM, 2022)², which do not show any wells in the GSP Area with significant or persistent declining trends. To the contrary, each of the hydrographs on Figure CC-42 of the GSP Common Chapter (Woodard & Curran, 2022) show that groundwater levels have been stable to increasing since the mid-1980s.

According to DWR (2023), there are very few groundwater users in the vicinity of the Mid-Cal well. Within one mile, there are reported to be six domestic wells, five groundwater production wells (i.e., irrigation wells), and two public supply wells. At distances between one to two miles from from the Mid-Cal well, there are no more than eight domestic wells and six groundwater

² An attempt was made to include a copy of Figure CC-42 from Woodard & Curran (2022) in this document. However, the graphics resolution of the original document posted online by NCDM is insufficient to include that figure herein. The reader is referred to the link in the References Cited section for access to Figure CC-42.

supply wells per square mile, and no public supply wells. Thus, there are not a significant number of other users reliant on groundwater in the vicinity of the Mid-Cal well.

Comparison of Project Effects on Groundwater Levels with GSP Sustainability Criteria

To assess the potential extent of the effect of pumping the Mid-Cal well, a drawdown simulation was conducted as part of this evaluation using the Theis equation (Domenico and Schwartz, 1990; Freeze and Cherry, 1979). The Theis Equation can provide the total drawdown at any distance from a pumping well at different times since pumping begins. The longer the duration of continuous pumping, the greater the amount of drawdown at a given distance from the well. However, once pumping ceases, the water level recovers to the pre-pumping level within about the same time that the well was pumped.

As described above, the Mid-Cal well is typically pumped for periods of 14 days to 54 days for current irrigation needs. During the Project construction phase, it is anticipated that 4,000-gallon water trucks would be filled from a tap on the irrigation line. Since the Mid-Cal well pumps at 1,000 gpm, the intermittent filling of a water truck during irrigation periods would not alter the irrigation pumping periods in any measurable way. During periods when the Mid-Cal well is not being pumped for irrigation, the well would only need to be pumped for four minutes at a time to fill 4,000-gallon water trucks as needed. Thus, the longest individual pumping durations during the construction phase of the Project would be the same as under existing conditions, ranging from 14 days to 54 days.

Figure 7 shows the results of the Theis Equation simulation for 14-day and 54-day pumping periods for the Mid-Cal well. After 14 days of pumping, the drawdown, or lowering, of the groundwater level would be about 0.85 foot (about 10 inches) at a distance of one mile and 0.13 foot (about 1.5 inches) at a distance of two miles from the well. After 54 days of pumping, the drawdown, or lowering, of the groundwater level would be about two feet at a distance of one mile and 0.8 foot (about 9.5 inches) at a distance of two miles from the well. As shown on the hydrographs in Figures 4 through 6, below, the groundwater level fluctuates as much as five to 10 feet on a seasonal basis under existing conditions. The minimal and temporary drawdowns from pumping to fill water trucks during the construction phase of the Project would not have any noticeable effect on the water levels and volume of groundwater available at the very limited number of wells within one to two miles of the Mid-Cal well.

The nearest Upper Aquifer well to the Project site identified in the GSP for assessment of chronic lowering of groundwater levels and, by proxy, reduction in groundwater storage, is designated as Well 07-003 (see Figure 6-2 and Tables 6-1 and 6-2 of the GSP [NCDM, 2022]). Well 07-003 is approximately five miles southeast of the Project site and 9.35 miles southeast of the Mid-Cal well. As part of the preparation of this Technical Memorandum, an additional analytical assessment was conducted to compare the measured groundwater levels in Well 07-003 with groundwater levels that may occur as a result of groundwater pumping for the Las Camas Project.

To conduct the analytical assessment, groundwater elevation data from Well 07-003 were obtained from the SGMA Data Viewer website (DWR, 2022). Data are available from September 2011 to November 2022. The groundwater elevation data were grouped by water

year³ and then categorized by water year type (e.g., wet, average, dry, or critically dry) and the change in groundwater storage in the Upper Aquifer as defined in the GSP (NCDM, 2022, Tables 5-22, 5-25, and 5-34). The GSP considers water years through 2012 to be part of the historical analysis period, 2013 to represent existing conditions, and 2014 and beyond to be part of the future projections for baseline conditions and for inclusion of the effects of climate change and of projects and management actions (CC and P&MA) identified in Chapter 7 of the GSP (NCDM, 2022).

Project water demands will be approximately 245 acre-feet the first year, 125 acre-feet the second year, and five acre-feet per year for the remainder of the Project life, which is anticipated to be greater than 20 years. The effect of groundwater pumping on groundwater levels and groundwater storage was assessed by subtracting the Project water demand for a given year from the GSP estimate of the change in groundwater storage for that year. The ratio of this reduced groundwater storage value to the change in storage without the Project was then applied to the difference in groundwater elevations between each measurement date for each water year. For successive dates where the groundwater level in Well 07-003 increased, the magnitude of increase was reduced by the ratio of the two groundwater storage values, whereas for successive dates where the groundwater level in Well 07-003 decreased, the magnitude of the decrease was enhanced by the ratio of the two groundwater storage values.

The existing groundwater elevation data from Well 07-003 and the groundwater storage projections from 2012 to 2022 from the GSP were used as the basis to predict Project effects, consistent with the GSP evaluations of past, existing, and future conditions. As an example, in 2012, the GSP estimates that the groundwater storage in the Upper Aquifer decreased by 105,000 acre-feet. If Project startup occurred at the beginning of that water year, the 245 acre-feet first-year demand represents 0.233 percent of the change in storage. From March 20, 2012, to April 23, 2012, the groundwater elevation increased from 87.86 ft msl to 105.63 ft msl, or 17.77 feet. However, due to the reduction in groundwater storage of 245 acre-feet during the first year of the Project, the groundwater level would have only increased by 17.729 feet. By May 17, 2012, the groundwater elevation had decreased to 86.67 ft msl, or 18.96 feet lower than the prior month's measurement. Due to the pumping for the Project and the related reduction in groundwater in storage, the groundwater decrease due to the Project would have been 19.004 feet. While groundwater elevations are typically measured and reported to the nearest hundredth of a foot (i.e., two decimal places), due to the small percentage changes and the importance of cumulative effects over time, this analysis was conducted to the nearest thousandth of a foot (i.e., three decimal places).

The analytical assessment described in the above paragraphs was conducted for two different GSP conditions and three different Project startup timing scenarios. For the GSP conditions, changes in groundwater storage were considered for both baseline conditions and for conditions where CC and P&MA were taken into consideration (NCDM, 2022). For Project startup, Scenario 1 used 2012 as the initial year of construction, which represents construction and initial operation during a multiple dry year period. Scenario 2 used 2014 as the initial year of construction, which represents construction during a period of successive critically dry years.

³ A water year extends from October 1 of a calendar year to September 30 of the subsequent calendar year. A water year provides a better representation of rainfall and hydrologic conditions in California than a calendar year does. In this document, a water year is referred to by the year in which it ends. Thus, the period from October 1, 2016, to September 30, 2017 is referred to herein as the 2017 water year.

Scenario 3 used 2016 as the initial year of construction, which represents construction and initial operation during a more “normal” climatic cycle of alternating wet, normal, and dry years.

The analytical assessment results are presented in Table 1 and shown on Figures 8 through 13. Even with the cumulative effects over multiple years, the maximum difference between the actual groundwater measurements and the projected groundwater elevations is only 1.43 feet. The Measurable Objective (MO) and the Minimum Threshold (MT) values for Well 07-003 from the GSP (NCDM, 2022) are also plotted on Figures 8 through 13. The MO and MT are groundwater sustainability criteria used to assess compliance with SGMA and the effectiveness of the overall GSP approach to managing a groundwater subbasin or GSP area. As defined in the GSP (NCDM, 2022, page 6-1), the MT is a quantitative threshold for a sustainability indicator (e.g., chronic lowering of groundwater or reduction in groundwater storage) used to define the point at which undesirable results may begin to occur. The MO is a quantitative target that establishes a point above the MT that allows for a range of active management in order to prevent undesirable results.

The results of the analytical assessment prepared as part of this Technical Memorandum demonstrate that the Project water demand would not chronically or persistently cause a lowering of groundwater levels below the MT and would not cause levels to fall below the MO any more frequently than they would without the Project, as shown on Figures 8 through 13. Thus, the groundwater demand for the Project would not conflict with the GSP and would not interfere with sustainable management of the GSP area.

Conclusions

The construction water demand for the Project is estimated to be 370 acre-feet over an approximately 70-week period from Spring 2024 to Spring 2025. For the purposes of this analysis, it is assumed that two-thirds of the Project construction water use would occur during 2024 and one-third would occur in 2025. Under this scenario, the 2024 net Project groundwater use for construction needs would be approximately 245 acre-feet while the 2025 net Project groundwater use for construction would be approximately 125 acre-feet. The long-term projected future water budget for 2014 to 2070 in the GSP Area includes an average total groundwater inflow of 181,000 acre-feet per year and an average total groundwater pumping volume of 102,000 acre-feet per year (see Table 5-33 of NCDM, 2022). The 2024 construction water demand for the Project is equivalent to approximately 0.14 percent and 0.24 percent of the average total groundwater inflow and annual average groundwater pumping volume, respectively, in the GSP Area. The 2025 construction water demand for the Project is equivalent to half the 2024 amount. The five acre-feet per year operational water demand is less than 0.003 percent and 0.005 percent of the average total groundwater inflow and annual average groundwater pumping volume, respectively, in the GSP Area. These values represent such a small proportion of the average groundwater inflow and average annual pumping that the Project’s effects on groundwater volumes and groundwater sustainability within the Subbasin are considered to be de minimis. Since most of the Project is located outside of the Subbasin (see Figure 2), the Project would have no effect on groundwater recharge in the Subbasin. Therefore, use of the Mid-Cal well to supply water for the Project would not substantially decrease groundwater supplies or interfere with groundwater recharge, such that the Project would not impede sustainable groundwater management and would not conflict with or obstruct implementation of the Groundwater Sustainability Plan.

An analytical assessment conducted as part of the evaluations prepared for this Technical Memorandum found that, even with the cumulative effects over the simulation period described above, the maximum difference between the actual groundwater measurements and the projected groundwater elevations in GSP monitoring well 07-003 is only 1.43 feet after 11 years. While the Project may continue for at least an additional 14 to 19 years, the continuing operational water demand during those subsequent years would only be five acre-feet per year. Since the operational water demand is such a small percentage of the groundwater inflow and groundwater pumping in the GSP Area, it is not anticipated that the magnitude of the cumulative deviations would ever be substantially greater than the maximum identified at the end of the simulation period for the analysis presented herein.

The results of the analytical assessment prepared as part of this Technical Memorandum demonstrate that the Project water demand would not chronically or persistently cause a lowering of groundwater levels below the MT and would not cause levels to fall below the MO any more frequently than they would without the Project. Thus, the groundwater demand for the Project would not conflict with the GSP and would not interfere with sustainable management of the GSP area.

Since most of the Project area lies outside of the Subbasin, an export permit under Merced County's Groundwater Mining and Export ordinance (County Code Section 9.27.050(E)(8)) may be required from the Division of Environmental Health. For this Project, water will be supplied from an existing well. No new wells are proposed to be drilled and no modifications to an existing well would occur. Thus, a consistency determination from the applicable GSA is not required for issuance of such a permit by the Division of Environmental Health. Nevertheless, for the reasons described above, the Project's water usage would be consistent with the GSP.

The analysis presented above demonstrates that the water demand for the Project, to be supplied from the Mid-Cal well will not result in groundwater "mining". The County Code defines groundwater "mining" as:

"the process, deliberate or inadvertent, of extracting groundwater from a source at a rate or amount in excess of the replenishment rate, such that the groundwater level declines persistently, threatening exhaustion of the supply, a decline of pumping levels to uneconomic depths, land subsidence, or significant water quality or other significant environmental damage."

The construction water demand is temporary, occurring over a period of 67 to 70 weeks. This temporary demand would not result in a persistent decline in groundwater levels. Based on the groundwater level trends shown on Figures 4 through 6 herein and Figure CC-42 of the GSP Common Chapter (Woodard & Curran, 2022), any decline in groundwater levels due to the pumping to provide the construction water demand would result in nominal decreases in local groundwater levels, those levels would recover rapidly in the years following the temporary construction period, and the volume extracted would not measurably affect the groundwater budget for the GSP Area. In addition, the short-term and temporary increase in pumping at the Mid-Cal well to meet the construction water demands would not result in a decline of pumping levels to uneconomic depths, land subsidence, or significant water quality or other significant environmental damage.

The on-going 5 acre-foot per year operational water needs are equivalent to less than one percent of the current annual groundwater production from the Mid-Cal well. Any effects on groundwater levels and supply would be imperceptible.

The lack of any persistent declines in groundwater levels due to use of the Mid-Cal well to meet the Project water demand precludes the potential to threaten exhaustion of the supply, for a decline of pumping levels to reach uneconomic depths, for land subsidence, or for significant water quality or other significant environmental damage. Thus, providing water for the Project from the Mid-Cal well does not constitute groundwater “mining” as defined in the County Code and issuance of a groundwater export permit by the Division of Environmental Health would be consistent with Merced County’s Groundwater Mining and Export ordinance (County Code Section 9.27.050(E)(8)).

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Figure 1. Northern and Central Delta-Mendota GSP Area

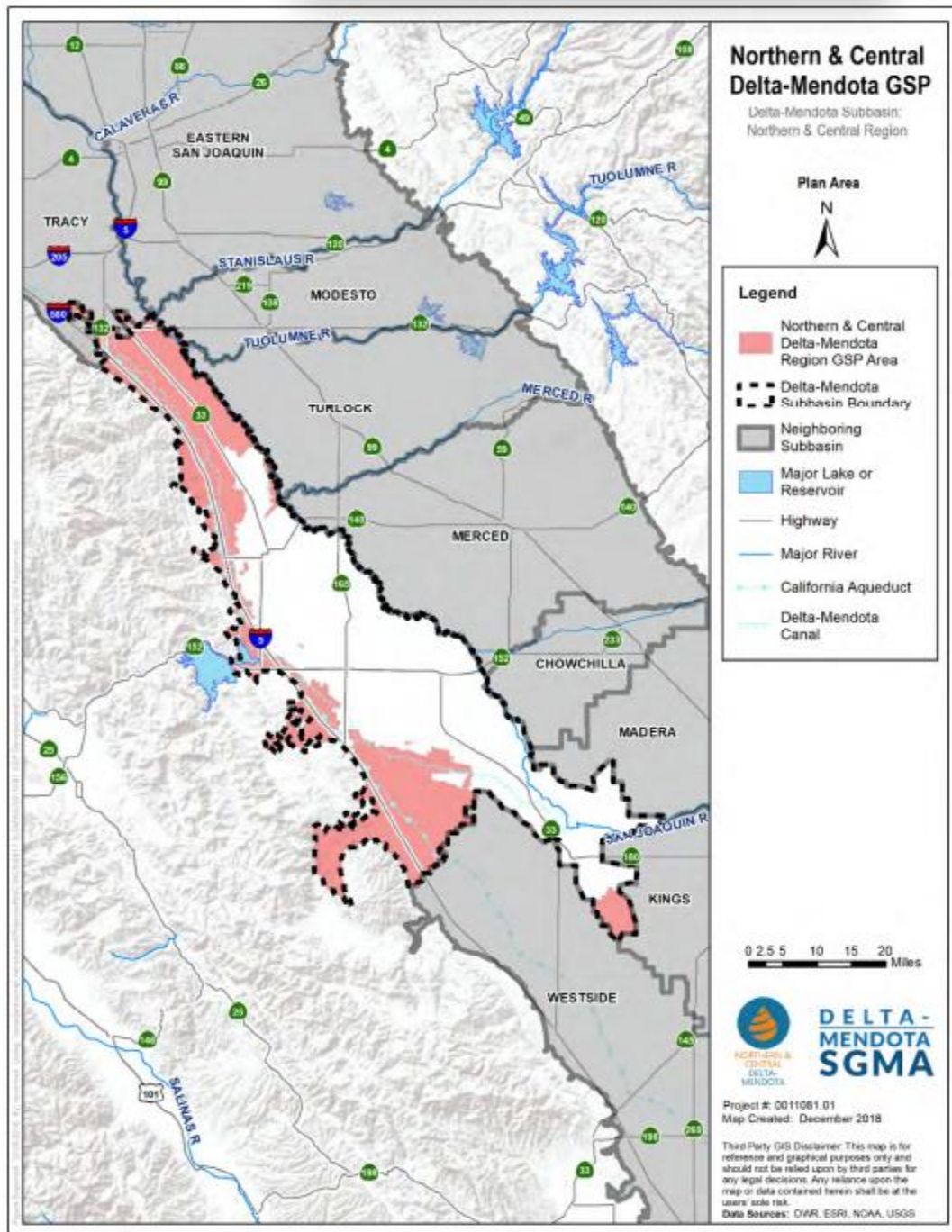


Figure 2. Groundwater Subbasin and Project Boundaries

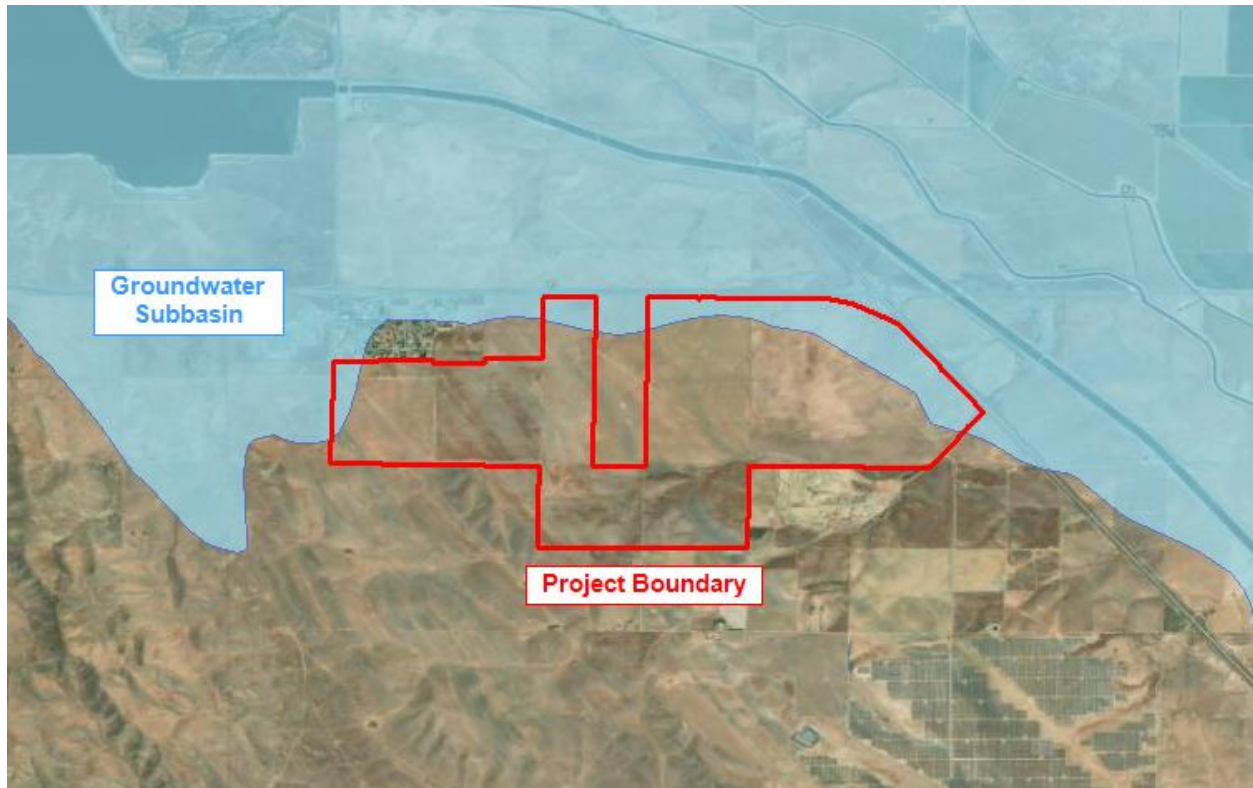


Figure 3. Geologic Cross Section Through Area of Mid-Cal Well (Figure 5-13 from NCDM, 2022)

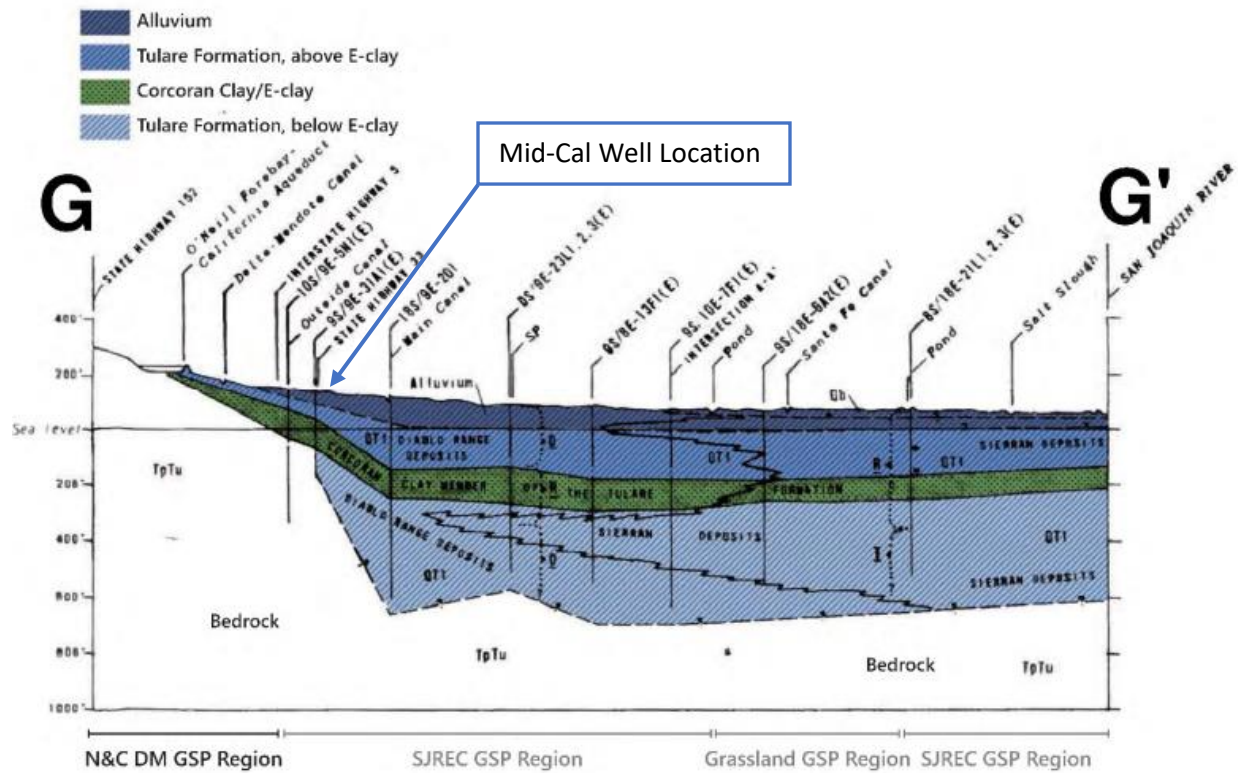


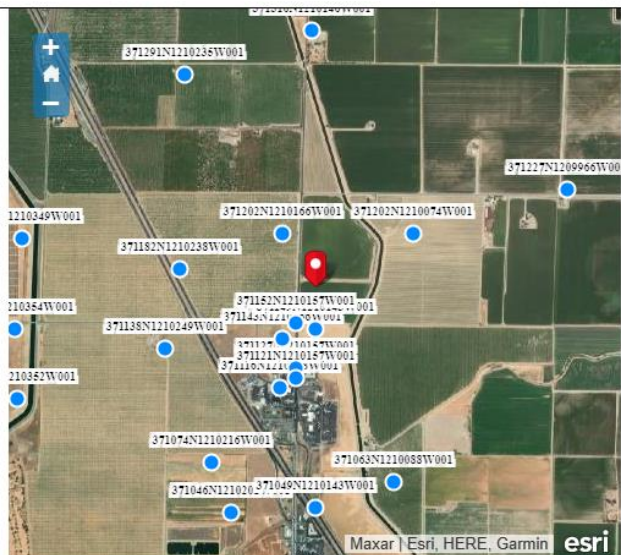
Figure 5-13. Cross-Section G-G' (Hotchkiss & Balding, 1971)

Figure 4. Hydrograph for Well 1,200 Feet Northeast of Mid-Cal Well (Site Code 371174N1210143W001)

Site Code: 371174N1210143W001 State Well Number: 09S09E29N001M



Site Code: 371174N1210143W001
 Local Well Name:
 State Well Number: 09S09E29N001M
 Station ID: 32099
 WCR Number:
 Latitude: 37.1174
 Longitude: -121.0143
 Station Organization ID:
 Station Organization Name:
 Well Location Description:
 Well Use Type: Unknown
 Well Completion Type: Unknown
 Well Depth (feet bgs):
 Top Perforation (feet bgs):
 Bottom Perforation (feet bgs):
 Ground Surface Elevation: 152.11
 Reference Point Elevation: 153.31
 Reference Point Description: None Provided
 Station Comments:



Water Level



☐ Water Year Type

Date: (hover to see values)

☒ -- GSE

☒ -- WSE 371174N1210143W001 : 0

Ground Levels for Well 371174N1210143W001

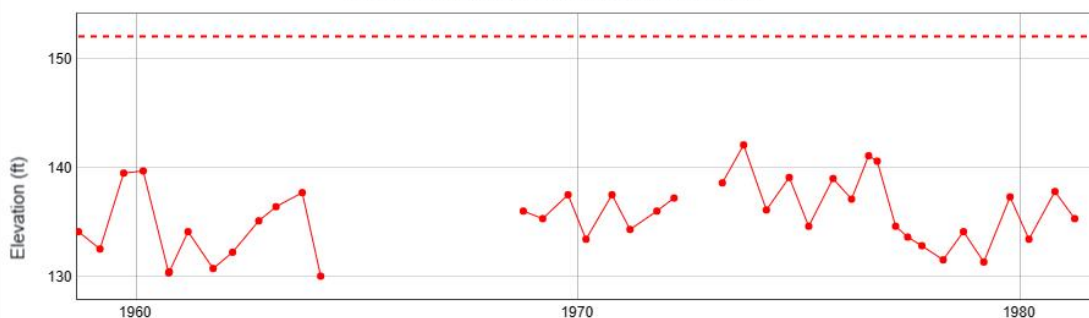
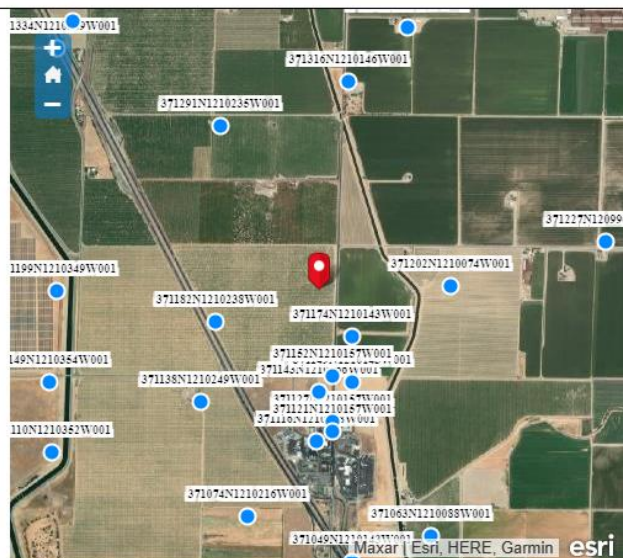


Figure 5. Hydrograph for Well 2,000 Feet Northwest of Mid-Cal Well (Site Code 371202N1210166W001)

Site Code: 371202N1210166W001 State Well Number: 09S09E30J001M



Site Code: 371202N1210166W001
 Local Well Name:
 State Well Number: 09S09E30J001M
 Station ID: 32100
 WCR Number:
 Latitude: 37.1202
 Longitude: -121.0166
 Station Organization ID:
 Station Organization Name:
 Well Location Description:
 Well Use Type: Unknown
 Well Completion Type: Unknown
 Well Depth (feet bgs):
 Top Perforation (feet bgs):
 Bottom Perforation (feet bgs):
 Ground Surface Elevation: 150.7
 Reference Point Elevation: 151
 Reference Point Description: None Provided
 Station Comments:



Water Level

☐ Water Year Type

Date: (hover to see values)

☒ -- GSE

☒ -- WSE 371202N1210166W001 : 0

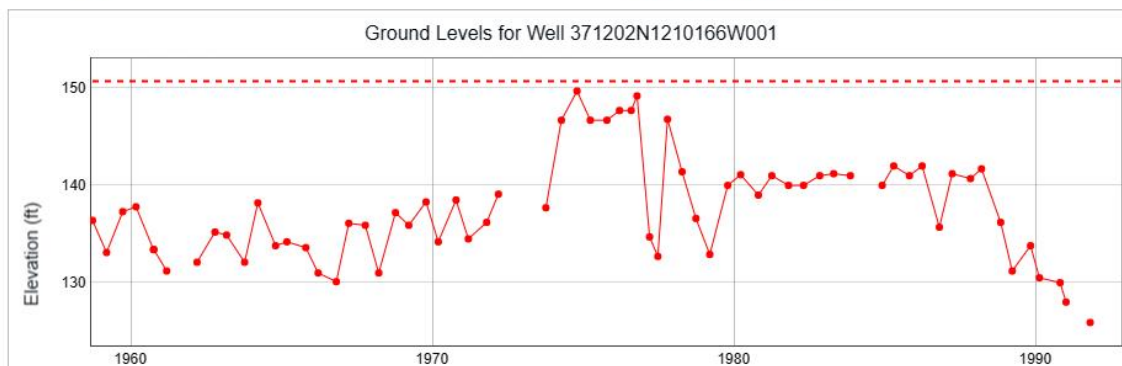
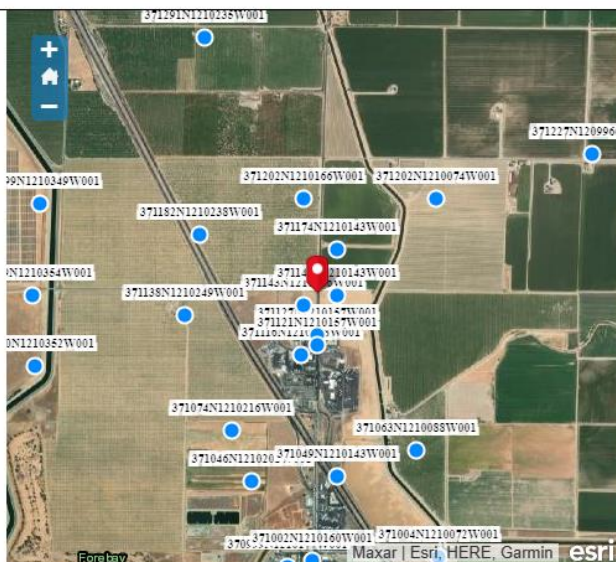


Figure 6. Hydrograph for Well 200 Feet West of Mid-Cal Well (Site Code 371152N1210157W001)

Site Code: 371152N1210157W001 State Well Number: 09S09E30R001M Local Well Name: 192

Site Code: 371152N1210157W001
Local Well Name: 192
State Well Number: 09S09E30R001M
Station ID: 24517
WCR Number:
Latitude: 37.1152
Longitude: -121.0157
Station Organization ID: 374
Station Organization Name: Central California Irrigation District & Firebaugh Canal Water District
Well Location Description:
Well Use Type:
Well Completion Type: Unknown
Well Depth (feet bgs):
Top Perforation (feet bgs):
Bottom Perforation (feet bgs):
Ground Surface Elevation: 153.61
Reference Point Elevation: 153.61
Reference Point Description: None Provided
Station Comments:



Water Level

☐ Water Year Type

Date: (hover to see values)

☒ -- GSE

☒ -- WSE 371152N1210157W001 : 0

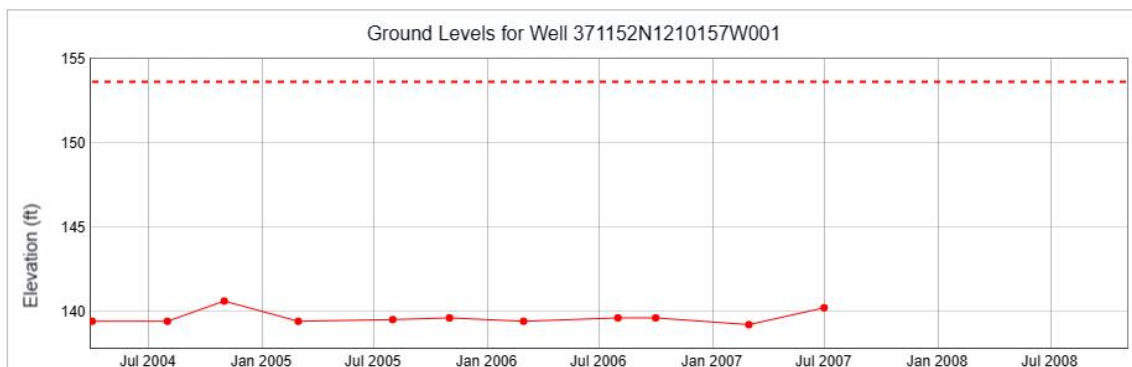


**Figure 7. Drawdown Profile
Mid-Cal Well Pumping**

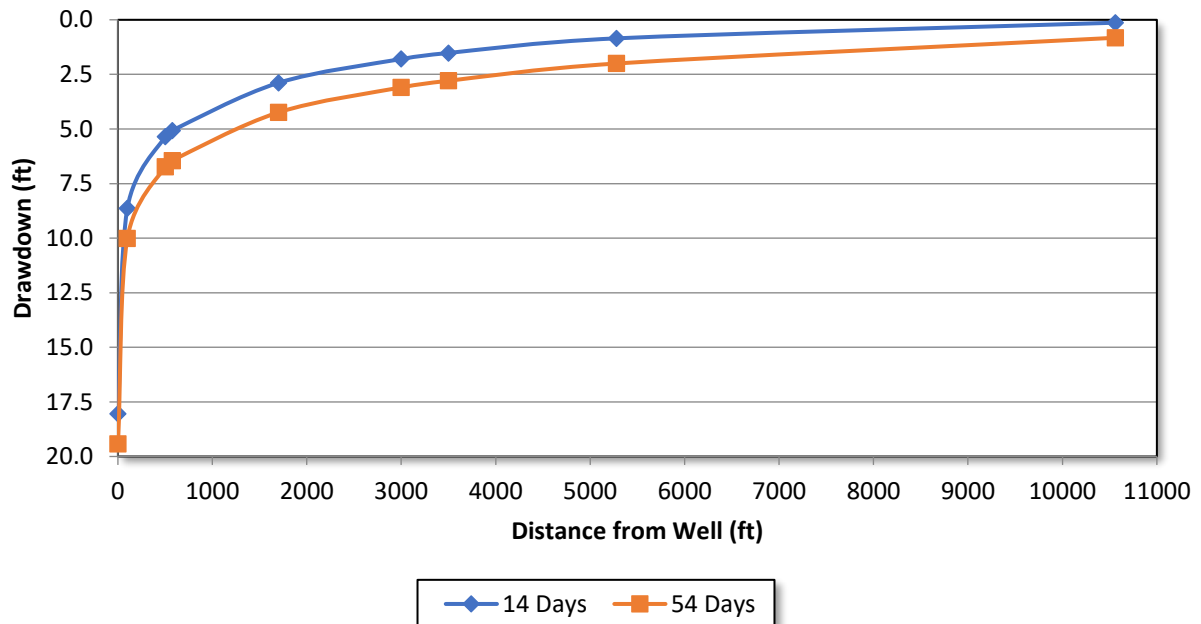


Figure 8. Comparison of Measured and Adjusted Groundwater Levels under Baseline Conditions - Scenario

1

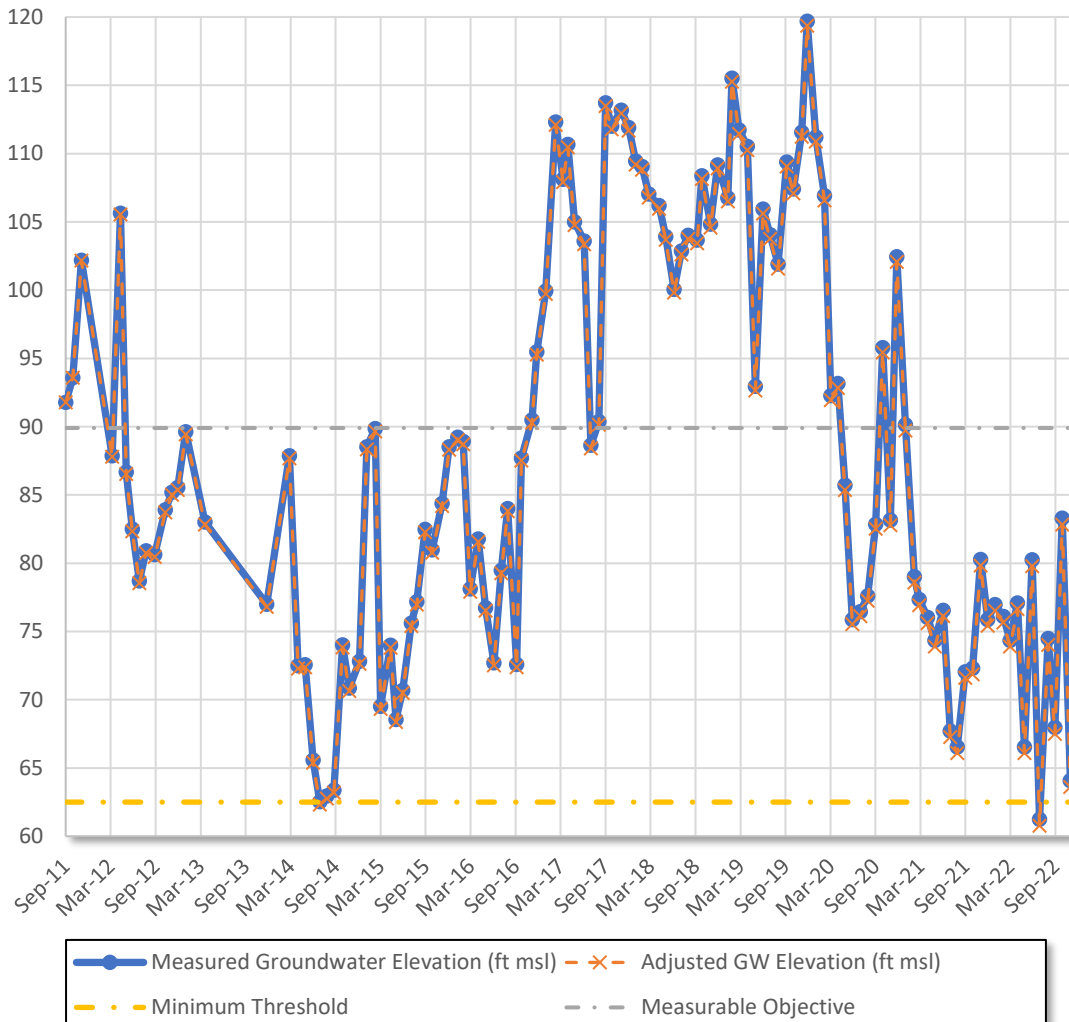


Figure 9. Comparison of Measured and Adjusted Groundwater Levels with CC and P&MA - Scenario 1

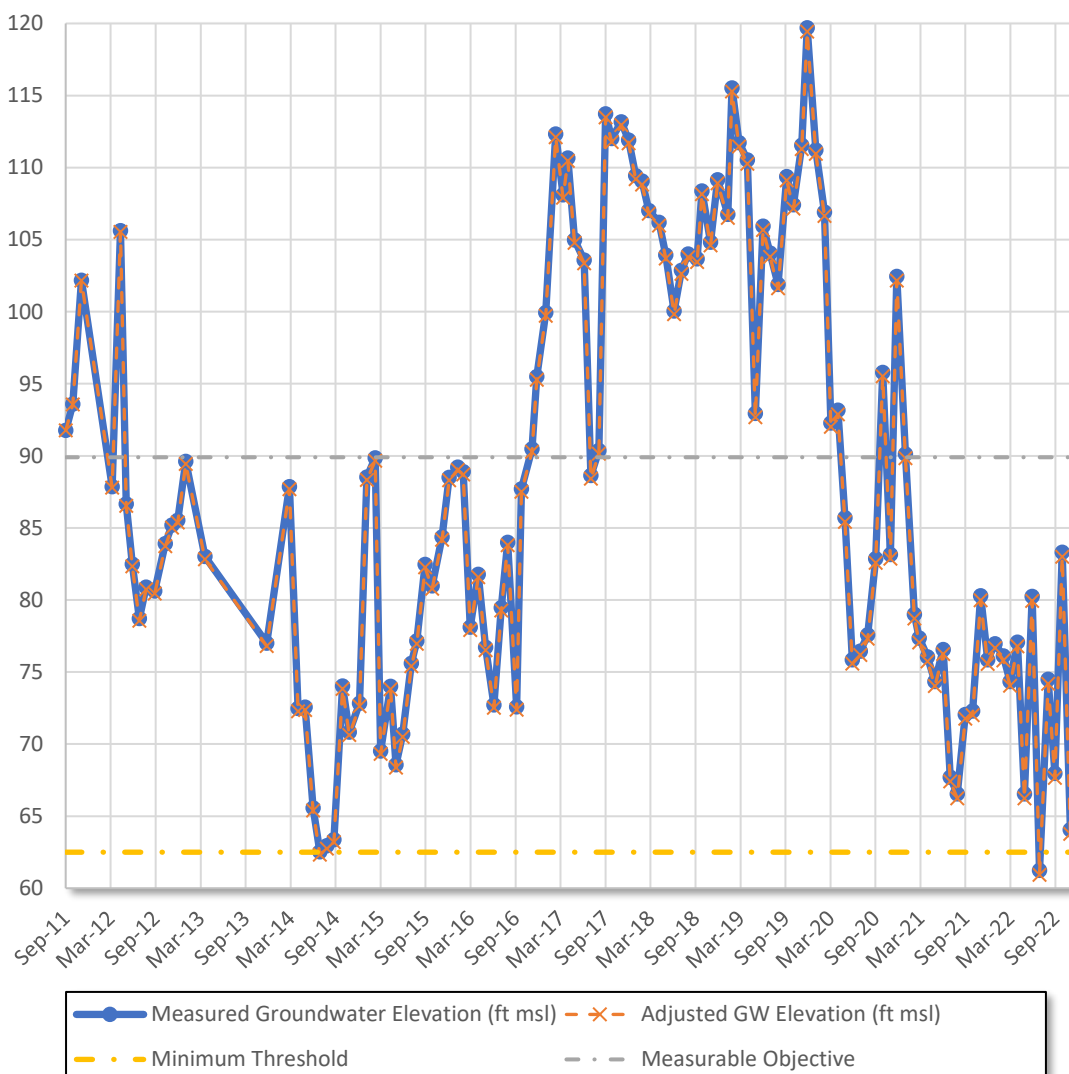


Figure 10. Comparison of Measured and Adjusted Groundwater Levels under Baseline Conditions - Scenario

2

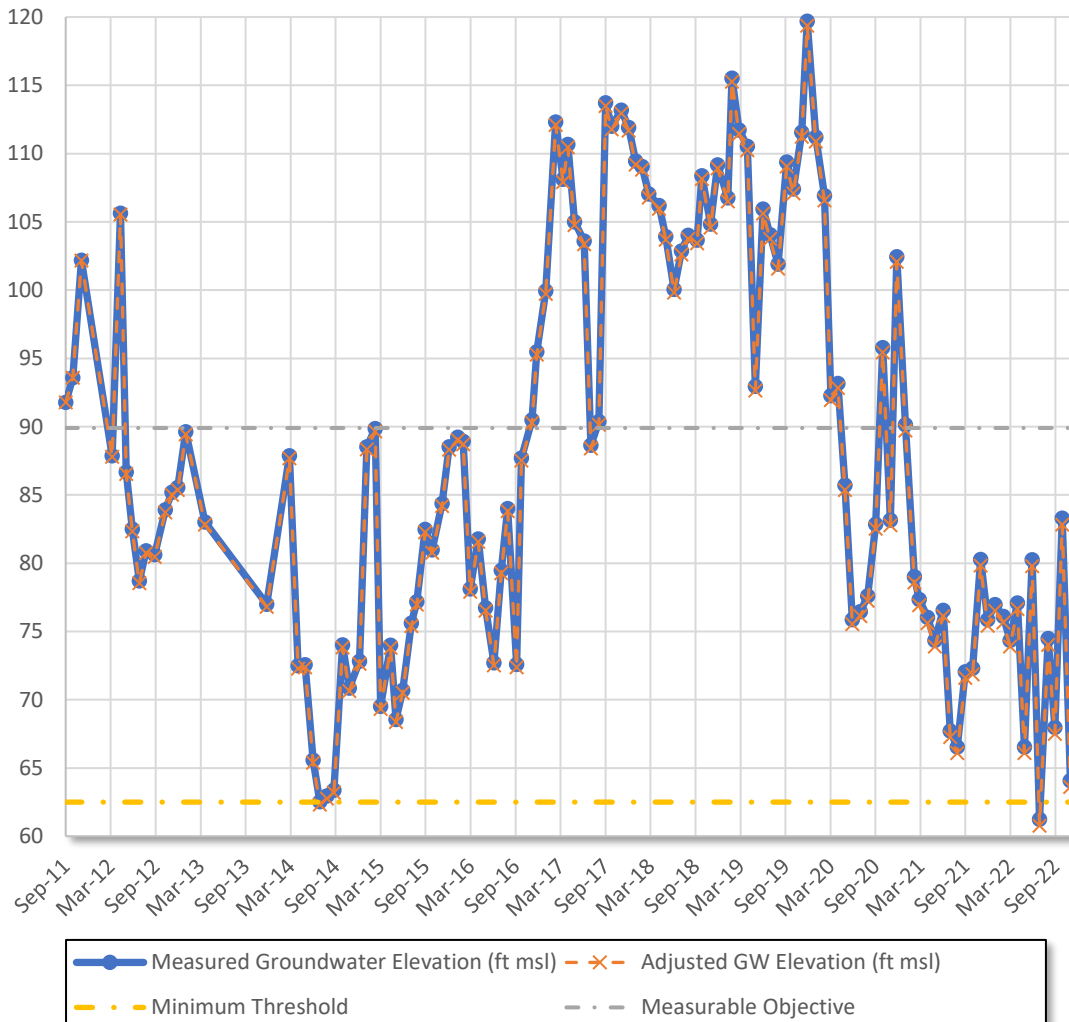


Figure 11. Comparison of Measured and Adjusted Groundwater Levels with CC and P&MA - Scenario 2

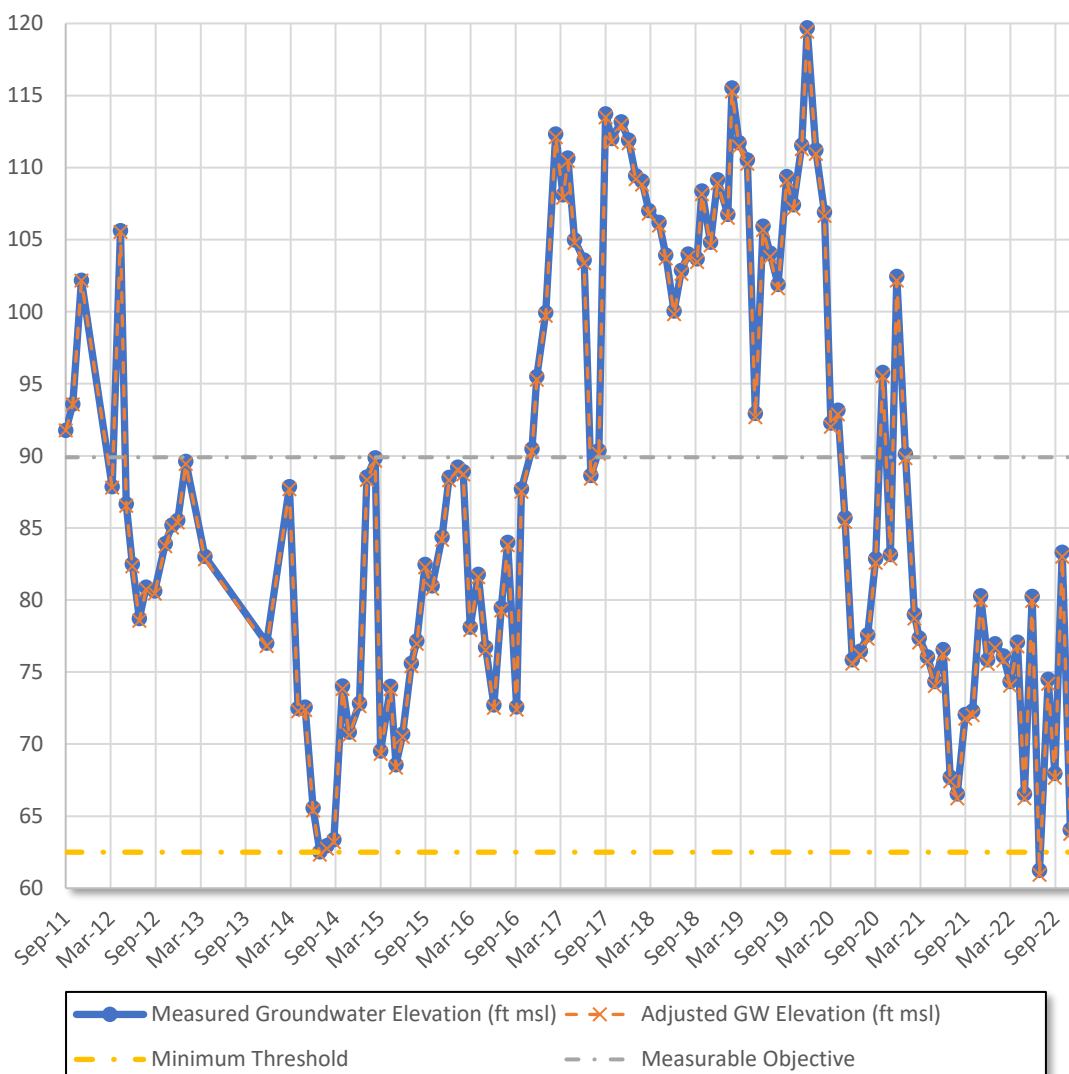


Figure 12. Comparison of Measured and Adjusted Groundwater Levels under Baseline Conditions - Scenario

3

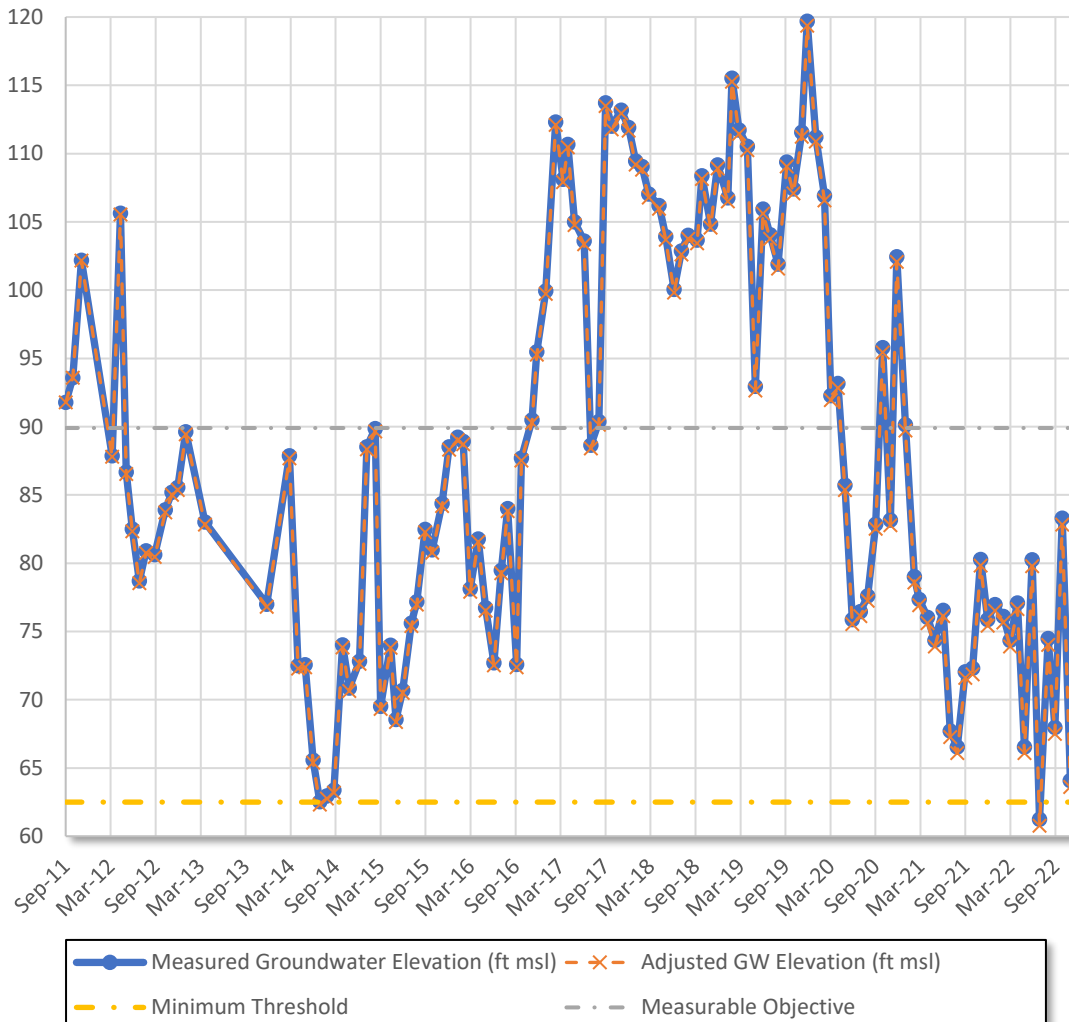


Figure 13. Comparison of Measured and Adjusted Groundwater Levels with CC and P&MA - Scenario 3

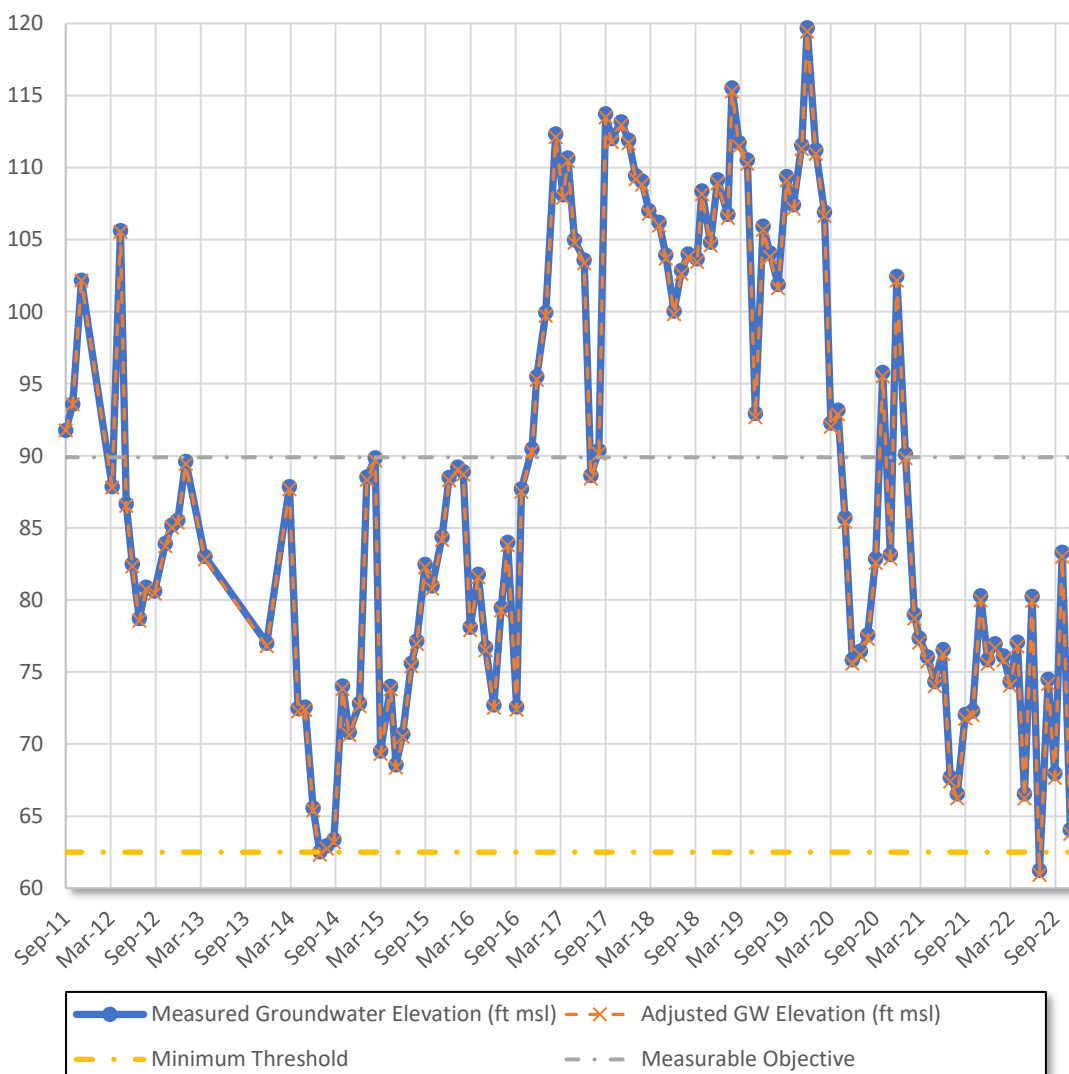


TABLE 1
Comparison of Measured Groundwater Elevations in GSP Upper Aquifer Monitoring Well 07-003
With Projected Groundwater Elevations under Different Project Scenarios

Water Year	Date	Measured Groundwater Elevation (ft msl)	Water Year Type	Upper Aquifer Change		Scenario 1			Scenario 2			Scenario 3			Minimum Threshold	Measurable Objective
				Historic, Existing, and Baseline	With CC and P&MA	Project Groundwa ter Use (AF)	Adjusted GW		Project Groundwa ter Use (AF)	Adjusted GW		Project Groundwa ter Use (AF)	Adjusted GW			
							Historic, Existing, and Baseline	With CC and P&MA		Historic, Existing, and Baseline	With CC and P&MA		Historic, Existing, and Baseline	With CC and P&MA		
2012	9/14/2011	91.78				0	91.780	91.780	0	91.780	91.780	0	91.780	91.780	62.5	89.9
	10/13/2011	93.58	Dry	-105000	-105000	245	93.576	93.576	0	93.580	93.580	0	93.580	93.580	62.5	89.9
	11/16/2011	102.18		-105000	-105000	245	102.156	102.156	0	102.180	102.180	0	102.180	102.180	62.5	89.9
	3/20/2012	87.86		-105000	-105000	245	87.802	87.802	0	87.860	87.860	0	87.860	87.860	62.5	89.9
	4/23/2012	105.63		-105000	-105000	245	105.531	105.531	0	105.630	105.630	0	105.630	105.630	62.5	89.9
	5/17/2012	86.67		-105000	-105000	245	86.527	86.527	0	86.670	86.670	0	86.670	86.670	62.5	89.9
	6/11/2012	82.49		-105000	-105000	245	82.337	82.337	0	82.490	82.490	0	82.490	82.490	62.5	89.9
	7/9/2012	78.71		-105000	-105000	245	78.548	78.548	0	78.710	78.710	0	78.710	78.710	62.5	89.9
	8/6/2012	80.9		-105000	-105000	245	80.733	80.733	0	80.900	80.900	0	80.900	80.900	62.5	89.9
	9/10/2012	80.62		-105000	-105000	245	80.452	80.452	0	80.620	80.620	0	80.620	80.620	62.5	89.9
2013	10/23/2012	83.9	Dry	-73000	-73000	125	83.727	83.727	0	83.900	83.900	0	83.900	83.900	62.5	89.9
	11/19/2012	85.19		-73000	-73000	125	85.014	85.014	0	85.190	85.190	0	85.190	85.190	62.5	89.9
	12/12/2012	85.54		-73000	-73000	125	85.364	85.364	0	85.540	85.540	0	85.540	85.540	62.5	89.9
	1/14/2013	89.62		-73000	-73000	125	89.437	89.437	0	89.620	89.620	0	89.620	89.620	62.5	89.9
	4/2/2013	83.02		-73000	-73000	125	82.826	82.826	0	83.020	83.020	0	83.020	83.020	62.5	89.9
2014	12/9/2013	77	Critically Dry	-128000	-135000	5	76.805	76.805	245	76.988	76.989	0	77.000	77.000	62.5	89.9
	3/12/2014	87.87		-128000	-135000	5	87.675	87.675	245	87.838	87.839	0	87.870	87.870	62.5	89.9
	4/16/2014	72.48		-128000	-135000	5	72.284	72.284	245	72.418	72.421	0	72.480	72.480	62.5	89.9
	5/14/2014	72.56		-128000	-135000	5	72.364	72.364	245	72.498	72.501	0	72.560	72.560	62.5	89.9
	6/16/2014	65.58		-128000	-135000	5	65.384	65.384	245	65.505	65.509	0	65.580	65.580	62.5	89.9
	7/14/2014	62.52		-128000	-135000	5	62.324	62.324	245	62.439	62.443	0	62.520	62.520	62.5	89.9
	8/11/2014	62.95		-128000	-135000	5	62.754	62.754	245	62.868	62.872	0	62.950	62.950	62.5	89.9
	9/8/2014	63.38		-128000	-135000	5	63.184	63.184	245	63.297	63.301	0	63.380	63.380	62.5	89.9
2015	10/14/2014	74.02	Critically Dry	-127000	-123000	5	73.823	73.824	125	73.927	73.931	0	74.020	74.020	62.5	89.9
	11/10/2014	70.84		-127000	-123000	5	70.643	70.643	125	70.744	70.747	0	70.840	70.840	62.5	89.9
	12/22/2014	72.82		-127000	-123000	5	72.623	72.623	125	72.722	72.725	0	72.820	72.820	62.5	89.9
	1/21/2015	88.52		-127000	-123000	5	88.323	88.323	125	88.406	88.409	0	88.520	88.520	62.5	89.9
	2/23/2015	89.85		-127000	-123000	5	89.653	89.653	125	89.735	89.738	0	89.850	89.850	62.5	89.9
	3/18/2015	69.52		-127000	-123000	5	69.322	69.322	125	69.385	69.387	0	69.520	69.520	62.5	89.9
	4/27/2015	74		-127000	-123000	5	73.802	73.802	125	73.860	73.863	0	74.000	74.000	62.5	89.9
	5/19/2015	68.56		-127000	-123000	5	68.361	68.361	125	68.415	68.417	0	68.560	68.560	62.5	89.9
	6/15/2015	70.69		-127000	-123000	5	70.491	70.491	125	70.543	70.545	0	70.690	70.690	62.5	89.9
	7/20/2015	75.6		-127000	-123000	5	75.401	75.401	125	75.448	75.450	0	75.600	75.600	62.5	89.9
	8/12/2015	77.17		-127000	-123000	5	76.971	76.971	125	77.017	77.019	0	77.170	77.170	62.5	89.9
	9/14/2015	82.47		-127000	-123000	5	82.271	82.271	125	82.311	82.313	0	82.470	82.470	62.5	89.9
2016	10/13/2015	80.97	Dry	-102000	-87000	5	80.771	80.771	5	80.811	80.813	245	80.966	80.966	62.5	89.9
	11/23/2015	84.38		-102000	-87000	5	84.181	84.181	5	84.221	84.223	245	84.368	84.366	62.5	89.9
	12/21/2015	88.51		-102000	-87000	5	88.310	88.310	5	88.351	88.353	245	88.488	88.485	62.5	89.9
	1/25/2016	89.22		-102000	-87000	5	89.020	89.020	5	89.061	89.063	245	89.197	89.193	62.5	89.9
	2/16/2016	88.91		-102000	-87000	5	88.710	88.710	5	88.751	88.753	245	88.886	88.882	62.5	89.9

Water Year	Date	Measured Groundwater Elevation (ft msl)	Water Year Type	Upper Aquifer Change		Scenario 1			Scenario 2			Scenario 3			Minimum Threshold	Measurable Objective
				Historic, Existing, and Baseline	With CC and P&MA	Project Groundwater Use (AF)	Adjusted GW		Project Groundwater Use (AF)	Adjusted GW		Project Groundwater Use (AF)	Adjusted GW			
							Historic, Existing, and Baseline	With CC and P&MA		Historic, Existing, and Baseline	With CC and P&MA		Historic, Existing, and Baseline	With CC and P&MA		
	3/16/2016	78.11		-102000	-87000	5	77.910	77.910	5	77.950	77.952	245	78.060	78.051	62.5	89.9
	4/18/2016	81.77		-102000	-87000	5	81.570	81.569	5	81.610	81.612	245	81.711	81.701	62.5	89.9
	5/18/2016	76.72		-102000	-87000	5	76.519	76.519	5	76.560	76.562	245	76.649	76.637	62.5	89.9
	6/20/2016	72.71		-102000	-87000	5	72.509	72.509	5	72.550	72.551	245	72.629	72.615	62.5	89.9
	7/21/2016	79.47		-102000	-87000	5	79.269	79.269	5	79.309	79.311	245	79.373	79.356	62.5	89.9
	8/15/2016	84		-102000	-87000	5	83.799	83.798	5	83.839	83.841	245	83.892	83.874	62.5	89.9
	9/21/2016	72.58		-102000	-87000	5	72.378	72.378	5	72.419	72.420	245	72.445	72.421	62.5	89.9
2017	10/11/2016	87.71	Wet	-12000	-17000	5	87.502	87.503	5	87.542	87.546	125	87.417	87.440	62.5	89.9
	11/22/2016	90.48		-12000	-17000	5	90.271	90.272	5	90.311	90.315	125	90.158	90.190	62.5	89.9
	12/12/2016	95.49		-12000	-17000	5	95.279	95.281	5	95.319	95.323	125	95.116	95.163	62.5	89.9
	1/17/2017	99.93		-12000	-17000	5	99.717	99.720	5	99.757	99.762	125	99.510	99.570	62.5	89.9
	2/27/2017	112.32		-12000	-17000	5	112.102	112.106	5	112.142	112.148	125	111.771	111.869	62.5	89.9
	3/29/2017	108.12		-12000	-17000	5	107.900	107.905	5	107.940	107.947	125	107.527	107.638	62.5	89.9
	4/17/2017	110.67		-12000	-17000	5	110.449	110.454	5	110.489	110.496	125	110.051	110.170	62.5	89.9
	5/15/2017	104.99		-12000	-17000	5	104.766	104.772	5	104.807	104.815	125	104.311	104.448	62.5	89.9
	6/23/2017	103.58		-12000	-17000	5	103.356	103.362	5	103.396	103.404	125	102.887	103.028	62.5	89.9
	7/20/2017	88.64		-12000	-17000	5	88.410	88.417	5	88.450	88.460	125	87.791	87.978	62.5	89.9
	8/21/2017	90.38		-12000	-17000	5	90.149	90.157	5	90.189	90.199	125	89.513	89.705	62.5	89.9
	9/18/2017	113.72		-12000	-17000	5	113.479	113.490	5	113.520	113.532	125	112.610	112.873	62.5	89.9
2018	10/13/2017	112.01	Average	41000	43000	5	111.769	111.780	5	111.809	111.822	5	110.900	111.163	62.5	89.9
	11/21/2017	113.18		41000	43000	5	112.939	112.950	5	112.979	112.992	5	112.069	112.333	62.5	89.9
	12/20/2017	111.91		41000	43000	5	111.669	111.680	5	111.709	111.722	5	110.799	111.063	62.5	89.9
	1/18/2018	109.44		41000	43000	5	109.198	109.209	5	109.239	109.252	5	108.329	108.592	62.5	89.9
	2/13/2018	109.06		41000	43000	5	108.818	108.829	5	108.859	108.872	5	107.949	108.212	62.5	89.9
	3/12/2018	107.03		41000	43000	5	106.788	106.799	5	106.829	106.841	5	105.919	106.182	62.5	89.9
	4/23/2018	106.2		41000	43000	5	105.958	105.969	5	105.998	106.011	5	105.089	105.352	62.5	89.9
	5/21/2018	103.93		41000	43000	5	103.688	103.699	5	103.728	103.741	5	102.818	103.082	62.5	89.9
	6/23/2018	100.05		41000	43000	5	99.807	99.818	5	99.848	99.861	5	98.938	99.201	62.5	89.9
	7/23/2018	102.86		41000	43000	5	102.617	102.628	5	102.657	102.670	5	101.747	102.011	62.5	89.9
	8/20/2018	104.01		41000	43000	5	103.767	103.778	5	103.807	103.820	5	102.897	103.161	62.5	89.9
	9/25/2018	103.67		41000	43000	5	103.427	103.438	5	103.467	103.480	5	102.557	102.821	62.5	89.9
2019	10/15/2018	108.38	Wet	4000	9000	5	108.131	108.145	5	108.171	108.188	5	107.261	107.528	62.5	89.9
	11/19/2018	104.83		4000	9000	5	104.576	104.593	5	104.617	104.636	5	103.707	103.976	62.5	89.9
	12/18/2018	109.16		4000	9000	5	108.901	108.921	5	108.941	108.963	5	108.032	108.304	62.5	89.9
	1/28/2019	106.76		4000	9000	5	106.498	106.519	5	106.538	106.562	5	105.629	105.903	62.5	89.9
	2/14/2019	115.53		4000	9000	5	115.257	115.285	5	115.297	115.327	5	114.388	114.668	62.5	89.9
	3/14/2019	111.72		4000	9000	5	111.442	111.472	5	111.483	111.515	5	110.573	110.856	62.5	89.9
	4/18/2019	110.52		4000	9000	5	110.241	110.272	5	110.281	110.314	5	109.371	109.655	62.5	89.9
	5/20/2019	92.94		4000	9000	5	92.639	92.682	5	92.679	92.724	5	91.769	92.065	62.5	89.9
	6/20/2019	105.93		4000	9000	5	105.612	105.665	5	105.653	105.707	5	104.743	105.048	62.5	89.9
	7/19/2019	104.07		4000	9000	5	103.750	103.804	5	103.791	103.846	5	102.881	103.187	62.5	89.9
	8/21/2019	101.9		4000	9000	5	101.577	101.633	5	101.618	101.675	5	100.708	101.016	62.5	89.9
	9/25/2019	109.38		4000	9000	5	109.048	109.108	5	109.089	109.151	5	108.179	108.492	62.5	89.9

Water Year	Date	Measured Groundwater Elevation (ft msl)	Water Year Type	Upper Aquifer Change		Scenario 1			Scenario 2			Scenario 3			Minimum Threshold	Measurable Objective
				Historic, Existing, and Baseline	With CC and P&MA	Project Groundwater Use (AF)	Adjusted GW		Project Groundwater Use (AF)	Adjusted GW		Project Groundwater Use (AF)	Adjusted GW			
							Historic, Existing, and Baseline	With CC and P&MA		Historic, Existing, and Baseline	With CC and P&MA		Historic, Existing, and Baseline	With CC and P&MA		
2020	10/22/2019	107.42	Dry	-111000	-112000	5	107.088	107.148	5	107.129	107.191	5	106.219	106.531	62.5	89.9
	11/25/2019	111.56		-111000	-112000	5	111.228	111.288	5	111.268	111.330	5	110.358	110.671	62.5	89.9
	12/17/2019	119.7		-111000	-112000	5	119.367	119.428	5	119.408	119.470	5	118.498	118.811	62.5	89.9
	1/21/2020	111.22		-111000	-112000	5	110.887	110.947	5	110.928	110.990	5	110.018	110.331	62.5	89.9
	2/25/2020	106.91		-111000	-112000	5	106.577	106.637	5	106.617	106.680	5	105.708	106.020	62.5	89.9
	3/23/2020	92.28		-111000	-112000	5	91.946	92.006	5	91.987	92.049	5	91.077	91.390	62.5	89.9
	4/20/2020	93.16		-111000	-112000	5	92.826	92.886	5	92.867	92.929	5	91.957	92.270	62.5	89.9
	5/19/2020	85.7		-111000	-112000	5	85.366	85.426	5	85.406	85.469	5	84.497	84.809	62.5	89.9
	6/18/2020	75.86		-111000	-112000	5	75.525	75.586	5	75.566	75.628	5	74.656	74.969	62.5	89.9
	7/21/2020	76.45		-111000	-112000	5	76.115	76.176	5	76.156	76.218	5	75.246	75.559	62.5	89.9
	8/20/2020	77.59		-111000	-112000	5	77.255	77.316	5	77.296	77.358	5	76.386	76.699	62.5	89.9
	9/21/2020	82.86		-111000	-112000	5	82.525	82.585	5	82.566	82.628	5	81.656	81.969	62.5	89.9
2021	10/20/2020	95.79	Wet	4000	22000	5	95.439	95.512	5	95.479	95.555	5	94.570	94.896	62.5	89.9
	11/20/2020	83.15		4000	22000	5	82.783	82.870	5	82.824	82.912	5	81.914	82.253	62.5	89.9
	12/16/2020	102.45		4000	22000	5	102.059	102.165	5	102.100	102.208	5	101.190	101.548	62.5	89.9
	1/20/2021	90.13		4000	22000	5	89.724	89.842	5	89.764	89.885	5	88.854	89.226	62.5	89.9
	2/26/2021	79		4000	22000	5	78.580	78.710	5	78.620	78.752	5	77.710	78.093	62.5	89.9
	3/17/2021	77.35		4000	22000	5	76.928	77.059	5	76.968	77.102	5	76.058	76.443	62.5	89.9
	4/20/2021	76.04		4000	22000	5	75.616	75.749	5	75.657	75.792	5	74.747	75.132	62.5	89.9
	5/20/2021	74.33		4000	22000	5	73.904	74.039	5	73.944	74.081	5	73.035	73.422	62.5	89.9
	6/22/2021	76.55		4000	22000	5	76.121	76.258	5	76.162	76.301	5	75.252	75.641	62.5	89.9
	7/21/2021	67.71		4000	22000	5	67.270	67.416	5	67.311	67.459	5	66.401	66.799	62.5	89.9
	8/19/2021	66.54		4000	22000	5	66.099	66.246	5	66.139	66.288	5	65.229	65.629	62.5	89.9
	9/21/2021	72.05		4000	22000	5	71.602	71.755	5	71.642	71.797	5	70.732	71.138	62.5	89.9
2022	10/20/2021	72.3	Wet	18000	40000	5	71.852	72.005	5	71.892	72.047	5	70.982	71.388	62.5	89.9
	11/22/2021	80.28		18000	40000	5	79.829	79.984	5	79.870	80.026	5	78.960	79.367	62.5	89.9
	12/20/2021	75.86		18000	40000	5	75.408	75.563	5	75.449	75.606	5	74.539	74.946	62.5	89.9
	1/20/2022	76.97		18000	40000	5	76.518	76.673	5	76.558	76.715	5	75.649	76.056	62.5	89.9
	2/22/2022	76.11		18000	40000	5	75.658	75.813	5	75.698	75.855	5	74.788	75.196	62.5	89.9
	3/21/2022	74.35		18000	40000	5	73.897	74.053	5	73.938	74.095	5	73.028	73.436	62.5	89.9
	4/20/2022	77.08		18000	40000	5	76.626	76.782	5	76.667	76.825	5	75.757	76.166	62.5	89.9
	5/19/2022	66.54		18000	40000	5	66.083	66.241	5	66.124	66.283	5	65.214	65.624	62.5	89.9
	6/20/2022	80.24		18000	40000	5	79.780	79.939	5	79.820	79.982	5	78.910	79.323	62.5	89.9
	7/20/2022	61.24		18000	40000	5	60.774	60.937	5	60.815	60.979	5	59.905	60.320	62.5	89.9
	8/24/2022	74.49		18000	40000	5	74.021	74.185	5	74.061	74.228	5	73.151	73.568	62.5	89.9
	9/20/2022	67.96		18000	40000	5	67.489	67.654	5	67.529	67.697	5	66.620	67.038	62.5	89.9
2023	10/20/2022	83.3		67000	80000	5	82.828	82.994	5	82.868	83.036	5	81.958	82.377	62.5	89.9
	11/22/2022	64.07		67000	80000	5	63.596	63.762	5	63.637	63.805	5	62.727	63.145	62.5	89.9