5. MINIMUM THRESHOLDS, MEASURABLE OBJECTIVES, AND INTERIM MILESTONES

This chapter of the Cuyama Groundwater Basin (Basin) *Groundwater Sustainability Plan* (GSP) defines the sustainability criteria used to avoid undesirable results during GSP implementation. The Sustainable Groundwater Management Act (SGMA) requires the application of minimum thresholds (MTs), measurable objectives (MOs), and interim milestones (IMs) to all representative monitoring sites identified in the GSP. These values, or thresholds, will help the Cuyama Basin Groundwater Sustainability Agency (CBGSA) and other groundwater users in the Basin identify sustainable values for the established SGMA sustainability indicators, and will help identify progress indicators over the 20-year GSP implementation period.

5.1 Useful Terms

There are several terms used in this chapter that describe Basin conditions and the values calculated for the representative sites. These terms are intended as a guide for readers and are not a definitive definition of any term.

- **Interim Milestones** – IMs are a target value representing measurable conditions, set in increments of five years. They are set by the CBGSA as part of the GSP; IMs will help the Basin reach sustainability by 2040.
- **Measurable Objectives** – MOs are specific, quantifiable goals for maintaining or improving specified groundwater conditions that are included in the adopted GSP to achieve the Basin's sustainability goal.
- **Minimum Thresholds** – MTs are a numeric value for each sustainability indicator, which are used to define when undesirable results occur if minimum thresholds are exceeded in a percentage of sites in the monitoring network.
- **Sustainability Goals** – Sustainability goals are the culmination of conditions in the absence of undesirable results within 20 years of the applicable statutory deadline.
- **Undesirable Results** – Undesirable results are the significant and unreasonable occurrence of conditions that adversely affect groundwater use in the Basin, as defined in Chapter 3.
- **Sustainability Indicators** – These indicators refer to any of the effects caused by groundwater conditions occurring throughout the Basin that, when significant and unreasonable, cause undesirable results, as described in Water Code Section 10721(x). These include the following:
  - Lowering groundwater levels
  - Reduction of groundwater storage
  - Seawater intrusion
  - Degraded water quality
  - Land subsidence

- Depletion of interconnected surface water

Both MOs and MTs are applied to all sustainability indicator representative sites. Sites in the Basin's monitoring networks that are not classified as representative sites are not required to have MOs or MTs. All of the Basin's representative sites will also have IMs calculated for 2025, 2030, and 2035 to help guide the CBGSA toward its 2040 sustainability goals. All wells meeting the representative well criteria outlined in this GSP are included in the Basin's monitoring network, although participation in the SGMA monitoring program is dependent upon agreements between the CBGSA and the well owners.

The following subsections describe the process of establishing MOs, MTs, and IMs for each of the sustainability indicators described above. They also discuss the results of this process.

5.2 Chronic Lowering of Groundwater Levels

The undesirable result for the chronic lowering of groundwater levels is a result that causes significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

Groundwater conditions, as discussed in Chapter 2, Section 2.2, vary across the Basin. Groundwater conditions are influenced by geographic attributes, geologic attributes, and overlying land uses in the Basin. Because of the variety of conditions, six threshold regions were established in the Basin so appropriate sustainability criteria could be set more precisely for each region.

5.2.1 Threshold Regions

The previous GSP utilized threshold regions that were defined to allow areas with similar conditions to be grouped together for calculation of MOs, MTs, and IMs. However, for this GSP Update the CBGSA has utilized new threshold calculations that incorporate historical data, potential impacts to beneficial uses and users of groundwater, and variations in local conditions in a consistent manner across the Basin. Therefore, threshold regions are no longer being used.

5.2.2 Minimum Thresholds, Measurable Objectives, and Interim Milestones

This section describes how MTs, MOs, and IMs were established for each representative well and explains the rationale behind the selected methodologies.

The minimum threshold calculation uses a stepwise function that takes a conservative approach to protect wells (production and domestic) across the Basin while providing flexibility, when possible, to accommodate the CBGSA planned pumping allocations and reductions strategy. The stepwise function has four potential calculation outcomes:

1. **Combined Well protection and GDE protection depth:** The well protection depth and GDE protection depth were merged together in a GIS analysis process that interpolated the data into a

3-dimensional coverage across the Basin, in the same process elevation points make a topographic map of the surface elevation. For each RMW's location, the interpolated protection depth was then extracted to get the final Well Protection / GDE protection depth value.

a. **Well Protection Depth**: The well protection depth is used to ensure that active production and domestic wells within the Basin are protected from harm to their beneficial uses. The well protection depth is a numerical value representing the approximate depth at which, if exceeded, beneficial uses could be impacted in a well. This value is unique and calculated for each active production and domestic well within the Basin where there is available data. Where data is not available, generalized or regional proxy data is utilized. Some wells are screened from this analysis either because they are too far removed from the representative well network (and therefore conditions at the nearest RWM are not indicative of conditions at the active well because of distance and/or other conditions such as geology or topology) or wells were already dry in 2015. The well protection depth is calculated for each pumping well as a four-part stepwise function, with a slight difference in the fourth step between domestic and production wells (Figure 5-1).

b. **GDE Protection Depth**: All potential GDE locations in the Basin were assigned a protection depth of 30 ft bgs via a dense spatial point-cloud within each GDE polygon in GIS. The point-clouds allow GIS to utilize the same data type (points instead of polygons) in the processing required for the protection depth calculation.

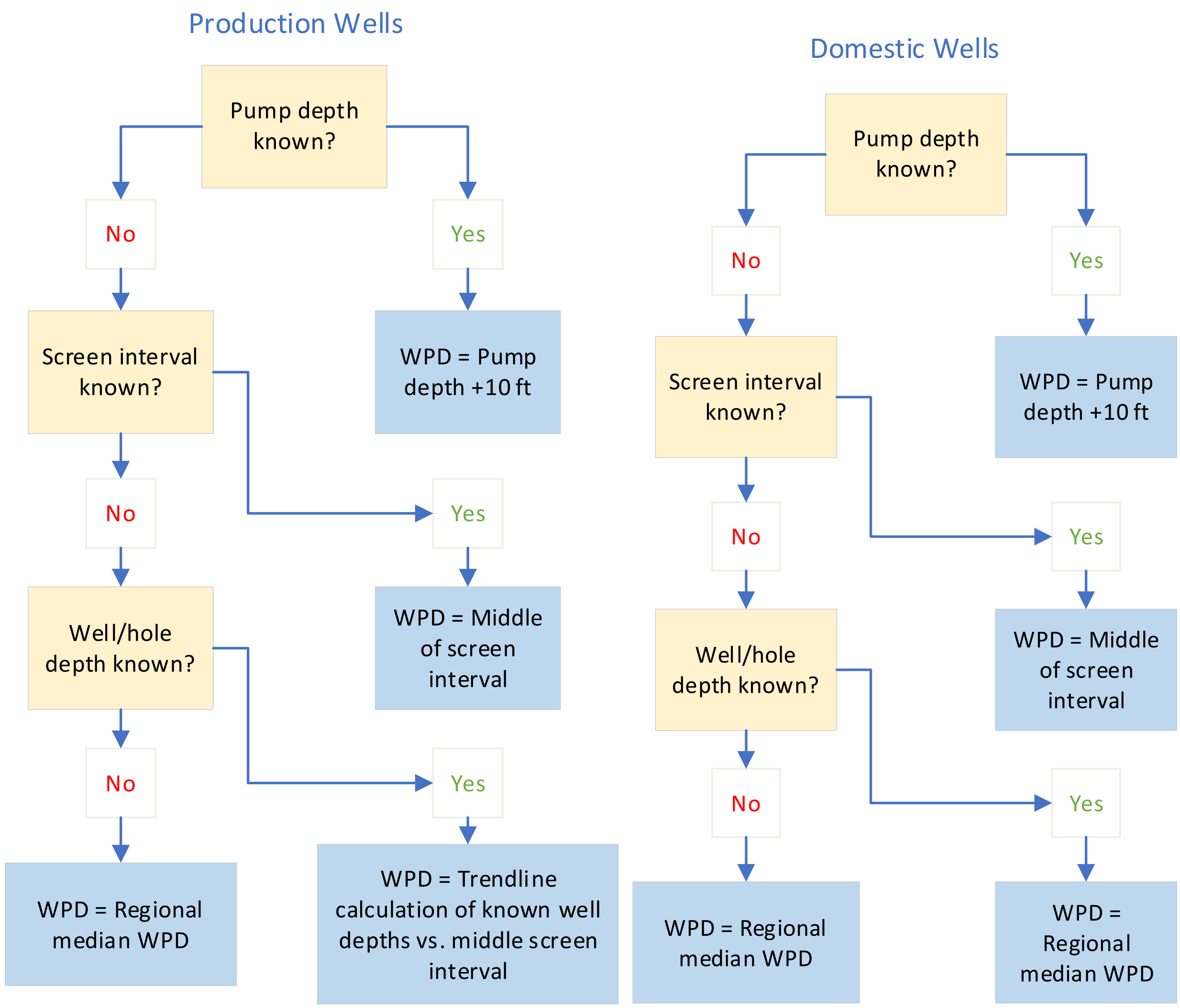

Figure 5-1: Well Protection Depth Stepwise Diagram for Production and Domestic Wells

2. **Recent deepest measurement plus 10 ft or 5% buffer (whichever is greater):** Historical data for the last ten years (2013-2023 based on the timing of the development of this methodology) was analyzed to find the deepest depth to water during that period. A buffer of the greater of either 10 ft or 5% of the depth to water value was then added to the max depth. This methodology helps utilize, where appropriate, historical and recently collected data that captures both wet and dry periods. This criteria allows for the flexibility for regions of the Basin that experience significant drawdown and recovery during dry and wet hydrologic cycles to manage those variations in groundwater elevation.

3. **Projected depth of water in 2040 based on modeled glidepath**: The Cuyama Basing Groundwater Model (updated in 2024) was used to project the depth of water in 2040 based on the CBGSA's planned allocation and glidepath pumping reductions. In regions of the Basin where there is significant pumping, this allows for groundwater levels to decline to where the model predicts they will be in 2040 given the anticipated schedule for pumping reductions.
4. **Saturated thickness in areas of greater geologic understanding:** The calculation for this strategy uses the localized region's total average saturated thickness for the primary storage area and calculating 15 percent of that depth. Because there is an area in the northwestern portion of the Basin with greater geological research and understanding, the saturated thickness provides a measurable and defined direct relationship between available water in the aquifer, storage capacity, and undesirable conditions. As discussed in the following section, additional analysis has also been conducted to ensure that the calculated MTs in this area do not impact beneficial uses or uses at any nearby active wells or potential GDEs.

Using these four options above, the stepwise function to determine the appropriate MT for each RMW is as follows:

1. For RMWs that used the saturated thickness approach in the approved 2020 GSP, utilize that same approach.
2. For RMWs that did not utilize the saturated thickness approach in the approved 2020 GSP,
    a. First find the deeper of these two values:
        i. Deepest depth to water (DTW) from 2013-2023 + buffer
        ii. Cuyama Basin groundwater model projected DTW in 2040
    b. Then find the shallower value between Step 2a, the WPD and the GDE protection depth

Figure 5-2 shows the groundwater level SMC minimum threshold methodology that resulted from the stepwise function above for all representative wells.

The CBGSA determined that the same margin of operational flexibility (MoOF) utilized in the 2020 GSP should be used again, unless that margin was less than 10 feet in which the MoOF would be equal to 10 feet.

In summary, this approach achieves the CBGSA's goal of allowing for operational and hydrologic flexibility in all parts of the Basin while also ensuring that groundwater pumping wells and GDEs are protected from negative impacts.

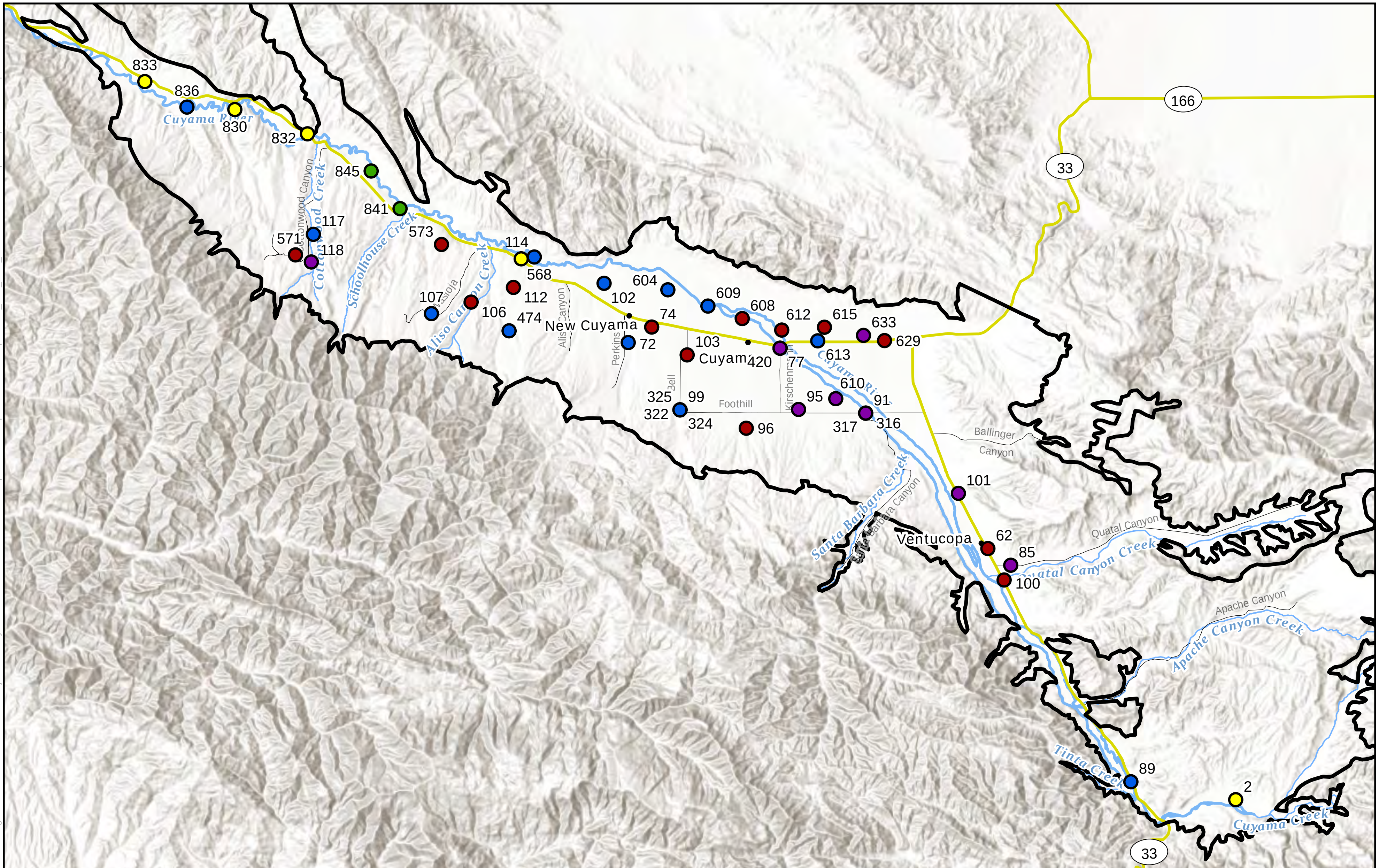

Figure 5-2: Minimum Threshold Calculation Method

Cuyama Valley Groundwater Basin

Legend

Method		
Glidepath	Highway	Creek
Recent Measurement	Local Road	Cuyama River
Saturated Thickness	Town	Cuyama Basin
WPD		
GDE		

N

0 1.25 2.5 5 Miles

Map Created: April 2024

Woodard & Curran

Cuyama Basin Groundwater Sustainability Agency

Figure Exported: 4/16/2024 By: ceggleton Using: \\woodardcurran.net\shared\Projects\CA Cuyama Basin GSA\0011078.01 GSP\wip\Z. GIS\2. Maps\3. 2025 GSP Update\05_MTs_MOs_IM\Well Protection DepthInterpolateWPD.aprx

Analysis of Northwestern Region Minimum Thresholds

DWR's consultation letter expressed concern about whether the thresholds established using the saturated thickness methodology (applied to RMW Opti wells 841 and 845) are protective of nearby beneficial users of water. Specifically, DWR questioned what impact(s) may occur to nearby domestic wells and GDEs if groundwater levels were to reach MTs in representative wells. To address this, the Cuyama Basin Water Resources Model (CBWRM) was used to simulate groundwater level conditions by artificially dropping groundwater levels near Opti Wells 841 and 845 to the set MTs. This was done by assigning specified head boundary conditions at the MT levels for the model nodes near these well locations. Since the only significant groundwater pumping in the Western and Northwestern regions occurs from a group of wells that are located approximately between Opti Wells 841 and 845, this analysis reflects a worst case condition that may result from anticipated pumping in this area of the Basin, and therefore is instructive as to whether the MTs in this region are protective of beneficial uses and users of water. The simulation was run for 10 years over the historical period between water years (WY) 2011 to 2020 during which the specified head boundary conditions at the MT levels were continuously active.

Figure 5-3 shows the modeled change in groundwater elevations resulting from setting groundwater levels at the MTs at wells 841 and 845. Areas shaded in red or tan color on the figure had reduced groundwater elevations as compared to the baseline condition. Areas shaded in lime green were unaffected by the change in groundwater elevations at well 841 and 845 locations. As shown in the figure, there are no active domestic wells within the area affected by the lowered groundwater elevations at wells 841 and 845. The only GDE which may be affected is the GDE located at the confluence of Cottonwood Creek and the Cuyama River, which has an expected impact of less than 5 feet. However, even with this difference, the estimated depth to water at this GDE location would be shallower than 30 feet and therefore should not have a detrimental impact on these potential GDEs. Potential impacts on this GDE location will be monitored at nearby Opti well 832.

As noted above, the other potential beneficial use that may be affected comes from Cuyama River inflows into Lake Twitchell. The model simulation also showed an increase in stream depletion in the affected portion of the aquifer of about 1,200 acre-feet per year. This represents about 12 percent (out of 10,200 AFY) of the modeled streamflow in the Cuyama River at this location during the WY 2011-2020 model simulation period. However, the actual change in inflows into Lake Twitchell would be less than 1,200 AFY because of stream depletions that would occur between Cottonwood Creek and Lake Twitchell. For comparison, during the same period the USGS gage on the Cuyama River just upstream of Lake Twitchell (11136800) recorded an average annual flow of 7,900 AFY, only a portion of which comes from the Cuyama Basin. Given the lack of data regarding the hydrology and stream seepage between Cottonwood Creek and Lake Twitchell, it is uncertain how much of an impact this would have on the flows that ultimately are stored in Lake Twitchell.

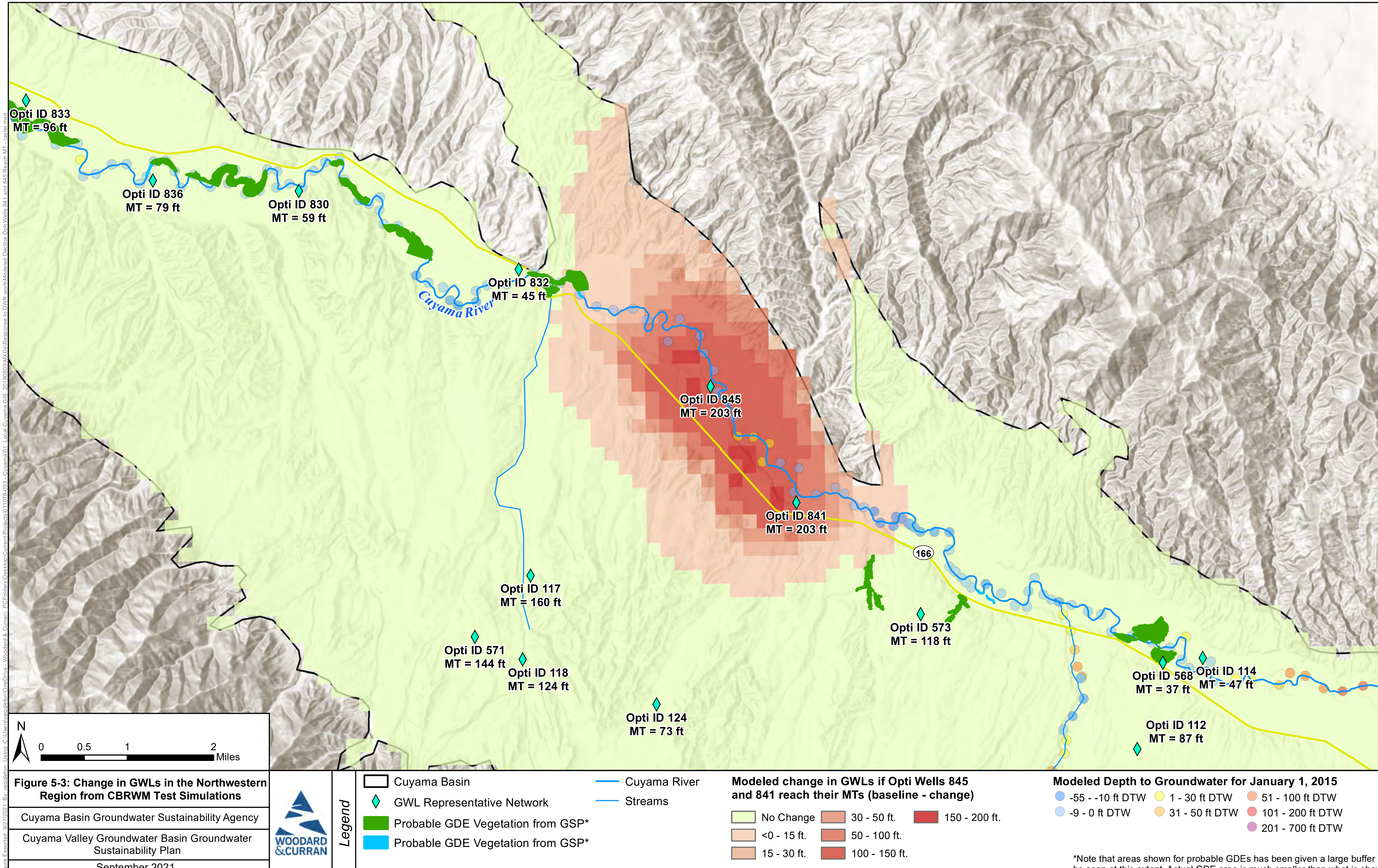

Figure 5-3: Change in GWLs in the Northwestern Region from CBRWM Test Simulations

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

September 2021

5.2.3 Selected MT, MO, and IM Graphs, Figures, and Tables

Figure 5-4 shows an example hydrograph with indicators for the MT and MO over the hydrograph. The left axis shows elevation above mean sea level, the right axis shows depth to water below ground surface. The brown line shows the ground surface elevation, and time in years is shown on the bottom axis. Each measurement taken at the monitoring well is shown as a blue dot, with blue lines connecting between the blue dots indicating the interpolated groundwater level between measurements. The MT and IM are shown as a red line, and the MO is shown as a green line. Appendix A includes hydrographs with MT, MO and IM for each representative monitoring well.

Table 5-1 shows the representative monitoring network and the numerical values for the MT, MO, and IM for each representative well.

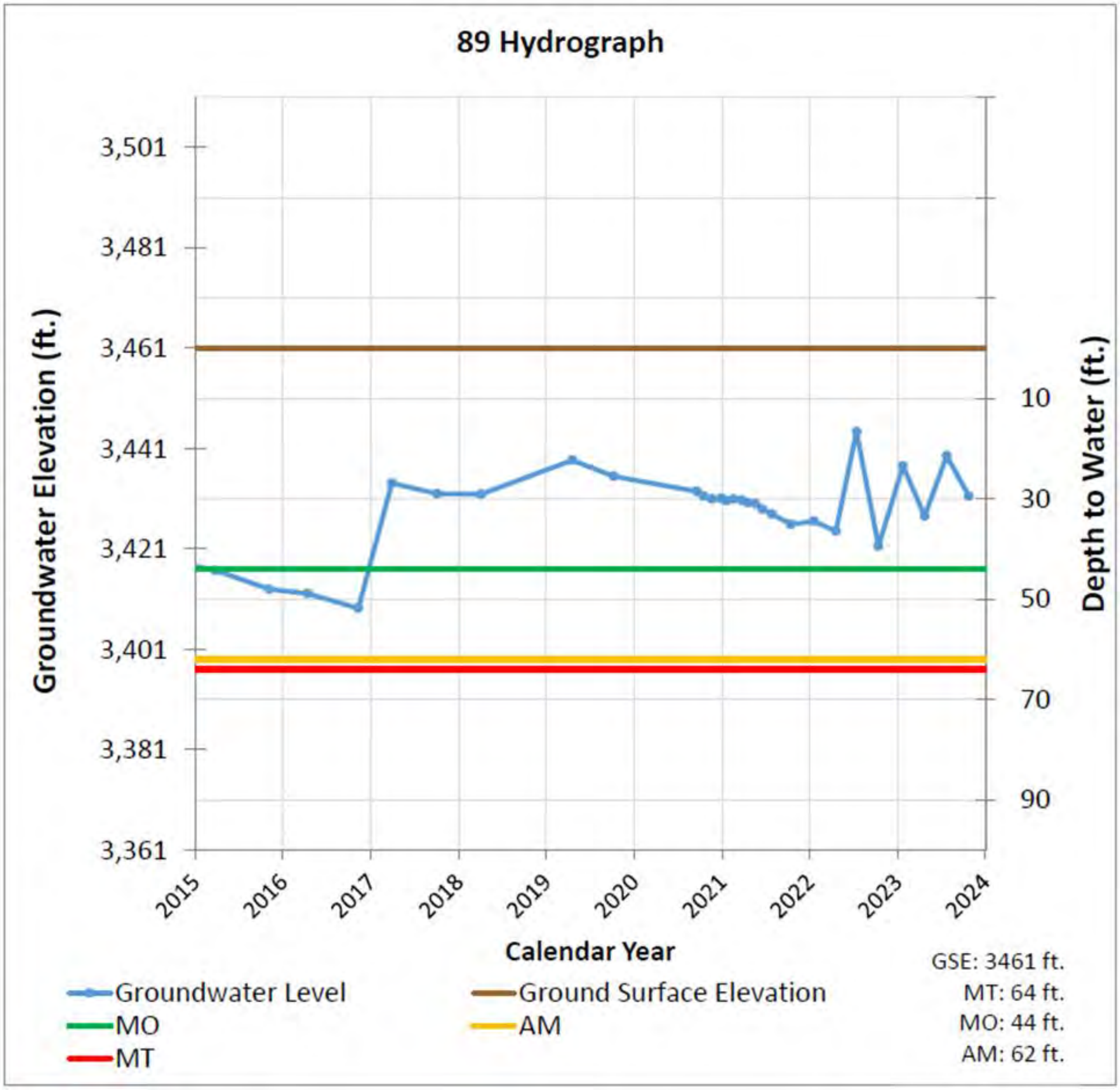

Figure 5-4: Example Hydrograph

Table 5-1: Representative Monitoring Network and Sustainability Criteria

OPTI Well	Region	Final MT	Final MO	2025 IM	2030 IM	2035 IM	Well Depth (feet)	Screen Top (feet)	Screen Bottom (feet)	GSE (feet)
72	Central	373	328	362	350	339	790	340	350	2,171
74	Central	322	309	319	316	312	--	--	--	2,193
77	Central	514	464	501	489	476	980	960	980	2,286
91	Central	730	681	718	705	693	980	960	980	2,474
95	Central	597	562	588	580	571	805	--	--	2,449
96	Central	369	361	367	365	363	500	--	--	2,606
99	Central	379	368	377	374	371	750	730	750	2,513
102	Central	470	432	461	451	442	--	--	--	2,046
103	Central	379	324	365	351	338	1,030	--	--	2,289
112	Central	102	100	101	101	100	441	--	--	2,139
114	Central	58	56	58	57	57	58	--	--	1,925
316	Central	731	682	719	706	694	830	--	--	2,474
317	Central	700	650	688	675	663	700	--	--	2,474
322	Central	387	378	385	383	381	850	--	--	2,513
324	Central	365	353	362	359	356	560	--	--	2,513
325	Central	331	323	329	327	325	380	--	--	2,513
420	Central	514	464	501	489	476	780	--	--	2,286
421	Central	514	466	502	490	478	620	--	--	2,286
474	Central	197	178	192	188	183	213	--	--	2,369
568	Central	47	46	47	47	46	188	--	--	1,905
604	Central	544	505	534	524	515	924	454	924	2,125
608	Central	504	475	497	490	483	745	440	745	2,224
609	Central	499	462	490	480	471	970	476	970	2,167
610	Central	557	527	549	542	534	780	428	780	2,442
612	Central	513	490	507	502	496	1,070	657	1070	2,266
613	Central	578	550	571	564	557	830	330	830	2,330
615	Central	588	556	580	572	564	865	480	865	2,327
629	Central	613	581	605	597	589	1,000	500	1000	2,379

OPTI Well	Region	Final MT	Final MO	2025 IM	2030 IM	2035 IM	Well Depth (feet)	Screen Top (feet)	Screen Bottom (feet)	GSE (feet)
633	Central	605	551	591	578	564	1,000	500	1000	2,364
62	Eastern	212	187	206	199	193	212	--	--	2,921
85	Eastern	200	176	194	188	182	233	--	--	3,047
100	Eastern	186	157	179	172	164	284	--	--	3,004
101	Eastern	138	115	133	127	121	200	--	--	2,741
841	Northwestern	203	153	191	178	166	600	170	580	1,761
845	Northwestern	203	153	191	178	166	380	100	360	1,712
2	Southeastern	52	35	48	44	39	73	--	--	3,720
89	Southeastern	62	42	57	52	47	125	--	--	3,461
106	Western	164	152	161	158	155	227.5	--	--	2,327
107	Western	122	103	117	113	108	200	--	--	2,482
117	Western	163	154	161	158	156	212	--	--	2,098
118	Western	40	10	24	7	-10	500	--	--	2,270
571	Western	142	118	136	130	124	280	--	--	2,307
573	Western	93	42	80	68	55	404	--	--	2,084
830	Far-West Northwestern	63	60	62	62	61	77.2	--	--	1,571
832	Far-West Northwestern	50	35	46	43	39	131.8	--	--	1,630
833	Far-West Northwestern	48	10	30	12	-6	503.55	--	--	1,457
836	Far-West Northwestern	49	10	38	28	17	325	--	--	1,486

5.3 Reduction of Groundwater Storage

The undesirable result for the reduction in groundwater storage is a result that causes significant and unreasonable reduction in the viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

Direct measurement of the reduction of groundwater storage in the Basin is not needed because monitoring in several areas of the Basin (i.e., the western, southeastern, and portions of the north facing slope of the Cuyama Valley near the center of the Basin) indicate that those regions are likely near, or at full conditions. Additionally, the Basin's primary aquifer is not confined and storage closely matches groundwater levels.

SGMA regulations define the MT for reduction of groundwater storage as "…the total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results."

Undesirable results for groundwater storage volumes in this GSP will use groundwater levels as a proxy, as the groundwater level sustainability criteria are protective of groundwater in storage.

5.3.1 Proxy Monitoring

Reduction of groundwater storage in the Basin uses groundwater levels as a proxy for determining sustainability, as permitted by Title 23 of the California Code of Regulations in Section 354.26 (d), Chapter 1.5.2.5. Additionally, there are currently no state, federal, or local standards that regulate groundwater storage. As described above, any benefits to groundwater storage are expected to coincide with groundwater level management.

5.4 Seawater Intrusion

Due to the geographic location of the Basin, seawater intrusion is not a concern, and thus is not required to establish criteria for undesirable results for seawater intrusion, as supported by Title 23 of the California Code of Regulations in Section 354.26 (d), Chapter 1.5.2.5.

5.5 Degraded Water Quality

The undesirable result for degraded water quality is a result stemming from a causal nexus between SGMA-related groundwater quantity management activities and groundwater quality that causes significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.

The SGMA regulations specify that, "minimum thresholds for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results."

Salinity (measured as total dissolved solids [TDS]), arsenic, and nitrates were identified during the development of the 2020 GSP as potential constituents of concern. However, recent data analysis has led the CBGSA to conclude that thresholds for TDS are warranted and thresholds for nitrate and arsenic are not aligned with the CBGSAs role within the Subbasin.

TDS is being monitored by the GSA for several reasons. Local stakeholders identified TDS as one of the constituents of concerns in the GSP development processes, and TDS has had several exceedance measurements near domestic and public supply wells. Although high TDS concentrations are naturally occurring within the Basin, it is believed that management of groundwater levels may help improve TDS concentration levels towards levels reflective of the natural condition.

The CBGSA will continue to monitor TDS and utilize the undesirable results statement and UR triggers identified in Section 3.2.4 to determine the appropriate actions and timing of applicable actions to address water quality concerns. As discussed in Section 7.6 Adaptive Management, the CBGSA has also set adaptive management triggers. Adaptive management triggers are thresholds that, if reached, initiate the process for considering implementation of adaptive management actions or projects. During GSP implementation, regular monitoring reports will be prepared for the CBGSA that summarize and provide updates on groundwater conditions, including groundwater quality.

Nitrates and Arsenic

Nitrates are the result of fertilizer application on agricultural land. The CBGSA does not have the regulatory authority granted through SGMA to regulate the application of fertilizer. This regulatory authority is held by the SWRCB through the Irrigated Lands Regulatory Program (ILRP). The CBGSA can encourage agricultural users in the Basin to use best management practices when using fertilizers but cannot limit their use. Because the CBGSA has no mechanism to directly control nitrate concentrations, the GSA believes that setting thresholds for nitrates is not appropriate. However, it should be noted that GSP implementation will likely have an indirect effect on nitrates in the central portion of the Basin due to the reduction in pumping allocations that were included in the GSP. This will likely reduce the application of fertilizers in the central part of the Basin as agricultural production in the Basin is reduced over time.

Similarly, because arsenic is naturally occurring, the CBGSA does not believe the establishment of thresholds for arsenic is appropriate. As shown in Figure 2-81, wells with high arsenic concentrations are located in a relatively small area of the Basin south of New Cuyama. A review of production well data provided by the counties (discussed in Section 2) indicates that there are no active private domestic wells located in this part of the Basin. The only operational public well that is located in this part of the Basin serves the Cuyama Community Services District (CCSD). As described in Chapter 7, the CCSD is currently pursuing the drilling of a new production well, which was included as a project in the GSP. Once this well is completed, it is not believed that any domestic water users will be using a well that accesses groundwater with known high arsenic concentrations.

Monitoring Approach for Nitrates and Arsenic

The CBGSA will continue to coordinate and work with the Regional Water Quality Control Board and other responsible regulatory programs on a regular basis for the successful and sustainable management of water resources that protect against undesirable conditions related to nitrates and arsenic. As discussed in Chapter 4, the CBGSA will take nitrate and arsenic measurements once every five years as part of its monitoring program and will use existing monitoring programs for nitrates and arsenic, in particular ILP for nitrates and USGS for arsenic.

In the event groundwater conditions related to nitrate and arsenic begin to impact the beneficial uses and users of groundwater in the Basin, the CBGSA will notify the appropriate regulatory program and/or agency and initiate more frequent coordination to address those conditions and support their regulatory actions to address those conditions. If undesirable groundwater conditions for nitrate and arsenic are found to be the result of Basin management by the CBGSA, a process may be developed to help mitigate or assist those uses and users by utilizing adaptive management strategies, including pumping management or well rehabilitation or replacement. At this time, however, the CBGSA will rely on the current processes and programs set forth to manage nitrate and arsenic in a sustainable manner.

5.5.1 Proxy Monitoring

Proxy monitoring is not used for groundwater quality monitoring in the Basin.

5.5.2 Minimum Thresholds, Measurable Objectives, and Interim Milestones

The CBGSA has decided to address TDS within the Basin by setting MTs, MOs, and IMs as shown in Table 5-2. TDS does not have a primary maximum contaminant level (MCL) but does have both a California Division of Drinking Water and U.S. Environmental Protection Agency. Secondary standard of 500 milligrams per liter (mg/L), and a short-term standard of 1,500 mg/L. Current levels in the Basin range from 84 to 4,400 mg/L. This is due to saline conditions in the portions of the watershed where rainfall percolates through marine sediments that contain large amounts of salt.

Due to this natural condition, additional data has been and will continue to be collected during GSP implementation to increase the CBGSA's understanding of TDS sources in the Basin. It should be noted however, that TDS levels in groundwater may not detrimentally impact the agricultural economy of the Basin. Much of the crops grown in the Basin, including carrots, are not significantly affected by the kinds of salts in the Basin.

Due to these factors, the MT for representative well sites was set to be the 20 percent of the total range of each representative monitoring site above the 90^{th} percentile of measurements for each site. For example, Opti Well 72 has a minimum recorded TDS value of 955 mg/L and a maximum of 1,020 mg/L. This is a range of 65 mg/L, and 20 percent of that range is 13 mg/L. The 90^{th} percentile for Opti Well 72 is 1,010 mg/L. The MT is then calculated by taking the 90^{th} percentile of 1,010 mg/L and adding 13mg/L to reach a final MT of 1,023 mg/L.

To provide for an acceptable margin of operational flexibility, the MO for TDS levels in the Basin have been set to the temporary MCL of 1,500 mg/L for each representative well where the latest measurements as of 2018 are greater than 1,500 mg/L. For wells with recent measurements of less than 1,500 mg/L, the MO was set to the most recent measurement as of 2018.

GSP regulations require GSAs to avoid undesirable results by 2040, which means they must meet or exceed the MTs. The CBGSA also recognizes that reaching an MO is a priority, but meeting or exceeding the MT is required by SGMA. For this reason, the IMs for 2025 have been set as the same value as the MT, with a projected improvement to one-third of the distance between the MT and MO in 2030 and one-half of the distance between the MT and MO in 2035.

Table 5-2: MOs, MTs, and Interim Milestones for Groundwater Quality Representative Sites - TDS

Opti Well	Well Depth (feet below GSE)	Screen Interval (feet below GSE)	Well Elevation (feet above MSL)	MO (mg/L)	MT (mg/L)	2025 IM (mg/L)	2030 IM (mg/L)	2035 IM (mg/L)
61	357	Unknown	3681	585	1000	896	793	689
72	790	340 – 350	2171	900	1106	1055	1003	952
74	--	Unknown	2193	1310	1872	1732	1591	1451
77	980	960 – 980	2286	1,120	1682	1542	1401	1261
79	600	Unknown	2374	1,500	2318	2114	1909	1705
83	198	Unknown	2858	1,120	1816	1642	1468	1294
88	400	Unknown	3549	320	1000	830	660	490
90	800	Unknown	2552	1,400	1596	1547	1498	1449
91	980	960 – 980	2474	1,020	1558	1424	1289	1155
95	805	Unknown	2449	1340	1950	1798	1645	1493
96	500	Unknown	2606	1100	1676	1532	1388	1244
99	750	730 – 750	2513	1,140	1658	1529	1399	1270
101	200	Unknown	2741	1210	1735	1604	1473	1341
102	--	Unknown	2046	1,500	2551	2288	2026	1763
157	71	Unknown	3755	1,360	2468	2191	1914	1637
204	--	Unknown	3693	380	1000	845	690	535
242	155	Unknown	2933	780	1656	1437	1218	999
316	830	Unknown	2474	1,060	1524	1408	1292	1176
317	700	Unknown	2474	692	1444	1256	1068	880
322	850	Unknown	2513	1,140	1504	1413	1322	1231
324	560	Unknown	2513	740	1000	935	870	805
325	380	Unknown	2513	1,070	1687	1533	1378	1224
420	780	Unknown	2286	1,080	1560	1440	1320	1200
421	620	Unknown	2286	1,280	1761	1640	1520	1400
424	1000	Unknown	2291	1,260	1658	1559	1459	1360
467	1140	Unknown	2224	1070	1846	1652	1458	1264
568	188	Unknown	1905	860	1118	1054	989	925
841	600	170 – 580	1761	561	1000	890	781	671
845	380	100 – 360	1712	1,250	1250	1250	1250	1250

5.6 Subsidence

The undesirable result for land subsidence is a result that causes significant and unreasonable reduction in the viability of the use of infrastructure over the planning and implementation horizon of this GSP.

5.6.1 Representative Monitoring

As discussed in Section 4.9, all monitoring network subsidence monitoring stations in the Basin, and three additional sites outside of the Basin are designated as representative monitoring sites. Detrimental impacts of subsidence include groundwater storage reductions and potential damage to infrastructure, such as large pipelines, roads, bridges, and canals. However, the Basin does not currently have infrastructure of this type, and storage losses are small enough they are unlikely to have a meaningful effect on the Basin water budget.

Subsidence in the central portion of the Basin is approximately 0.9 inches per year, as shown in Section 2.2. Currently, there are no state, federal, or local standards that regulate subsidence rates.

5.6.2 Minimum Thresholds, Measurable Objectives, and Interim Milestones

Although several factors may affect subsidence rates, including natural geologic processes, oil pumping, and groundwater pumping, the primary influence within the Basin is due to groundwater pumping. Because current subsidence rates (approximately 0.9 inches per year) are not significant and unreasonable, the MT rate for subsidence was set at 2 inches per year to allow for flexibility as the Basin works toward sustainability in 2040. This rate is applied to the two stations in the Basin (CUHS and VCST), as the other stations in the monitoring network represent ambient changes in vertical displacement, primarily due to geological influences. This level of subsidence is considered unlikely to cause a significant and unreasonable reduction in the viability of the use of infrastructure over the planning and implementation horizon of this GSP.

Subsidence is expected to be influenced through the management of groundwater pumping through the groundwater level MOs, MTs, and IMs. Thus, the MO for subsidence is set for zero lowering of ground surface elevations.

IMs are not needed for the subsidence sustainability indicator because the current rate of subsidence is above the MT.

Subsidence rates will be measured in the frequency of measurement and monitoring protocols documented in Section 4's Appendix A.

5.7 Depletions of Interconnected Surface Water

The following content reflects what was included in the 2020 GSP. DWR is in the process of developing additional guidance documents to assist GSAs in addressing the interconnected surface waters sustainability indicator. At this time, those guidance documents have not been published, but the CBGSA plans to utilize those resources when they become available for future updates to the GSP and for future ISW implementation.

The undesirable result for depletions of interconnected surface water is a result that causes significant and unreasonable reductions in the viability of agriculture or riparian habitat in the Basin over the planning and implementation horizon of this GSP.

5.7.1 Proxy Monitoring

Reduction of groundwater storage in the Basin uses groundwater levels as a proxy for determining sustainability, as permitted by Title 23 of the California Code of Regulations in Section 354.26 (d), Chapter 1.5.2.5. Additionally, there are currently no state, federal, or local standards that regulate groundwater storage. As described above, any benefits to groundwater storage are expected to coincide with groundwater level management.

5.7.2 Minimum Thresholds, Measurable Objectives, and Interim Milestones

SGMA regulations define the MT for interconnected surface water as "…the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on the beneficial uses of the surface water and may lead to undesirable results." Under normal surface water conditions in the Basin as of January 1, 2015, surface flows infiltrate into the groundwater system and are used by phreatophytes, except in the most extreme flash flood events, when surface water flows out of the Basin. Historically, these flash flood events flow for less than one week of the year. Conditions have not changed since January 1, 2015, and surface flows continue to infiltrate into the groundwater system for use by local phreatophytes.

Because current Basin conditions have not varied from January 1, 2015 conditions, and the new methodology for the chronic lowering of groundwater levels ISW incorporates protections for beneficial users including GDEs, the groundwater level thresholds are used by proxy to protect the Basin from undesirable results related to depletion of interconnected surface water.

The ISW monitoring network includes 12 wells, nine of which are representative wells for which minimum thresholds and measurable objective have been defined. The MT, MO, and UR criteria (30 percent of representative wells below their MTs for two consecutive years) are the same as those calculated and provided in the groundwater level representative network for the groundwater level monitoring. MTs at the representative well locations are protective of GDE locations in the upper and lower portions of the river, with MTs less than 30 feet from the bottom of the river channel in the vicinity of four wells (89, 114, 830 and 832). Note that Well 906 is part of a new multi-completion well that was constructed in the summer of 2021 under DWR's Technical Support Services; while Well 906 is a representative well, sustainability criteria will not be developed for this well until a history of groundwater level measurements has been established. These thresholds are included in Section 5.2 but are also included in Table 5-3 below.

Table 5-3: Representative Monitoring Network and Sustainability Criteria

OPTI Well	Region	Final MT	Final MO	2025 IM	2030 IM	2035 IM	Well Depth (feet)	Screen Top (feet)	Screen Bottom (feet)	GSE (feet)
114	Central	58	56	58	57	57	58	--	--	1,925
568	Central	47	46	47	47	46	188	--	--	1,905
2	Southeastern	52	35	48	44	39	73	--	--	3,720
89	Southeastern	62	42	57	52	47	125	--	--	3,461
830	Far-West Northwestern	63	60	62	62	61	77.2	--	--	1,571
832	Far-West Northwestern	50	35	46	43	39	131.8	--	--	1,630
833	Far-West Northwestern	48	10	30	12	-6	503.55	--	--	1,457

5.8 References

California Water Boards Irrigated Land Regulatory Program (ILRP) website. https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/. Accessed January 11, 2019.