Cuyama Basin
Groundwater Sustainability Plan—
Annual Report for 2022-2023 Water Year

Prepared by:

Woodard & Curran

March 2024

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Abbreviations and Acronyms

AF	acre-feet
CBGSA	Cuyama Basin Groundwater Sustainability Agency
CBWD	Cuyama Basin Water District
CBWRM	Cuyama Basin Water Resources Model
CCSD	Cuyama Community Services District
DMS	Data Management System
DWR	California Department of Water Resources
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
SAC	Standing Advisory Committee
SBCWA	Santa Barbara County Water Agency
SGMA	Sustainability Groundwater Management Act
SR	State Route
TSS	Technical Support Services
USGS	United States Geological Survey

Executive Summary

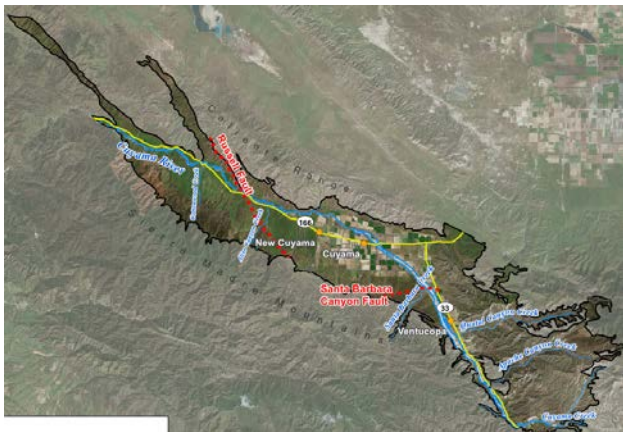
§356.2 (a)	General information, including an executive summary and a location map depicting the basin covered by the report.

ES-1 Introduction

In 2014, the California legislature enacted the Sustainable Groundwater Management Act (SGMA) in response to continued overdraft of California's groundwater resources. The Cuyama Groundwater Basin (Basin) is one of 21 basins and subbasins identified by the California Department of Water Resources (DWR) as being in a state of critical overdraft. SGMA requires that a Groundwater Sustainability Plan (GSP) be prepared to address the measures necessary to attain sustainable conditions in the Cuyama Groundwater Basin. Within the framework of SGMA, sustainability is generally defined as the conditions that result in long-term reliability of groundwater supply and the absence of undesirable results.

In response to SGMA, the Cuyama Basin Groundwater Sustainability Agency (CBGSA) was formed in 2017. The CBGSA is a joint-powers agency that is comprised of Kern, Santa Barbara, San Luis Obispo and Ventura Counties, plus the Cuyama Community Services District and the Cuyama Basin Water District. The CBGSA is governed by an 11-member Board of Directors, with one representative from Kern, San Luis Obispo and Ventura counties, two representatives from Santa Barbara County, one member from the Cuyama Community Services District, and five members from the Cuyama Basin Water District.

Figure ES-1: GSP Plan Area



The Draft Cuyama Basin GSP was adopted on December 4, 2019 by the CBGSA and submitted to DWR on January 28, 2020. SGMA requires that the CBGSA develop a GSP that achieves groundwater sustainability in the Basin by the year 2040.

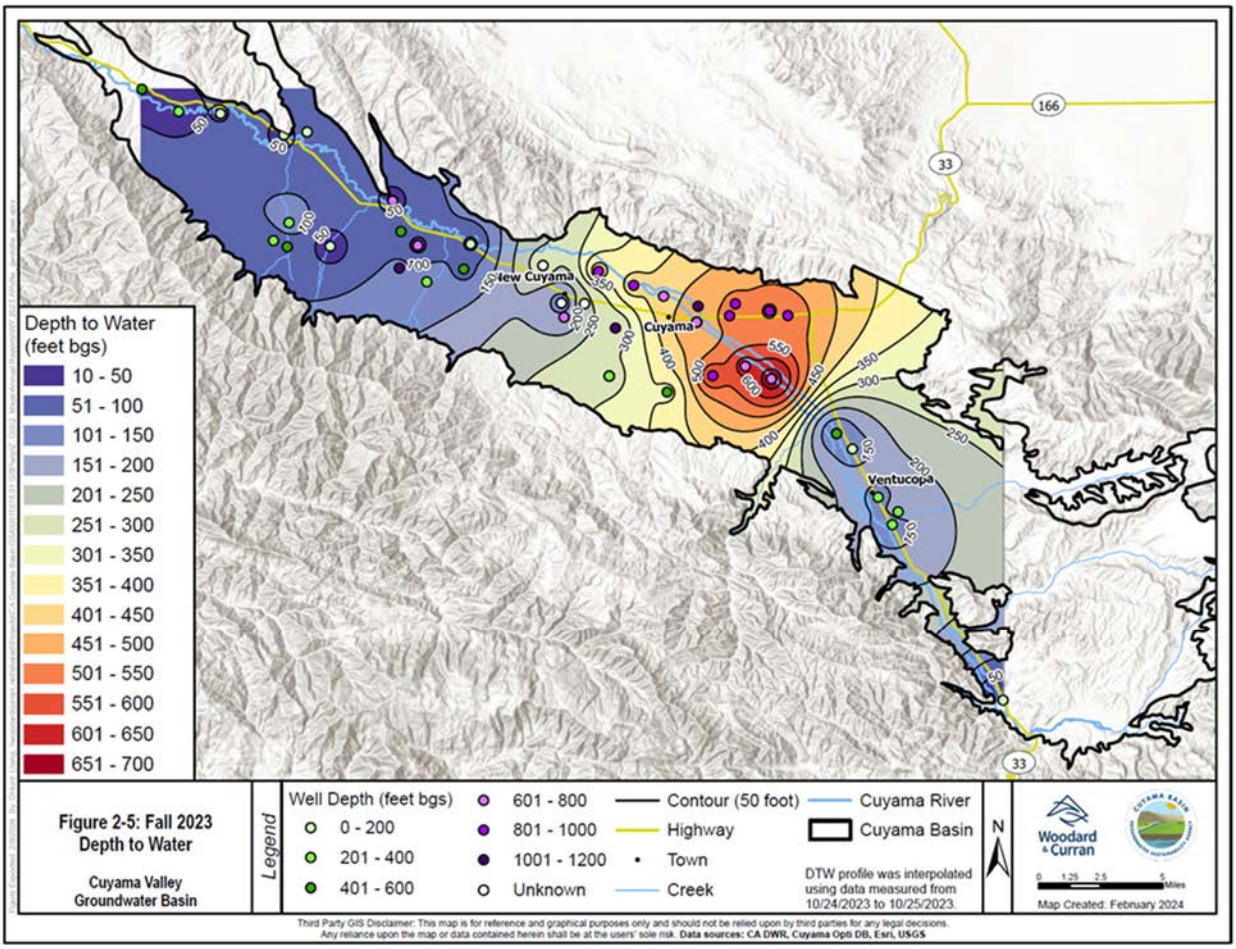
On January 21, 2021, DWR determined that the GSP was "incomplete" and recommended CBGSA to amend the GSP to address four corrective actions. To address these corrective actions, CBGSA developed supplemental sections to the GSP and resubmitted to DWR on July 18, 2022. On March 2, 2023, DWR announced that the Revised GSP had been Approved.

The jurisdictional area of the CBGSA is defined by DWR's Bulletin 118, 2013, the 2016 Interim Update, and the latest 2020 update. The Cuyama Groundwater Basin generally underlies the Cuyama Valley, as shown in **Figure ES-1**.

ES-2 Groundwater Levels

The Annual Report for the 2023 water year includes groundwater contours for Spring and Fall of 2023, and updated hydrographs for the groundwater level monitoring network identified in the Cuyama Basin GSP. The Cuyama Basin consists of a single principal aquifer, and water levels in Basin monitoring wells are considered representative of conditions in that aquifer. Groundwater levels in some portions of the Basin have been declining for many years while other areas of the Basin have experienced no significant change in groundwater levels. Groundwater levels vary across the Basin, with the highest depth to water occurring in the central portion of the Basin (**Figure ES-2**). The western and eastern portions of the Basin have generally shallower depth to water. Generally, depth to water and groundwater elevation in 2023 have changed a small amount in the central basin compared to 2022 levels with little change in other parts of the basin.

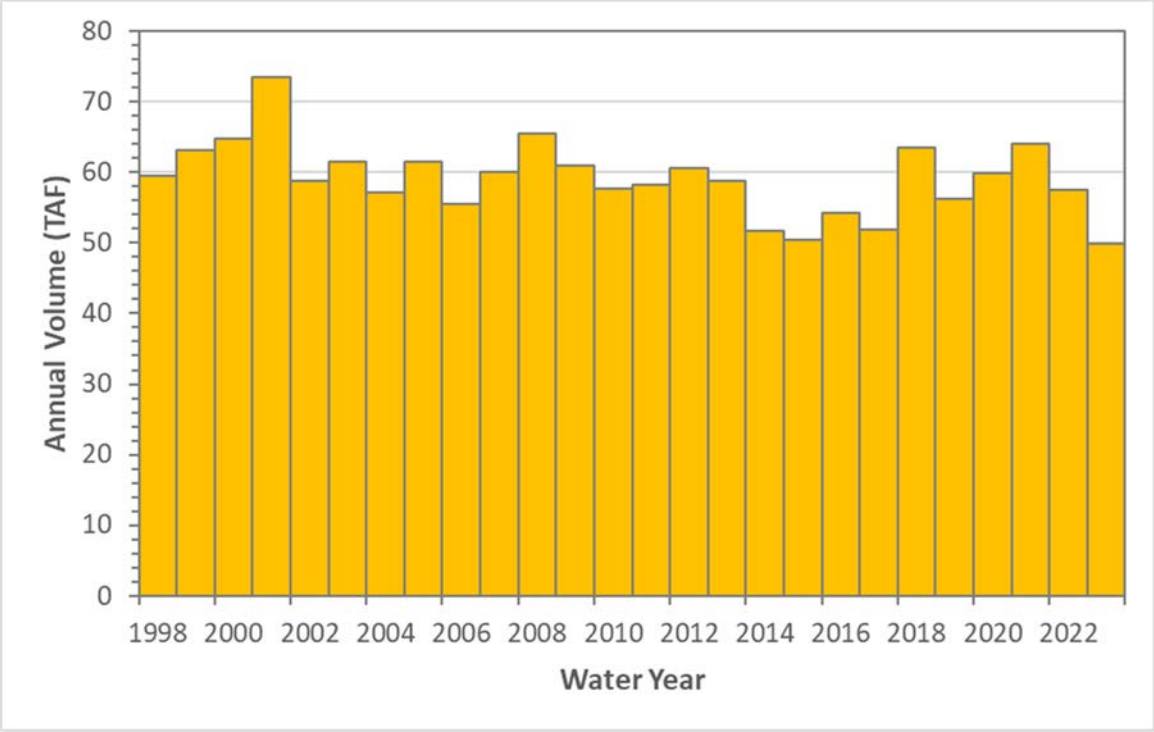
Figure ES-2: Cuyama Basin Depth to Water Contour Map (Fall 2023)



ES-3 Water Use

The Cuyama Groundwater Basin is supplied entirely by groundwater, with virtually no surface water use. Groundwater pumping in the Basin is estimated to have been about 49,900 AF in 2023. This reflects a decrease of about 7,500 AF as compared to 2022. (See **Figure ES-3**).

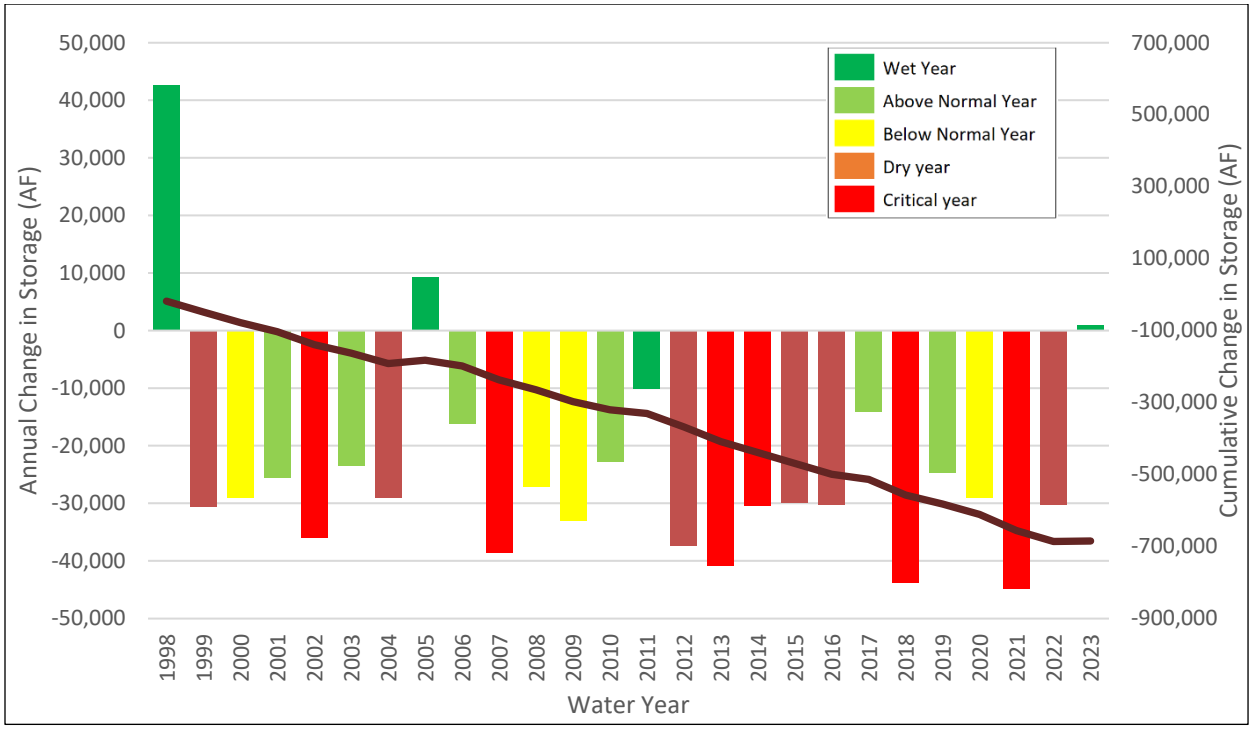
Figure ES-3: Annual Groundwater Extraction in the Cuyama Basin in Water Years 1998-2023



ES-4 Change in Groundwater Storage

It is estimated that there was an increase in Basin groundwater storage of 969 AF in 2023. This year showed an annual increase in groundwater storage, the first time since 2005. However there continues to be a long-term trend in groundwater storage reduction in the Basin since 1999. **Figure ES-4** shows the historical change in groundwater storage by year, water year type,[1] and cumulative water volume in each year for the period from 1998 through 2023.

Figure ES-4: Change in Groundwater Storage by Year, Water Year Type, and Cumulative Water Volume



[1] Water year types are customized for the Basin watershed based on annual precipitation as follows:

- Wet year = more than 19.6 inches
- Above normal year = 13.1 to 19.6 inches
- Below normal year = 9.85 to 13.1 inches
- Dry year = 6.6 to 9.85 inches
- Critical year = less than 6.6 inches.

ES-5 Groundwater Quality

Only 34% of monitoring wells were sampled for total dissolved solids (TDS) in 2023 due to limitations in gaining access to well sites. Approximately 13% of measured wells exceeded their measurable objective and 4% exceeded their minimum threshold for TDS. However, CBGSA considers it premature to use this data to evaluate the performance of groundwater quality at this time since only three rounds of measurements have been taken at these wells.

ES-6 Land Subsidence

Observed subsidence rates in the Basin are well below the minimum threshold, and thus undesirable results for subsidence are not occurring in the Basin.

ES-7 Plan Implementation

The following plan implementation activities were accomplished in 2023:

- Implementation of a groundwater extraction fee and supplemental fee, which is expected to generate revenue to cover the administrative costs of the CBGSA for the period from January 1, 2023, through December 31, 2023.
- A total of nine public meetings were conducted at which GSP development and implementation was discussed.
- The Cuyama Basin Groundwater Sustainability Agency (CBGSA) Board continued implementation of the groundwater levels monitoring network, includes quarterly monitoring at each monitoring well.
- The CBGSA continued to utilize the COD SGMA Implementation Grant for $7.6 million in funding for implementation activities.
- The CBGSA and Cuyama Basin Water District (CBWD) continued implementation of management actions in the Central management area.

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Section 1. Introduction

§356.2 (a)	General information, including an executive summary and a location map depicting the basin covered by the report.

1.1 Introduction and Agency Information

This section describes the Cuyama Basin Groundwater Sustainability Agency (CBGSA), its authority in relation to the Sustainable Groundwater Management Act (SGMA), and the purpose of this Annual Report.

This Annual Report meets regulatory requirements established by the California Department of Water Resources (DWR) as provided in Article 7 of the California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2.

The CBGSA was created by a Joint Exercise of Powers Agreement among the following agencies:

- Counties of Kern, San Luis Obispo, and Ventura
- Santa Barbara County Water Agency (SBCWA), representing the County of Santa Barbara
- Cuyama Basin Water District (CBWD)
- Cuyama Community Services District (CCSD)

The CBGSA Board of Directors includes the following individuals:

- Cory Bantilan – Chairperson, SBCWA
- Matt Vickery – Vice Chairperson, CBWD
- Derek Yurosek –CBWD
- Deborah Williams –CCSD
- Byron Albano – CBWD
- Jimmy Paulding – County of San Luis Obispo
- Zack Scrivner – County of Kern
- Arne Anselm – County of Ventura
- Rick Burnes – CBWD
- Das Williams – SBCWA
- Jane Wooster – CBWD

The CBGSA's established boundary corresponds to DWR's California's Groundwater Bulletin 118 – Update 2003 (Bulletin 118) groundwater basin boundary for the Cuyama Valley Groundwater Basin (Basin) (DWR, 2003). No additional areas were incorporated.

1.1.1 Management Structure

The CBGSA is governed by an 11-member Board of Directors that meets bi-monthly (i.e. six-times a year). A General Manager manages day-to-day operations of the CBWD, while Board Members vote on actions of the CBGSA; the Board is the CBGSA's decision-making body. The Board also formed a Standing Advisory Committee comprised of nine stakeholders to provide recommendations to the Board on key technical issues which also meets regularly.

1.1.2 Legal Authority

Per Section 10723.8(a) of the California Water Code, the Santa Barbara County Water Agency (SBCWA) gave notice to DWR on behalf of the CBGSA of its decision to form a GSA, which is Basin 3-013, per DWR's Bulletin 118.

1.1.3 Groundwater Sustainability Plan

The CBGSA Board of Directors approved the first iteration of the Cuyama Groundwater Sustainability Plan (GSP) on December 4, 2019. The GSP was submitted to DWR for approval on January 28, 2020.

On January 21, 2021, DWR determined that the GSP was "incomplete" and recommended CBGSA amend the GSP to address the following four corrective actions:

- Provide justification for, and effects associated with, the sustainable management criteria;
- Use of groundwater levels as a proxy for depletion of interconnected surface water;
- Further address degraded water quality; and
- Provide explanation for how overdraft will be mitigated in the basin.

To address these corrective actions, the CBGSA developed the following supplement sections to the GSP and resubmitted to DWR on July 18, 2022:

- Supplemental Section 2.2.7: Basin Settings, Groundwater Conditions, Groundwater Quality performed additional data collection efforts for nitrate and arsenic measurements.
- Supplemental Section 3.3: Undesirable Results, Evaluation of the Presence of Undesirable Results provided additional information regarding the rationale for the criteria used in the GSP to define the point at which Basin conditions cause significant and unreasonable effects to occur.
- Supplemental Section 4.10: Monitoring Networks, Depletions of Interconnected Surface Water Monitoring Network identifies a subset of groundwater level representative monitoring wells for use in ISW monitoring and provides a rational for their selection and adequate data collection and monitoring for ISWs.
- Supplemental Section 5.2: Minimum Thresholds, Measurable Objectives, and Interim Milestones, Chronic Lowering of Groundwater Levels performed two technical analyses to provide additional information related to the effects of the GSP's groundwater levels minimum thresholds and undesirable results on well infrastructure and on environmental uses of groundwater.
- Supplemental Section 5.5: Minimum Thresholds, Measurable Objectives, and Interim Milestones, Degraded Water Quality provides information on why groundwater management is unlikely to affect nitrate and arsenic concentrations.
- Supplemental Section 7.2: Projects and Management Actions, Management Areas provide additional information regarding the Ventucopa management area and the northwestern region of the Basin.
- Supplemental Section 7.6: Projects and Management Actions, Adaptive Management explains the circumstances of when adaptative management strategies may be also triggered for other reasons.

The resubmitted and updated GSP is available for viewing online at http://cuyamabasin.org/. On March 2, 2023, DWR announced that the Revised GSP had been Approved. The CBGSA is currently working on a revision to the GSP that is expected to be completed in January 2025.

1.2 Plan Area

Figure 1-1 shows the Basin and its key geographic features. The Basin encompasses an area of about 378 square miles[2] and includes the communities of New Cuyama and Cuyama, which are located along State Route (SR) 166, and Ventucopa, which is located along SR 33. The Basin encompasses an approximately 55-mile stretch of the Cuyama River, which runs through the Basin for much of its extent before leaving the Basin to the northwest and flowing toward the Pacific Ocean. The Basin also encompasses stretches of Wells Creek in its north-central area, Santa Barbara Creek in the south-central area, the Quatal Canyon drainage and Cuyama Creek in the southern area of the Basin. Most of the agriculture in the Basin occurs in the central portion east of New Cuyama, and along the Cuyama River near SR 33 through Ventucopa.

Figure 1-2 shows the CBGSA boundary. The CBGSA boundary covers all of the Cuyama Valley Groundwater Basin.

[2] The 2003 version of Bulletin 118 section on the Cuyama Valley Groundwater Basin incorrectly stated that the Basin area is 230 square miles. The estimate of 378 square miles shown here and in the GSP is consistent with the mapping shown on DWR's GSA Map Viewer.

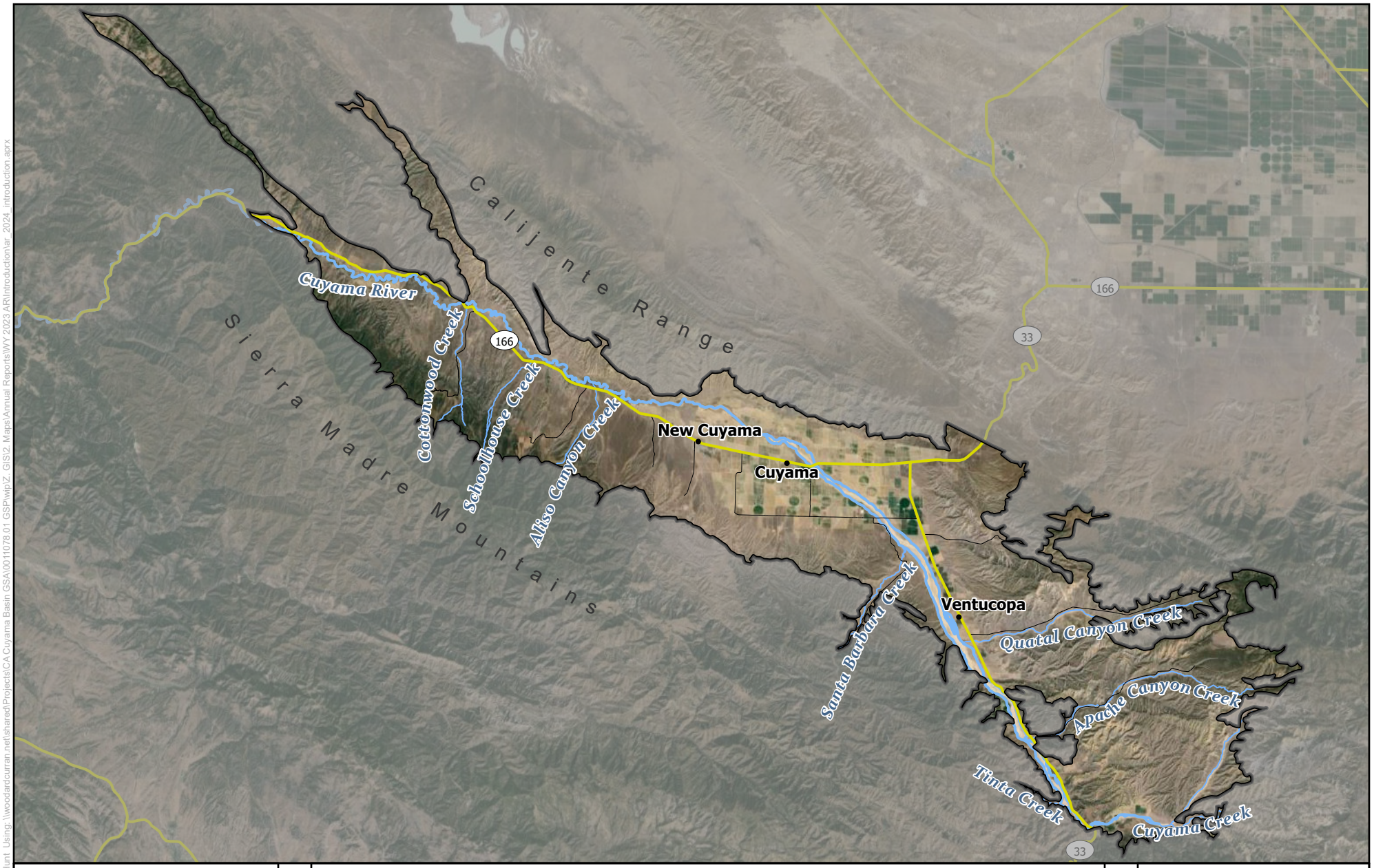

Figure 1-1: Groundwater Sustainability Plan Area

Cuyama Valley Groundwater Basin

Legend

Cuyama Basin
Cuyama River
Creek
Highway
Local Road
Town

N

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0 1.75 3.5 7 Miles

Map Created: February 2024

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. **Data sources: CA DWR, Esri, USGS**

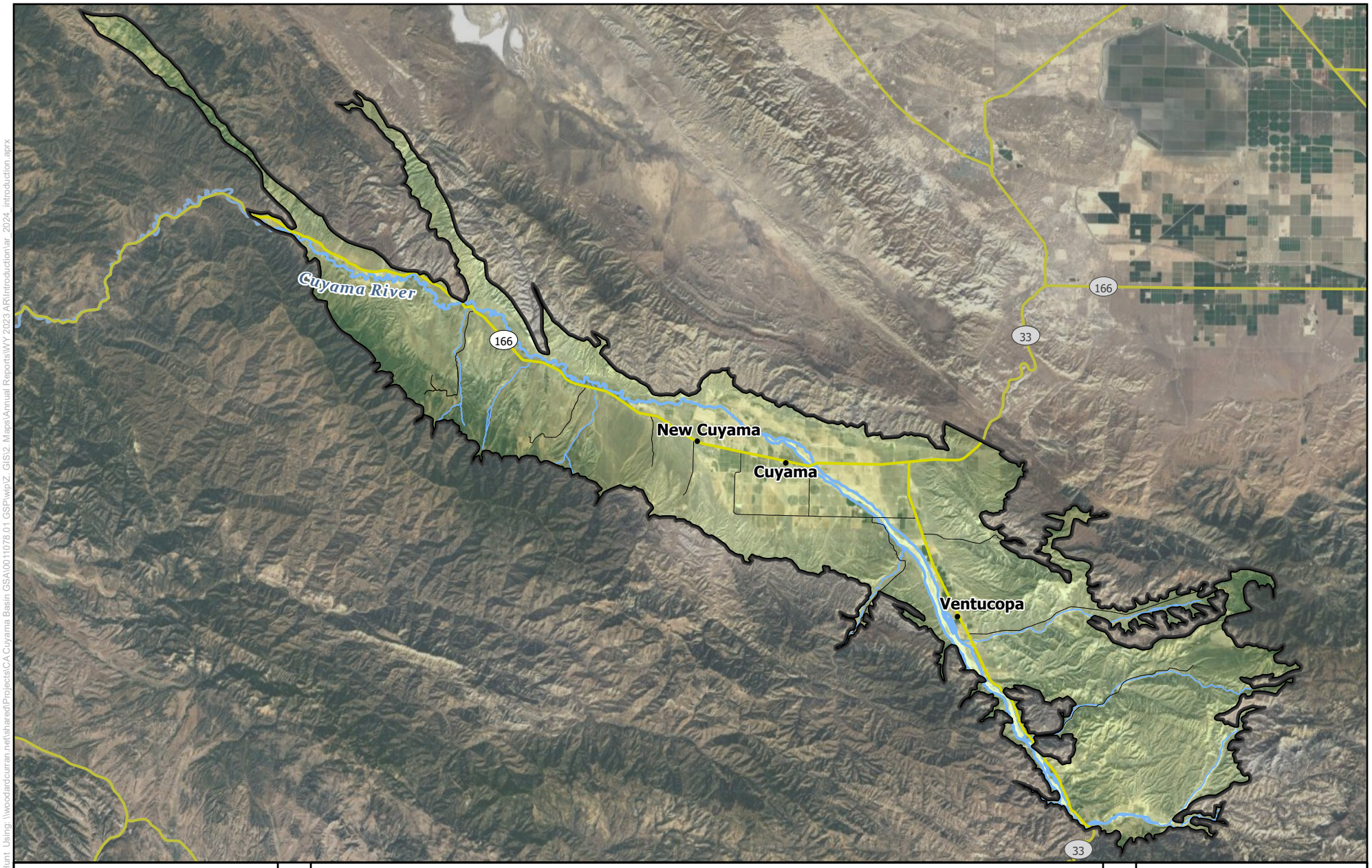

Figure 1-2: Groundwater Sustainability Agency Boundary

Cuyama Valley Groundwater Basin

Legend

- Cuyama Basin
- Cuyama River
- Creek
- Highway
- Local Road
- Town
- Cuyama Basin GSA

N

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0 1.75 3.5 7 Miles

Map Created: February 2024

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk. **Data sources: CA DWR, Esri, OpenStreetMap, USGS**

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Section 2. Groundwater Levels

§356.2 (b)(1)	Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:
§356.2 (b)(1)(A)	Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.
§356.2 (b)(1)(B)	Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.

2.1 Groundwater Levels Representative Monitoring Network

As required by DWR's SGMA regulations, a monitoring network and representative monitoring network were identified in the Cuyama Basin GSP utilizing existing wells. The current groundwater levels representative monitoring network that was approved by the CBGSA Board is shown on **Figure 2-1.** The Cuyama Basin consists of a single principal aquifer, and water levels in monitoring network wells are considered representative of conditions in that aquifer. The objective of the representative monitoring network is to detect undesirable results in the Basin related to groundwater levels using the sustainability thresholds described in the GSP. Other related objectives of the monitoring network are defined via the SGMA regulations as follows:

- Demonstrate progress toward achieving measurable objectives described in the GSP.
- Monitor impacts to the beneficial uses or users of groundwater.
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
- Quantify annual changes in water budget components.
- Monitoring that has occurred on the groundwater level monitoring network since the development of the Cuyama Basin GSP is included in this Annual Report. Collected groundwater level data has been analyzed to prepare contour maps and updated hydrographs, which are presented in the following sections.

In its September 2023 meeting, the CBGSA Board voted to modify the representative monitoring network to remove two wells for which the CBGSA has not been able to get a landowner agreement. This change will be reflected in the 2025 GSP update.

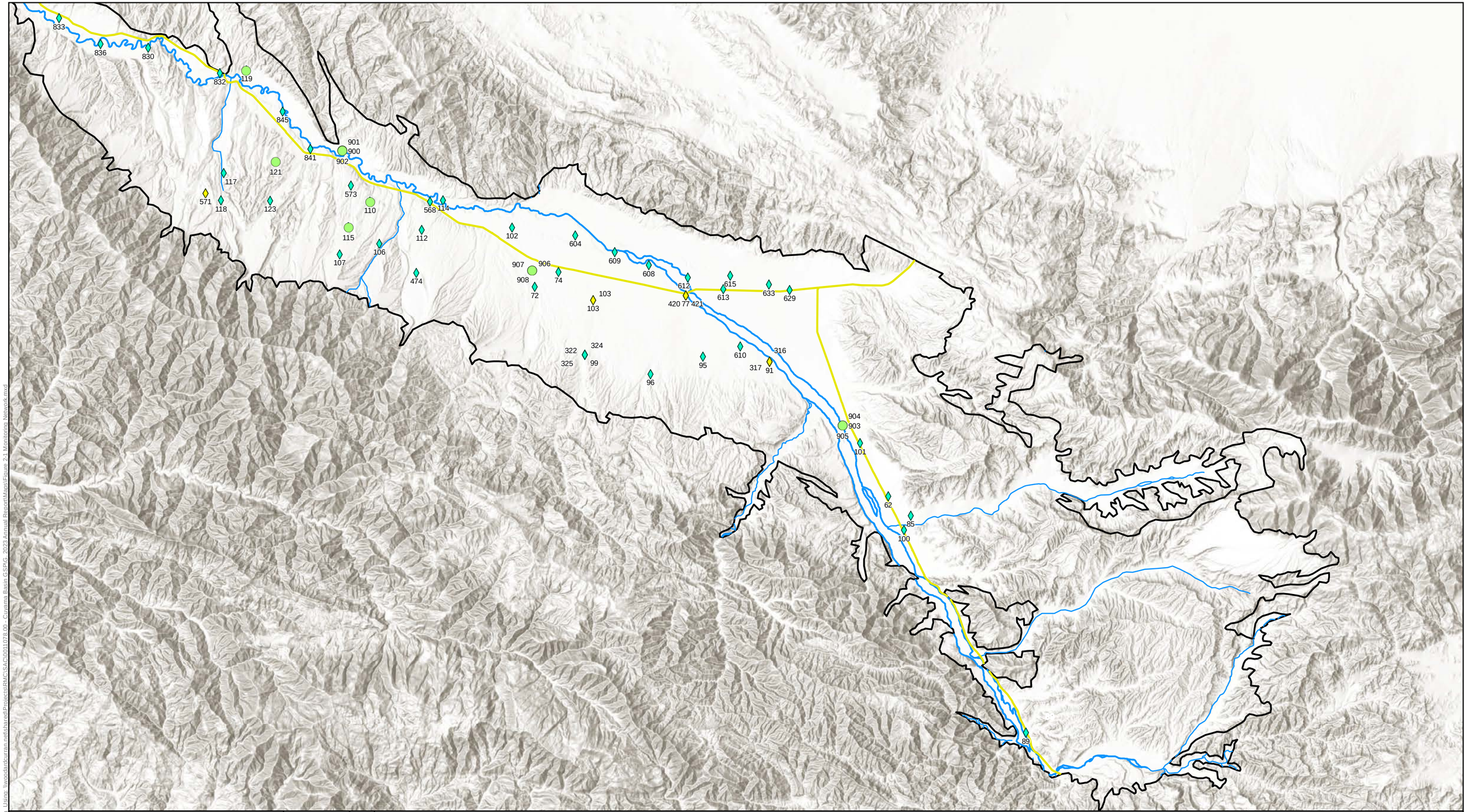

Figure 2-1: Cuyama GW Basin - Groundwater Monitoring Network

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

March 2023

Woodard & Curran

Legend

- Cuyama Basin
- Cuyama River
- Highways
- Representative Wells
- Representative Well with Transducer
- Monitoring Network Well

N

0 1.75 3.5 7 Miles

Plot Exported: 3/9/2023 By: mvallejo Using: \\woodardcurran.net\data\oh\Projects\MCSA\C001079.00 - Cuyama Basin GSPG - 2023 Annual Report\Maps\Figure 2-1 Monitoring Network.mxd

2.2 Groundwater Contour Maps

The submitted GSP included contour maps up through the spring of 2018. The previous Annual Reports included contour maps for spring and fall of 2019 through 2022. For this Annual Report, analysis was conducted to incorporate data through October 2023 that was collected by the CBGSA and local landowners. Data was then added to the Data Management System (DMS) and processed to analyze the current groundwater conditions by creating seasonal groundwater contour/raster maps for the spring and fall of 2023 and hydrographs of Basin monitoring wells.

A contour map shows changes in groundwater elevations by interpolating groundwater elevations between monitoring sites. The elevations are shown on the map with the use of a contour line, which indicates that at all locations that line is drawn, the line represents groundwater at the elevation indicated. There are two versions of contour maps used in this section: one that shows the elevation of groundwater above mean sea level, which is useful because it can be used to identify the horizontal gradients of groundwater, and one that shows contours of depth to water, the distance from the ground surface to groundwater, which is useful because it can identify areas of shallow or deep groundwater.

Analysts prepared groundwater contour maps under the supervision of a Certified Hydrogeologist in the State of California for both groundwater elevation and depth to water for both spring and fall of 2023.

Each contour map is contoured at a 50-foot contour interval, with contour elevations indicated in white numeric label. The groundwater contours were also based on assumptions in order to accumulate enough data points to generate useful contour maps. Assumptions are as follows:

- Measurements from wells of different depths are representative of conditions at that location and there are no significant known vertical gradients. Due to the limited spatial amount of monitoring points, data from wells of a wide variety of depths were used to generate the contours.
- Measurements collected by the CBGSA monitoring program in April 2023 were used to develop the spring contours and in October 2023 to develop the fall contours. It is assumed that these measurements are representative of conditions during the spring or fall season, and conditions have not changed substantially from the time of the earliest measurement used to the latest.

These assumptions generate contours that are useful at the planning level for understanding groundwater levels across the Basin, and to identify general horizontal gradients and regional groundwater level trends. The contour maps are not indicative of exact values across the Basin because groundwater contour maps approximate conditions between measurement points, and do not account for topography. Therefore, a well on a ridge may be farther from groundwater than one in a canyon, and the contour map will not reflect that level of detail.

Figure 2-2 shows groundwater elevation contours for Spring of 2023. Based on data that was collected by local landowners and the CBGSA. The contours developed using the available data show two general trends in the Basin. First, in most of the Basin, groundwater generally reflects the topography of the Basin. For example, groundwater elevations decrease moving from the highest portions of the Valley in the Southeastern portion of the Basin towards the central portion, and groundwater also travels down slope in a northern direction off of the southern foothills towards the Cuyama River. The second trend and potential exception to the first, is the central portion of the Basin where there is a clear depression and deviation from the topography (more clearly seen in the following figure). Groundwater levels near the town of Cuyama and slightly towards the east are much deeper and do not match the surface topography. There is also a greater decline in groundwater elevations between the Ventucopa area and the central portion of the Basin.

Figure 2-3 shows the depth to groundwater contours for Spring 2023 and more clearly shows a depression in the central portion of the Basin greater than 600 ft below ground surface. Groundwater levels then increase toward the west reaching depths above 100 ft in the western portion of the Basin. These levels align with trends seen in previous contour maps provided in previous Annual Reports.

Figure 2-4 shows the groundwater elevation contours for Fall of 2023. Groundwater elevations show a depression in the central portion of the Basin and a steep gradient between the central portion of the Basin and the Ventucopa area, which is consistent with contour maps for 2015 through 2022 conditions and previous Annual Reports. Contours indicate a groundwater flow down the Basin from east to west, with a decrease in gradient through the central portion of the Basin.

Figure 2-5 shows the depth to groundwater contours for the Fall of 2023. Depth to water contours indicate a depression in the central portion of the Basin, and a steep gradient between the central portion of the Basin and the Ventucopa area, which is consistent with contour maps for 2015 through 2022 conditions and previous Annual Reports.

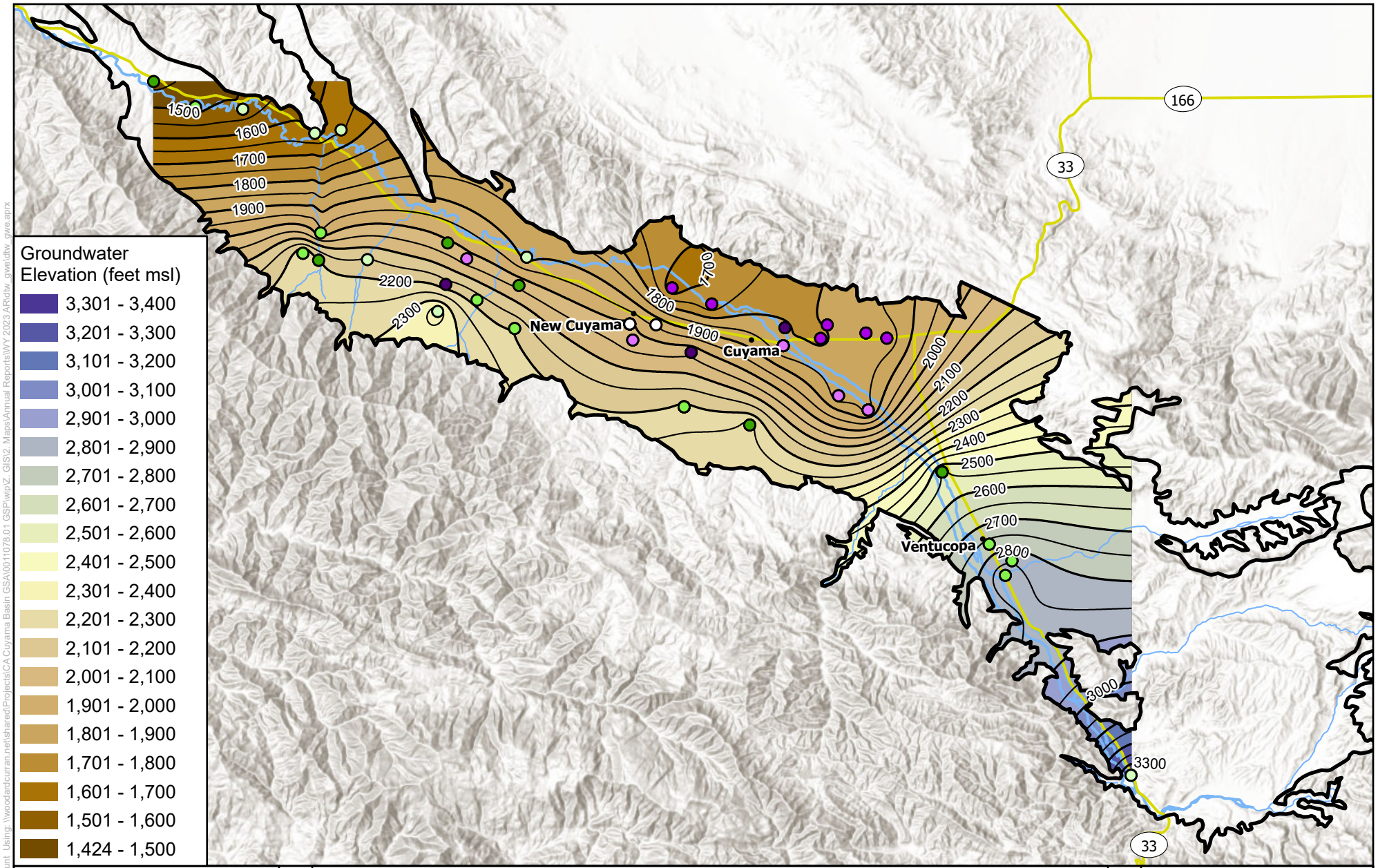

Figure 2-2: Spring 2023 Groundwater Elevation

Cuyama Valley Groundwater Basin

Legend

Well Depth (feet bgs)
- 0 - 200
- 201 - 400
- 401 - 600
- 601 - 800
- 801 - 1000
- 1001 - 1200
- Unknown

Contour (50 foot)
Highway
Town
Creek
Cuyama River
Cuyama Basin

GWE profile was interpolated using data measured from 4/24/2023 to 4/25/2023.

N

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0 1.25 2.5 5 Miles

Map Created: February 2024

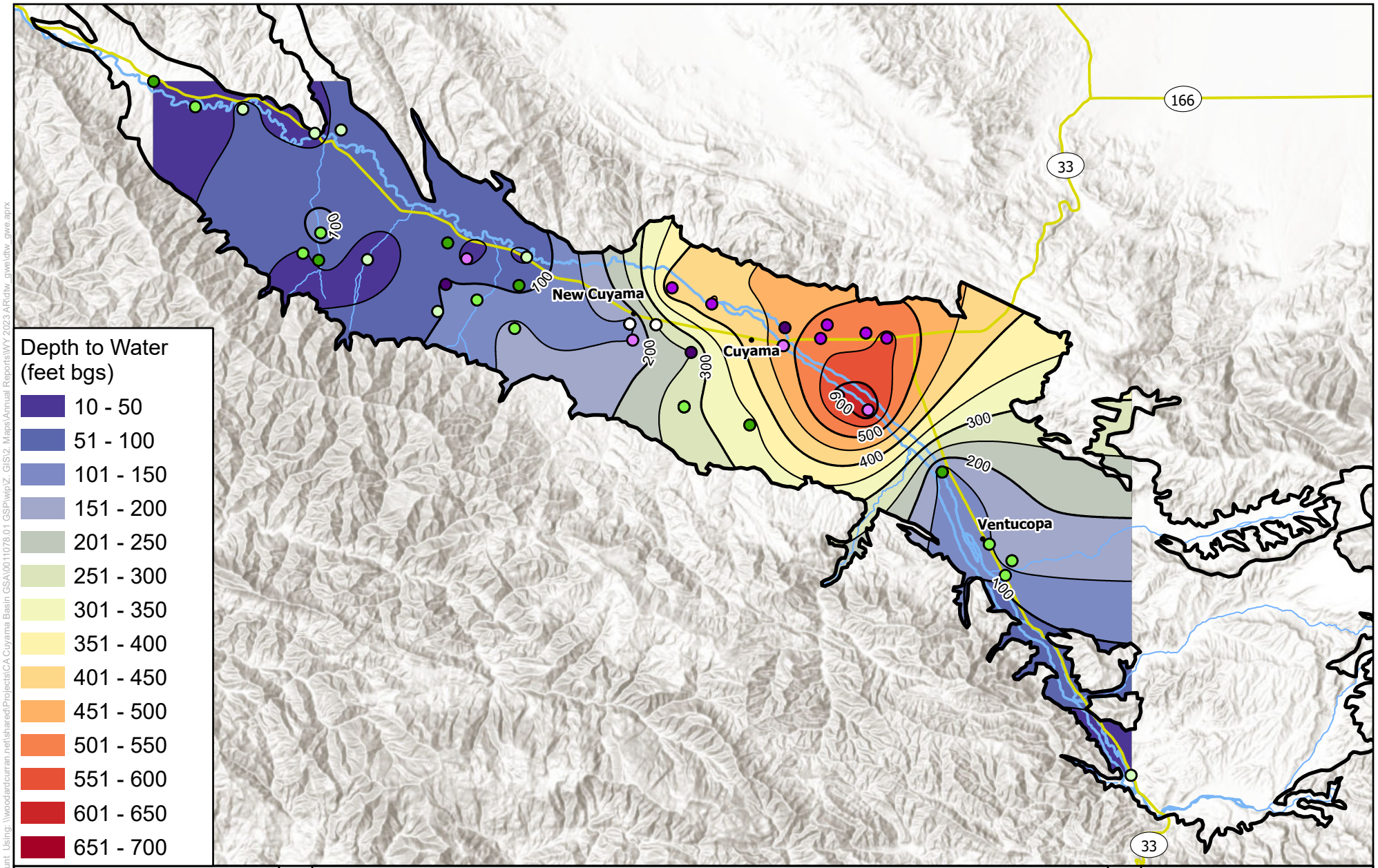

Figure 2-3: Spring 2023 Depth to Water

Cuyama Valley Groundwater Basin

Legend

Well Depth (feet bgs)
- 0 - 200
- 201 - 400
- 401 - 600
- 601 - 800
- 801 - 1000
- 1001 - 1200
- Unknown

Contour (50 foot)
Highway
Town
Creek
Cuyama River
Cuyama Basin

DTW profile was interpolated using data measured from 4/24/2023 to 4/25/2023.

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: February 2024

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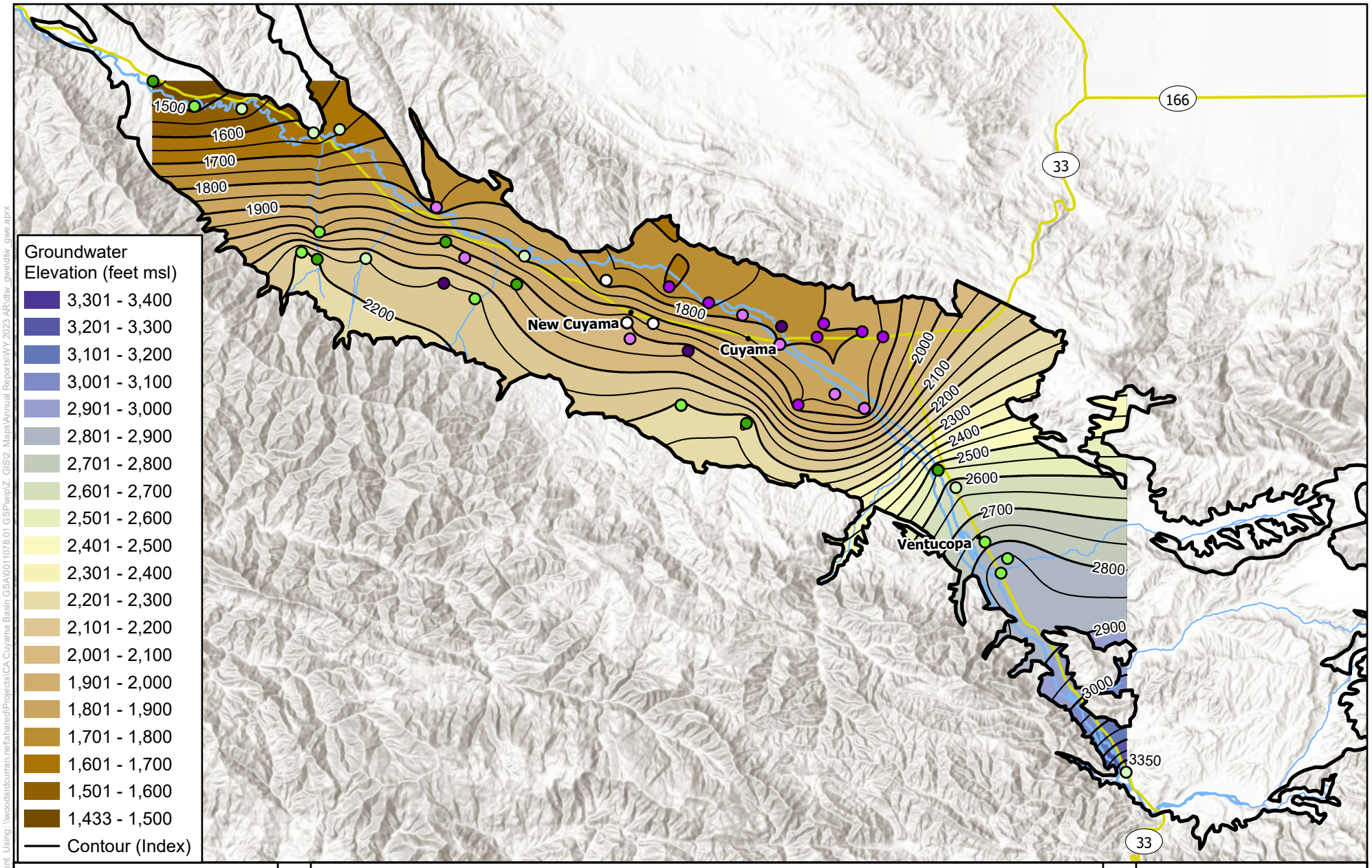

Figure 2-4: Fall 2023 Groundwater Elevation

Cuyama Valley Groundwater Basin

Legend

Well Depth (feet bgs)
- 0 - 200
- 201 - 400
- 401 - 600
- 601 - 800
- 801 - 1000
- 1001 - 1200
- Unknown

Contour (50 foot)
Highway
Town
Creek
Cuyama River
Cuyama Basin

GWE profile was interpolated using data measured from 10/24/2023 to 10/25/2023.

N

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0 1.25 2.5 5 Miles

Map Created: February 2024

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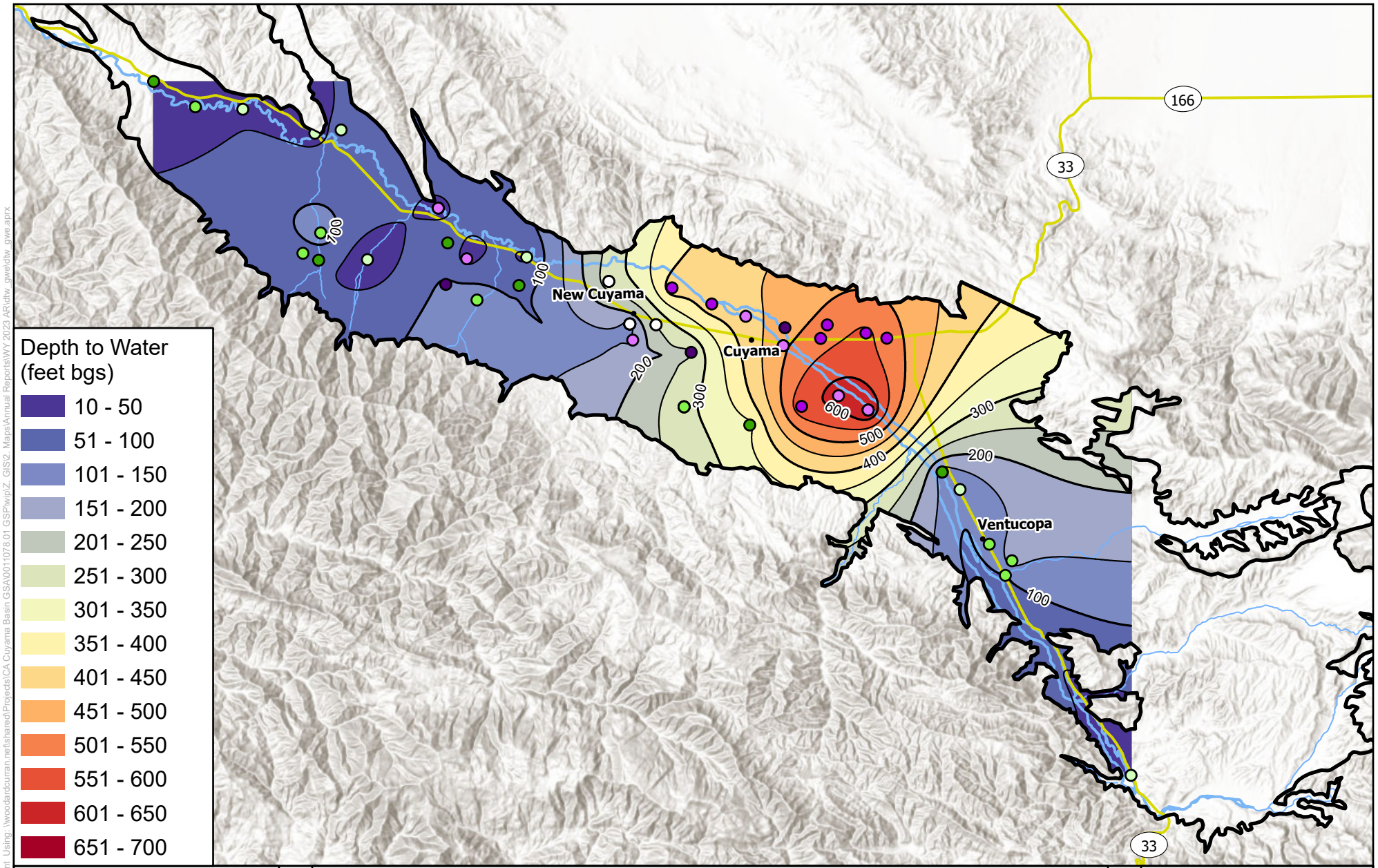

Figure 2-5: Fall 2023 Depth to Water

Cuyama Valley Groundwater Basin

Legend

Well Depth (feet bgs)
- 0 - 200
- 201 - 400
- 401 - 600
- 601 - 800
- 801 - 1000
- 1001 - 1200
- Unknown

Contour (50 foot)
Highway
Town
Creek
Cuyama River
Cuyama Basin

DTW profile was interpolated using data measured from 10/24/2023 to 10/25/2023.

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: February 2024

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2.3 Hydrographs

Groundwater hydrographs were developed for each representative monitoring network well to provide indicators of groundwater trends throughout the Basin. Measurements from each well with historical monitoring data were compiled into one hydrograph for each well. A selection of wells from each threshold region are provided below, while hydrographs for every groundwater level representative network well are presented in Appendix A.

In many cases, changes in historical groundwater conditions at particular wells have been influenced by climactic patterns in the Basin. Historical precipitation is highly variable, with several relatively wet years and some multi-year droughts.

Groundwater conditions generally vary in different parts of the Basin. To provide a comparative analysis general groundwater trends are provided in **Table 2-1** and are accompanied by hydrographs for an example well in each threshold regions. A map of threshold regions is provided in **Figure 2-6**, which also shows the locations of example wells used in each threshold region.

Table 2-1: Groundwater Trends by Threshold Regions

Threshold Region	Groundwater Trend	Example Well(s)
Northwestern Region	An upward trend influenced by seasonal fluctuations. This is expected as a wet winter brought recharge to this area. Although there are recent changes in land use that have begun to pump groundwater, levels have risen over the past water year. Levels are approximately 150 ft above the Measurable Objective, about 50 ft higher than in the last Annual Report.	841 (**Figure 2-7**)
Western Region	Levels in this region showed a significant increase due to the wet water year to within 40 feet of ground surface. Current levels are approximately 50 ft above the Measurable Objective.	571 (**Figure 2-8**)
Central Region	Levels have historically had a steady downward trend with some seasonal fluctuations. This pattern remains for some wells but with slight bumps correlated with the wet year (Well 91) with trends continuing downward and, in some cases, levels surpassing minimum thresholds. There is some indication of recovery in some wells such as Well 74 where groundwater levels improved up to the MO and then continued the downward trend again.	74 and 91 (**Figure 2-9 & Figure 2-10**)
Eastern Region	This region has seen an overall decline over several decades. However, with the wet conditions, groundwater trends appear to be approaching Measurable Objective and, in some cases, surpassing the Measurable Objective.	62 (**Figure 2-11**)
Southeastern Region	Levels in this relatively small region decreased slightly during the last drought but have recovered over the past few years and are well above the Measurable Objective.	89 (**Figure 2-12**)

Figure 2-6: Cuyama GW Basin Groundwater Level Representative Wells & Thresholds Regions

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

March 2023

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Legend

- Cuyama Basin
- Representative Wells
- Towns
- Faults
- Highways
- Cuyama River
- Streams

Threshold Regions

- Badlands Region
- Central Region
- Eastern Region
- Northwestern Region
- Southeastern Region
- Western Region

N

0 2.75 5.5 11 Miles

Figure Exported: 3/2/2023 By: mvalliere Using: W:\woodardcurran\sharedProjects\RMC\SAC\001078.00 - Cuyama Basin GSPG - 2023 Annual Report\Maps\Figure 2-6 Thresholds.mxd

Figure 2-7: Example Well Hydrographs – Northwestern Region

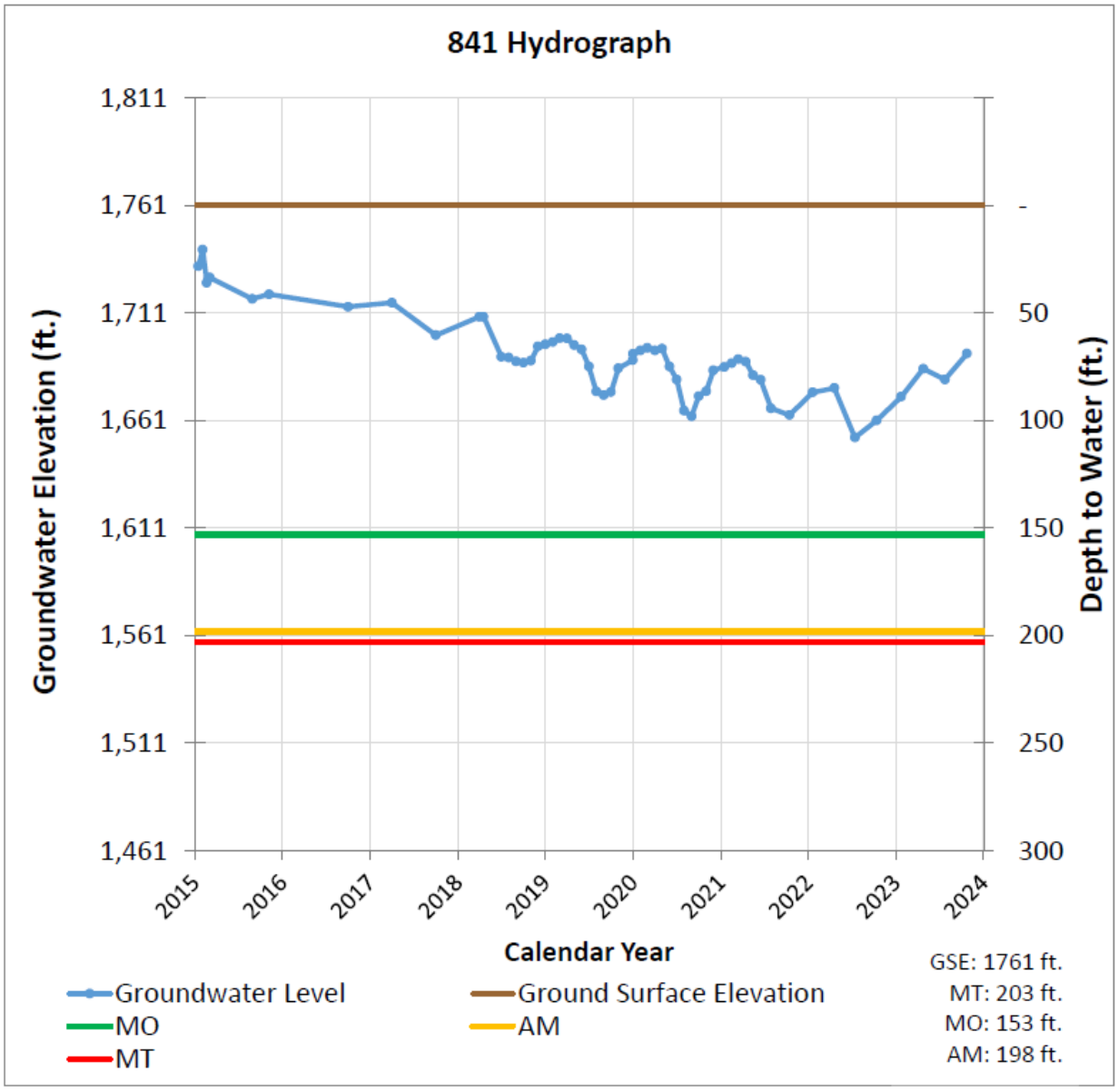


Figure 2-8: Example Well Hydrographs – Western Region

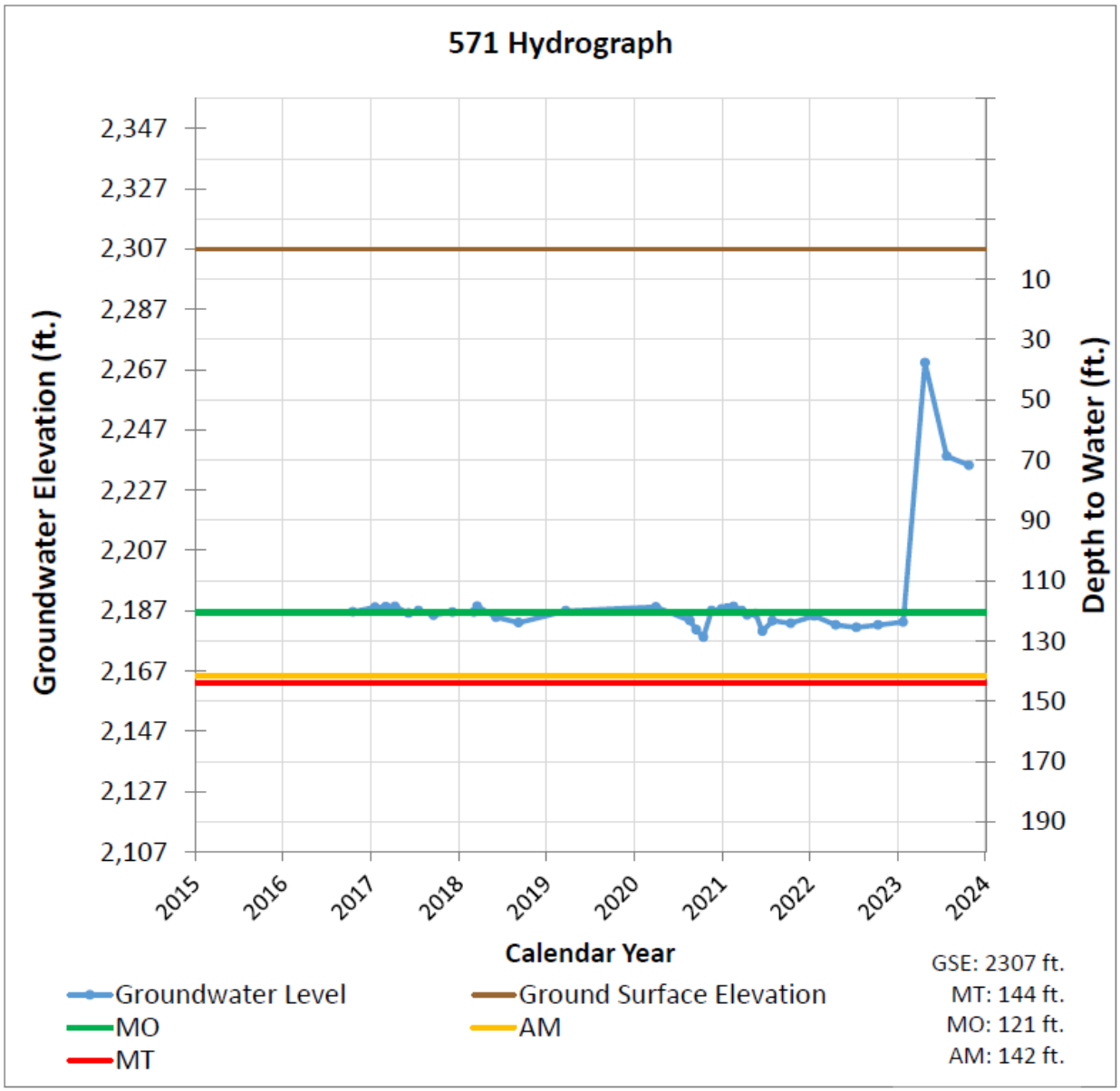


Figure 2-9: Example Well Hydrographs – Central Region

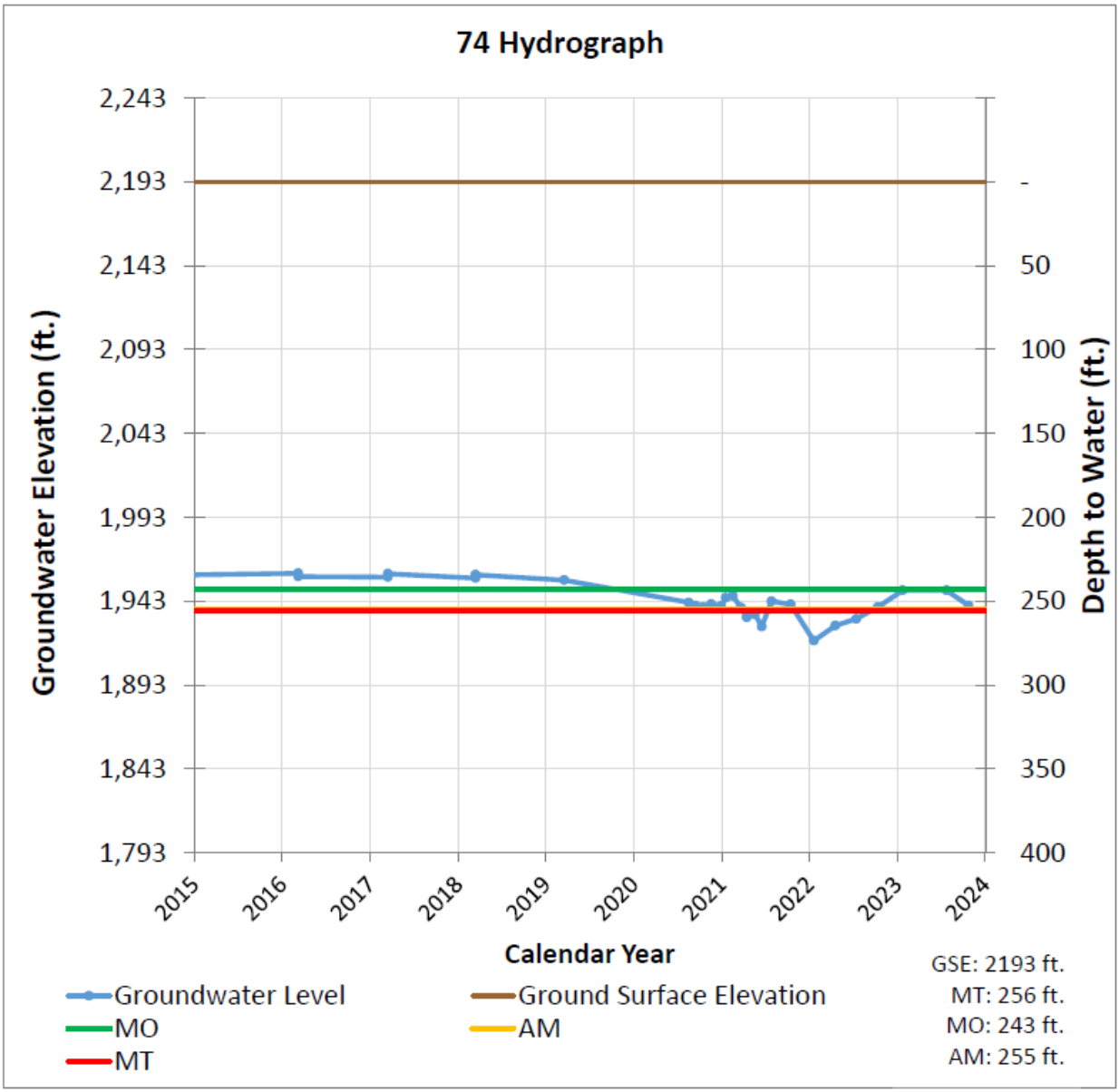


Figure 2-10: Example Well Hydrographs – Central Region

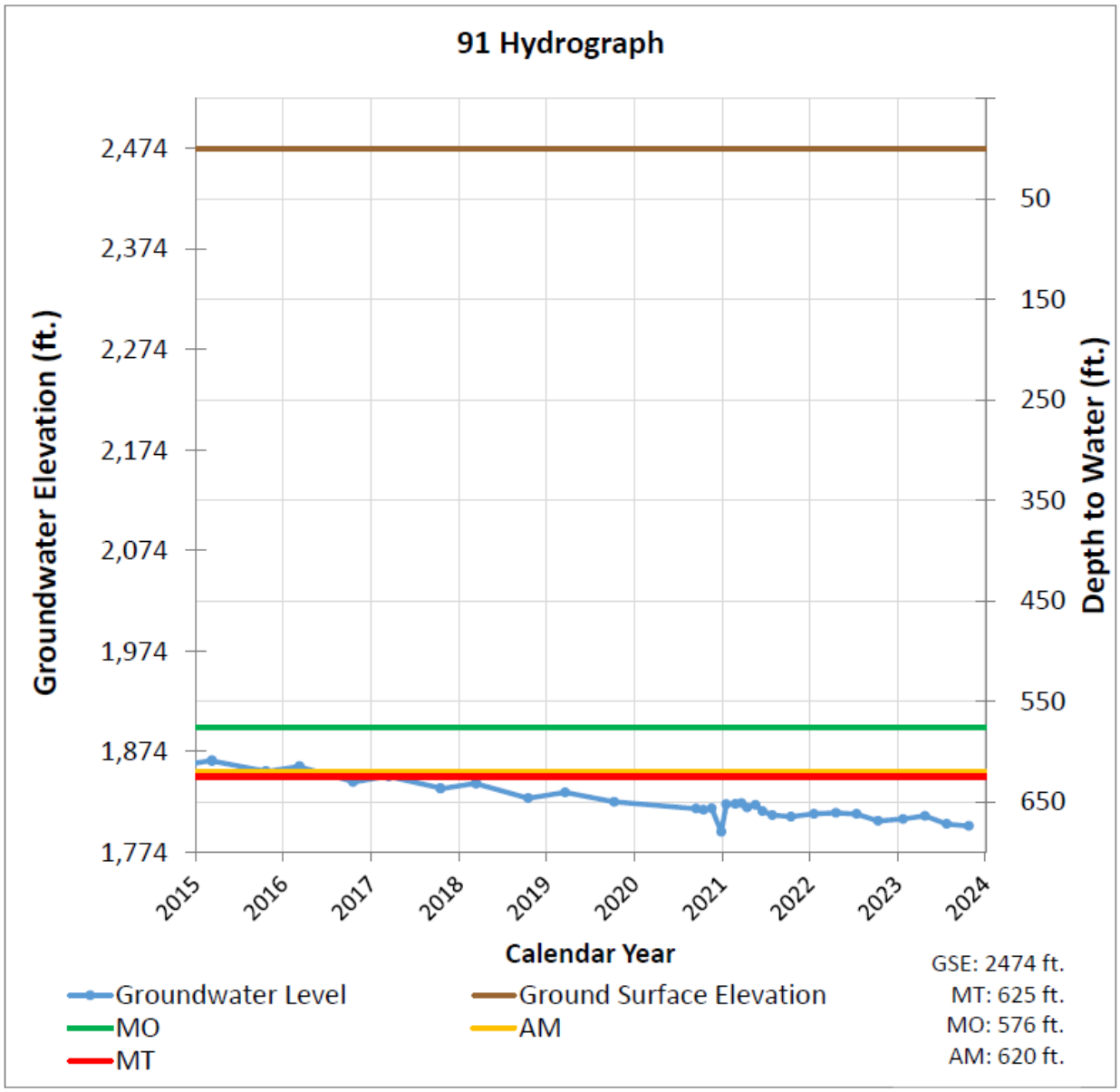


Figure 2-11: Example Well Hydrographs – Eastern Region

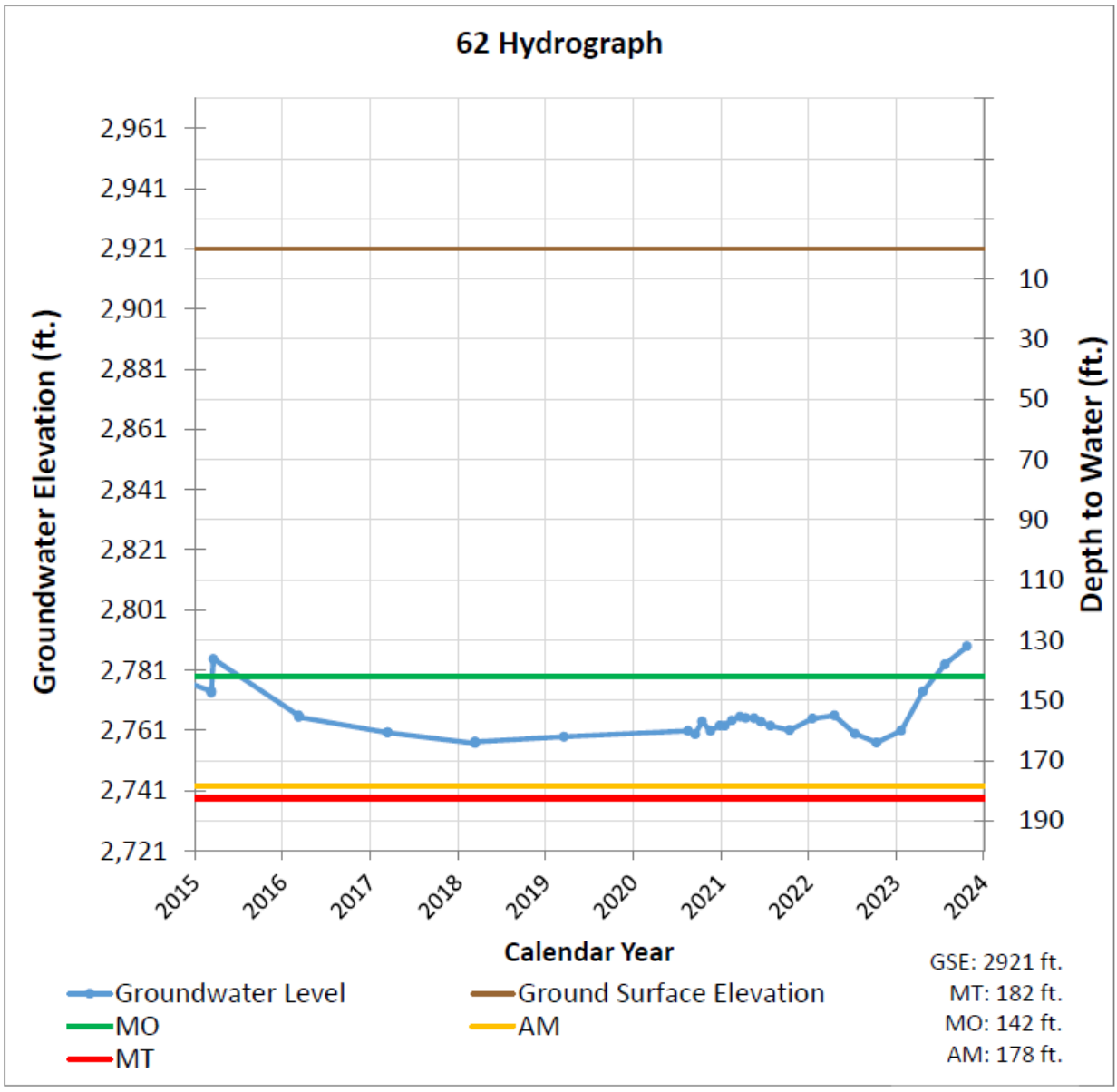
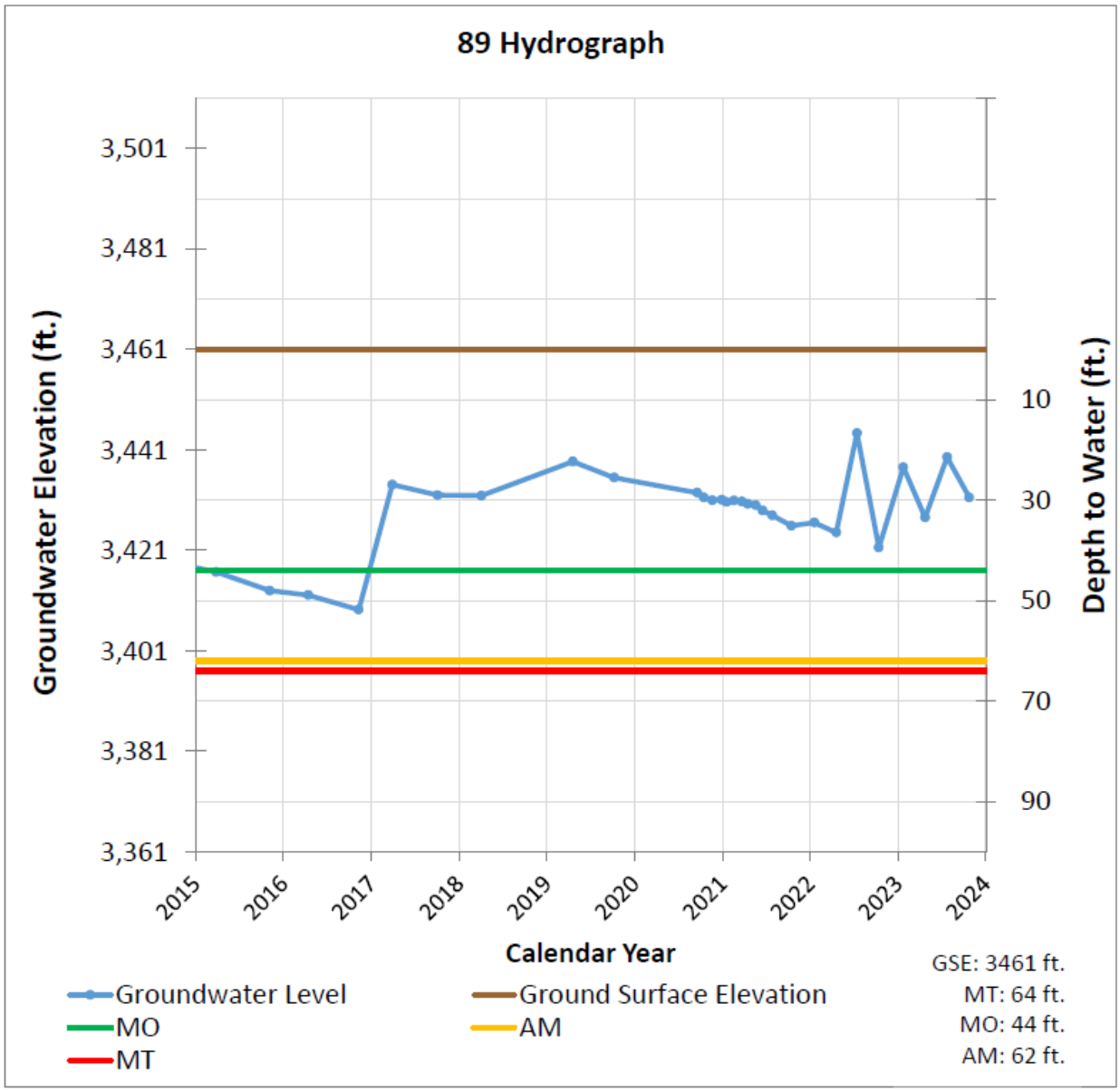


Figure 2-12: Example Well Hydrographs – Southeastern Region



Section 3. Water Use

§356.2 (b) (2)	Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.
§356.2 (b) (3)	Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.
§356.2 (b) (4)	Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.

3.1 Groundwater Extraction

Water budgets in the Cuyama Basin GSP were developed using the Cuyama Basin Water Resources Model (CBWRM) model, which is a fully integrated surface and groundwater flow model covering the Basin. The CBWRM was used to develop a historical water budget that evaluated the availability and reliability of past surface water supply deliveries, aquifer response to water supply, and demand trends relative to water year type. For the GSP, the CBWRM was used to develop water budget estimates for the hydrologic period of 1998 through 2017. As discussed in the GSP, the model was developed based on the best available data and information as of June 2018. An assessment of model uncertainty included in the GSP estimated an error range in overall model results of about +/- 10%. An update of the model, including re-calibration based on recently available data, was completed in June 2022. It is expected that the model will be refined in the future as improved and updated monitoring information becomes available for the Basin. For the current Annual Report, the CBWRM model was extended to include the 2023 water year, utilizing updated land use, temperature, and precipitation[3] data from those years.

Figure 3-1 shows the annual time series of groundwater pumping for the water years 1998 through 2023.[4] The CBWRM estimates a total groundwater extraction amount of 49,900 AF in the Cuyama Basin in the 2023 water year. This reflects a decrease of about 7,500 AF as compared to 2022. Almost all groundwater extraction in the Basin is for agriculture use. There is approximately 300 AF of domestic use in each year, with the remainder in each year being for agricultural use.

The total pumping volume in the basin in water year 2023 was significantly higher than the sustainable yield of 20,000 AF estimated in the GSP. The GSP included a pumping allocations management action to reduce pumping levels to sustainable levels by 2040. See section 7.5.2 for an update on progress made to implement this management action.

[3] Precipitation data provided by PRISM was updated and there are minor changes to some historical (pre-2020) data reflected in the water budget results when compared to previous reports.

[4] Groundwater extraction estimates for years 1998 through 2022 differ from estimates reported in previous Cuyama Basin Annual Reports due to model updates using the most recent land use data.

Figure 3-1: Annual Groundwater Extraction in the Cuyama Basin in Water Years 1998-2023

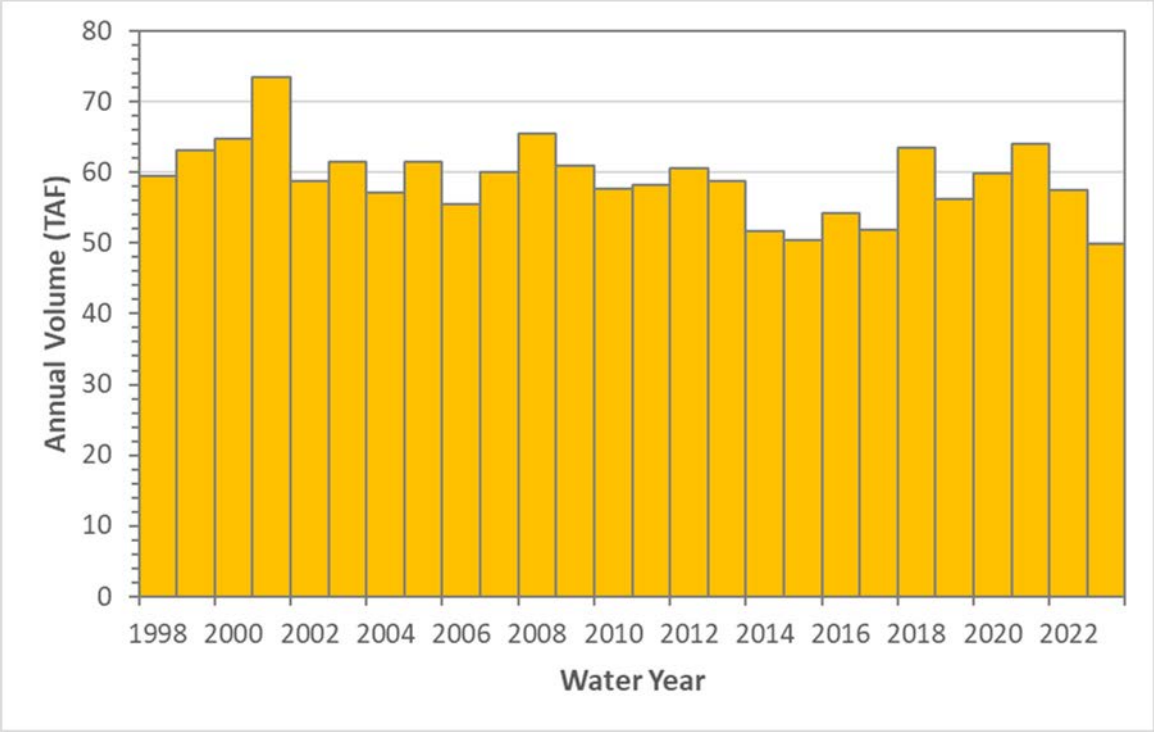


Figure 3-2 shows the locations where groundwater is applied in the Basin. The locations of groundwater use have not changed significantly since completion of the GSP.

Figure 3-3: Shows the active pumping wells within the Cuyama Basin Boundary.

3.2 Surface Water Use

No surface water was used in the Cuyama Basin during the reporting period.

3.3 Total Water Use

Since there is no surface water use in the Cuyama Basin, the total water use equals the groundwater extraction in each year, as shown in Section 3.1.

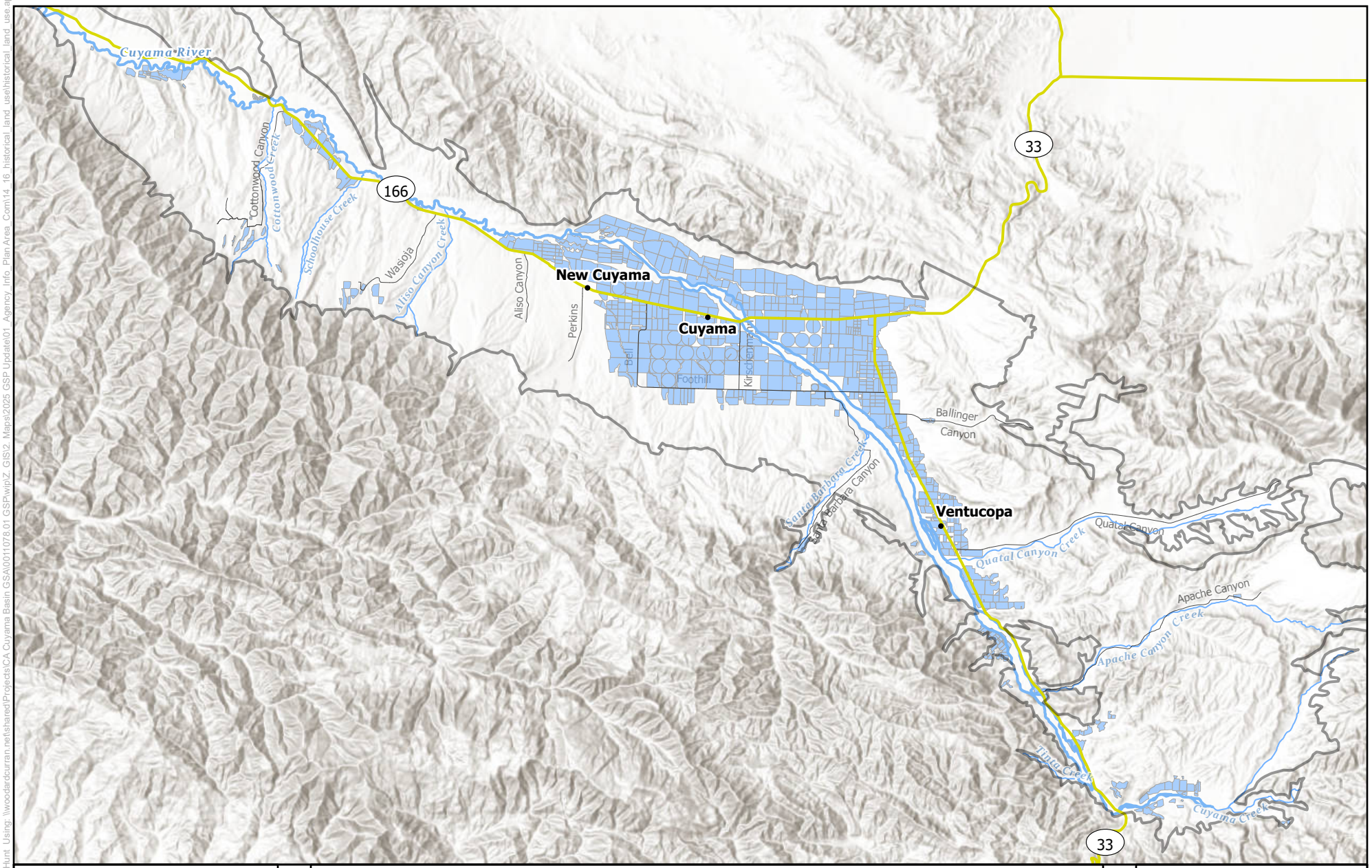


Figure 3-2: Water Source for Land Use

Cuyama Valley Groundwater Basin

Legend

Water Source

- Irrigated by Surface Water
- irrigated by Surface and Groundwater
- Irrigated by Groundwater

- Highway
- Local Road
- Town
- Cuyama River
- Creek
- Cuyama Basin

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: December 2023

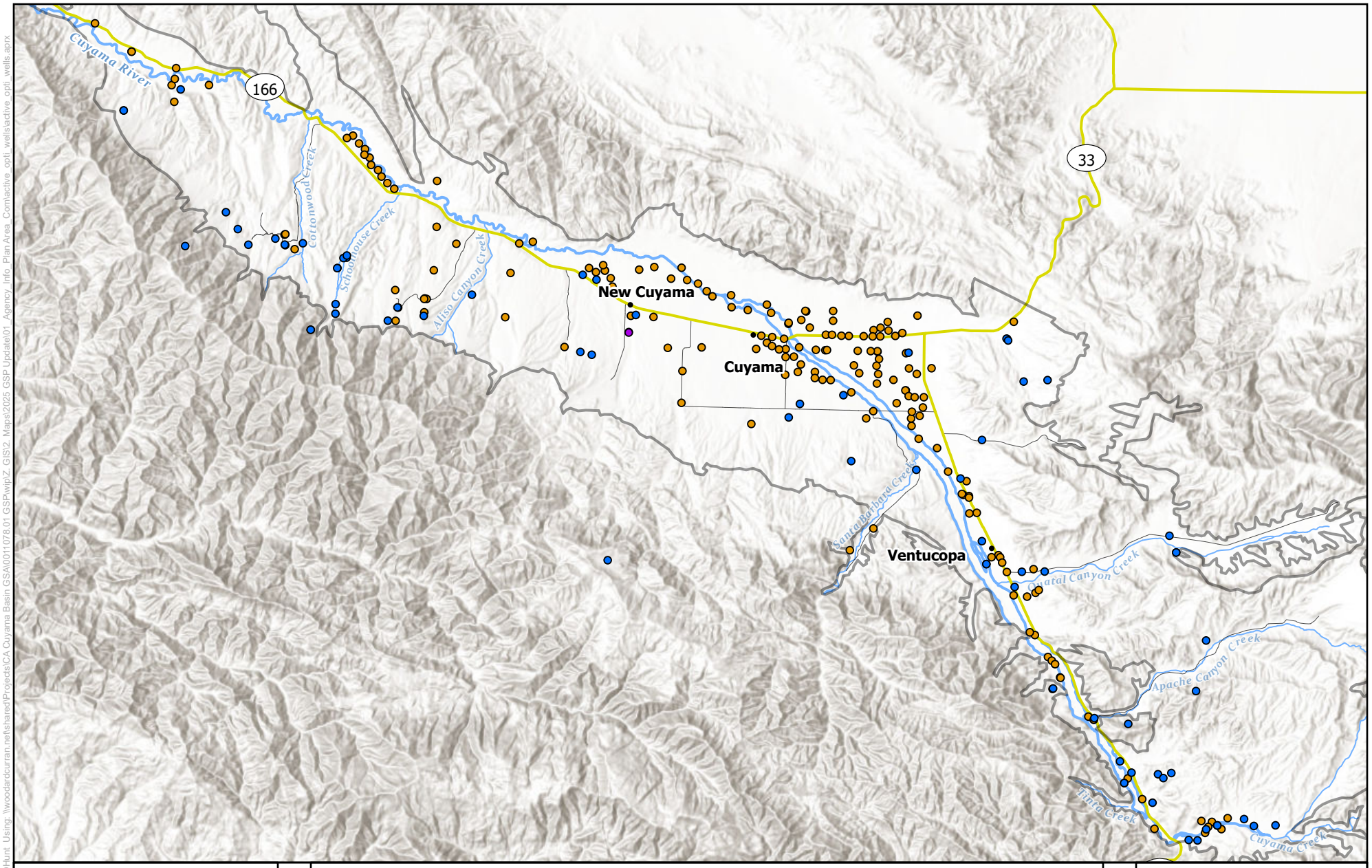


Figure 3-3: Active Wells in Network

Cuyama Valley Groundwater Basin

Legend

Well Type
- Domestic
- Production
- Public

Highway
Local Road
Town
Cuyama River
Creek
Cuyama Basin

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: December 2023

Figure Exported: 12/26/2023 By: DHunt Using: \\woodardcurran.net\shared\Projects\CA Cuyama Basin GSA\001078.01 GSPwipZ_GIS\2_Maps\2025 GSP Update\01_Agency_Info_Plan Area_Com\active_opti_wells\active_opti_wells.aprx

Section 4. Change in Groundwater Storage

§356.2 (b) (5)	Change in groundwater in storage shall include the following:
§356.2 (b) (5) (A)	Change in groundwater in storage maps for each principal aquifer in the basin.
§356.2 (b) (5) (B)	A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.

Figure 4-1 shows contours of the estimated change in groundwater levels in the Cuyama Basin between fall 2022 and fall 2023. The changes shown are based on historical measurements of groundwater elevations in Cuyama Basin representative wells that have recorded measurements in the fall period of each year. These contours are useful at the planning level for understanding groundwater levels across the Basin, and to identify general horizontal gradients and regional groundwater level trends. The contour map is not indicative of exact values across the Basin because groundwater contour maps approximate conditions between measurement points, and do not account for topography.

A quantitative estimate of the annual change in groundwater storage was estimated using the CBWRM model, which was extended to include the 2023 water year as described in the groundwater extraction section above. The CBWRM was used to estimate the full groundwater budget for each year in the Cuyama Basin, which consists of a single principal aquifer. The estimated values for each water budget component in each of the past four years are shown in **Table 4-1**. The CBWRM estimates reductions in groundwater storage of 44,800 AF in 2021, 38,500 AF in 2022, and an increase of 1000 AF in 2023.

Table 4-1: Groundwater Budget Estimates for Water Years 2020, 2021, 2022, and 2023

Component	Water Year 2021 (AFY)	Water Year 2022 (AFY)[5]	Water Year 2023 (AFY)
Inflows			
Deep percolation	17,500	20,900	33,900
Stream seepage	800	4,900	11,700
Subsurface inflow	900	1,400	5,300
Total Inflow	19,200	27,200	50,800
Outflow			
Groundwater pumping	64,000	57,400	49,900
Total Outflow	64,000	57,400	49,900
Change in Storage	**-44,800**	**-30,200**	**+1000**

[5] The data for water year 2022 differs from the previous Annual Report due to updates in land use classifications

Table 4-2 shows groundwater extractions by water use sector. The primary use of groundwater extractions in the basin is agricultural, accounting for 99% of the groundwater utilized. Urban water use is primarily in Cuyama and New Cuyama for drinking water supply. Groundwater use for other sectors in the Cuyama Basin is minimal.

As shown in **Table 4-3,** the groundwater extraction estimates were developed using the CBWRM model developed by the CBGSA. The model uses crop acreage from local landowners and LandIQ to estimate crop demands.

Table 4-2: Groundwater Extraction By Water Use Sector (2023)

Groundwater Extraction Sector	Total Water Use (Acre-feet)
Agricultural	49,700
Urban	200
Industrial	0
Managed Wetlands	0
Managed Recharge	0
Native Vegetation	0
Other	0
Total	**49,900**

Table 4-3: Groundwater Extraction Measurement Volume Methods and Accuracy Table

Groundwater Extraction Volume	Measurement Type	Method Description	Accuracy	Accuracy Description
49,900	CBRWM	Indirect estimate of groundwater extraction based upon a calculated demand. Crop demand is estimated using locally reported crops per field with the spatial support of LandIQ.	+/-10%	CBWRM utilizes available land use, precipitation, evapotranspiration, soil survey, geological survey, population and per-capita water use data in the subbasin. Since the primary water use sector is agriculture, LandIQ was correlated with local survey data to better estimate crop demand.

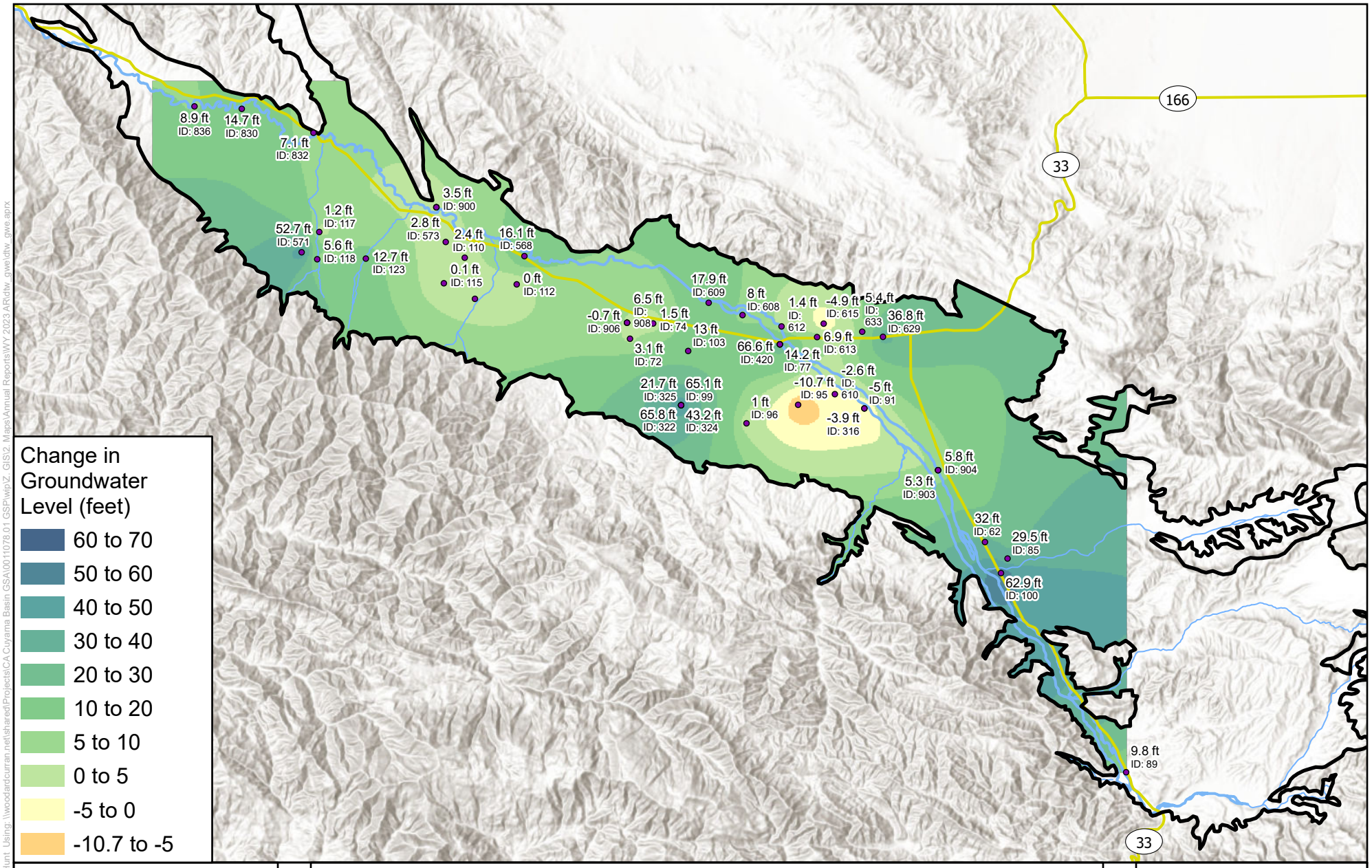


Figure 4-1: Groundwater Level Change - Fall 2022 to 2023

Cuyama Valley Groundwater Basin

Legend

Measurement Well
Cuyama Basin
Highway
Cuyama River
Creek

GWL difference was calculated from wells with measurements collected in both October 2022 and 2023. "ID" labels correspond to Opti ID numbers - refer to their individual hydrographs for a more informative view of GWL change.

N

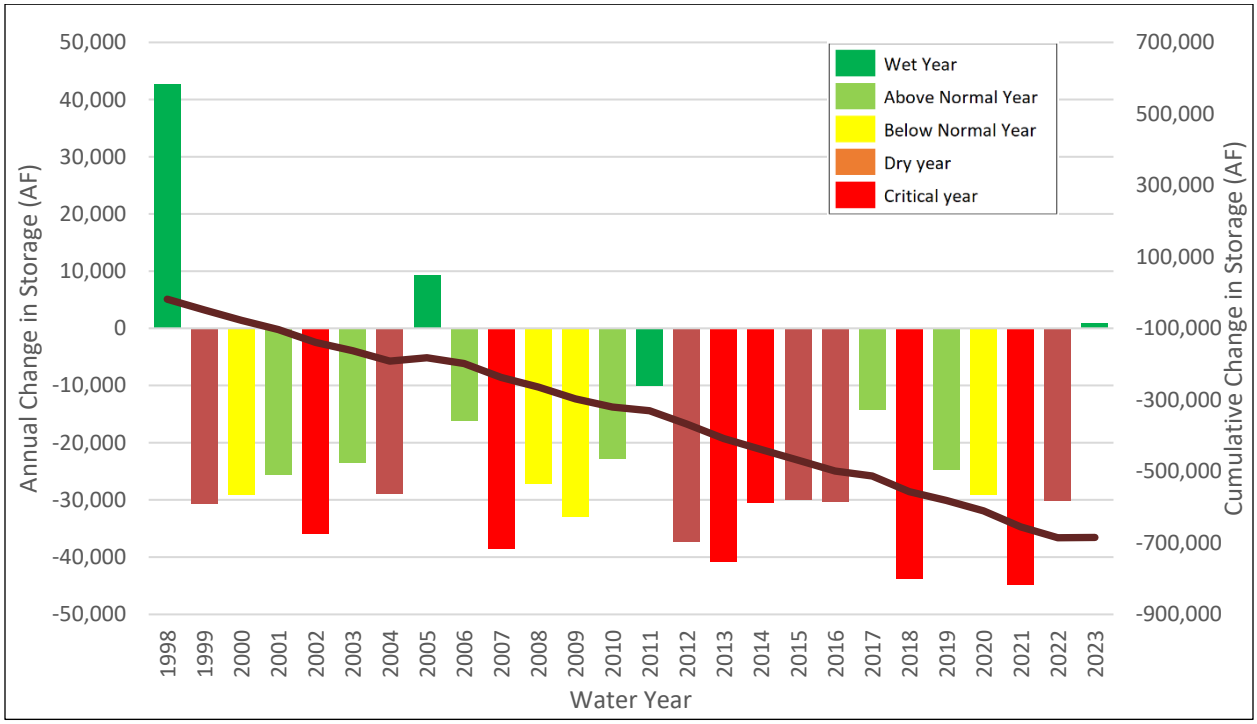
Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: February 2024

Figure 4-2 shows the historical change in groundwater storage by year, water year type,[6] and cumulative water volume in each year for the period from 1998 through 2023.[7] The change in groundwater storage in each year was estimated by the CBWRM model. The color of bar for each year of change in storage correlates a water year type defined by Basin precipitation.

Figure 4-2: Change in Groundwater Storage by Year, Water Year Type, and Cumulative Water Volume



[6] Water year types are customized for the Basin watershed based on annual precipitation as follows:

- Wet year = more than 19.6 inches
- Above normal year = 13.1 to 19.6 inches
- Below normal year = 9.85 to 13.1 inches
- Dry year = 6.6 to 9.85 inches
- Critical year = less than 6.6 inches.

[7] Groundwater storage change estimates for years 1998 through 2021 differ from estimates reported in previous Cuyama Basin Annual Reports due to model updates using the most recent land use data.

Section 5. Groundwater Quality

As discussed in Section 4.8 of the Cuyama GSP, the CBGSA's groundwater quality network is designed to monitor salinity levels (as total dissolved solids (TDS)). The groundwater quality network is composed of 64 wells representative wells and 13 non-representative wells, for a total of 77 wells. The representative wells are listed in **Table 5-1** and all representative and non-representative wells are shown on **Figure 5-1.**

In 2023 a comprehensive review of the groundwater quality network was conducted after three years of annual sampling for TDS had been performed. Wells were evaluated with respect to the following issues: lack of landowner agreements for monitoring, access issues at well sites, access issues due to weather. Based on this analysis, the CBGSA board approved a revised water quality network in November 2023, which is shown in **Figure 5-2.** This revised network will take effect when the 2025 GSP Update is complete and will provide adequate coverage in the Basin while ensuring continued and consistent monitoring during the GSP implementation period.

In 2023, the CBGSA collected TDS measurements at 22 of the 64 representative wells (34%) in the groundwater quality monitoring network. The results are listed in **Table 5-1** and shown on **Figure 5-3.** Of the 22 representative wells measured in water year 2023, three wells exceeded their measurable objective, and one well exceeded the minimum threshold and 2025 interim milestone. Therefore, 13% of measured wells exceeded their measurable objective and 4% exceeded their minimum threshold. However, 66% of wells were not sampled due to limitations in gaining access to well sites. Water quality results (as compared to minimum thresholds) can be found in **Figure 5-4**. Since the GSA has only attempted to sample these wells three times and significant differences were noted relative to previous measurements (in both a positive and negative direction), the CBGSA considers it premature to use this data to evaluate the performance of groundwater quality at this time. The CBGSA will continue to sample for TDS and will assess the sustainability criteria for TDS in the future.

The CBGSA conducts its own sampling for nitrate and arsenic once every five years. In the interim years the CBGSA leverages existing monitoring programs for nitrate and arsenic through California State Water Resource Control Board Groundwater Ambient Monitoring and Assessment (GAMA) Database, which includes in particular data from the Central Coast Regional Water Board's Irrigated Lands Program for nitrates as part of its database. Nitrate and arsenic data are shown on **Figure 5-5** for nitrate **Figure 5-6** for arsenic. The table on the **Figure 5-6** shows arsenic results from a multi -completion well. As you can see arsenic varies with depth so results for all depths are shown.

These maps include data downloaded from GAMA and the sampling results from the CBGSA's sampling for these constituents conducted in 2022 and reported in the WY 2022 Annual Report. Because few measurements were available for WY 2023, these maps include data for both water years 2022 and 2023 in the Cuyama Basin. The CBGSA will continue to rely on these third-party sources as described in the 2022 GSP update Supplemental Section 2.2.7.

Table 5-1: Groundwater Quality Network Wells and TDS Measurements

	TDS					
Opti ID	Date	Measurement (mg/L)	MO (mg/L)	MT (mg/L)	2025 Interim Milestone (mg/L)	Interim Milestone Status
61	-	-	585	615	615	
72	8/23/2023	900	996	1,023	1,023	Below IM
73	-	-	805	856	856	
74	8/23/2023	1310	1,500	1,833	1,833	Below IM
76	-	-	1,500	2,307	2,307	
77	7/24/2023	1120	1,500	1,592	1,592	Below IM
79	-	-	1,500	2,320	2,320	
81	-	-	1,500	2,788	2,788	
83	8/23/2023	1120	1,500	1,726	1,726	Below IM
85	-	-	618	1,391	1,391	
86	-	-	969	975	975	
87	-	-	1,090	1,165	1,165	
88	8/23/2023	320	302	302	302	Above IM
90	-	-	1,500	1,593	1,593	
91	7/25/2023	1020	1,410	1,487	1,487	Below IM
94	8/23/2023	1190	1,050	1,245	1,245	Below IM
95	8/23/2023	1340	1,500	1,866	1,866	
96	8/23/2023	1100	1,500	1,632	1,632	Below IM
98	-	-	1,500	2,400	2,400	
99	8/24/2023	1140	1,490	1,562	1,562	Below IM
101	8/23/2023	1210	1,500	1,693	1,693	Below IM
102	8/23/2023	1610	1,500	2,351	2,351	Below IM
130	-	-	1,500	1,855	1,855	
131	-	-	1,500	1,982	1,982	
157	-	-	1,500	2,360	2,360	
196	-	-	851	904	904	
205	-	-	253	269	269	
226	-	-	1,500	1,844	1,844	
227	-	-	1,500	2,230	2,230	
242	8/23/2023	780	1,470	1,518	1,518	Below IM
269	-	-	1,500	1,702	1,702	
309	-	-	1,410	1,509	1,509	
316	7/25/2023	1060	1,380	1,468	1,468	Below IM
317	-	-	1,260	1,337	1,337	
318	-	-	1,080	1,152	1,152	
322	8/24/2023	1140	1,350	1,386	1,386	Below IM
324	8/24/2023	740	746	777	777	Below IM
325	8/24/2023	1070	1,470	1,569	1,569	Below IM
400	-	-	918	976	976	
420	7/24/2023	1080	1,430	1,490	1,490	Below IM
421	7/24/2023	1280	1,500	1,616	1,616	Below IM

	TDS					
Opti ID	Date	Measurement (mg/L)	MO (mg/L)	MT (mg/L)	2025 Interim Milestone (mg/L)	Interim Milestone Status
422	-	-	1,500	1,942	1,942	
424	8/23/2023	1260	1,500	1,588	1,588	Below IM
467	8/23/2023	1070	1,500	1,764	1,764	Below IM
568	8/23/2023	860	871	1,191	1,191	Below IM
702	-	-	110	2,074	2,074	
703	-	-	400	4,097	4,097	
710	-	-	1,040	1,040	1,040	
711	-	-	928	928	928	
712	-	-	977	978	978	
713	-	-	1,200	1,200	1,200	
721	-	-	1,500	2,170	2,170	
758	-	-	900	954	954	
840	-	-	559	559	559	
841	-	-	561	561	561	
842	-	-	547	547	547	
843	-	-	569	569	569	
844	-	-	481	481	481	
845	-	-	1,250	1,250	1,250	
846	-	-	918	918	918	
847	-	-	480	480	480	
848	-	-	674	674	674	
849	-	-	1,500	1,780	1,780	
850	-	-	472	472	472	

Note: Shaded cells represent sustainable management criteria exceedances. “ND” indicates that a measurement was taken, but no constituent was detected.

703
846
849
848
847
840
850
843
842
Russell Fault
Turkey Trap Ridge Fault
102
Graveyard Ridge Fault
712
74
72
73
467
400
424
79
81
98
96
95
309
90
Santa Barbara Canyon Fault
83
242
710
85
86
758
87
131
227
226
88
204
196
130
157
702

Figure 5-1: Cuyama GW Basin Groundwater Quality Representative Wells

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

December 2019

WOODARD &CURRAN

Legend

- Cuyama Basin
- Towns
- Faults
- Highways
- Cuyama River
- Streams
- Representative Groundwater Quality Wells

N

0 1.75 3.5 7 Miles

Plot Exported 2/7/2019 By eepeterson Using C:\Users\eepeterson\OneDrive - Woodard & Curran_PC\Riders\Design\Current Projects\010703.003 - Cuyama\01_Local Cuyama GIS\2_GWQ_RepWells.mxd

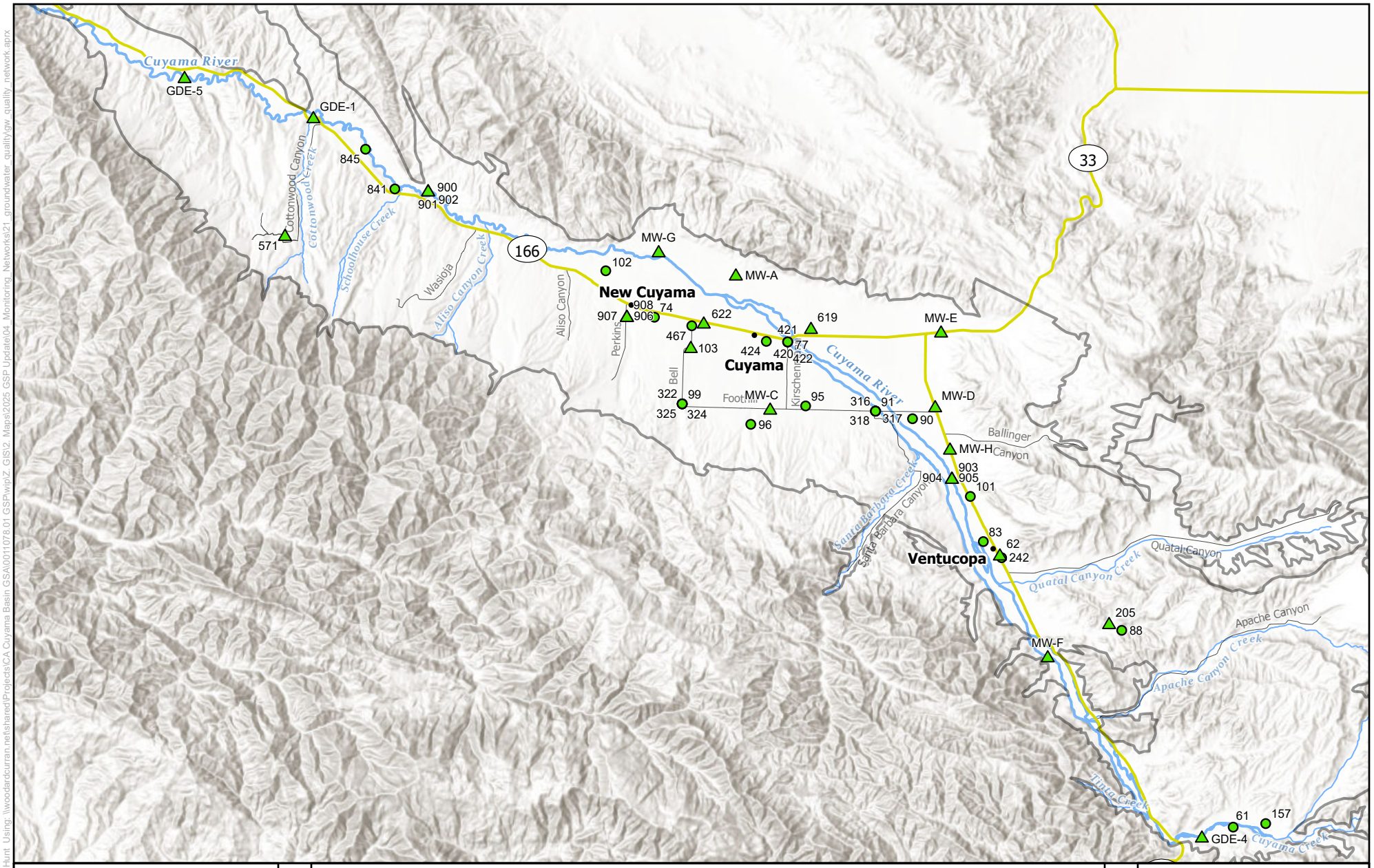


Figure 5-2: Updated Groundwater Quality Monitoring Network

Cuyama Valley Groundwater Basin

Legend

Network Well
- Representative Monitoring
- Non-representative Monitoring

Highway
Local Road
Town
Cuyama River
Creek
Cuyama Basin

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: December 2023

Figure Exported: 12/27/2023 By: DHunt Using: \\woodardcurran.net\shared\Projects\CA Cuyama Basin GSA\001078.01 GSPwip\Z. GIS\2. Maps\2025 GSP Update\04. Monitoring_Networks\21_groundwater_quality\gw_quality_network.aprx

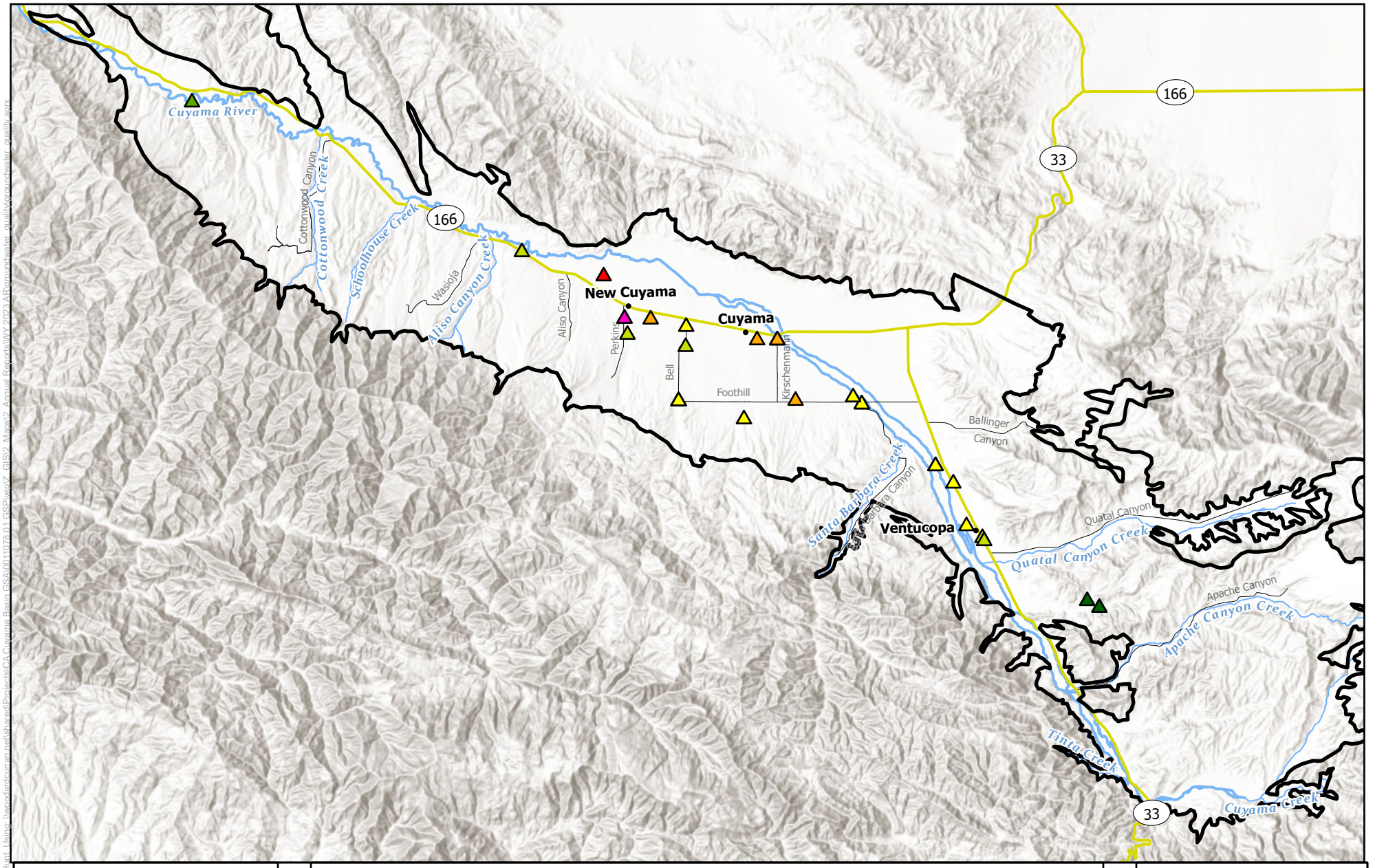


Figure 5-3: Groundwater Quality Measurements - TDS

2023 Data

Cuyama Valley Groundwater Basin

Legend

- < 500 mg/L
- 501 - 750 mg/L
- 751 - 1,000 mg/L
- 1,001 - 1,250 mg/L
- 1,251 - 1,500 mg/L
- 1,501 - 1,750 mg/L
- 1,751 - 2,000 mg/L
- 2,001 - 2,250 mg/L
- Highway
- Local Road
- Town
- Creek
- Cuyama River
- Cuyama Basin

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: March 2024

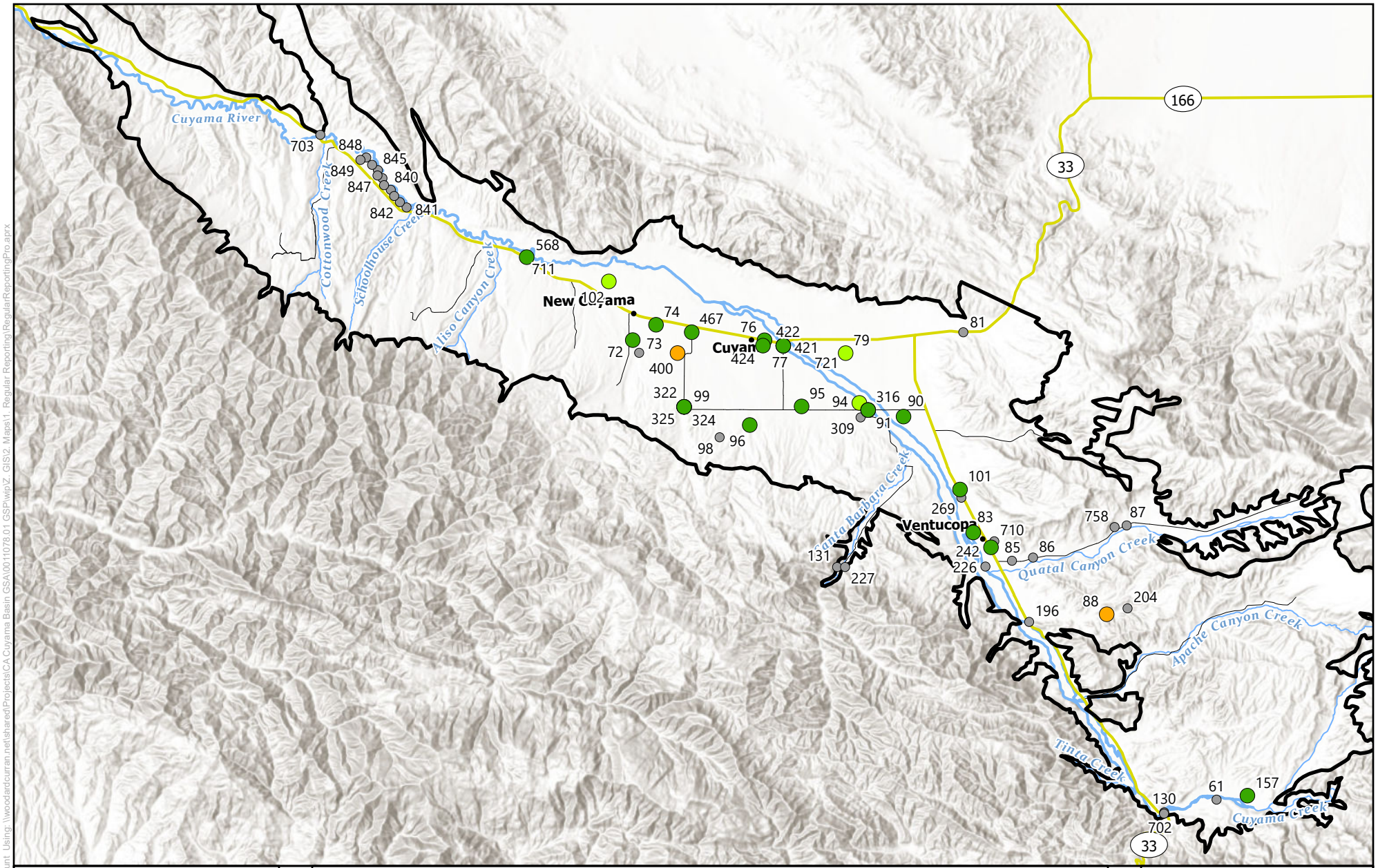


Figure 5-4: Groundwater Quality Status - TDS

Years 2021 to 2023

Cuyama Valley Groundwater Basin

Legend

- Above Minimum Threshold
- More than 10% Below Minimum Threshold
- Below Measurable Objective
- No available data this period
- Highway
- Local Road
- Town
- Creek
- Cuyama River
- Cuyama Basin

Status determined using 2020 sustainable management criteria.

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: March 2024

Figure Exported: 3/13/2024 By: DHunt Using: \\woodardcurran.net\shared\Projects\CA\Cuyama Basin GSA\0011078.01 GSPwip\Z_GIS\2_Maps\1_Regular Reporting\RegularReportingPro.aprx

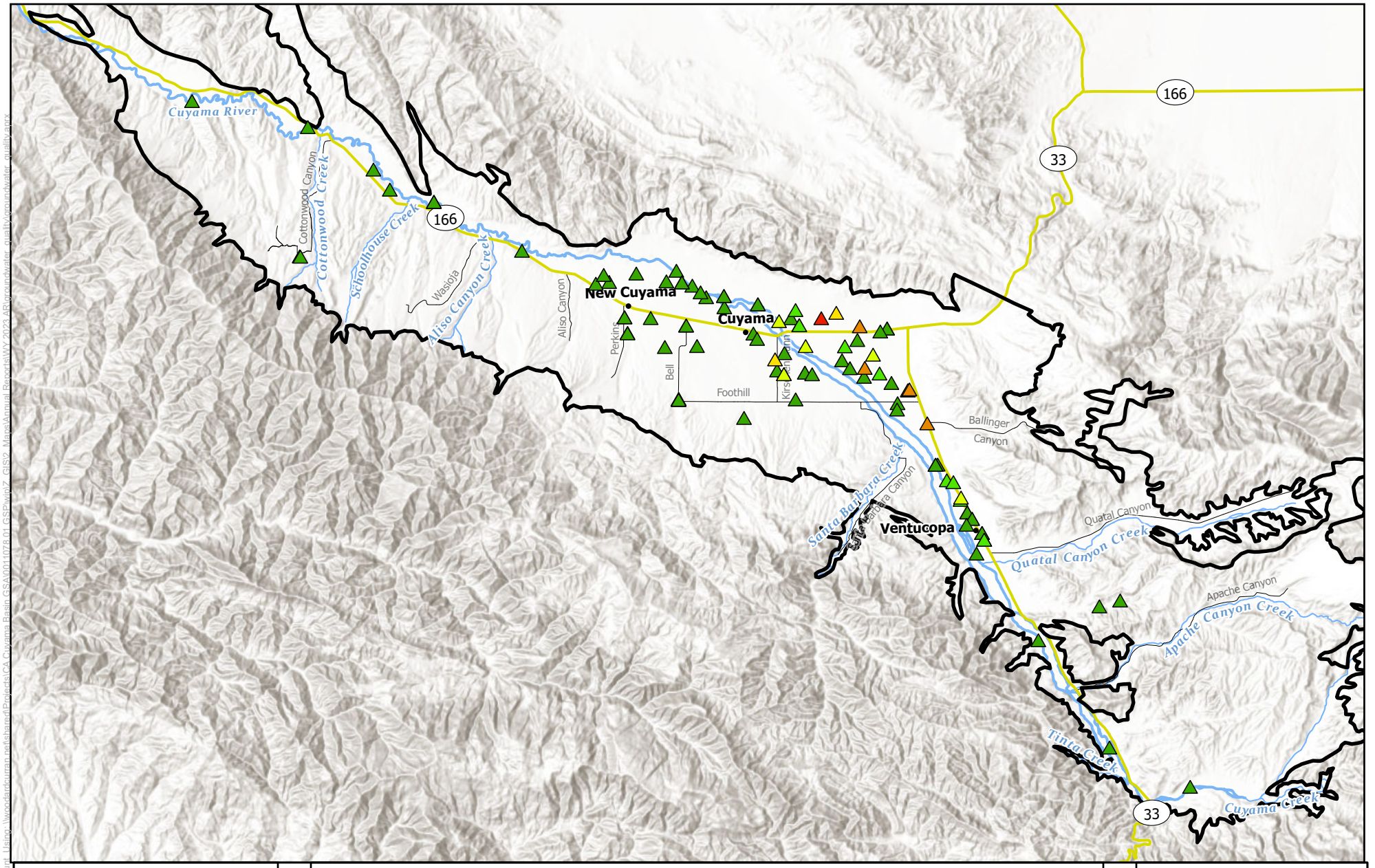


Figure 5-5: Groundwater Quality Measurements - Nitrate as NO3-N

Years 2022 and 2023

Cuyama Valley Groundwater Basin

Legend

- < 5 mg/L
- 5 - 8 mg/L
- 8 - 10 mg/L
- 10 - 15 mg/L
- 15 - 20 mg/L
- > 20 mg/L
- Highway
- Local Road
- Town
- Creek
- Cuyama River
- Cuyama Basin

*Values from monitoring wells with multiple observations were averaged with respect to year sampled.

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: February 2024

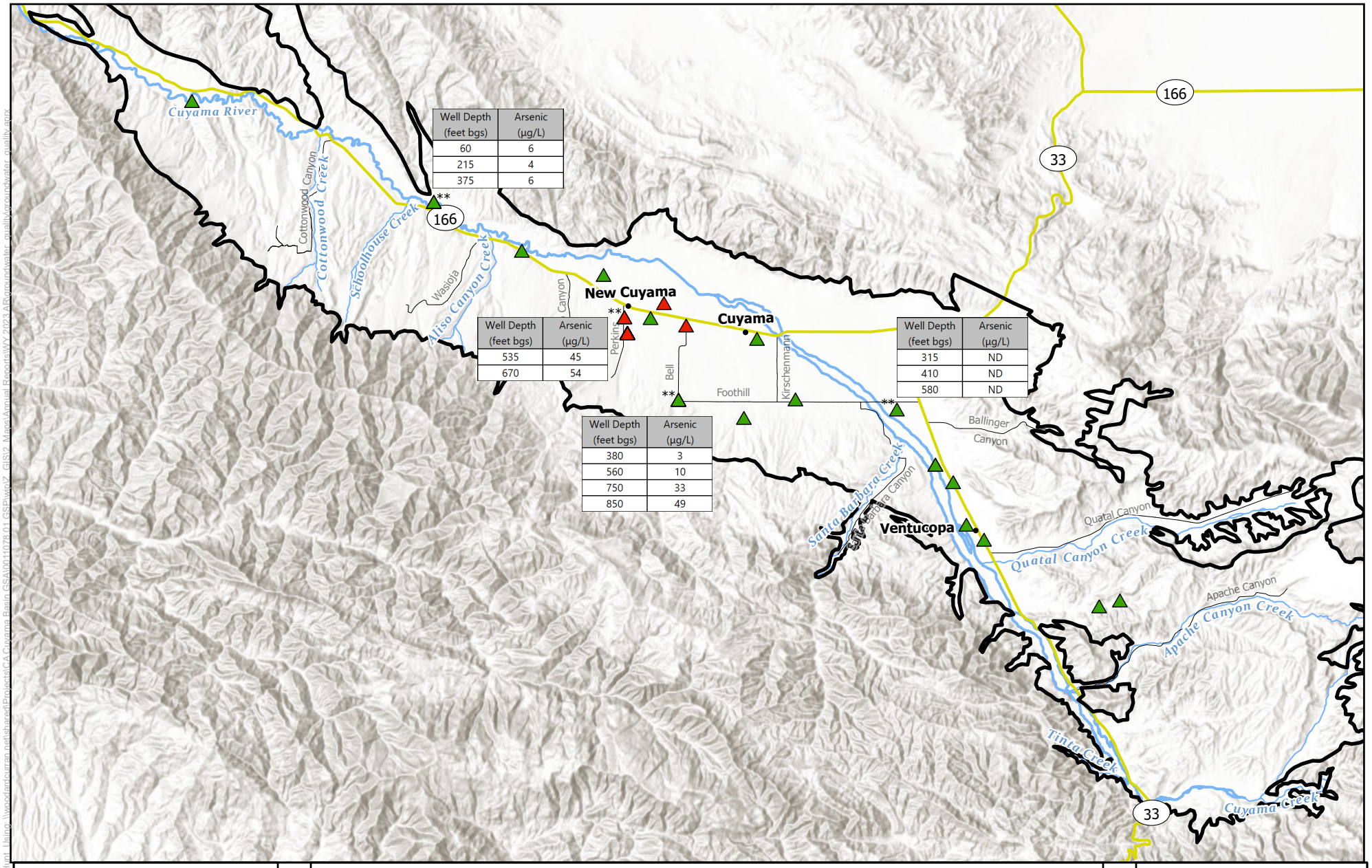


Figure 5-6: Groundwater Quality Measurements - Arsenic

Years 2022 and 2023

Cuyama Valley Groundwater Basin

Legend

- < 5 µg/L
- 5 - 8 µg/L
- 8 - 10 µg/L
- 10 - 15 µg/L
- 15 - 20 µg/L
- > 20 µg/L
- Highway
- Local Road
- Town
- Creek
- Cuyama River
- Cuyama Basin

N

Woodard & Curran

0 1.25 2.5 5 Miles

Map Created: February 2024

*Values from monitoring wells with multiple observations were averaged with respect to year sampled. **Nested well at this location.

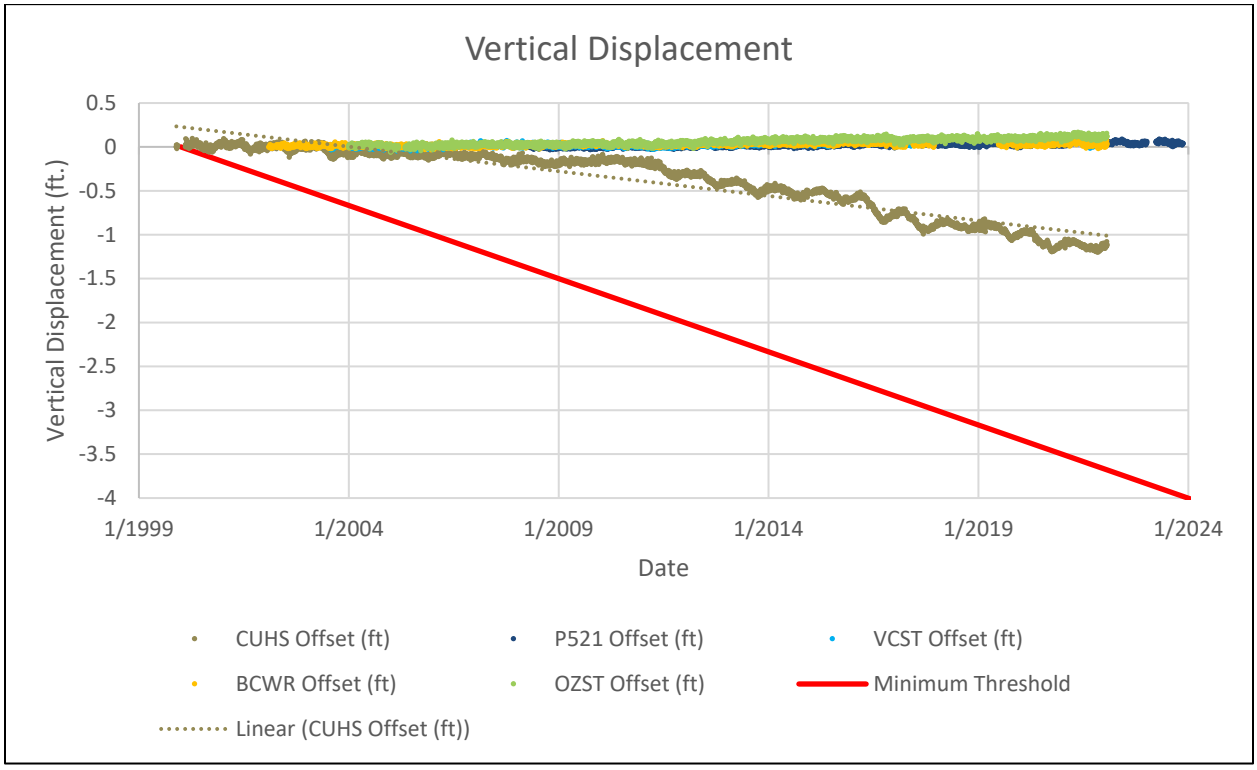
Section 6. Land Subsidence

Section 4.9 of the Cuyama GSP describes the monitoring network for land subsidence in the Basin, which is composed of five continuous geographic positioning system (CGPS) stations in and around the Basin to monitor lateral and vertical ground movements. Two of the five stations, the Cuyama Valley High School (CUHS) and the Ventucopa (VCST) stations, are within the Basin boundary. The other three stations are outside of the Basin and provide data comparative data for vertical movements that are more likely related to tectonic displacement rather than land subsidence.

The undesirable result for subsidence, as described in Section 3.2.5, is detected when 30 percent of representative subsidence monitoring sites (i.e. 1 of 2 sites) exceed the minimum threshold for subsidence over two years. The minimum threshold for subsidence, as defined in GSP Section 5.6.3, is 2 inches per year.

At the time the GSP was submitted in 2020, subsidence rates for the CUHS station were -0.56 inches per year. As shown in **Figure 6-1** data through 2022 (2023 data was not yet available) was downloaded from UNAVCO[8] and the subsidence trend for CUHS was recalculated. Subsidence rates during 2021 and 2022 actually reflected a positive change in ground surface elevation, and current subsidence rates in the central portion of the Basin are 34.02 mm per year or 1.34 inches per year (for WY 2022). This rate is below the minimum threshold, and thus undesirable results for subsidence are not occurring in the Basin.

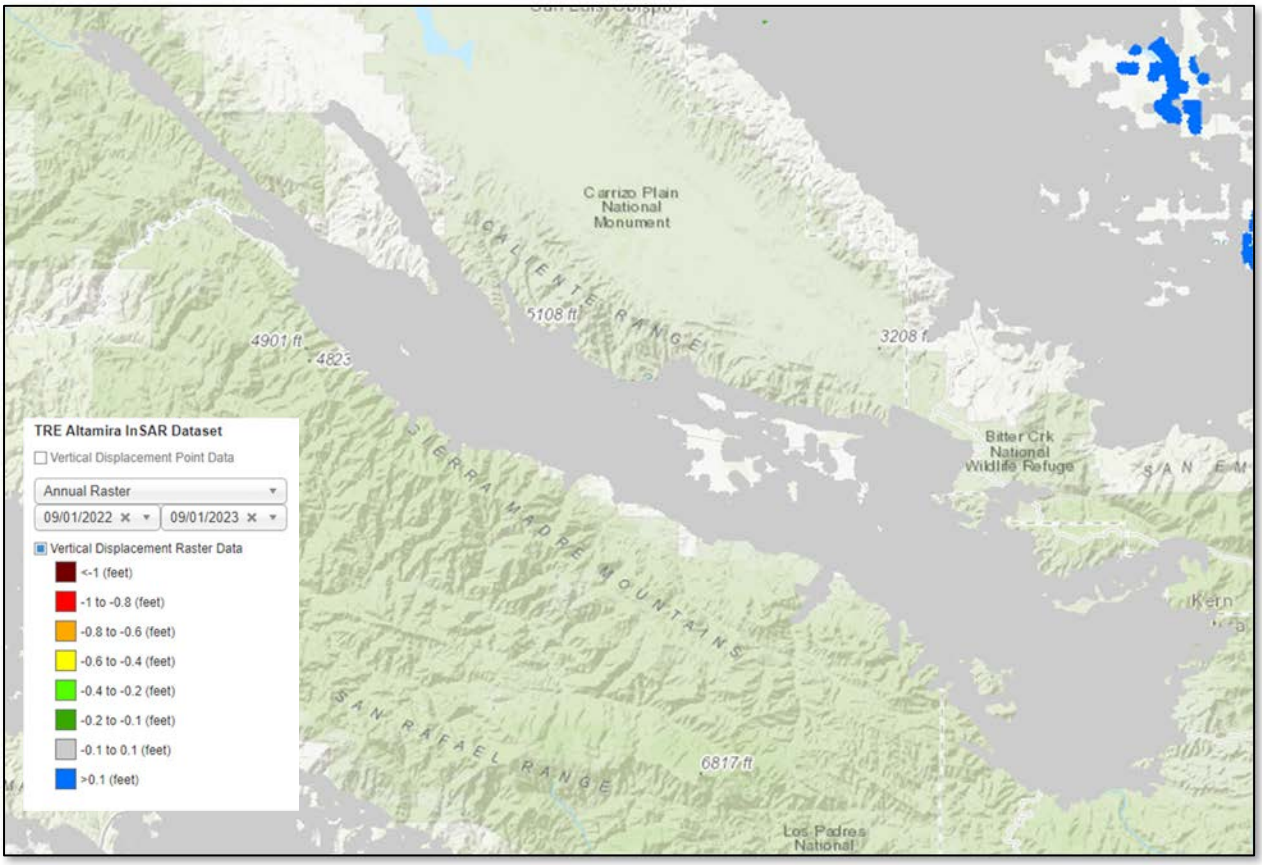
Figure 6-1: Subsidence Monitoring Data



[8] https://www.unavco.org/data/web-services/documentation/documentation.html#!/GNSS47GPS/getPositionByStationId

To assess potential changes during WY 2023 where UNAVCO data was not yet available, the TRE Altamira InSAR Dataset was used to ensure no detrimental or drastic changes had occurred. Raster results are presented in **Figure 6-2** and show no discernable change (between -0.1 and +0.1 feet) over that period.

Figure 6-2: Cuyama Subsidence Raster from SGMA Data Viewer – TRE Altamira InSAR Data



Section 7. Plan Implementation

§356.2 (c)	A description of progress toward implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

This section describes management activities taken by the CBGSA to implement the Cuyama Basin GSP from adoption of the GSP through preparation of this Annual Report.

7.1 Progress Toward Achieving Interim Milestones

Since the GSP was adopted by the CBGSA Board recently and CBGSA data collection efforts began in the second half of 2020, progress toward achieving interim milestones is in its early stages.

To track changes in groundwater conditions and the Basins progress towards sustainability, the GSA compiles a quarterly groundwater condition reports based on the data collected to monitoring groundwater levels. Current data collection occurs quarterly with corresponding reports. Data collection prior to 2022 was conducted monthly, but the CBGSA determined quarterly data collection was sufficient after a full year of monthly monitoring had been performed.

As described in Section 5 of the GSP (Minimum Thresholds, Measurable Objectives, and Interim Milestones), all interim milestones (IMs) are calculated the same way in each threshold region. IMs are equal to the MT in 2025, with a projected improvement to one-third the distance between the MT and MO in 2030 and half the distance between the MT and MO in 2035. **Table 7-1** includes measurements of depth to water (DTW) at each well and compares them to their respective 2025 IMs. For each well, the groundwater level measurement taken in October 2023 is used if available; otherwise, the most recent measurement taken in July 2023 is used instead. As is shown in the table, 31 wells are currently above their IM, while 14 are below, and one is equal to the IM, relative to the most recent measurement. Three wells did not have measurements taken during the water year, either because an access agreement has not granted, or the well was inaccessible.

As outlined in the GSP, undesirable results for the chronic lowering of groundwater levels occurs, “when 30 percent of representative monitoring wells… fall below their minimum groundwater elevation threshold for two consecutive years.” (Cuyama GSP, pg. 3-2). As of October 2023, 33% of representative wells (16 of 49) were below the minimum threshold. (Cuyama Groundwater Conditions Report, pg. 1). At least 30% of representative monitoring wells (i.e. 15 wells) had been below the minimum threshold for 1 or more consecutive month. This indicated that undesirable results for the chronic lower of groundwater levels could be observed during the October 2025 groundwater levels monitoring if conditions do not improve before then. Steps that the CBGSA Board has taken in response to these observed basin conditions are described in Section 7.6 Adaptive Management, below.

Table 7-1: Measured Depths to Groundwater Compared to 2025 Interim Milestones

Well	Region	Depth to Water (feet)	Measurement Month	2025 IM (feet)	Status
72	Central	154	Oct-23	169	Above IM
74	Central	253	Oct-23	256	Above IM
77	Central	493	Oct-23	450	Below IM
91	Central	674	Oct-23	625	Below IM
95	Central	608	Oct-23	573	Below IM
96	Central	336	Oct-23	333	Below IM
98	Central	-		450	-
99	Central	290	Oct-23	311	Above IM
102	Central	288	Oct-23	235	Below IM
103	Central	244	Oct-23	290	Above IM
112	Central	86	Oct-23	87	Above IM
114	Central	-	Oct-23	47	-
316	Central	675	Oct-23	623	Below IM
317	Central	673	Oct-23	623	Below IM
322	Central	291	Oct-23	307	Above IM
324	Central	292	Oct-23	311	Above IM
325	Central	291	Oct-23	300	Above IM
420	Central	494	Oct-23	450	Below IM
421	Central	493	Oct-23	444	Below IM
474	Central	163	Jul-23	188	Above IM
568	Central	37	Oct-23	37	At IM
604	Central	440	Oct-23	526	Above IM
608	Central	433	Oct-23	436	Above IM
609	Central	442	Oct-23	458	Above IM
610	Central	637	Oct-23	621	Below IM
612	Central	479	Oct-23	463	Below IM
613	Central	530	Oct-23	503	Below IM
615	Central	518	Oct-23	500	Below IM
629	Central	530	Oct-23	559	Above IM
633	Central	566	Oct-23	547	Below IM
62	Eastern	132	Oct-23	182	Above IM
85	Eastern	177	Oct-23	233	Above IM
100	Eastern	95	Oct-23	181	Above IM
101	Eastern	106	Oct-23	111	Above IM
841	Northwestern	69	Oct-23	203	Above IM
845	Northwestern	74	Oct-23	203	Above IM
2	Southeastern	22	Oct-23	72	Above IM

89	Southeastern	29	Oct-23	64	Above IM
106	Western	142	Oct-23	154	Above IM
107	Western	68	Jul-23	91	Above IM
117	Western	152	Oct-23	160	Above IM
118	Western	53	Oct-23	124	Above IM
124	Western	-		73	-
571	Western	72	Oct-23	144	Above IM
573	Western	69	Oct-23	118	Above IM
830	Far-West Northwestern	49	Oct-23	59	Above IM
832	Far-West Northwestern	35	Oct-23	45	Above IM
833	Far-West Northwestern	23	Oct-23	96	Above IM
836	Far-West Northwestern	30	Oct-23	79	Above IM

7.2 Funding to Support GSP Implementation

On May 3, 2023, the CBGSA Board held a rate hearing and set a groundwater extraction fee of $12 per acre-foot for FY 23-24.

Additionally, the CBGSA has been awarded a $7.6 million in grant fund under the Critically Overdrafted Basin (COD) SGMA Implementation Round 1 grant opportunity, with funding awarded for the following activities through April, 2026:

- Ongoing Monitoring and Enhancements
    - Installation of Piezometers
    - installation of dedicated monitoring wells
    - DMS maintenance and enhancements
    - Groundwater level and quality monitoring
    - USGS stream gage maintenance
- Project and Management Action Implementation
    - CBWRM model update and re-calibration
    - Develop and implement framework for pumping allocations
    - Analysis of management actions implementation options
    - Adaptive management support
    - Precipitation enhancement technical analysis
    - Flood and stormwater capture technical analysis
- GSP Implementation and Outreach Activities
    - GSP implementation program management
    - Stakeholder engagement and community outreach

    - Prepare annual reports
    - Modify GSP in response to DWR determination
    - 5-year GSP update
- Improving Understanding of Basin Water Use
    - Perform updated land use survey
    - Perform river channel survey
    - Enhance existing CIMIS station and implement new stations

The CBGSA has also submitted a proposal to DWR for approximately $2 million under the SGMA Implementation Round 2 grant opportunity with funding to do additional implemenation tasks. The CBGSA however did not get funding through that grant opportunity.

7.3 Stakeholder Outreach Activities in Support of GSP Implementation

The following is a list of public meetings where GSP development and implementation was discussed during the 2022-2023 water year.

- CBGSA Board meetings: September 7, November 2, November 15, December 12, January 18, March 29, May 3, July 12, and September 6
- Standing Advisory Committee (SAC) meetings: October 27, January 5, March 23, April 27, July 6, and August 31
-

7.4 Progress on Implementation of GSP Projects

Table 7-2 shows the projects and management actions that were included in the GSP. The following subsections describe the progress of implementation of each GSP project.

Table 7-2: Summary of Projects and Management Actions included in the GSP

Activity	Current Status	Anticipated Timing	Estimated Cost[a]
Project 1: Flood and Stormwater Capture	Water rights analysis of potential water supplies currently underway	• Feasibility study: 0 to 5 years • Design/Construction: 5 to 15 years	• Study: $1,000,000 • Flood and Stormwater Capture Project: $600-$800 per AF ($2,600,000 – 3,400,000 per year)
Project 2: Precipitation Enhancement	Feasibility Study currently underway by Desert Research Institute;	• Refined project study: 0 to 2 years • Implementation of Precipitation Enhancement: 0 to 5 years	• Study: $200,000 • Precipitation Enhancement Project: $25 per AF ($150,000 per year)
Project 3: Water Supply Transfers/Exchanges	Not yet begun	• Feasibility study/planning: 0 to 5 years • Implementation in 5 to 15 years	• Study: $200,000 • Transfers/Exchanges: $600-$2,800 per AF (total cost TBD)
Project 4: Improve Reliability of Water Supplies for Local Communities	In progress for CCSD; not yet begun for other communities	• Feasibility studies: 0 to 2 years • Design/Construction: 1 to 5 years	• Study: $100,000 • Design/Construction: • $1,800,000
Management Action 1: Basin-Wide Economic Analysis	Completed	• December 2020	• $60,000
Management Action 2: Pumping Allocations in Central Basin Management Area	Allocations developed for 2023 and 2024 and implemented in 2023 calendar year	• Allocations implemented: 2023 through 2040	• Plan: $300,000 • Implementation: $150,000 per year
Adaptive Management	Board ad-hoc committee has been formed and is considering potential actions	Only implemented if triggered; timing would vary	TBD

[a] Estimated cost based on planning documents and professional judgment
AF = acre-feet

7.4.1 Project 1: Flood and Stormwater Capture

The CBGSA application for COD SGMA Implementation Grant funding from DWR includes a task to understand the feasibility of future flood and stormwater capture. Specifically, funding was sought to perform a water rights analysis on flood and stormwater capture flows in the Basin to understand the feasibility of further developing a stormwater capture project in the Basin given water availability and existing water rights. Initial work has been done to look at reservoir operations data to see during what windows during Twitchell Reservoir there were managed released and to assess the possibility of capturing

this excess water upstream in the Cuyama Basin. Our current data suggests that this occurs 11% of the time. The CBGSA also looked at USGS stream flow gages in the area to correlate time periods when reservoirs were releasing water to see how much stormwater may be available for capture. Additional analysis will be done in the coming year to assess the feasibility of implantation of a flood and stormwater capture project. This water rights analysis has not yet been completed but is expected to be completed in 2024.

7.4.2 Project 2: Precipitation Enhancement

The CBGSA application for COD SGMA Implementation Grant funding from DWR, which includes a task to understand the feasibility of precipitation enhancements efforts. Specifically, funding was sought to perform a feasibility study of the precipitation enhancement action identified in the GSP to determine if this action should be pursued and implemented in the Basin. The CBGSA contracted with the Desert Research Institute (DRI) to assess cloud seeding effects on Santa Barbra County and the Cuyama Valley. A proposal was submitted in September 2023 and work was initiated in October. A final report which will provide additional acre feet potential of precipitation from cloud seeding is expected in August 2024.

7.4.3 Project 3: Water Supply Transfers or Exchanges

No progress was made toward implementation of this project since completion of the GSP in January 2020. This project will be explored if Project 1 mentioned above: flood and stormwater capture was feasible but greater volumes of water are desired.

7.4.4 Project 4: Improve Reliability of Water Supplies for Local Communities

This management action includes consideration of opportunities to improve water supply reliability for Ventucopa within CCSD service area. Potential projects include a replacement well for CCSD and improvement of Ventucopa Water Supply Company (VWSC’s) existing well. Since the 2020 GSP adoption DWR's IRWM program awarded CCSD a grant to install a new production well. Work by the CCSD to install the new well is ongoing.

7.5 Management Actions

Table 7-2 shows the projects and management actions that were included in the GSP. The following subsections describe the progress of implementation of each GSP management action.

7.5.1 Management Action 1: Basin-Wide Economic Analysis

A Basin-wide direct economic analysis of proposed GSP actions was completed. The results of this analysis were presented to the GSP Board on December 4, 2019, and the final report was completed in December 2019. The final Basin-wide economic analysis report was provided in the 2020 Annual Report. This management action is 100% complete.

7.5.2 Management Action 2: Pumping Allocations in Central Basin Management Area

CBGSA staff has worked and continues to work with the Board and stakeholders to implement pumping allocations in the Central Management Area which began in the 2023 calendar year. As directed by the Board, in July 2022, CBGSA staff developed pumping allocations for 2023 and 2024 for each parcel located within the Central Management Area. These allocations reflect a 5% reduction in 2023 and a 10% reduction in 2024 relative to baseline levels. Actual pumping was reported for most water users in the Central Management Area in 2023, with all users at or below their pumping allocation amount for 2023.

7.6 Adaptive Management

As discussed in the previous annual report, because several wells in the Basin are trending towards undesirable results, the CBGSA Board has undertaken efforts to review wells that have exceeded minimum thresholds, investigate potential causes of the exceedances, and identify if any domestic or production wells are affected by declining groundwater levels. During WY 2023, several wells with groundwater levels that previously exceeded minimum thresholds recovered to above these threshold levels.

The Board continues to consider potential actions to address minimum threshold exceedances, including restricting pumping in individual wells, adjusting minimum thresholds or the undesirable result criteria identified in the GSP, and accelerating basin-wide pumping reductions. Potential options for implementing these actions will be discussed by the Board during the upcoming water year.

7.7 Progress Toward Implementation of Monitoring Networks

This section provides updates about implementation of the monitoring networks identified during GSP development.

7.7.1 Groundwater Levels Monitoring Network

In October 2021 the CBGSA transitioned to quarterly groundwater monitoring from its groundwater levels network. The CBGSA goes out in the field and collects Depth to Water measurements quarterly and attempts to take measurements from each of the representative and non-representative wells in the monitoring network. The results of this groundwater level monitoring are shown in Table 7-1. In September 2023, the CBGSA board voted to revise the monitoring network; the revised monitoring network will be included in the 2025 GSP Update.

7.7.2 Surface Water Monitoring Network

Under a Category 1 grant from DWR, two new surface flow gages were installed on the Cuyama River during 2021. These gages are managed by the United States Geologic Survey (USGS), and data collected at the gage locations are available on the USGS website at the following links:

https://waterdata.usgs.gov/nwis/uv?site_no=11136500

https://waterdata.usgs.gov/ca/nwis/uv?site_no=11136710

Section 8. References

California Department of Water Resources (DWR). 2003. *California's Groundwater Bulletin 118—Update 2003*. https://water.ca.gov/LegacyFiles/groundwater/bulletin118/basindescriptions/3-13.pdf

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Appendix A
Updated Hydrographs for Representative Wells

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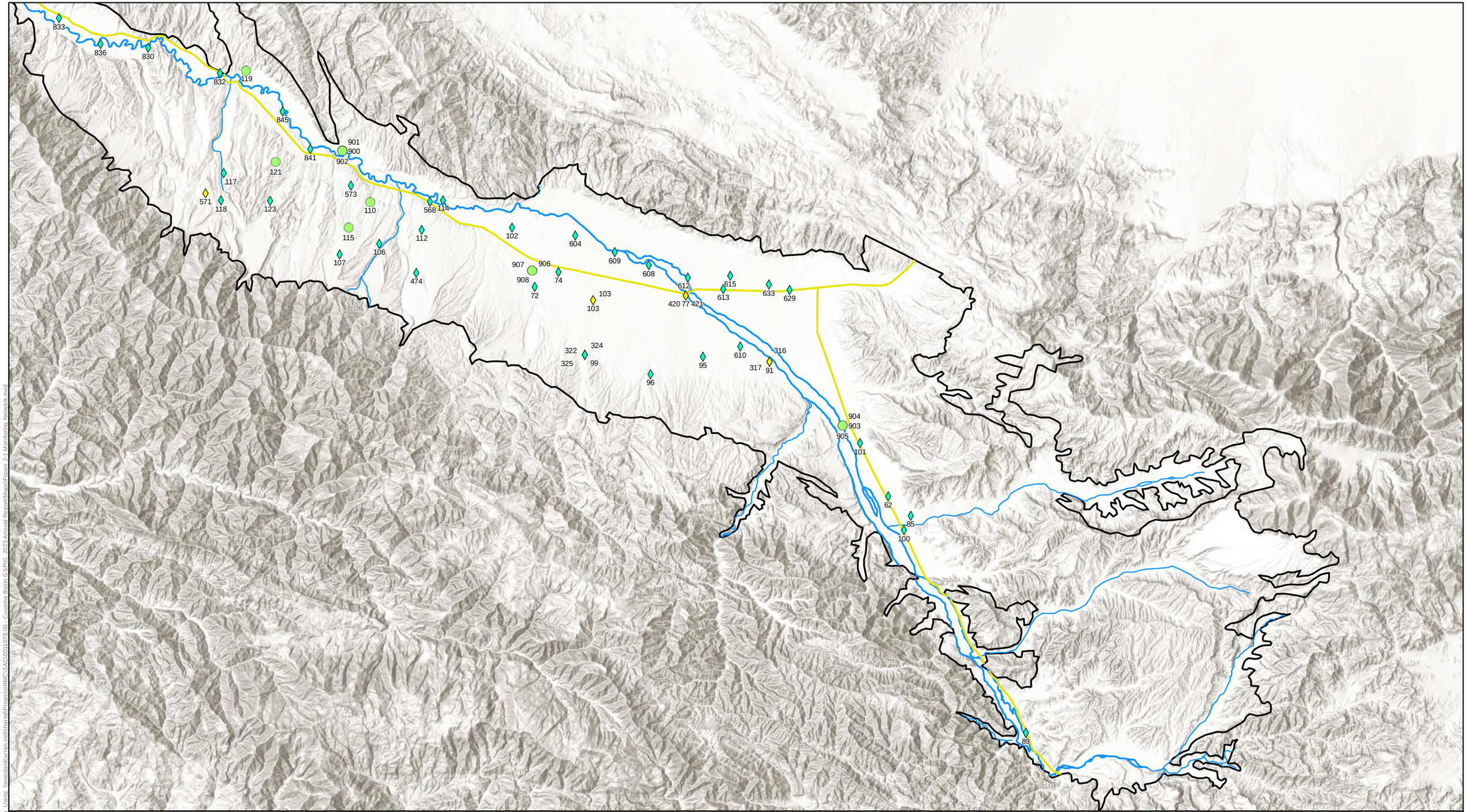


Cuyama GW Basin - Groundwater Monitoring Network

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

March 2023

Woodard & Curran

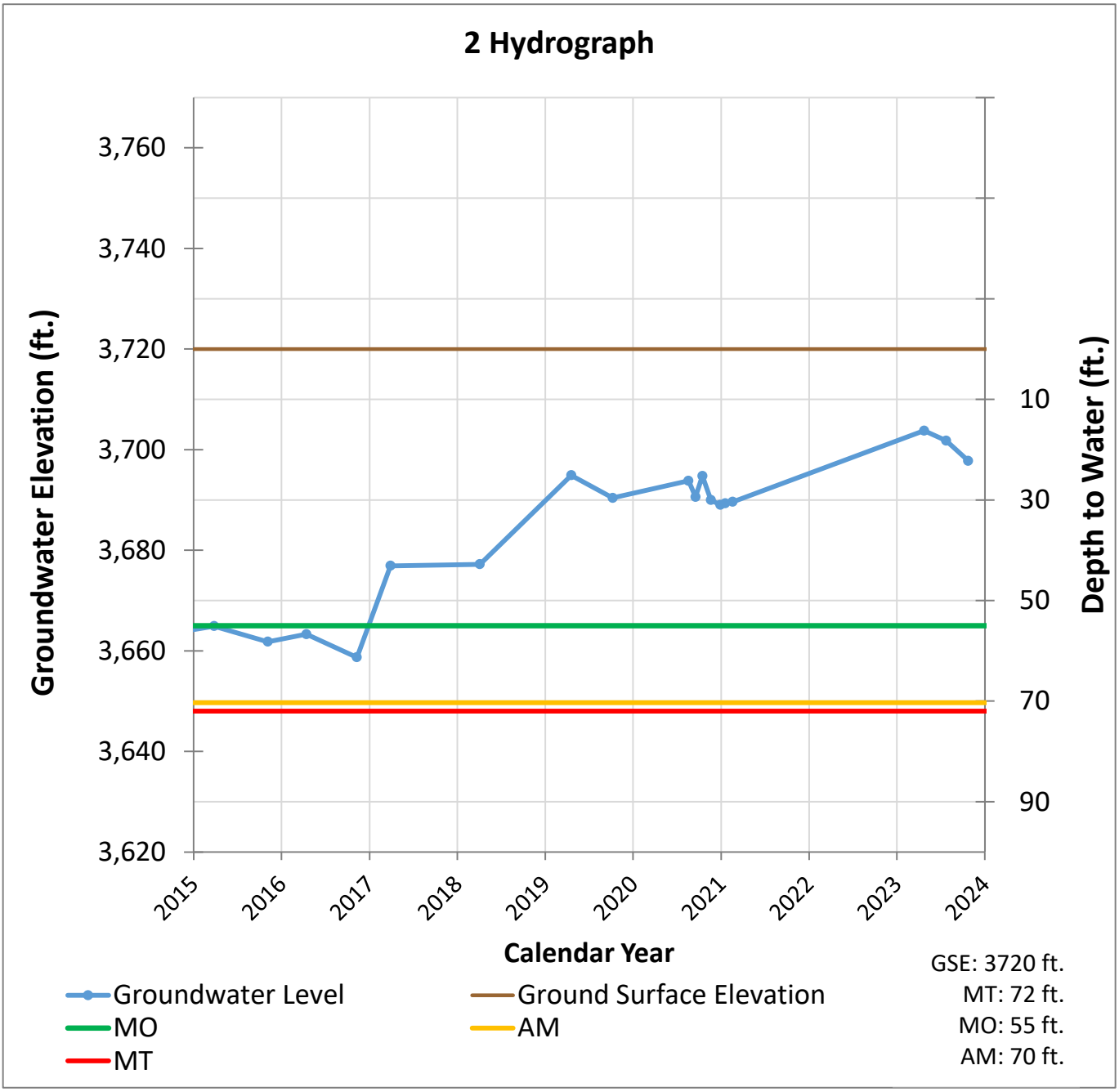
Legend

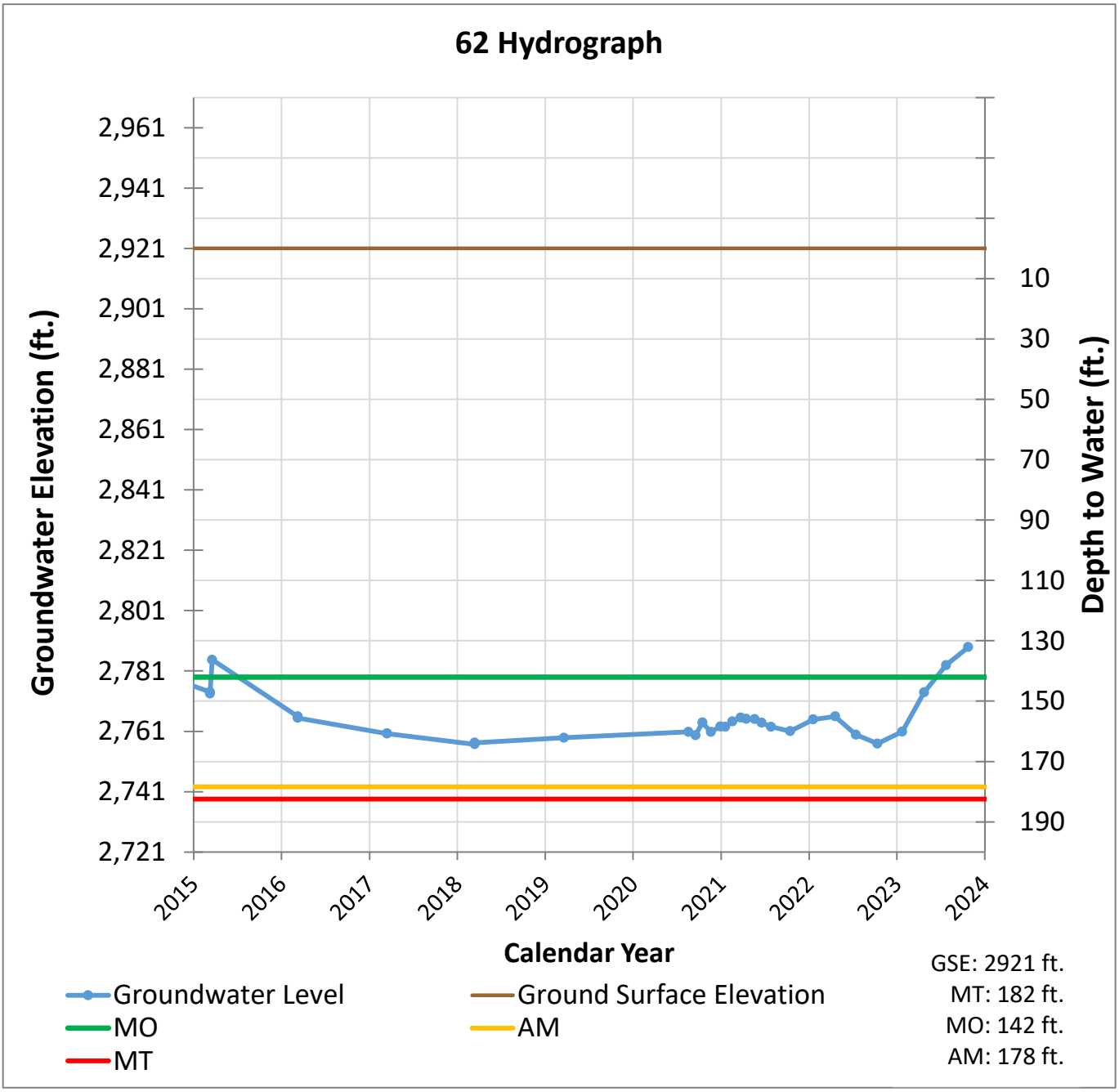
- Cuyama Basin
- Cuyama River
- Highways
- Representative Wells
- Representative Well with Transducer
- Monitoring Network Well

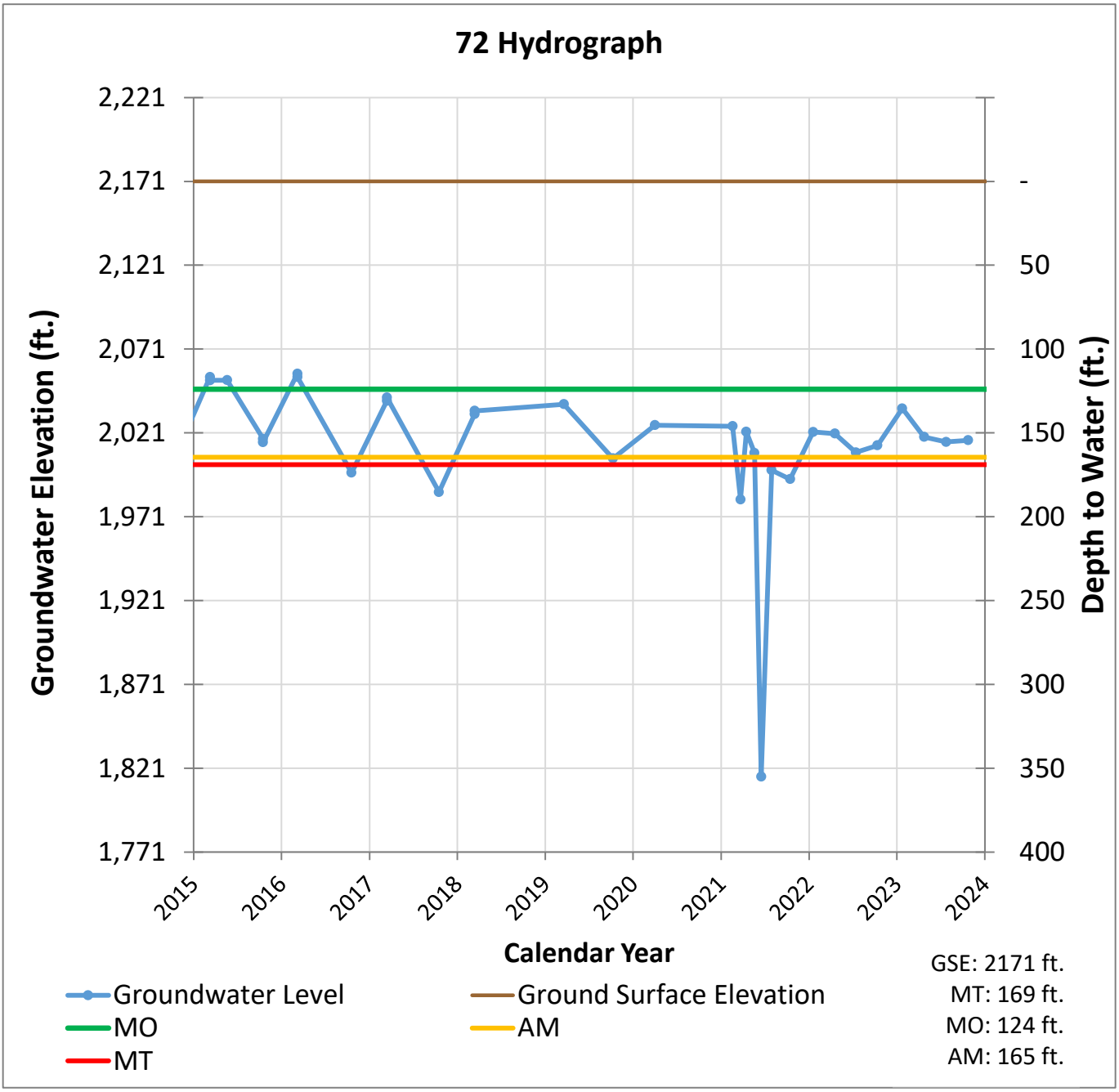
N

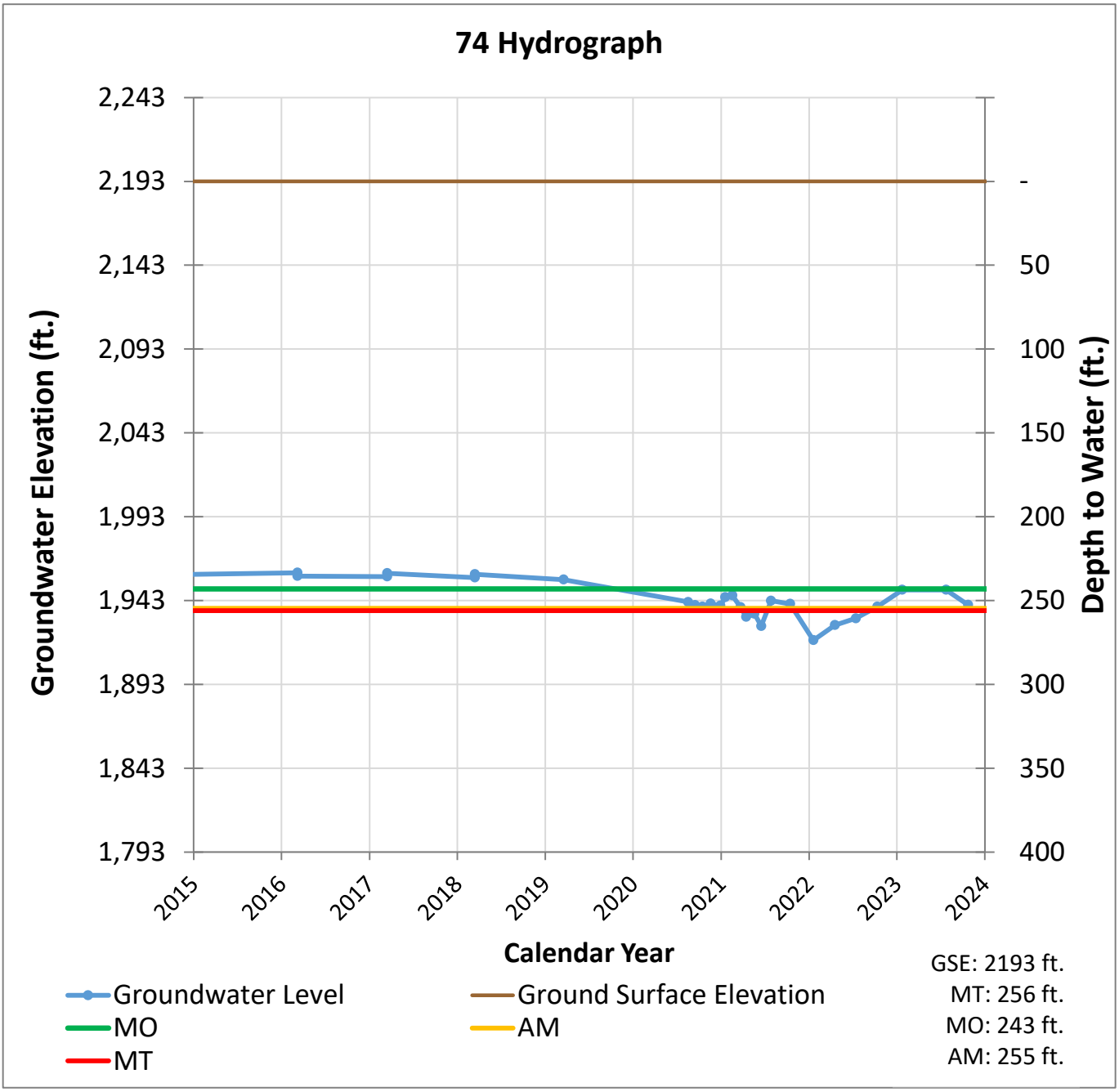
0 1.75 3.5 7 Miles

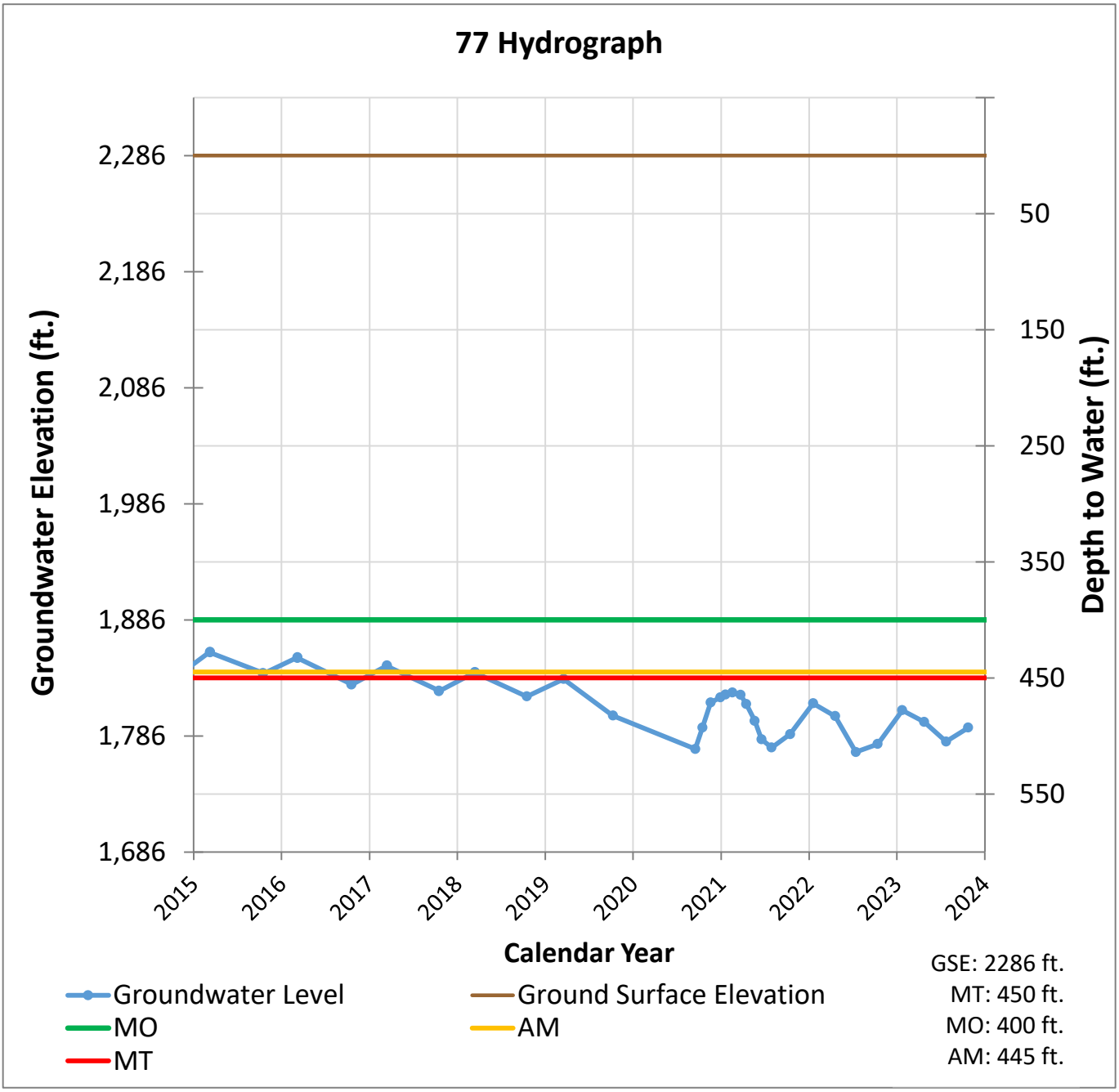
Plot Exported: 3/9/2023 By: mvallejo Using: W:\woodardcurran.net\shared\Projects\MC\SA\C0091079.00 - Cuyama Basin GSPG - 2023 Annual Report\Maps\Figure 2-1 Monitoring Network.mxd

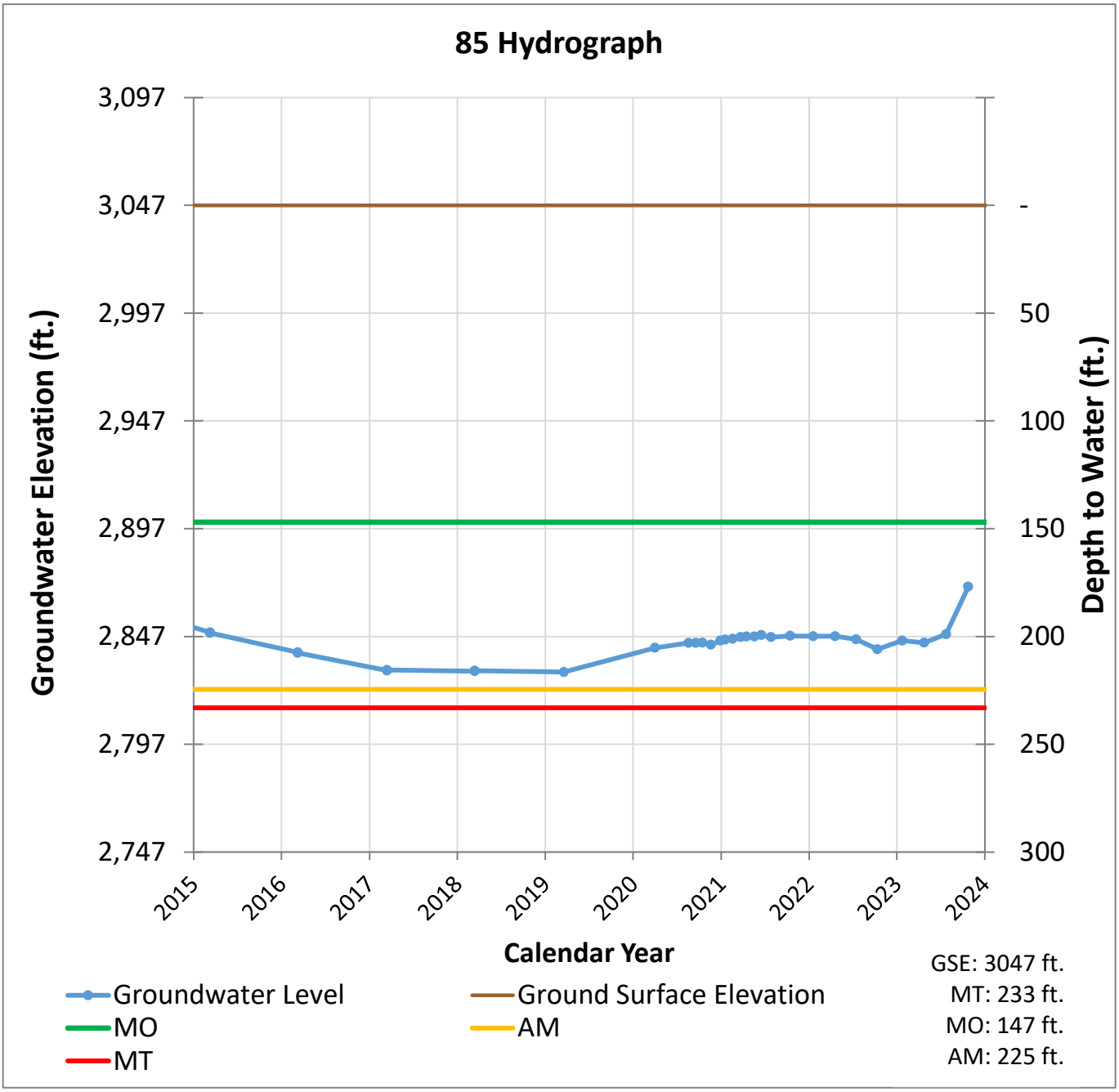

2 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
3,760
3,740
3,720
3,700
3,680
3,660
3,640
3,620
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 3720 ft.
MT: 72 ft.
MO: 55 ft.
AM: 70 ft.

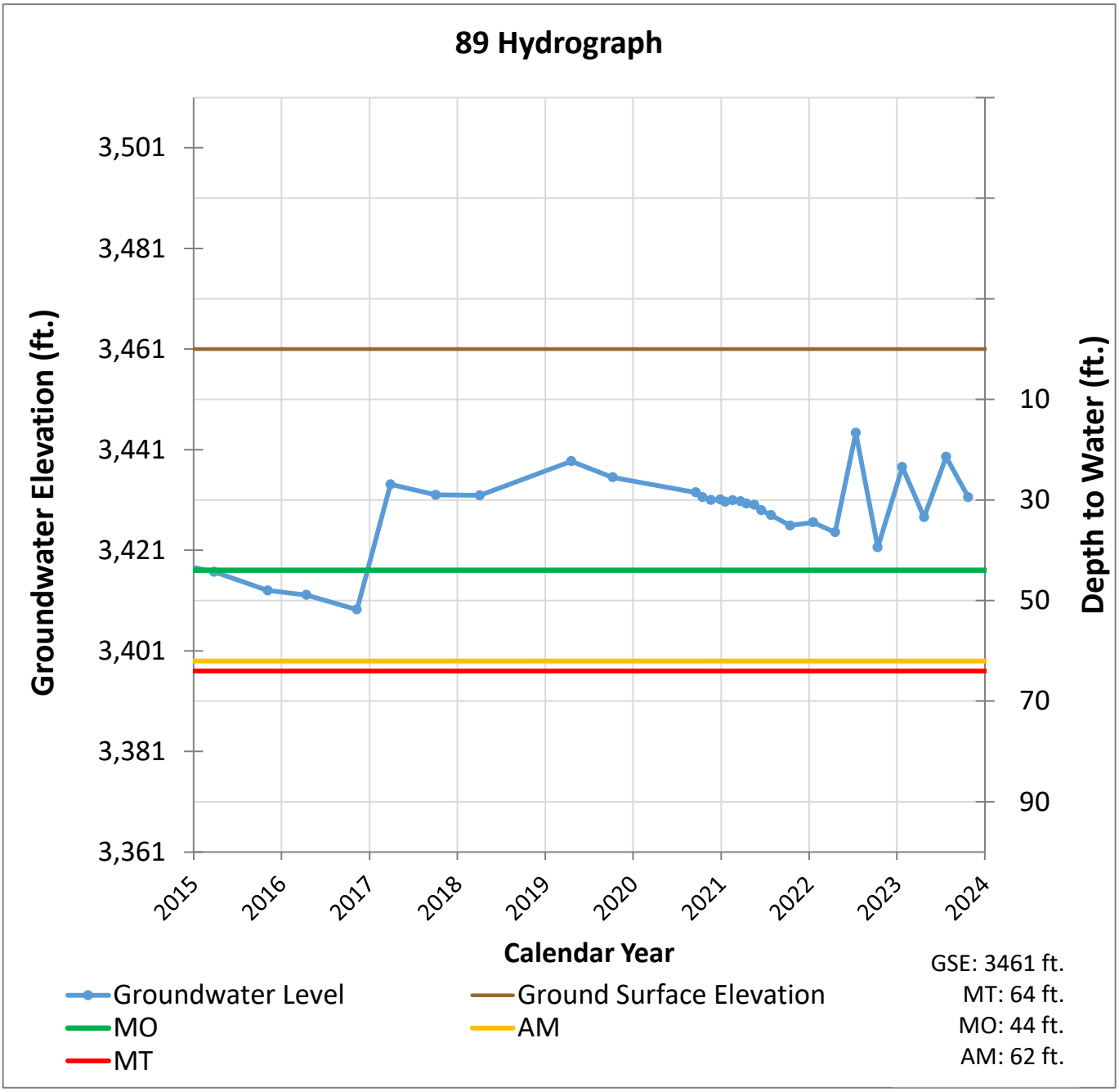

62 Hydrograph
Groundwater Elevation (ft.)
2,961
2,941
2,921
2,901
2,881
2,861
2,841
2,821
2,801
2,781
2,761
2,741
2,721
Depth to Water (ft.)
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2921 ft.
MT: 182 ft.
MO: 142 ft.
AM: 178 ft.

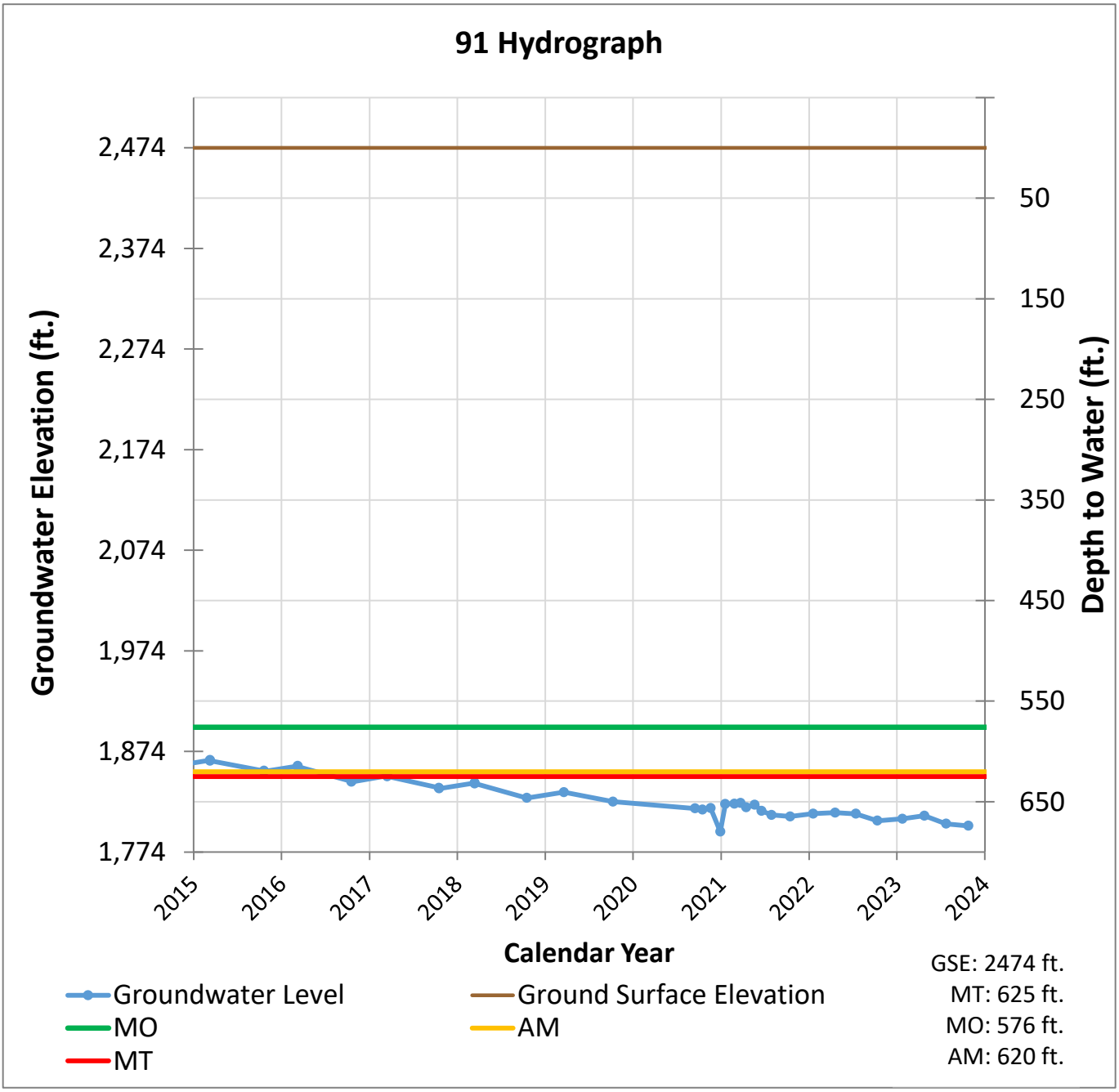

72 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,221
2,171
2,121
2,071
2,021
1,971
1,921
1,871
1,821
1,771
-
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2171 ft.
MT: 169 ft.
MO: 124 ft.
AM: 165 ft.

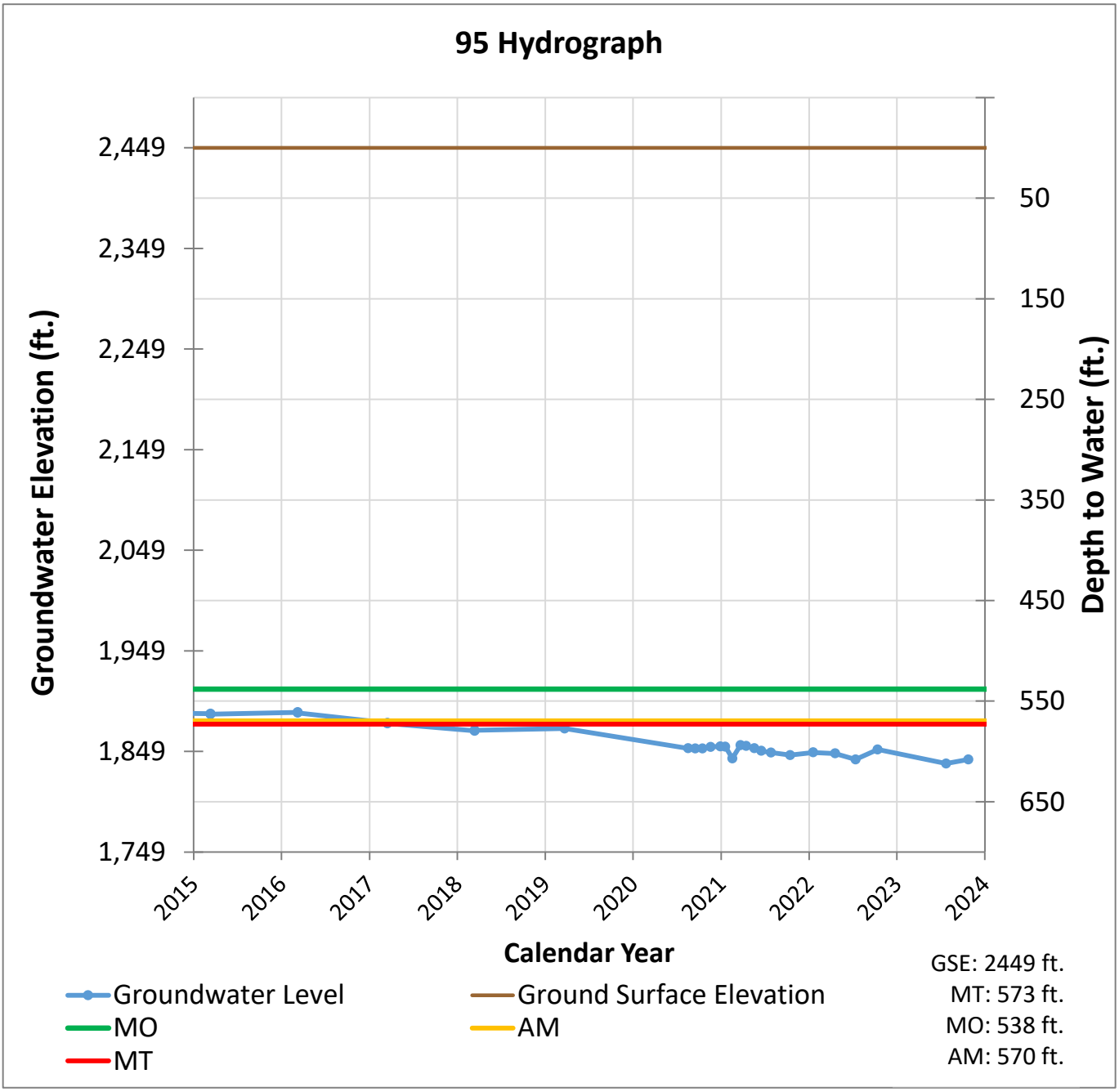

74 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,243
2,193
2,143
2,093
2,043
1,993
1,943
1,893
1,843
1,793
-
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2193 ft.
MT: 256 ft.
MO: 243 ft.
AM: 255 ft.

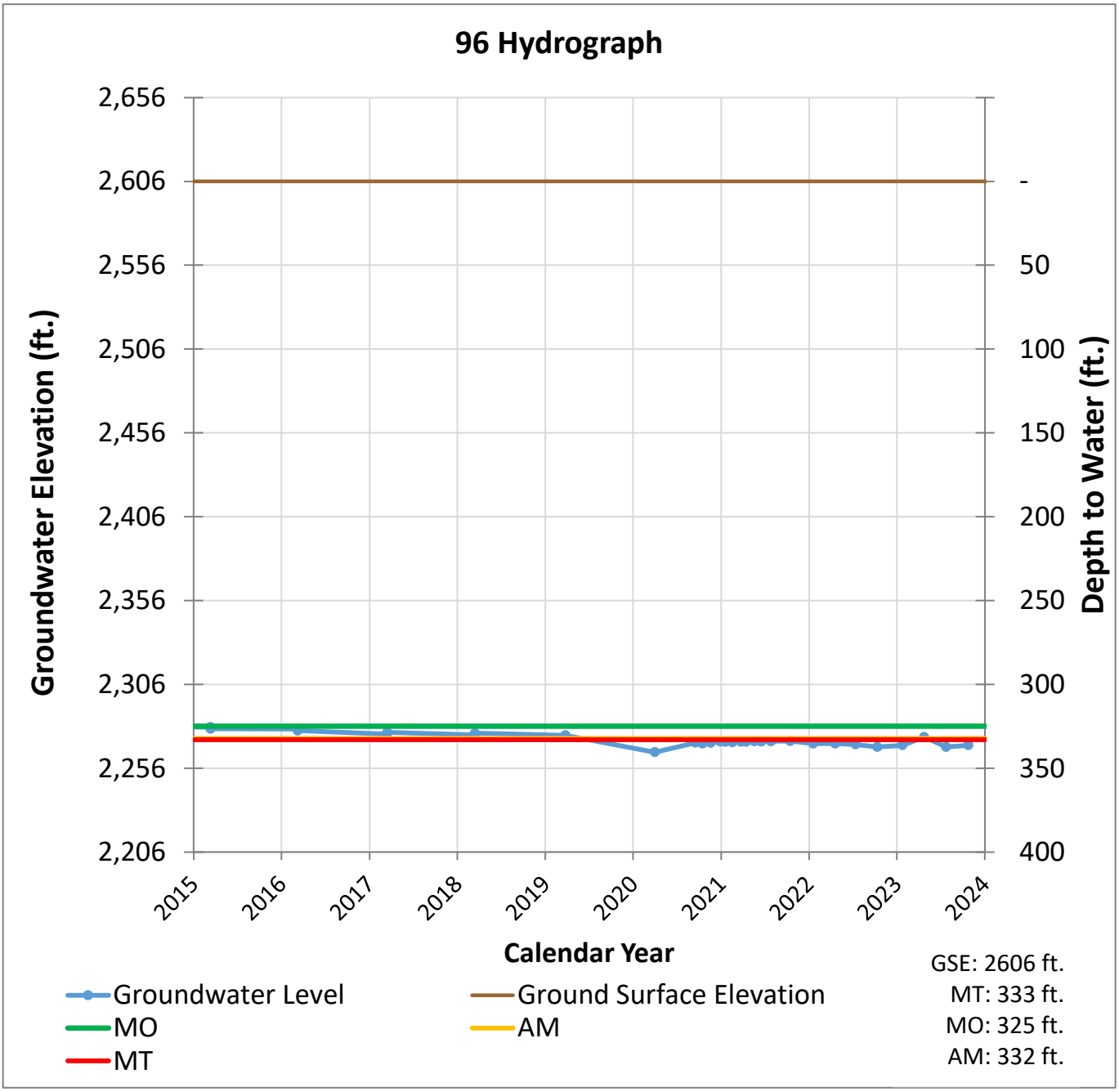

77 Hydrograph
Groundwater Elevation (ft.)
2,286
2,186
2,086
1,986
1,886
1,786
1,686
Depth to Water (ft.)
50
150
250
350
450
550
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2286 ft.
MT: 450 ft.
MO: 400 ft.
AM: 445 ft.

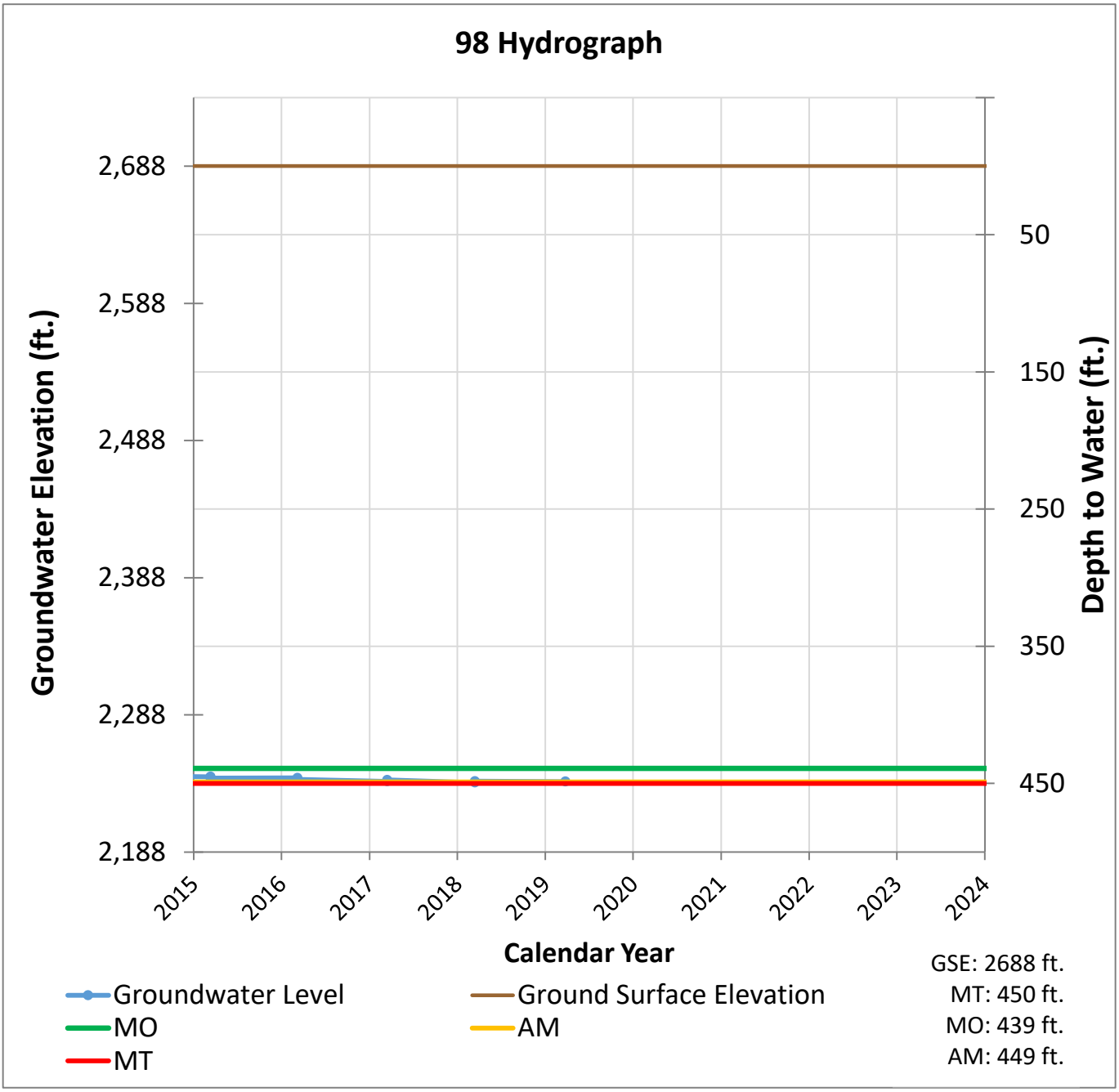

85 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
3,097
3,047
2,997
2,947
2,897
2,847
2,797
2,747
-
50
100
150
200
250
300
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 3047 ft.
MT: 233 ft.
MO: 147 ft.
AM: 225 ft.

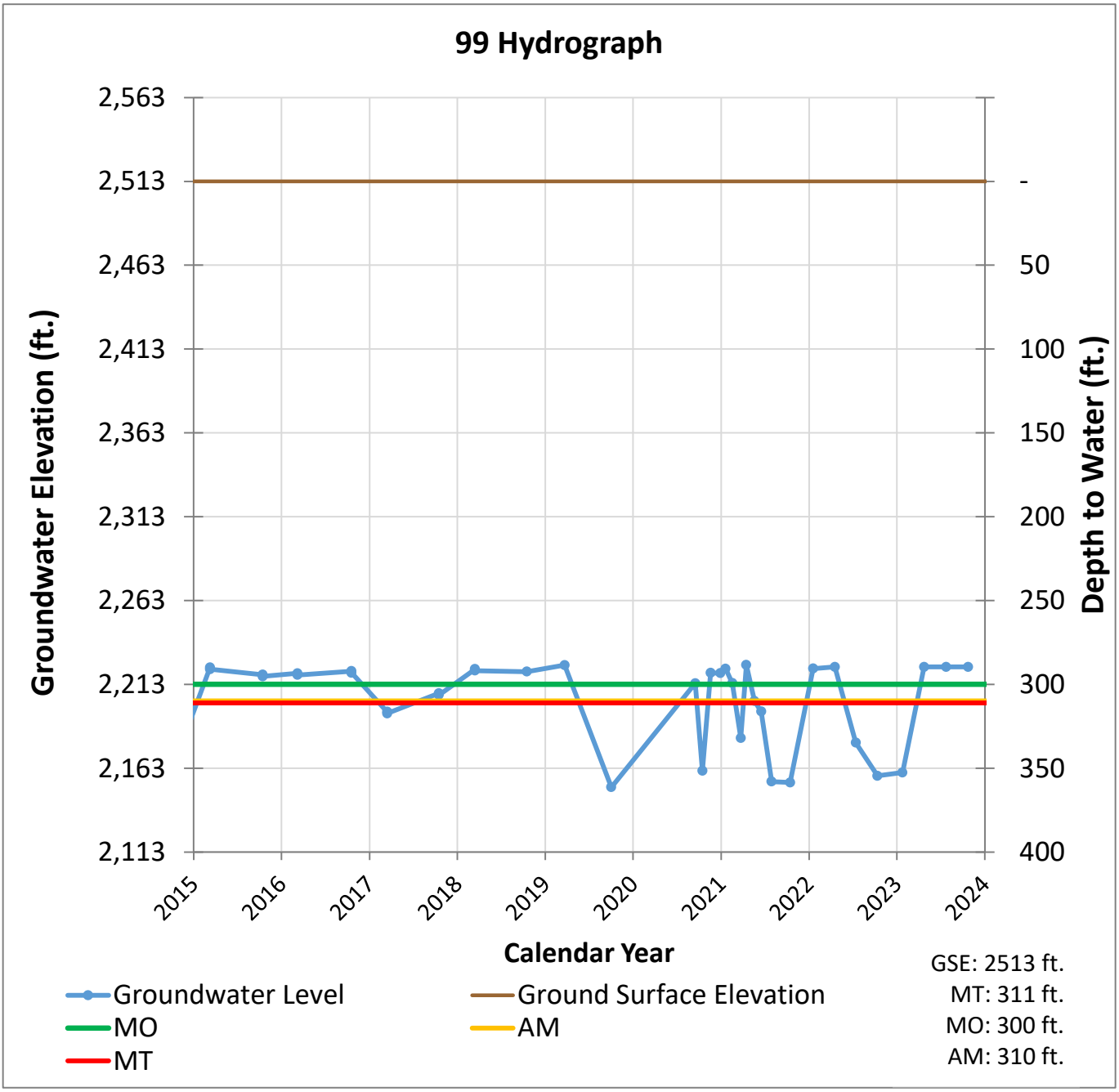

89 Hydrograph
Groundwater Elevation (ft.)
3,501
3,481
3,461
3,441
3,421
3,401
3,381
3,361
Depth to Water (ft.)
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 3461 ft.
MT: 64 ft.
MO: 44 ft.
AM: 62 ft.

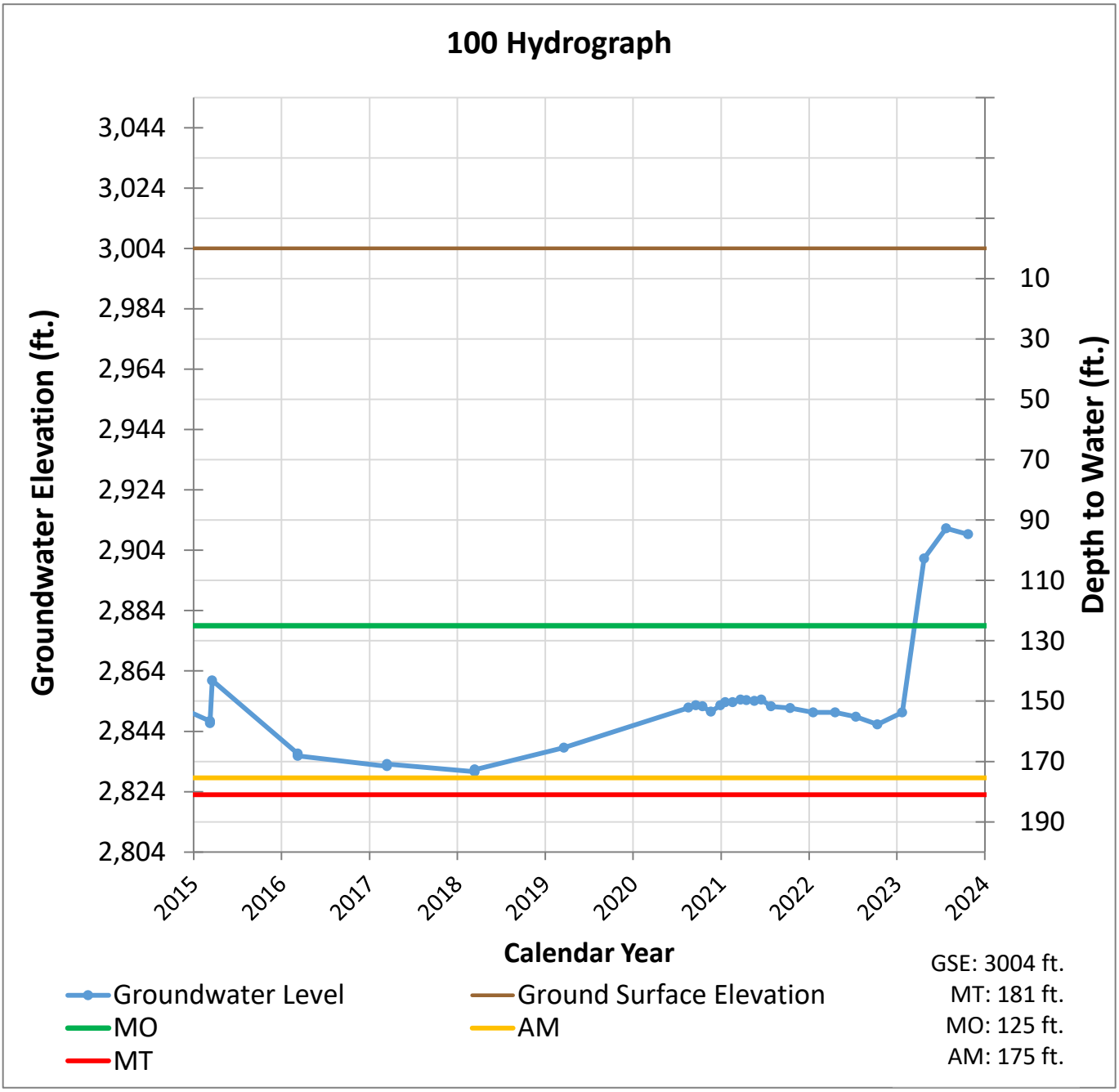

91 Hydrograph
Groundwater Elevation (ft.)
2,474
2,374
2,274
2,174
2,074
1,974
1,874
1,774
Depth to Water (ft.)
50
150
250
350
450
550
650
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2474 ft.
MT: 625 ft.
MO: 576 ft.
AM: 620 ft.

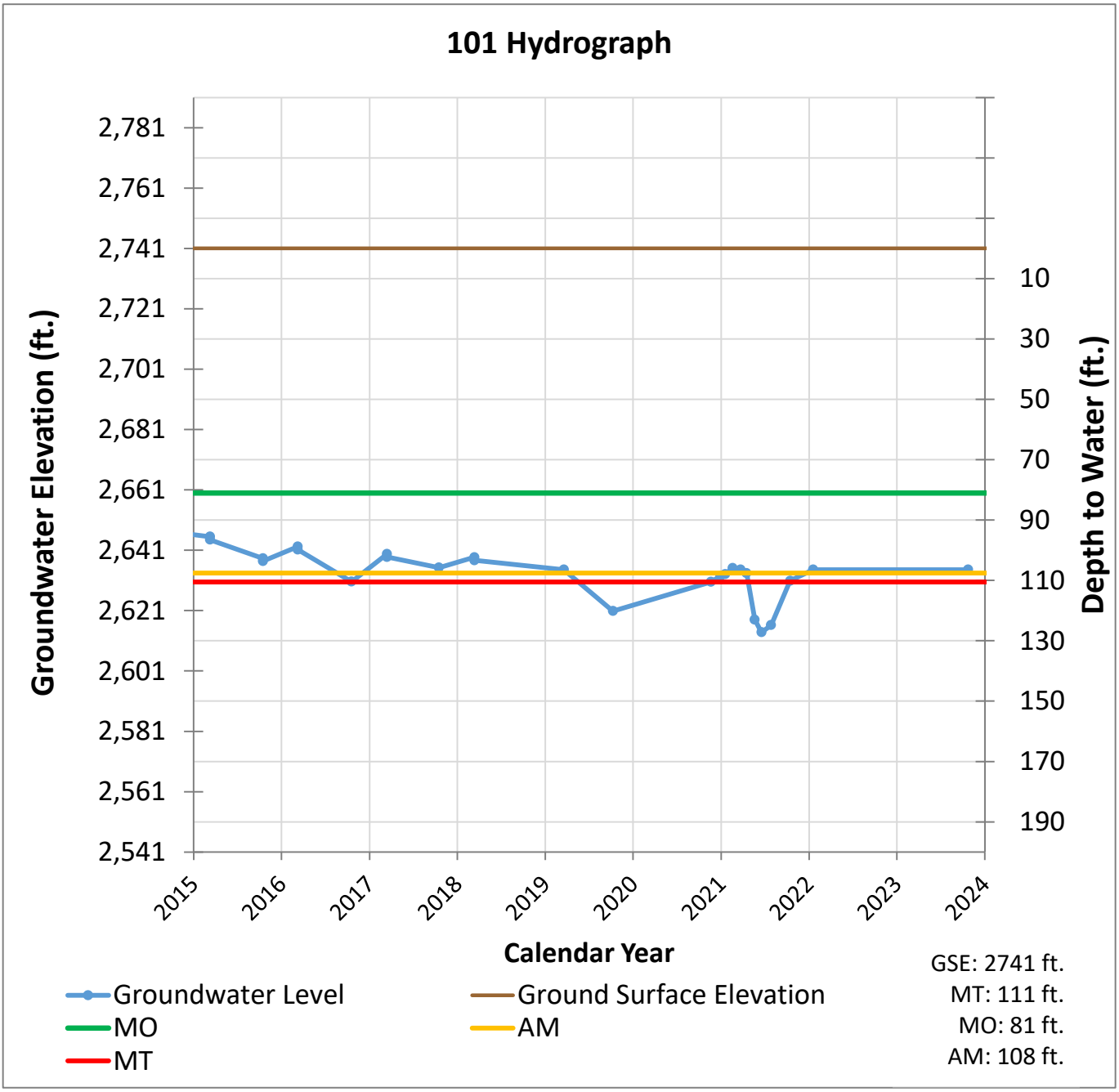

95 Hydrograph
Groundwater Elevation (ft.)
2,449
2,349
2,249
2,149
2,049
1,949
1,849
1,749
Depth to Water (ft.)
50
150
250
350
450
550
650
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2449 ft.
MT: 573 ft.
MO: 538 ft.
AM: 570 ft.

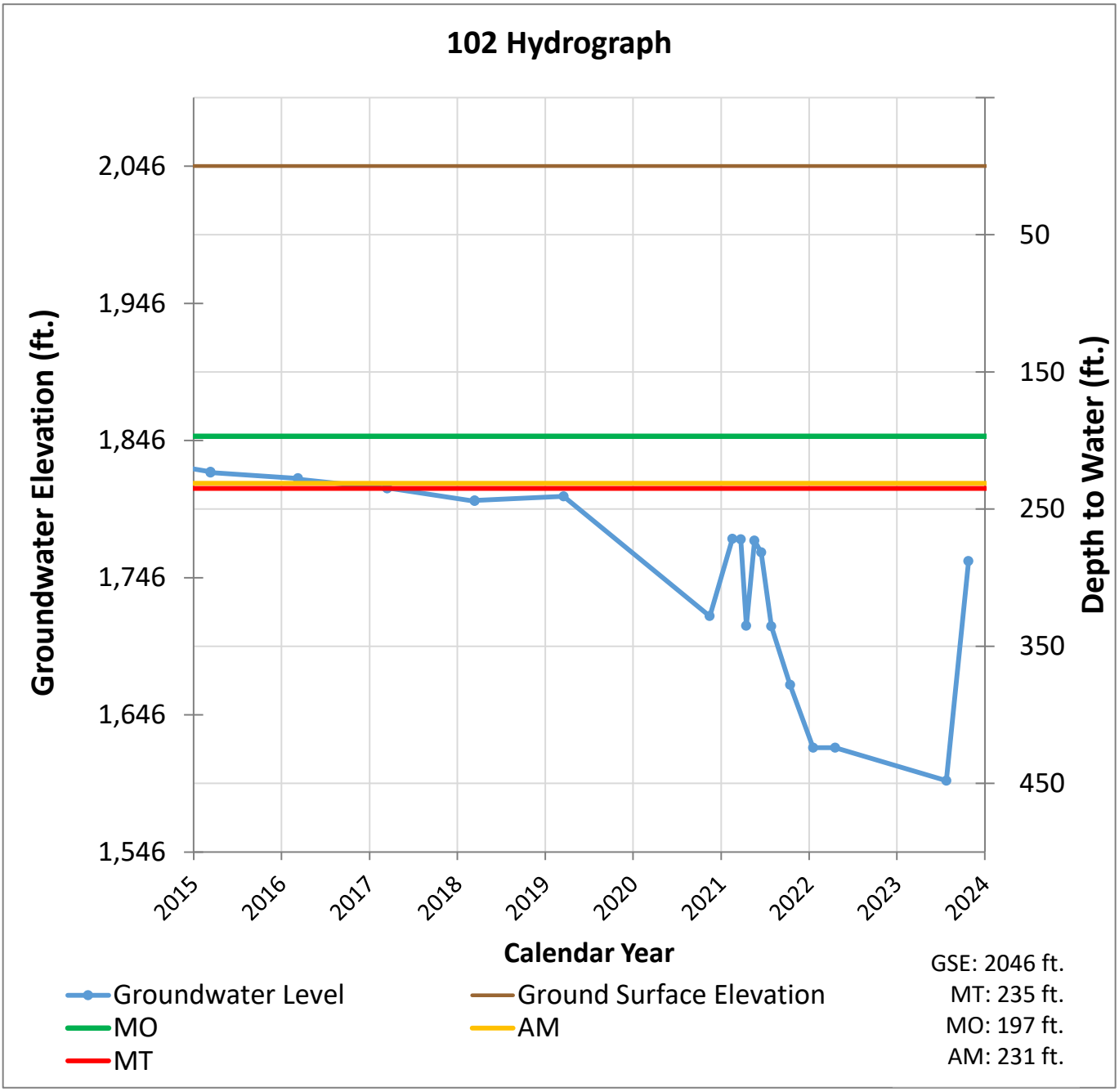

96 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,656
2,606
2,556
2,506
2,456
2,406
2,356
2,306
2,256
2,206
-
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2606 ft.
MT: 333 ft.
MO: 325 ft.
AM: 332 ft.

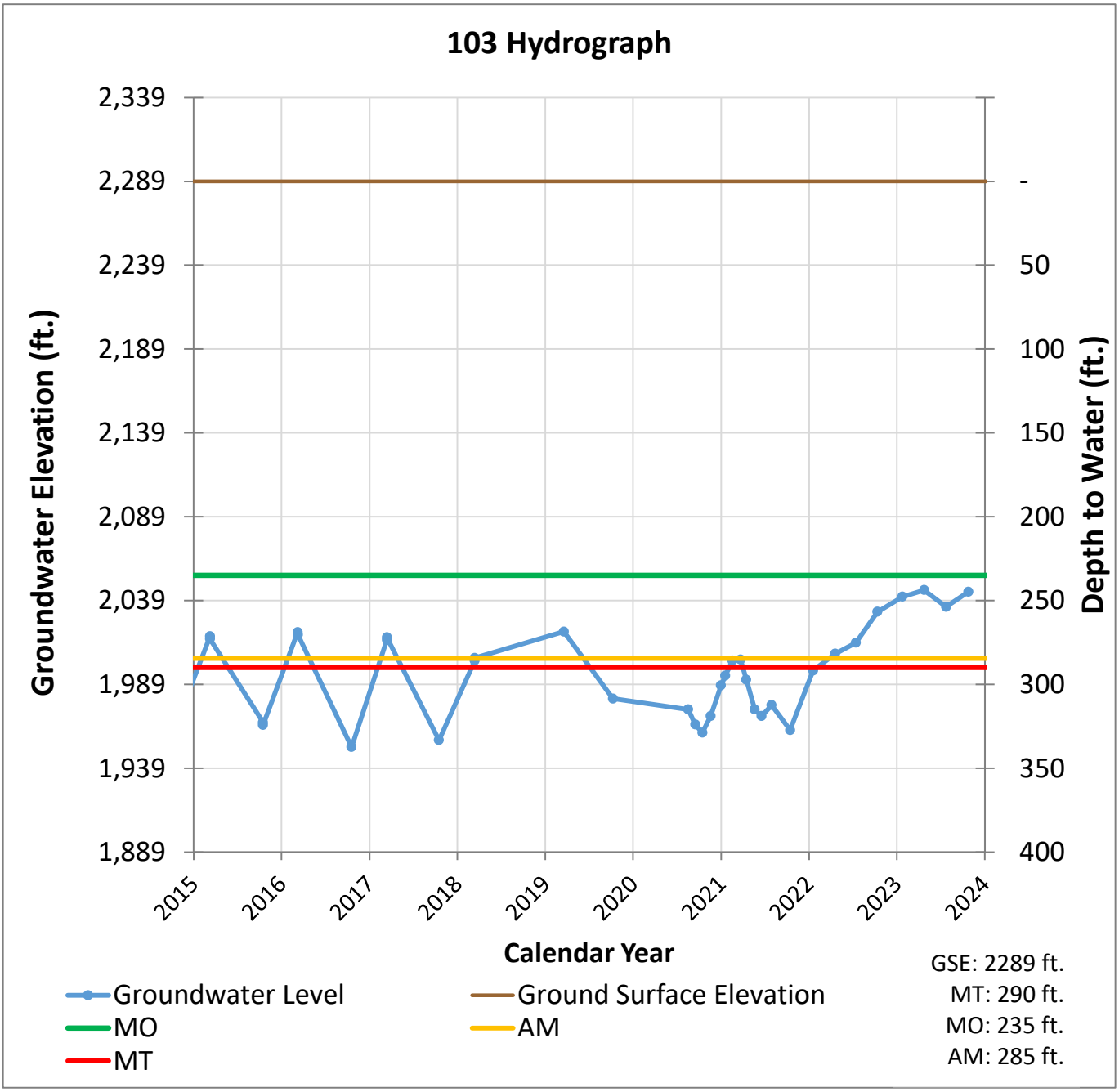

98 Hydrograph
Groundwater Elevation (ft.)
2,688
2,588
2,488
2,388
2,288
2,188
Depth to Water (ft.)
50
150
250
350
450
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2688 ft.
MT: 450 ft.
MO: 439 ft.
AM: 449 ft.

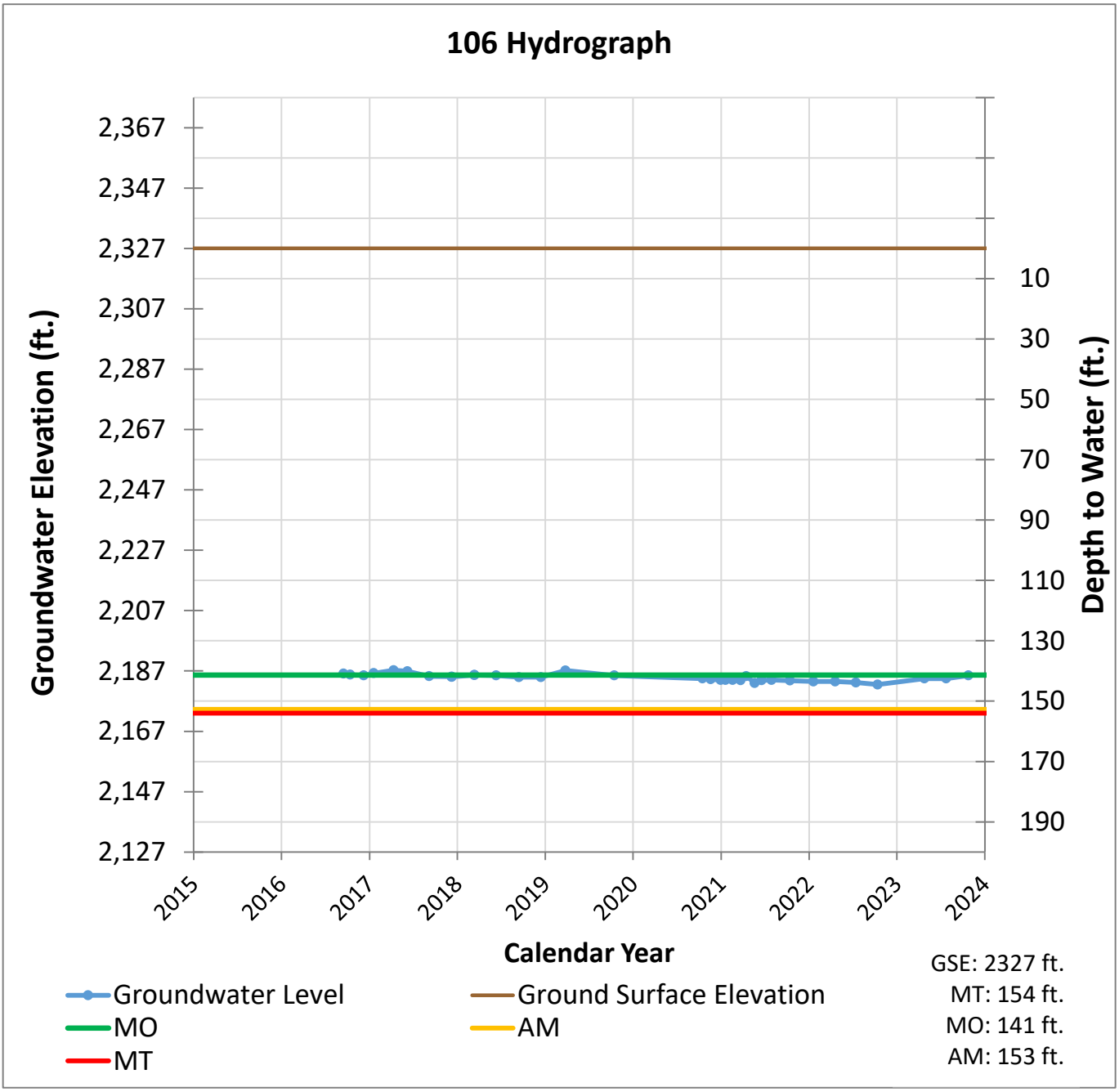

99 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,563
2,513
2,463
2,413
2,363
2,313
2,263
2,213
2,163
2,113
-
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2513 ft.
MT: 311 ft.
MO: 300 ft.
AM: 310 ft.

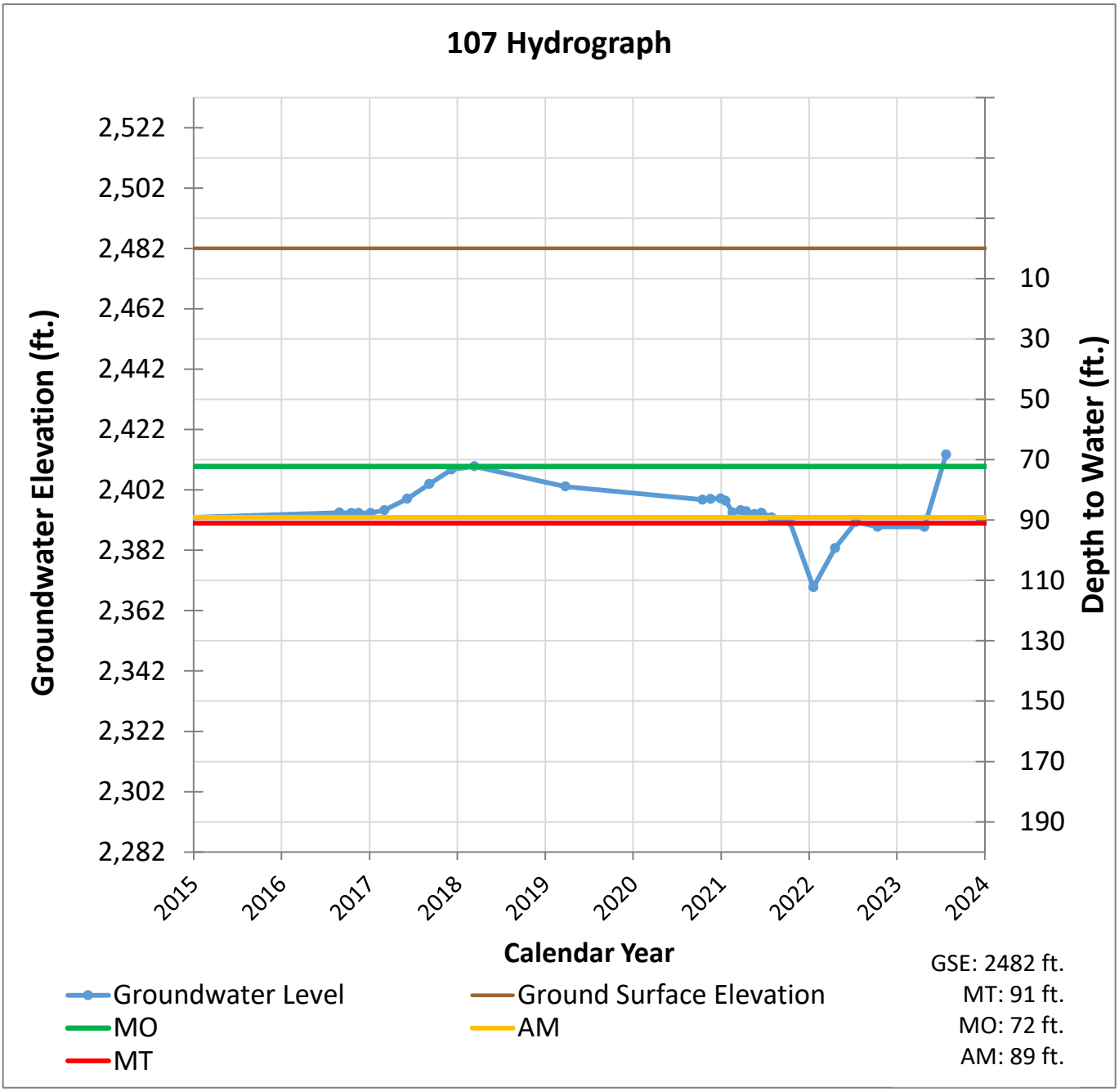

100 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
3,044
3,024
3,004
2,984
2,964
2,944
2,924
2,904
2,884
2,864
2,844
2,824
2,804
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 3004 ft.
MT: 181 ft.
MO: 125 ft.
AM: 175 ft.

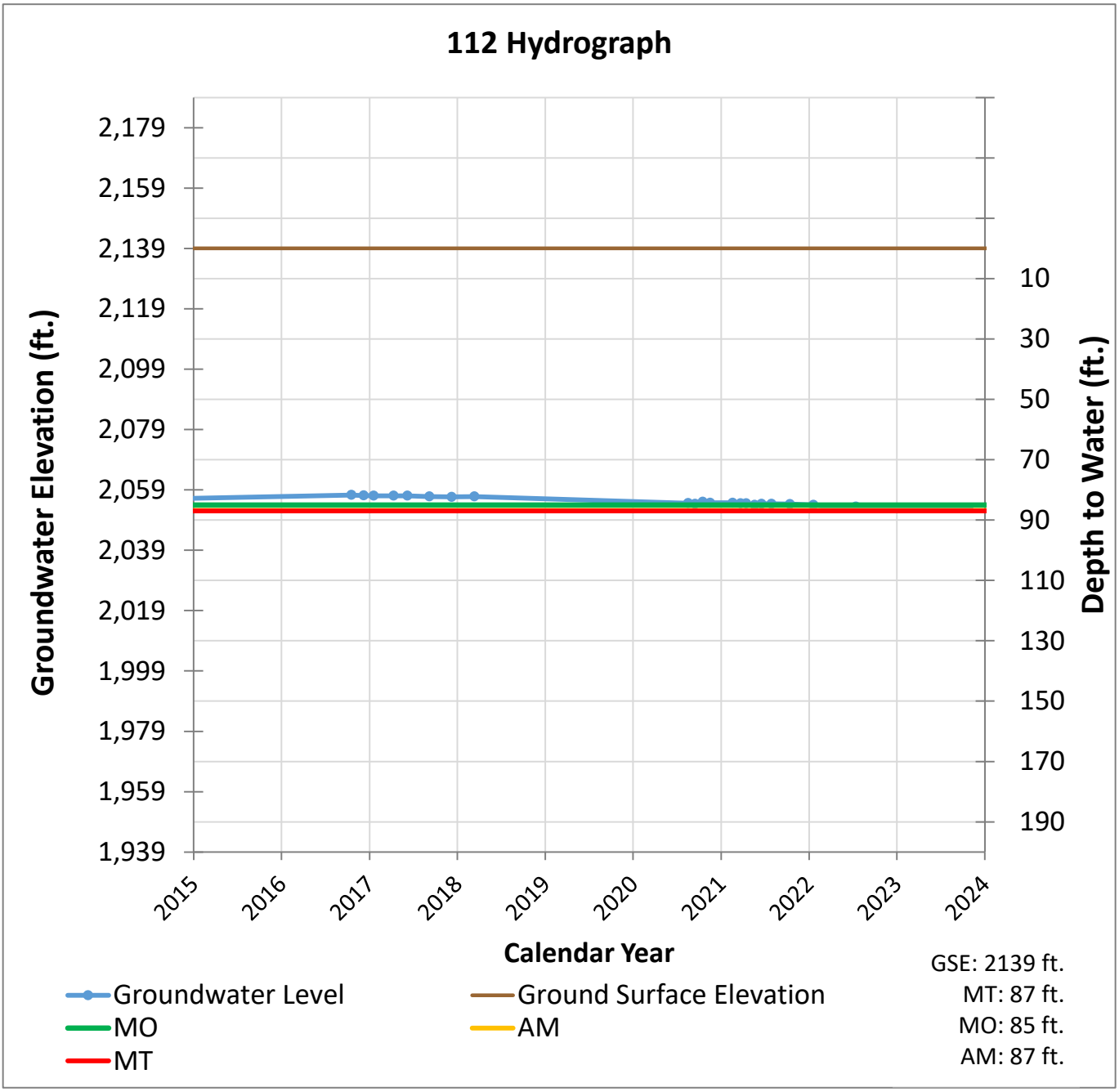

101 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,781
2,761
2,741
2,721
2,701
2,681
2,661
2,641
2,621
2,601
2,581
2,561
2,541
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2741 ft.
MT: 111 ft.
MO: 81 ft.
AM: 108 ft.

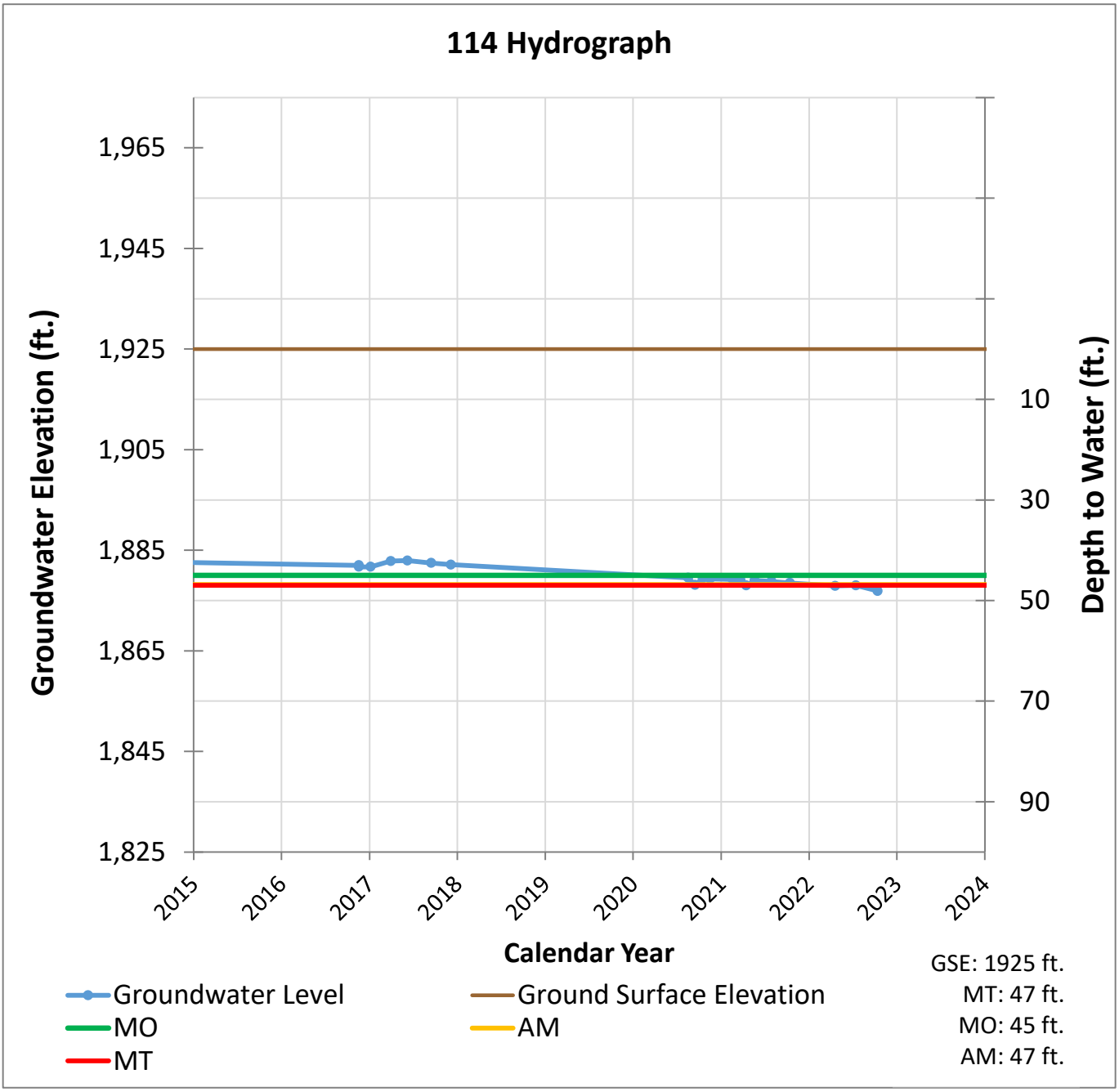

102 Hydrograph
Groundwater Elevation (ft.)
2,046
1,946
1,846
1,746
1,646
1,546
Depth to Water (ft.)
50
150
250
350
450
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2046 ft.
MT: 235 ft.
MO: 197 ft.
AM: 231 ft.

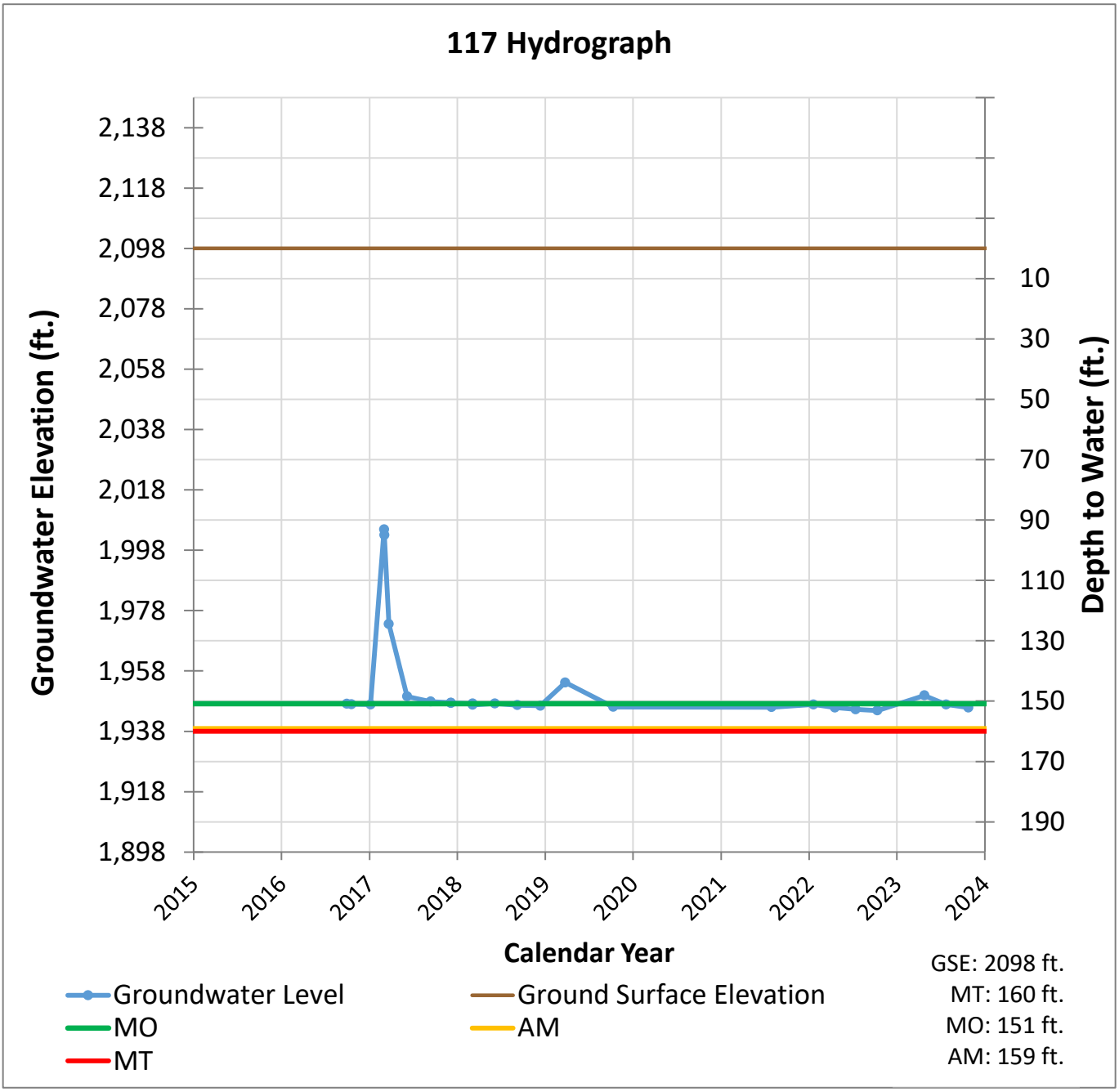

103 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,339
2,289
2,239
2,189
2,139
2,089
2,039
1,989
1,939
1,889
-
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2289 ft.
MT: 290 ft.
MO: 235 ft.
AM: 285 ft.

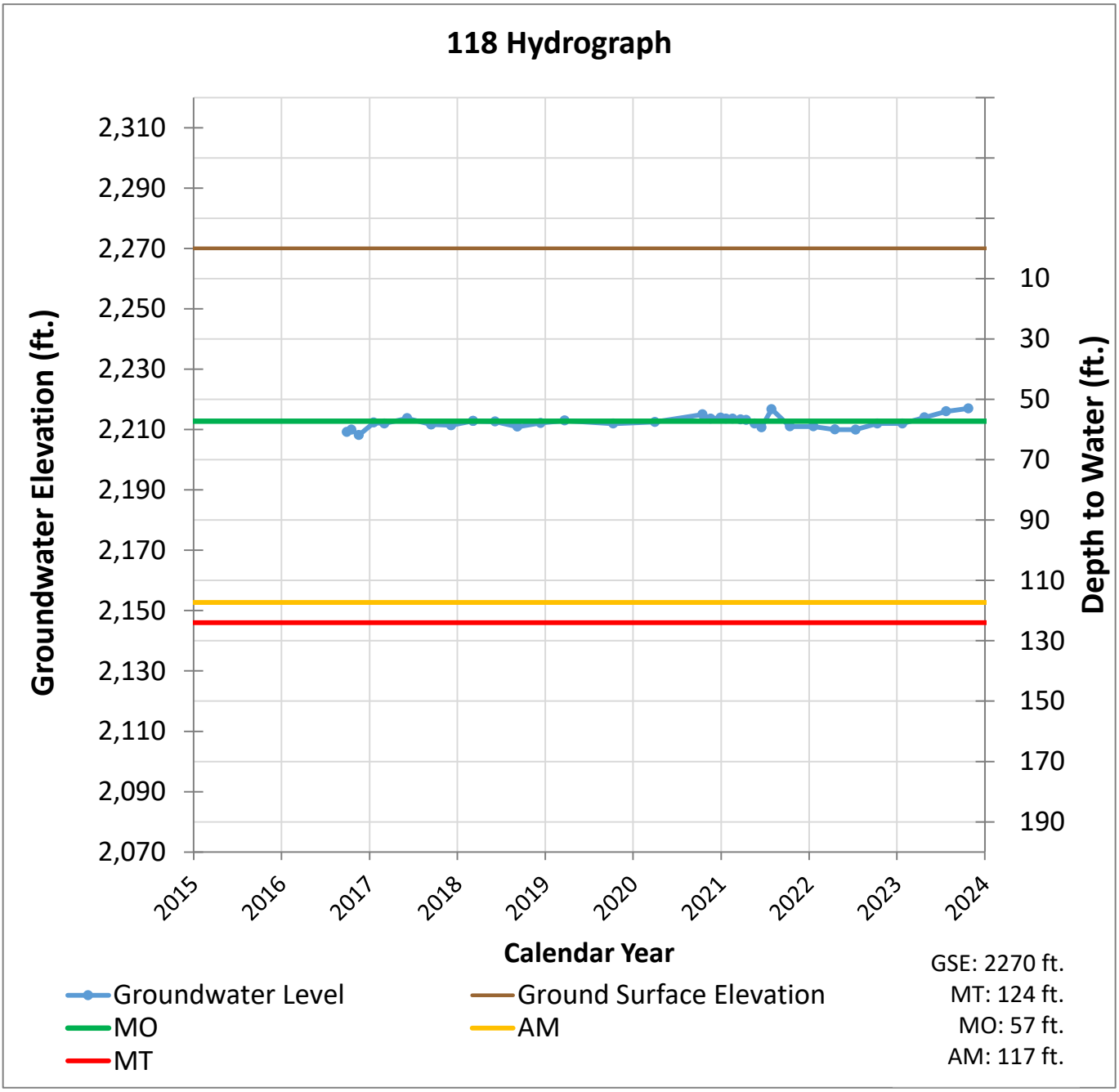

106 Hydrograph
Groundwater Elevation (ft.)
2,367
2,347
2,327
2,307
2,287
2,267
2,247
2,227
2,207
2,187
2,167
2,147
2,127
Depth to Water (ft.)
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2327 ft.
MT: 154 ft.
MO: 141 ft.
AM: 153 ft.

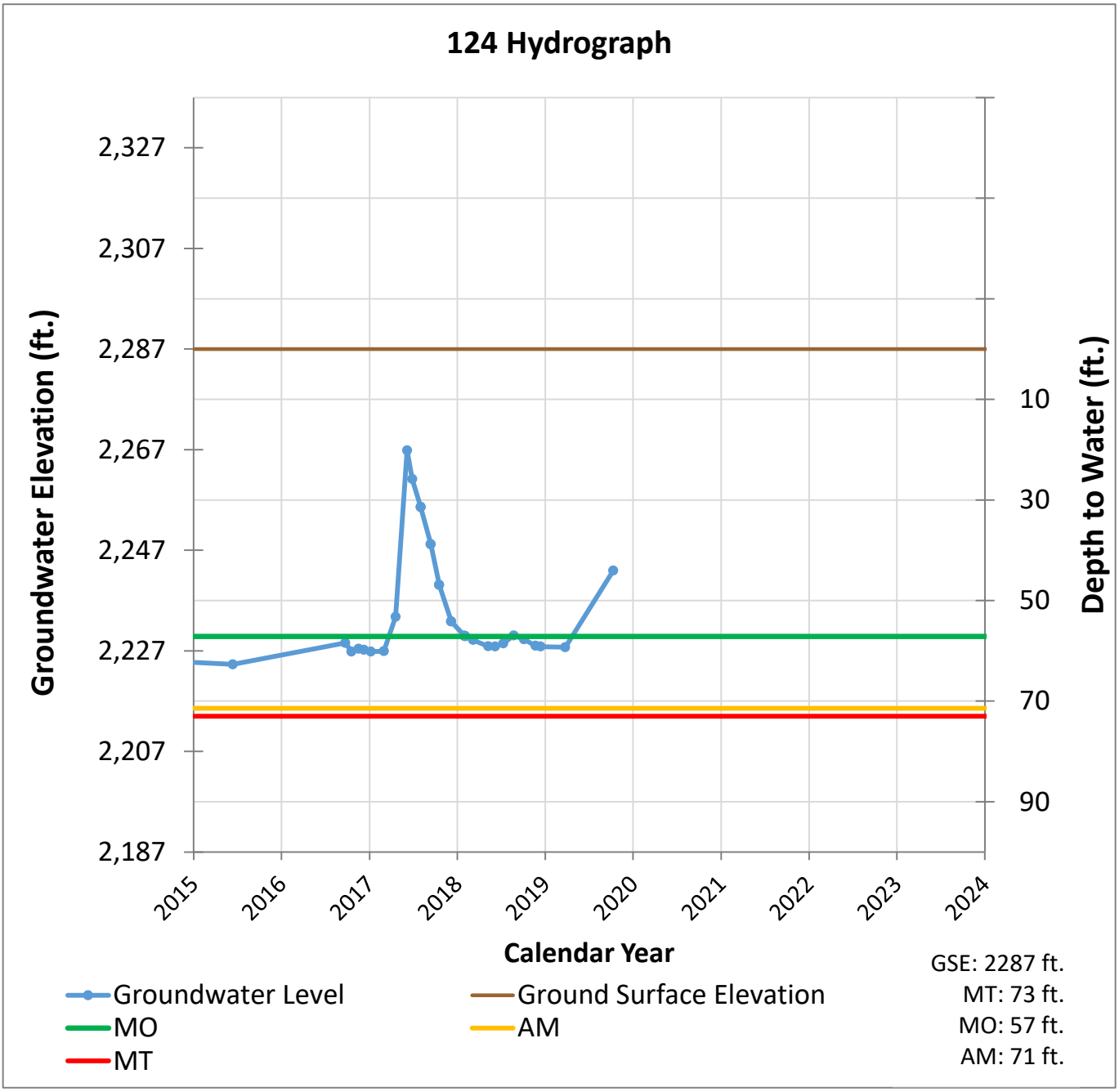

107 Hydrograph
Groundwater Elevation (ft.)
2,522
2,502
2,482
2,462
2,442
2,422
2,402
2,382
2,362
2,342
2,322
2,302
2,282
Depth to Water (ft.)
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2482 ft.
MT: 91 ft.
MO: 72 ft.
AM: 89 ft.

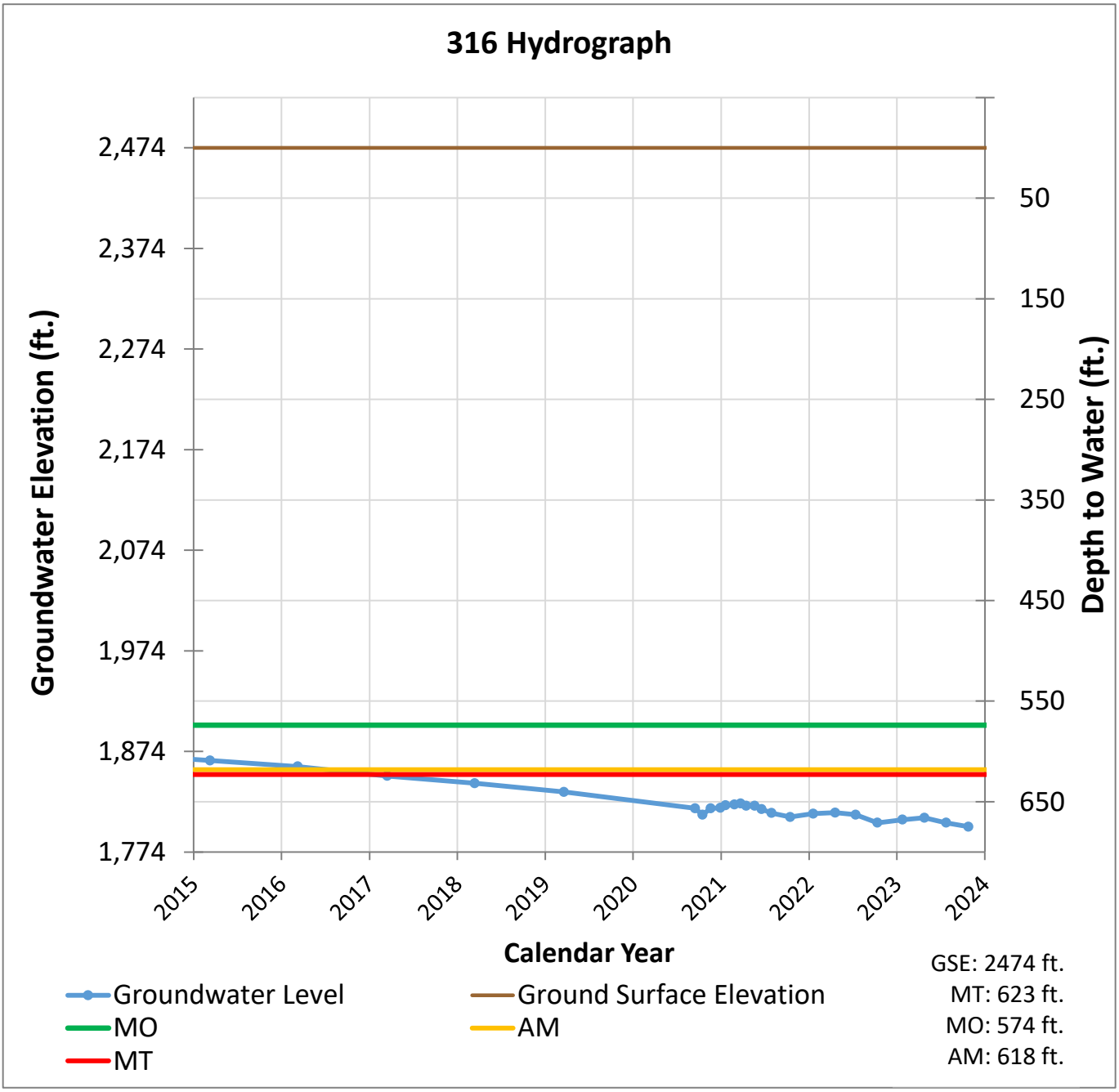

112 Hydrograph
Groundwater Elevation (ft.)
2,179
2,159
2,139
2,119
2,099
2,079
2,059
2,039
2,019
1,999
1,979
1,959
1,939
Depth to Water (ft.)
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2139 ft.
MT: 87 ft.
MO: 85 ft.
AM: 87 ft.

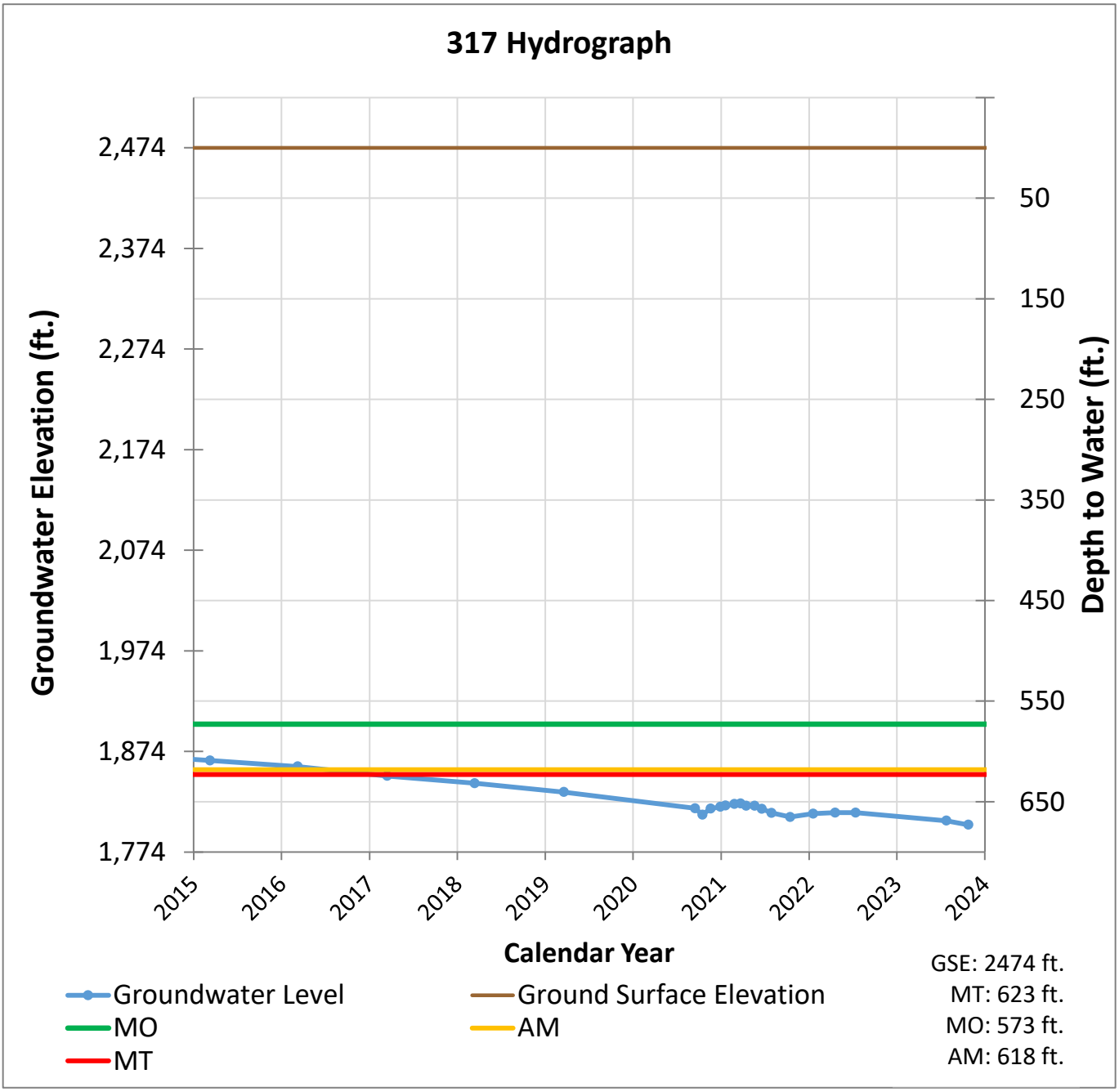

114 Hydrograph
Groundwater Elevation (ft.)
1,965
1,945
1,925
1,905
1,885
1,865
1,845
1,825
Depth to Water (ft.)
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 1925 ft.
MT: 47 ft.
MO: 45 ft.
AM: 47 ft.

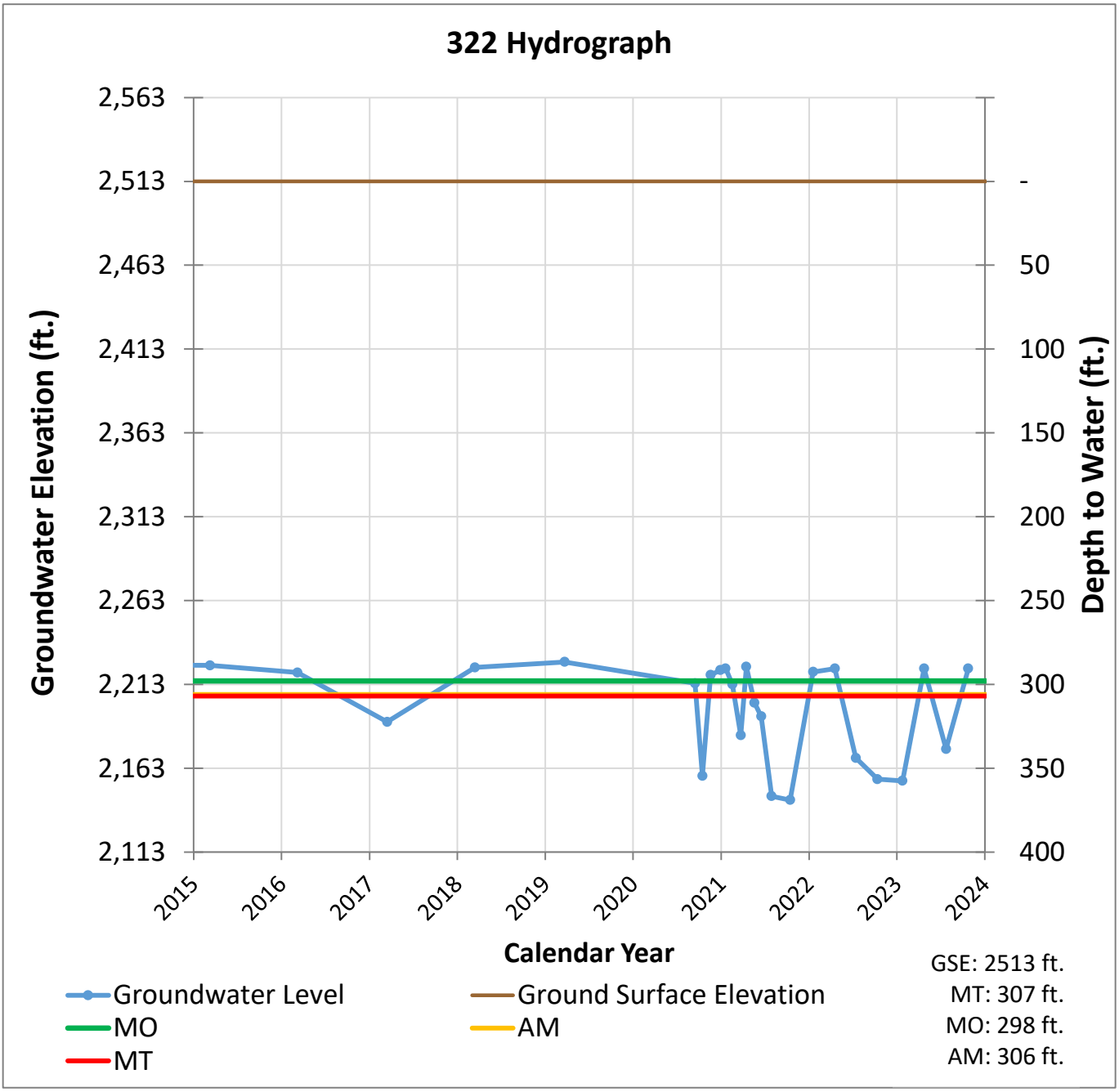

117 Hydrograph
Groundwater Elevation (ft.)
2,138
2,118
2,098
2,078
2,058
2,038
2,018
1,998
1,978
1,958
1,938
1,918
1,898
Depth to Water (ft.)
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2098 ft.
MT: 160 ft.
MO: 151 ft.
AM: 159 ft.

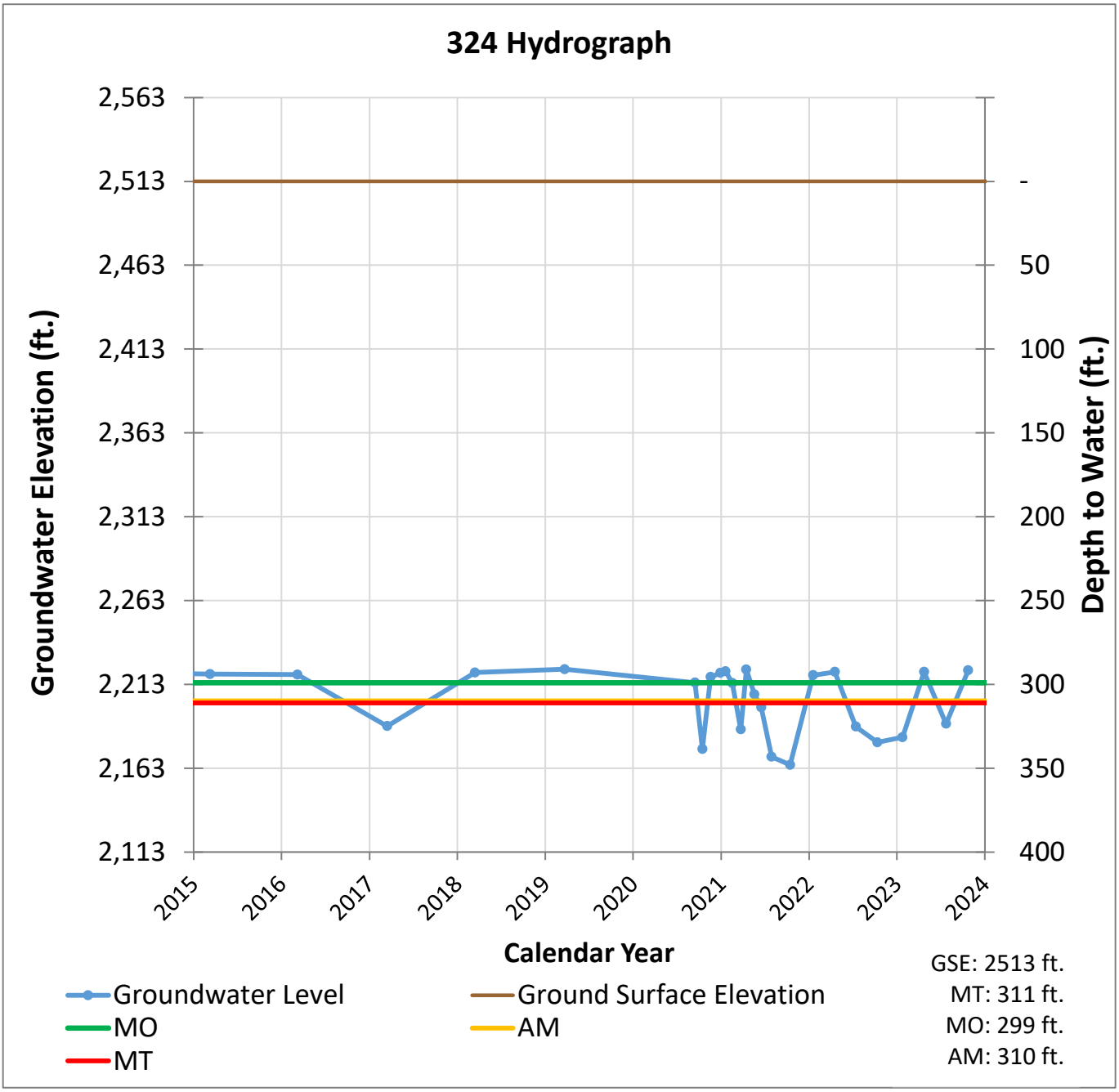

118 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,310
2,290
2,270
2,250
2,230
2,210
2,190
2,170
2,150
2,130
2,110
2,090
2,070
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2270 ft.
MT: 124 ft.
MO: 57 ft.
AM: 117 ft.

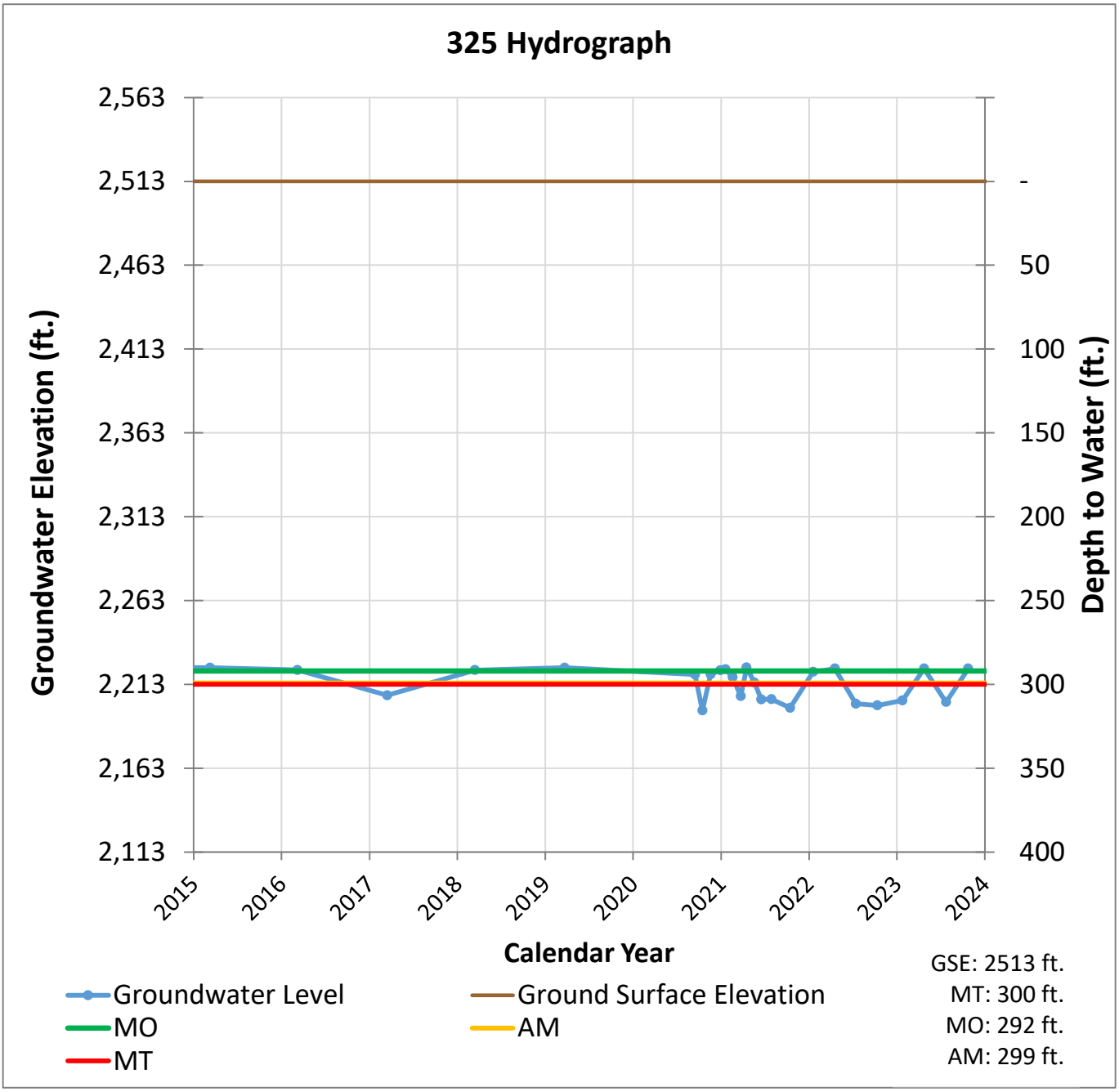

124 Hydrograph
Groundwater Elevation (ft.)
2,327
2,307
2,287
2,267
2,247
2,227
2,207
2,187
Depth to Water (ft.)
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2287 ft.
MT: 73 ft.
MO: 57 ft.
AM: 71 ft.

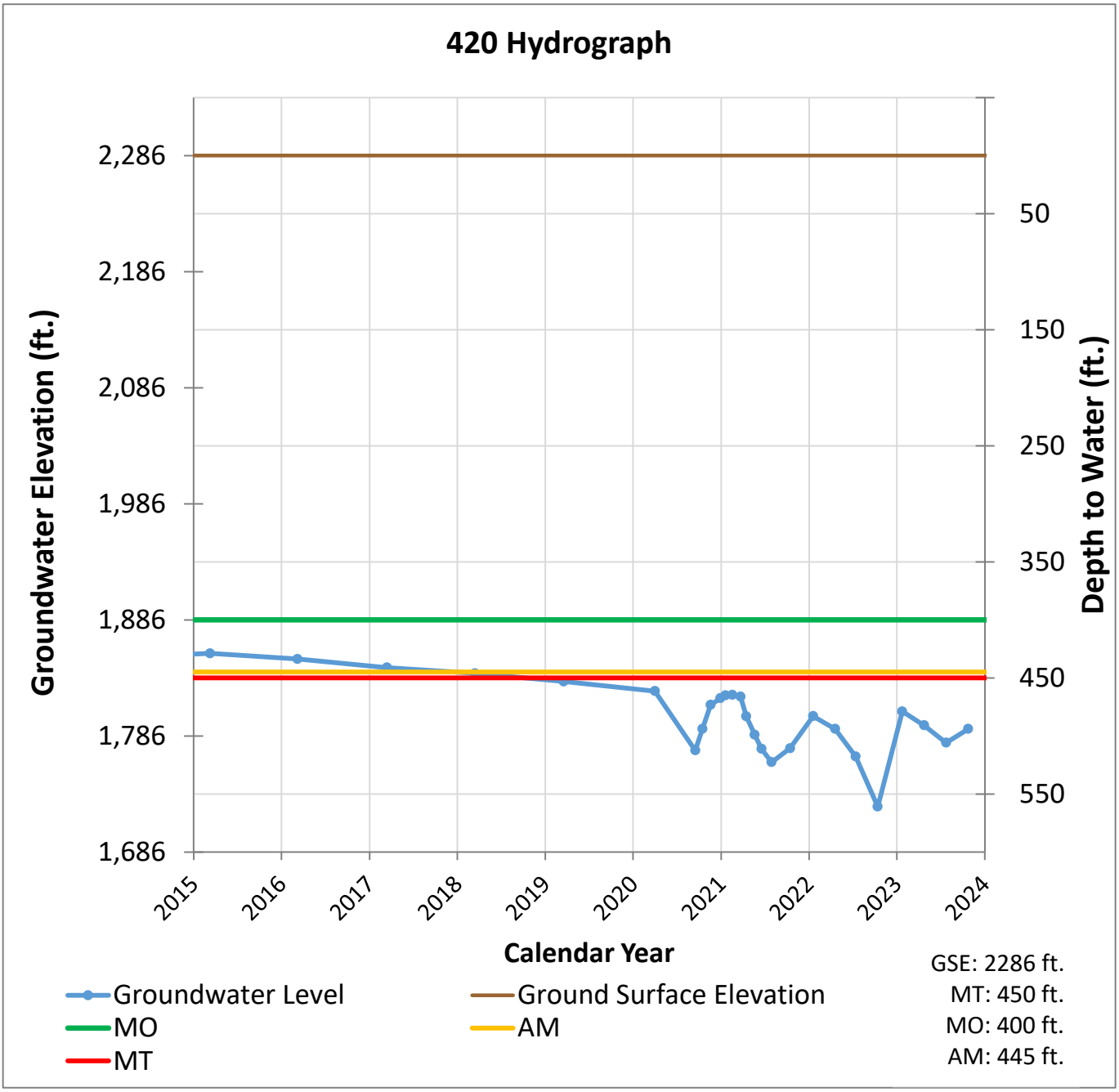

316 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,474
2,374
2,274
2,174
2,074
1,974
1,874
1,774
50
150
250
350
450
550
650
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2474 ft.
MT: 623 ft.
MO: 574 ft.
AM: 618 ft.

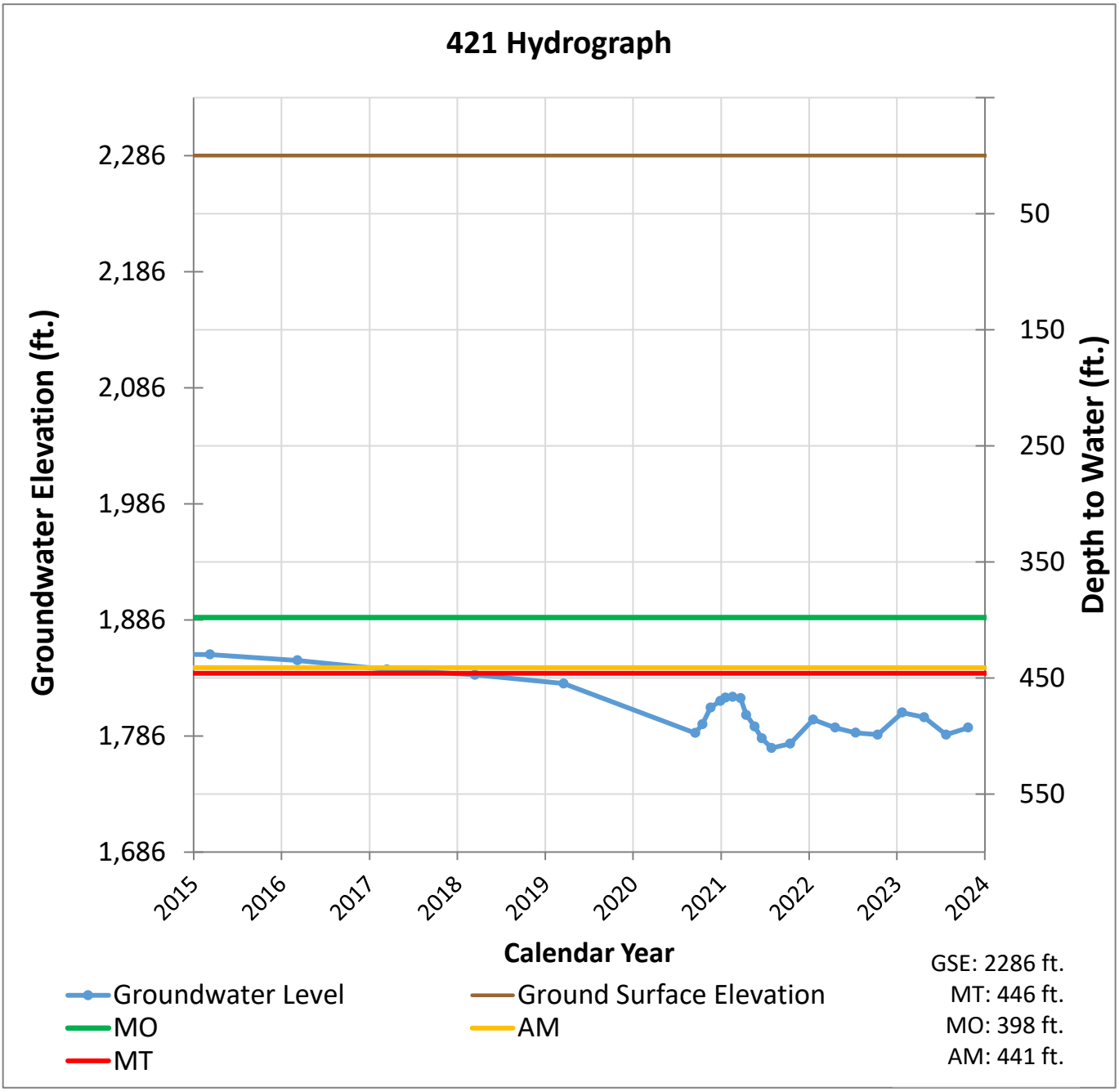

317 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,474
2,374
2,274
2,174
2,074
1,974
1,874
1,774
50
150
250
350
450
550
650
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2474 ft.
MT: 623 ft.
MO: 573 ft.
AM: 618 ft.

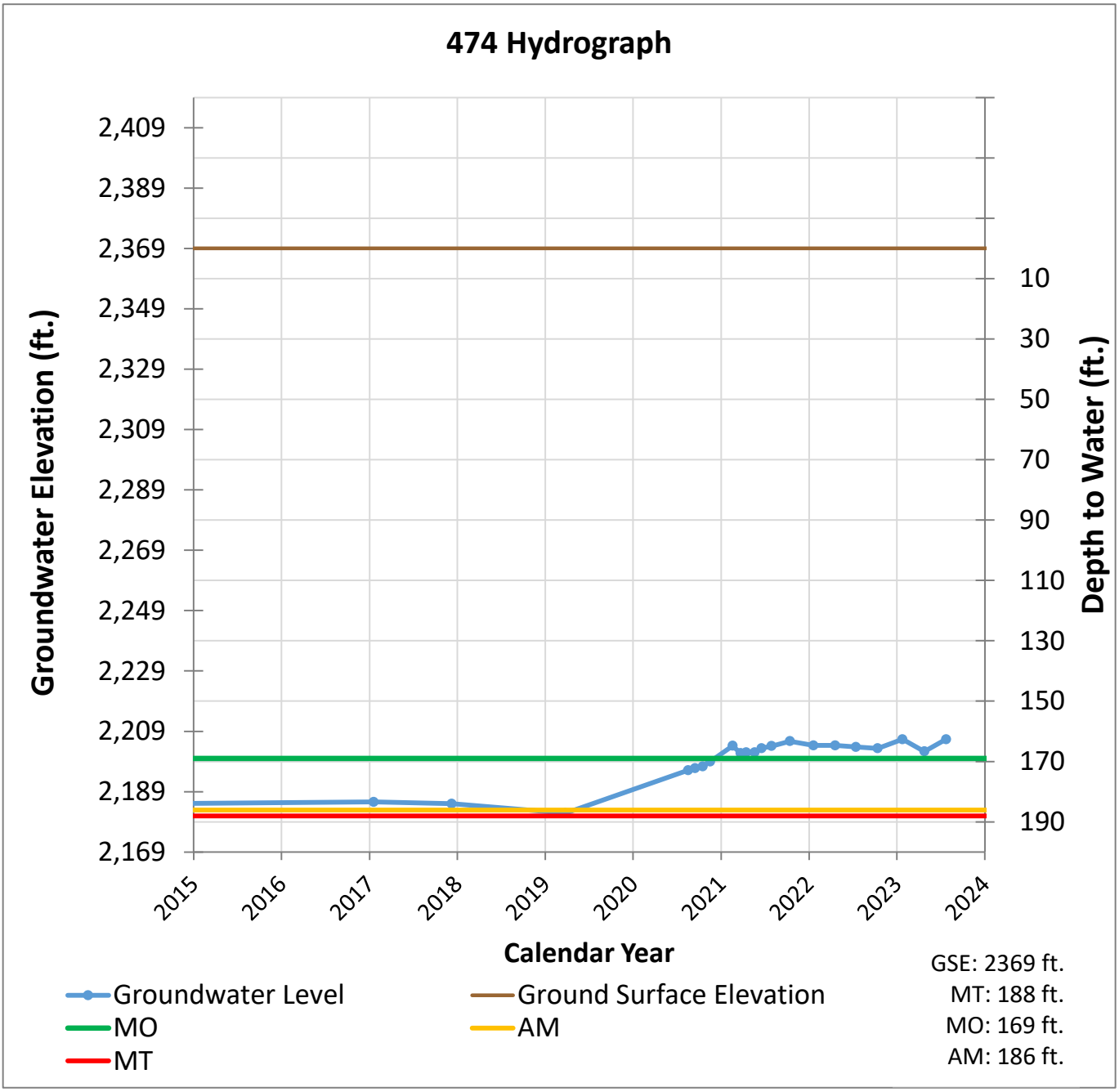

322 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,563
2,513
2,463
2,413
2,363
2,313
2,263
2,213
2,163
2,113
-
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2513 ft.
MT: 307 ft.
MO: 298 ft.
AM: 306 ft.

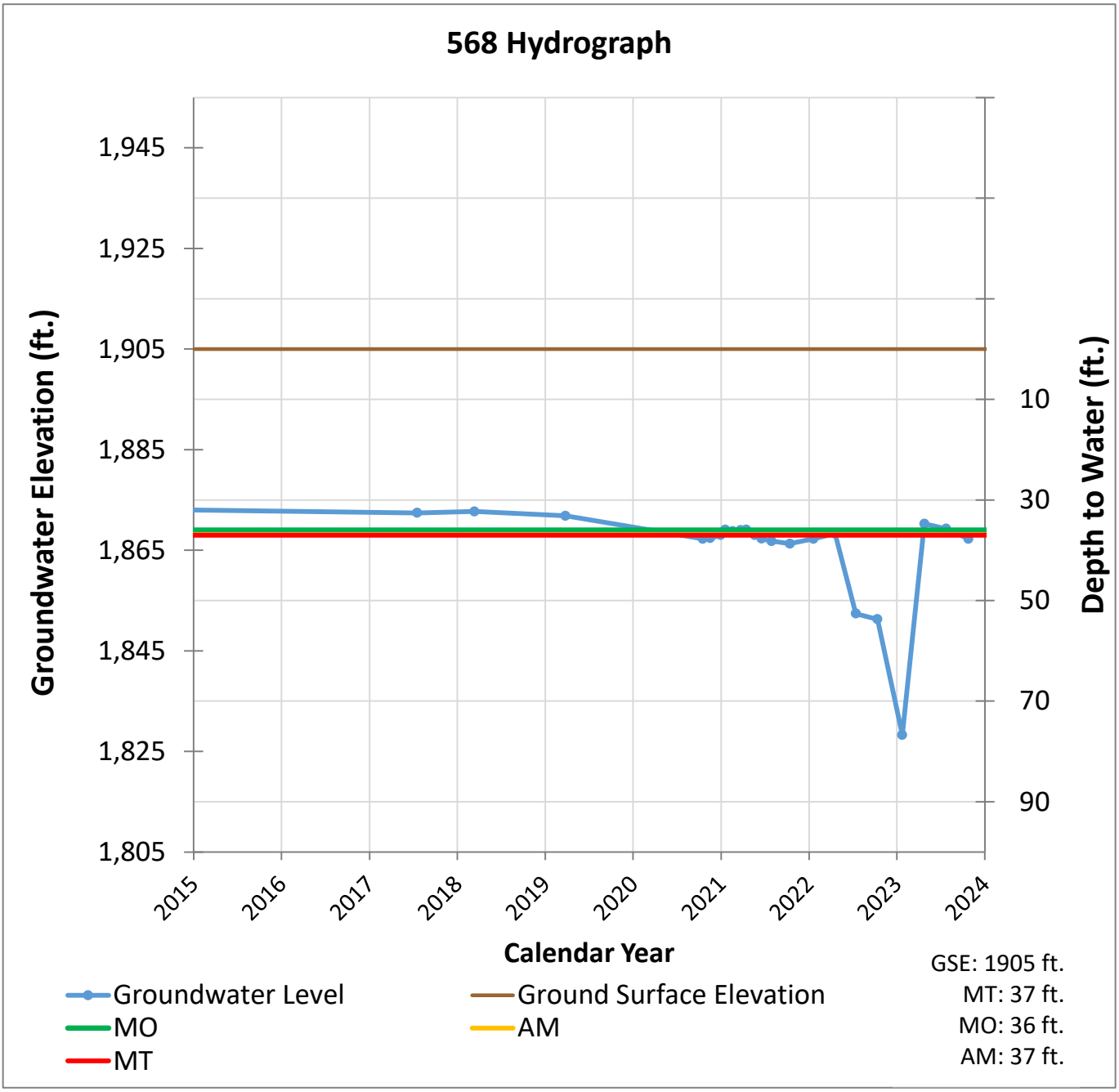

324 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,563
2,513
2,463
2,413
2,363
2,313
2,263
2,213
2,163
2,113
-
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2513 ft.
MT: 311 ft.
MO: 299 ft.
AM: 310 ft.

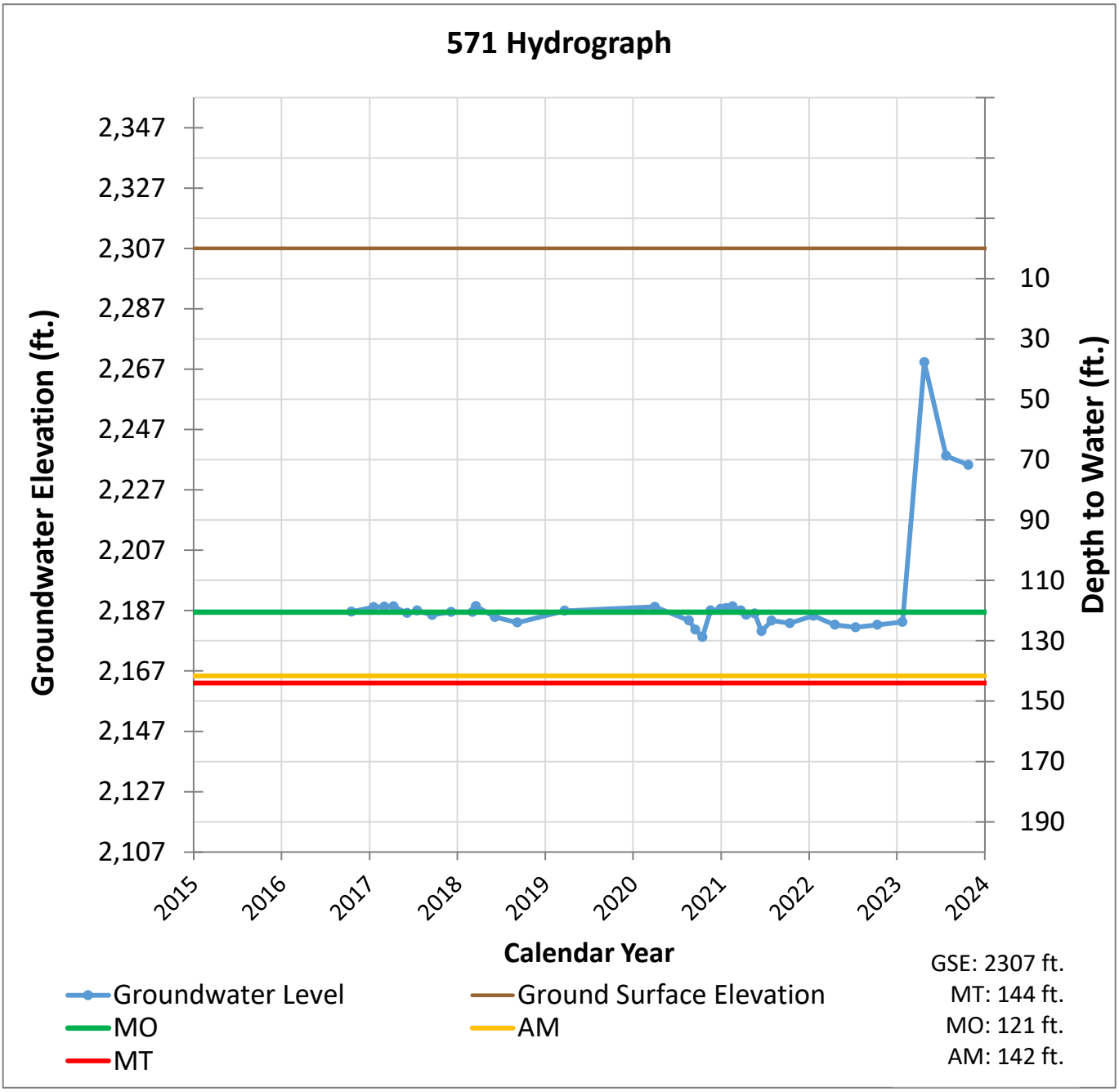

325 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,563
2,513
2,463
2,413
2,363
2,313
2,263
2,213
2,163
2,113
-
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2513 ft.
MT: 300 ft.
MO: 292 ft.
AM: 299 ft.

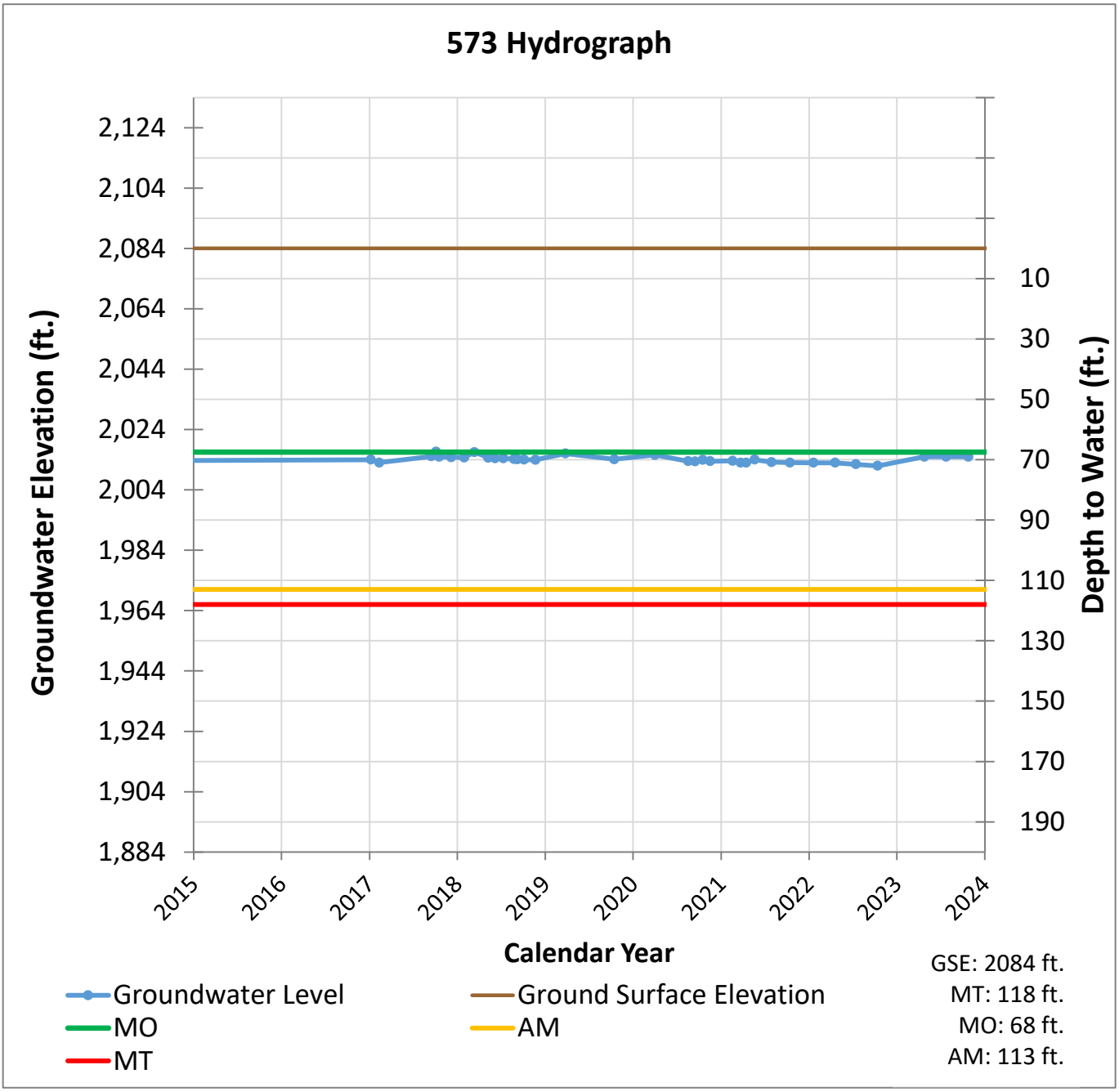

420 Hydrograph
Groundwater Elevation (ft.)
2,286
2,186
2,086
1,986
1,886
1,786
1,686
Depth to Water (ft.)
50
150
250
350
450
550
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2286 ft.
MT: 450 ft.
MO: 400 ft.
AM: 445 ft.

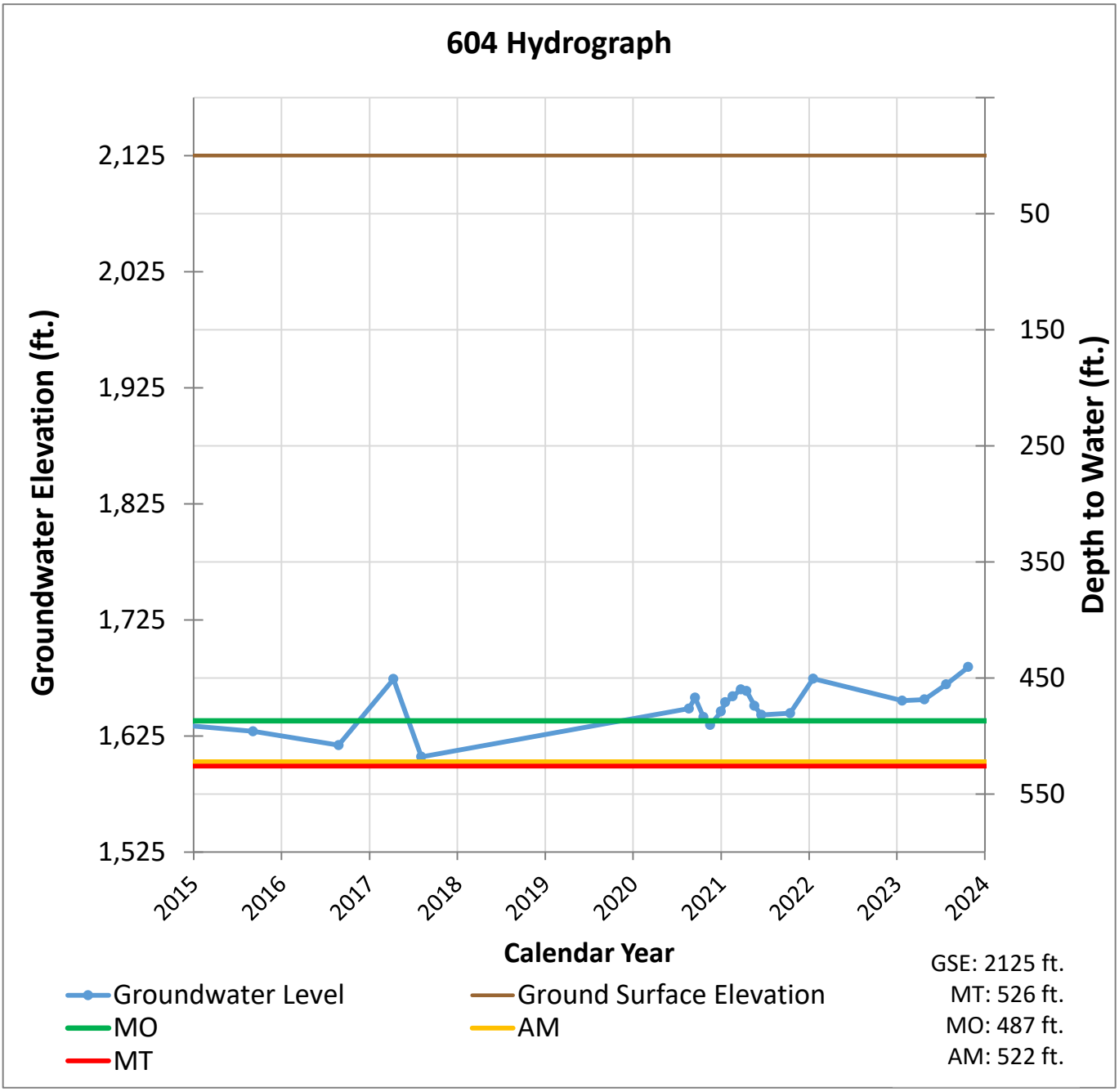

421 Hydrograph
Groundwater Elevation (ft.)
2,286
2,186
2,086
1,986
1,886
1,786
1,686
Depth to Water (ft.)
50
150
250
350
450
550
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2286 ft.
MT: 446 ft.
MO: 398 ft.
AM: 441 ft.

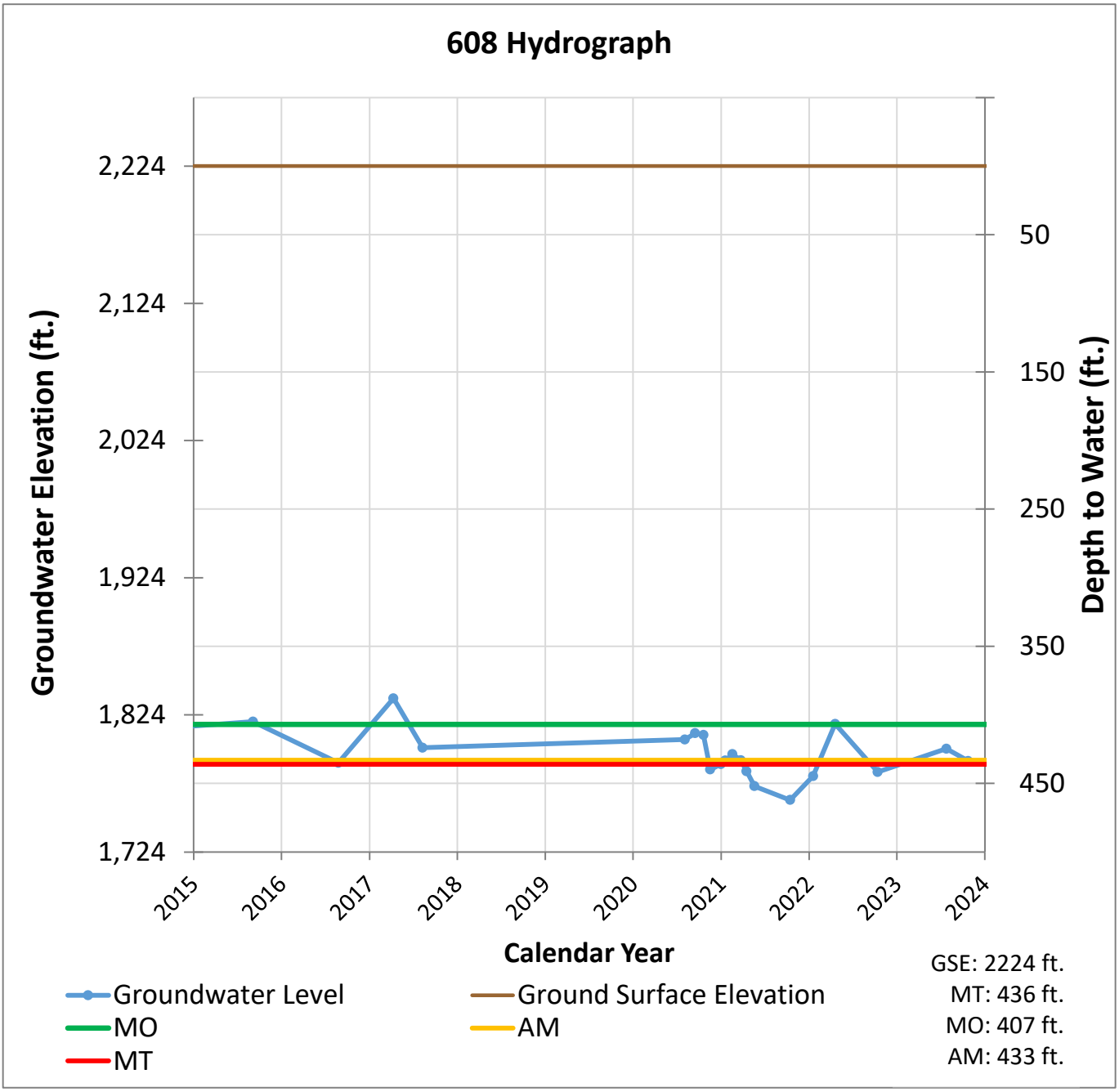

474 Hydrograph
Groundwater Elevation (ft.)
2,409
2,389
2,369
2,349
2,329
2,309
2,289
2,269
2,249
2,229
2,209
2,189
2,169
Depth to Water (ft.)
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2369 ft.
MT: 188 ft.
MO: 169 ft.
AM: 186 ft.

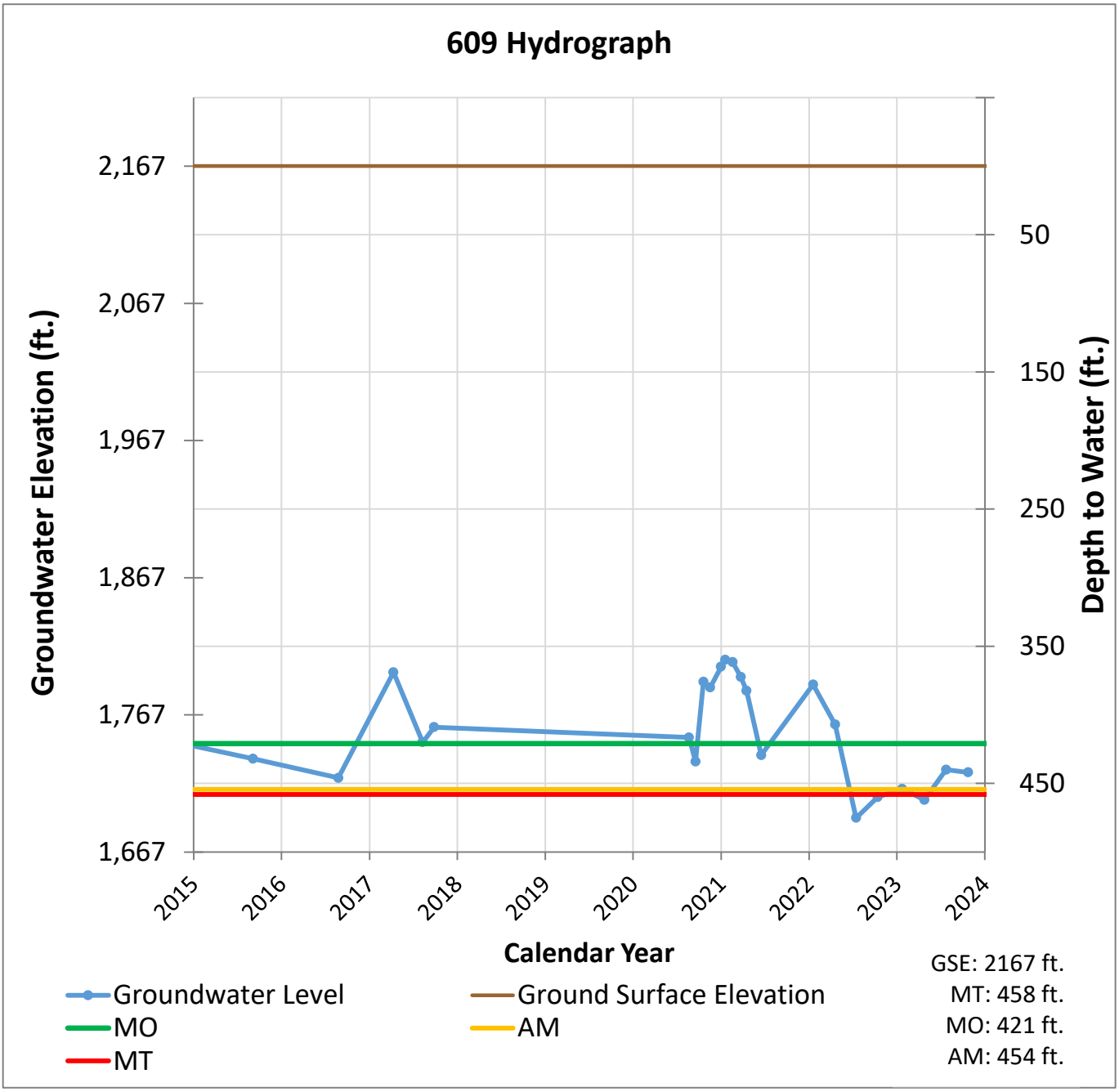

568 Hydrograph
Groundwater Elevation (ft.)
1,945
1,925
1,905
1,885
1,865
1,845
1,825
1,805
Depth to Water (ft.)
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 1905 ft.
MT: 37 ft.
MO: 36 ft.
AM: 37 ft.

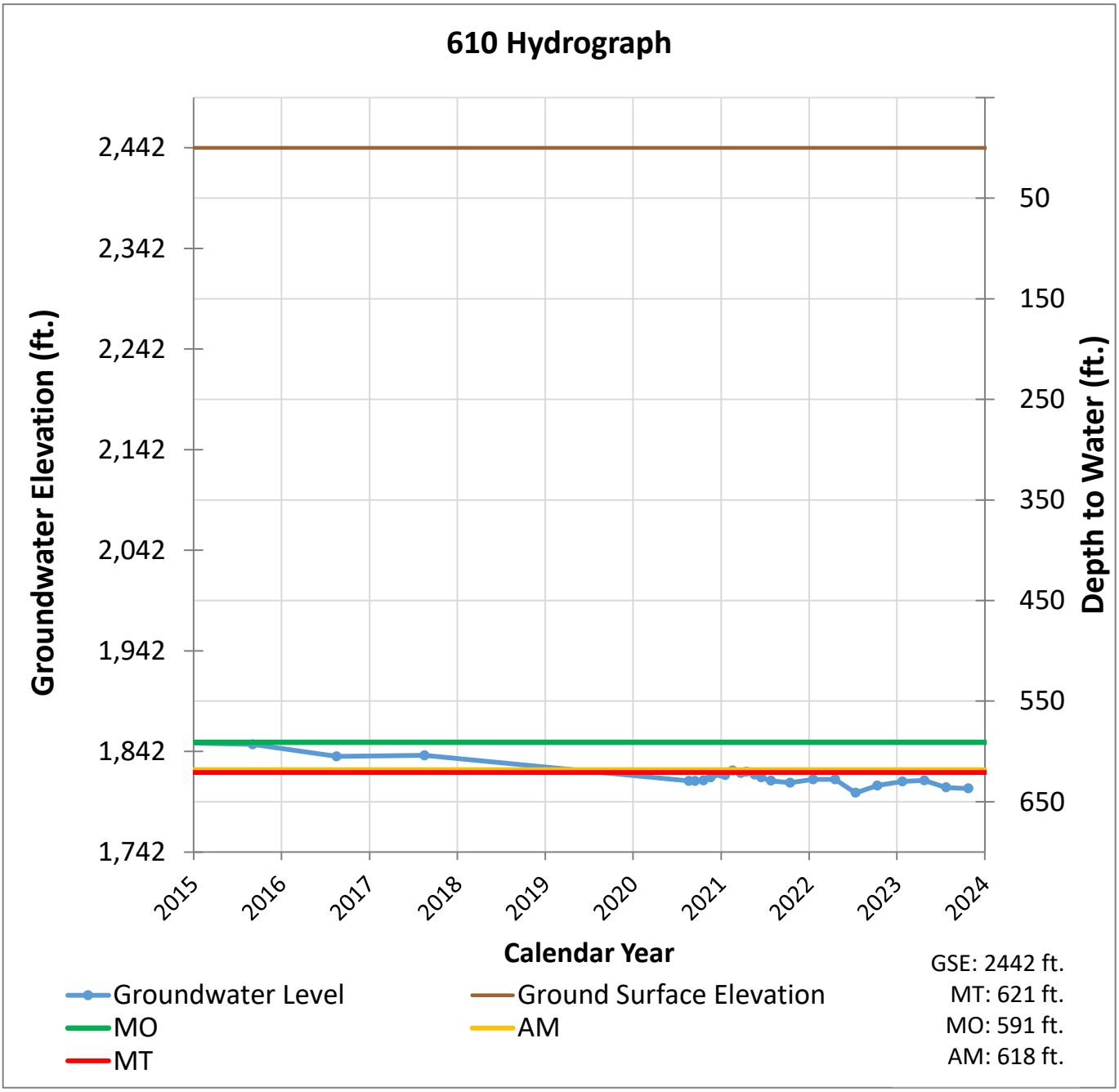

571 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
2,347
2,327
2,307
2,287
2,267
2,247
2,227
2,207
2,187
2,167
2,147
2,127
2,107
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2307 ft.
MT: 144 ft.
MO: 121 ft.
AM: 142 ft.

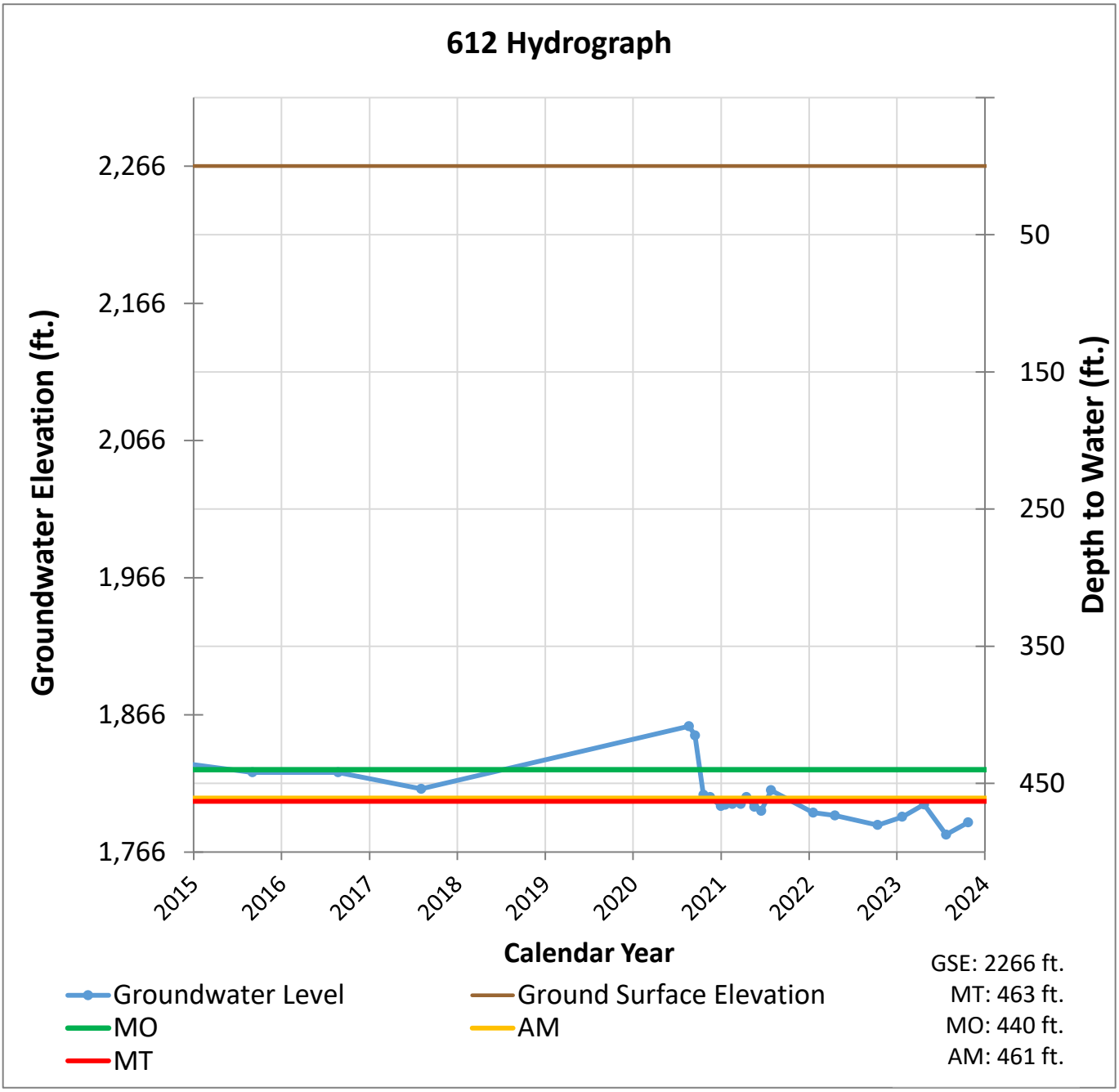

573 Hydrograph
Groundwater Elevation (ft.)
2,124
2,104
2,084
2,064
2,044
2,024
2,004
1,984
1,964
1,944
1,924
1,904
1,884
Depth to Water (ft.)
10
30
50
70
90
110
130
150
170
190
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2084 ft.
MT: 118 ft.
MO: 68 ft.
AM: 113 ft.

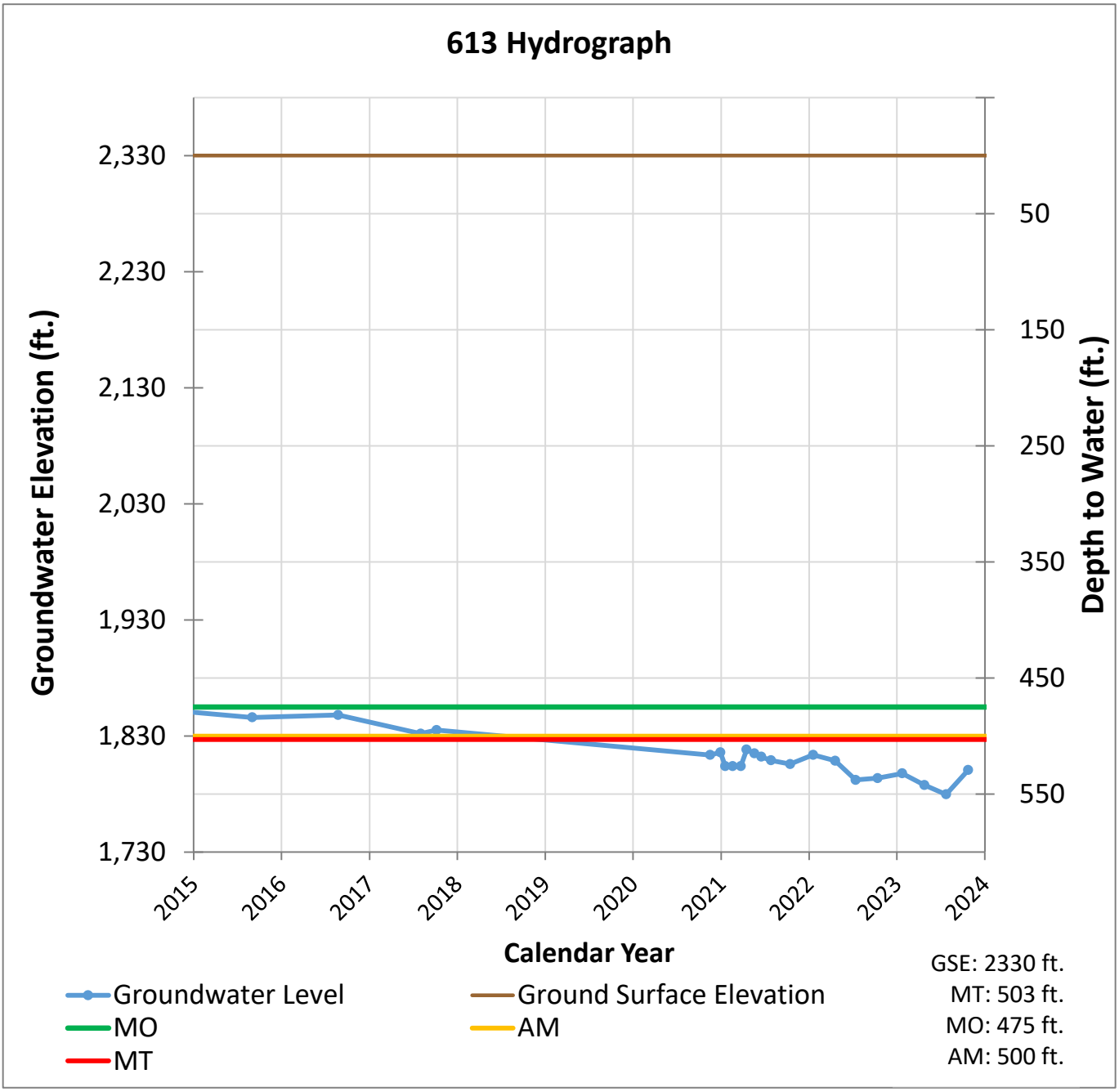

604 Hydrograph
Groundwater Elevation (ft.)
2,125
2,025
1,925
1,825
1,725
1,625
1,525
Depth to Water (ft.)
50
150
250
350
450
550
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2125 ft.
MT: 526 ft.
MO: 487 ft.
AM: 522 ft.

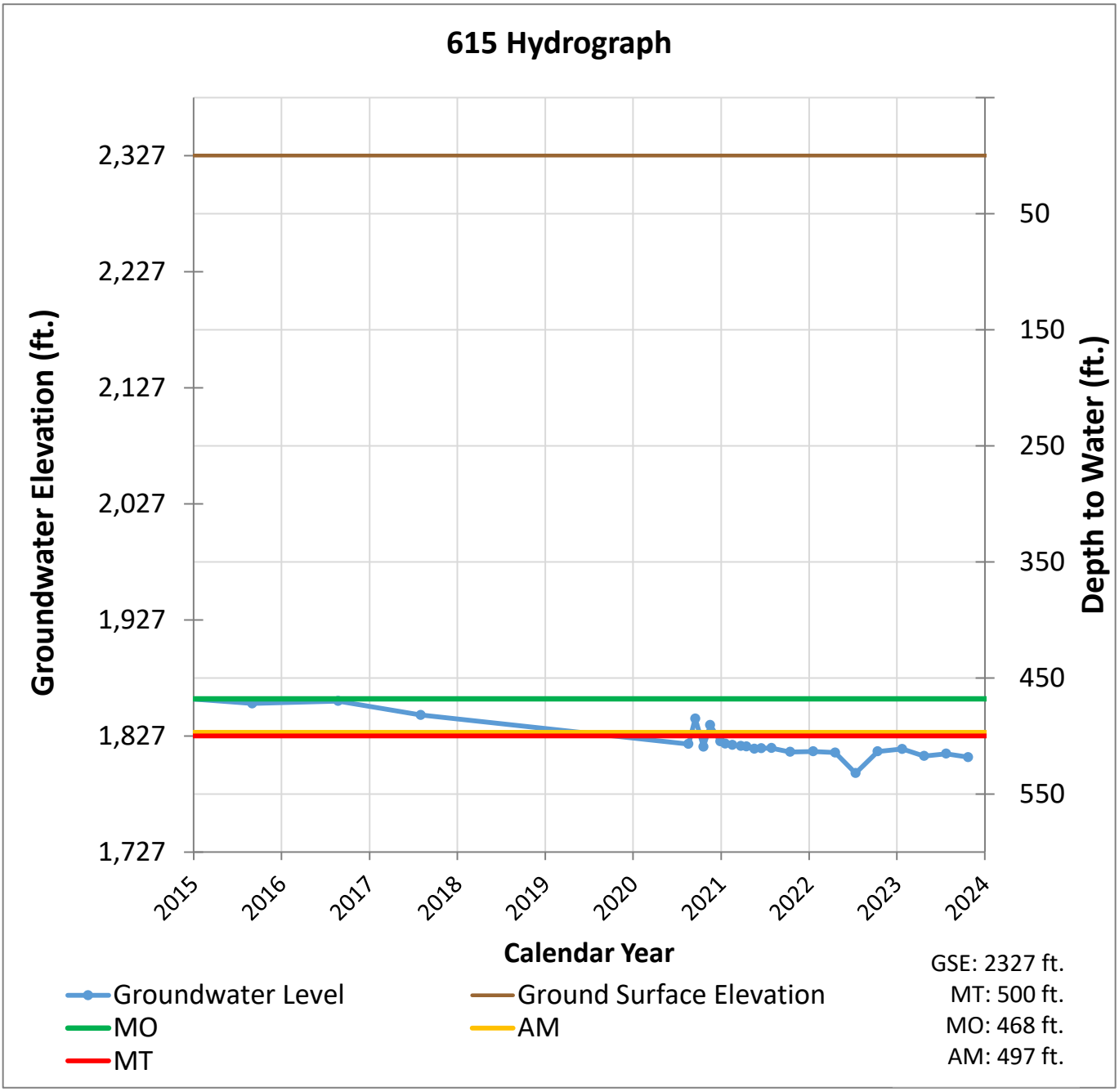

608 Hydrograph
Groundwater Elevation (ft.)
2,224
2,124
2,024
1,924
1,824
1,724
Depth to Water (ft.)
50
150
250
350
450
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2224 ft.
MT: 436 ft.
MO: 407 ft.
AM: 433 ft.

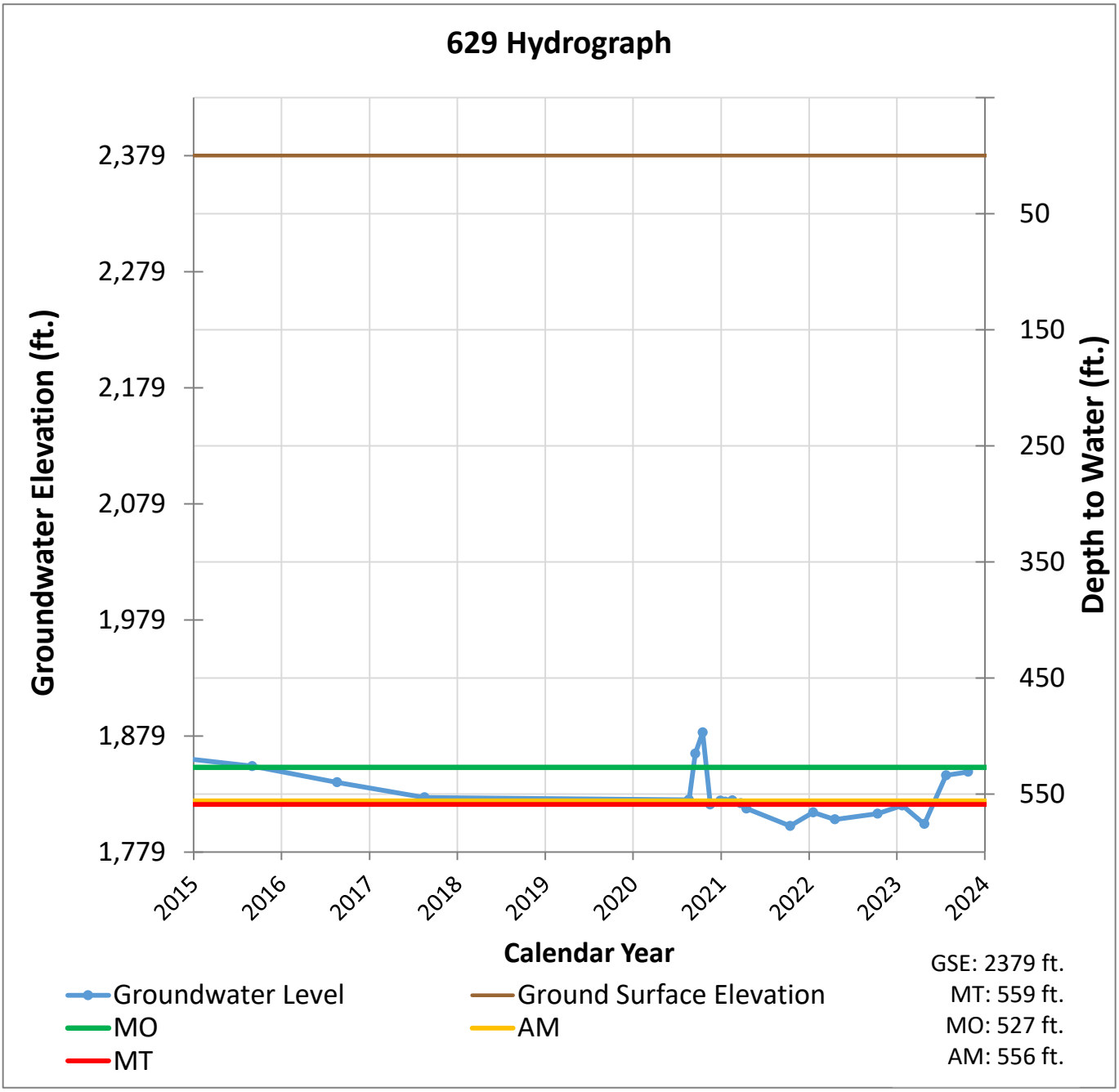

609 Hydrograph
Groundwater Elevation (ft.)
2,167
2,067
1,967
1,867
1,767
1,667
Depth to Water (ft.)
50
150
250
350
450
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2167 ft.
MT: 458 ft.
MO: 421 ft.
AM: 454 ft.

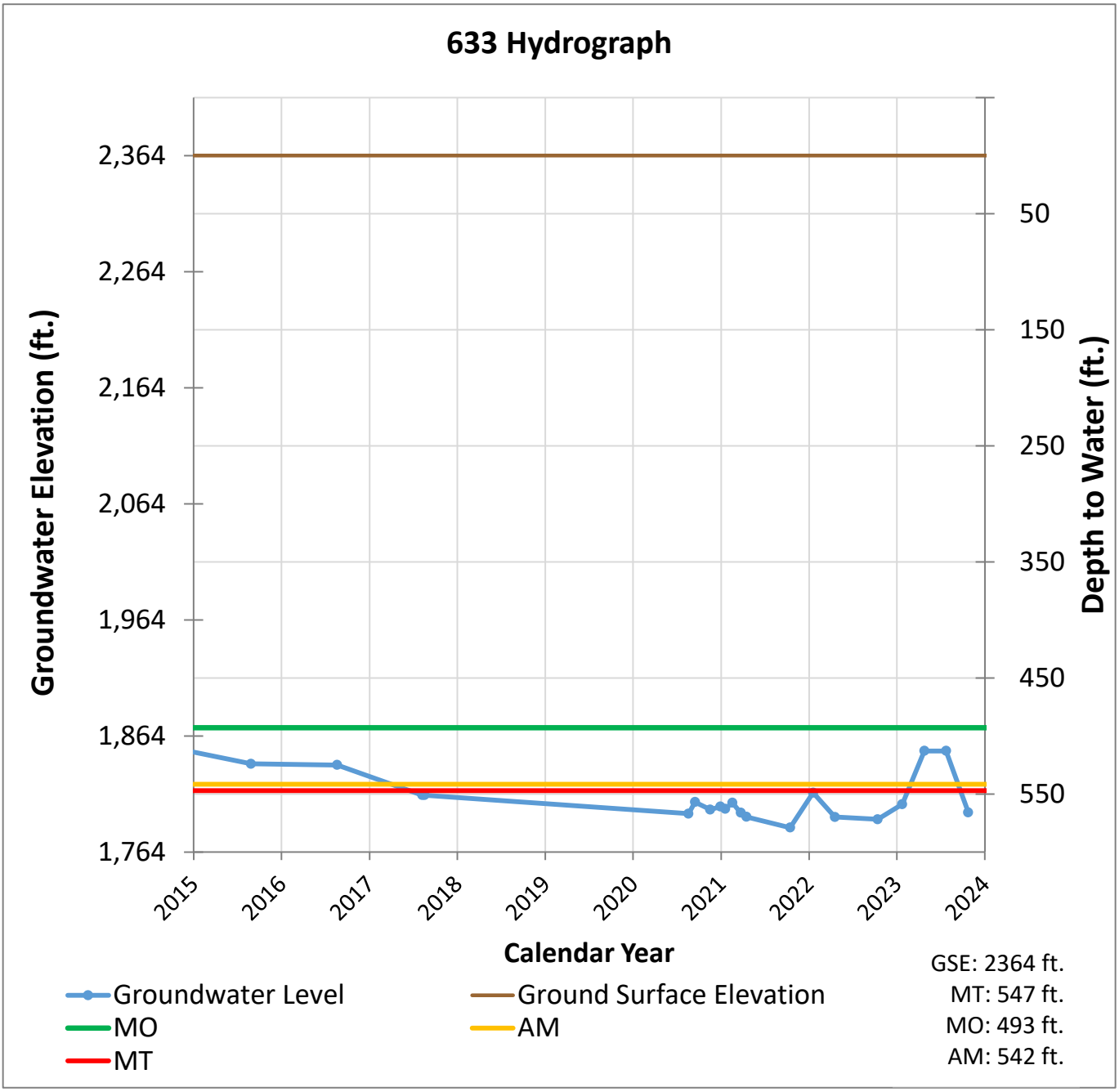

610 Hydrograph
Groundwater Elevation (ft.)
2,442
2,342
2,242
2,142
2,042
1,942
1,842
1,742
Depth to Water (ft.)
50
150
250
350
450
550
650
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2442 ft.
MT: 621 ft.
MO: 591 ft.
AM: 618 ft.

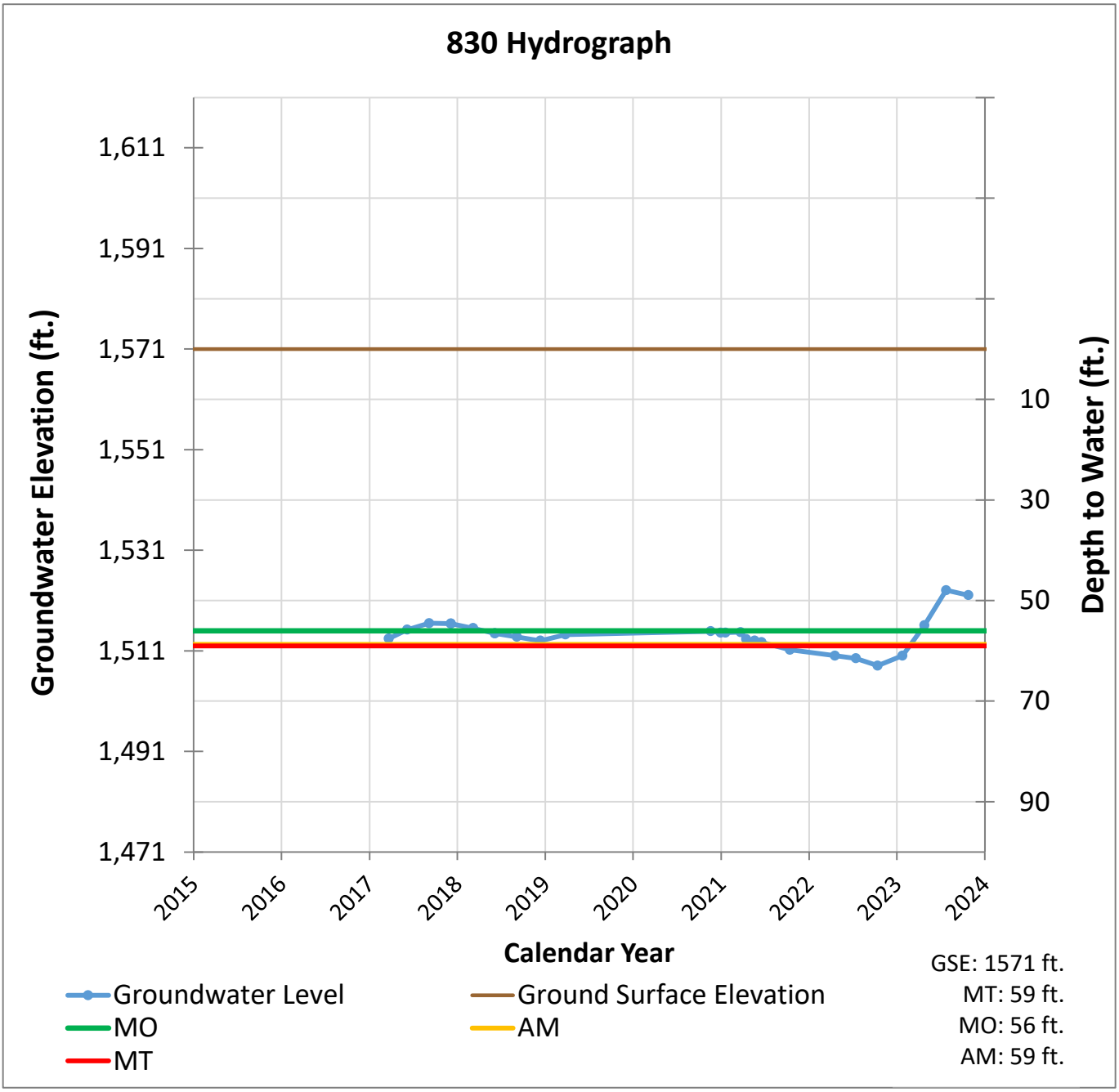

612 Hydrograph
Groundwater Elevation (ft.)
2,266
2,166
2,066
1,966
1,866
1,766
Depth to Water (ft.)
50
150
250
350
450
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2266 ft.
MT: 463 ft.
MO: 440 ft.
AM: 461 ft.

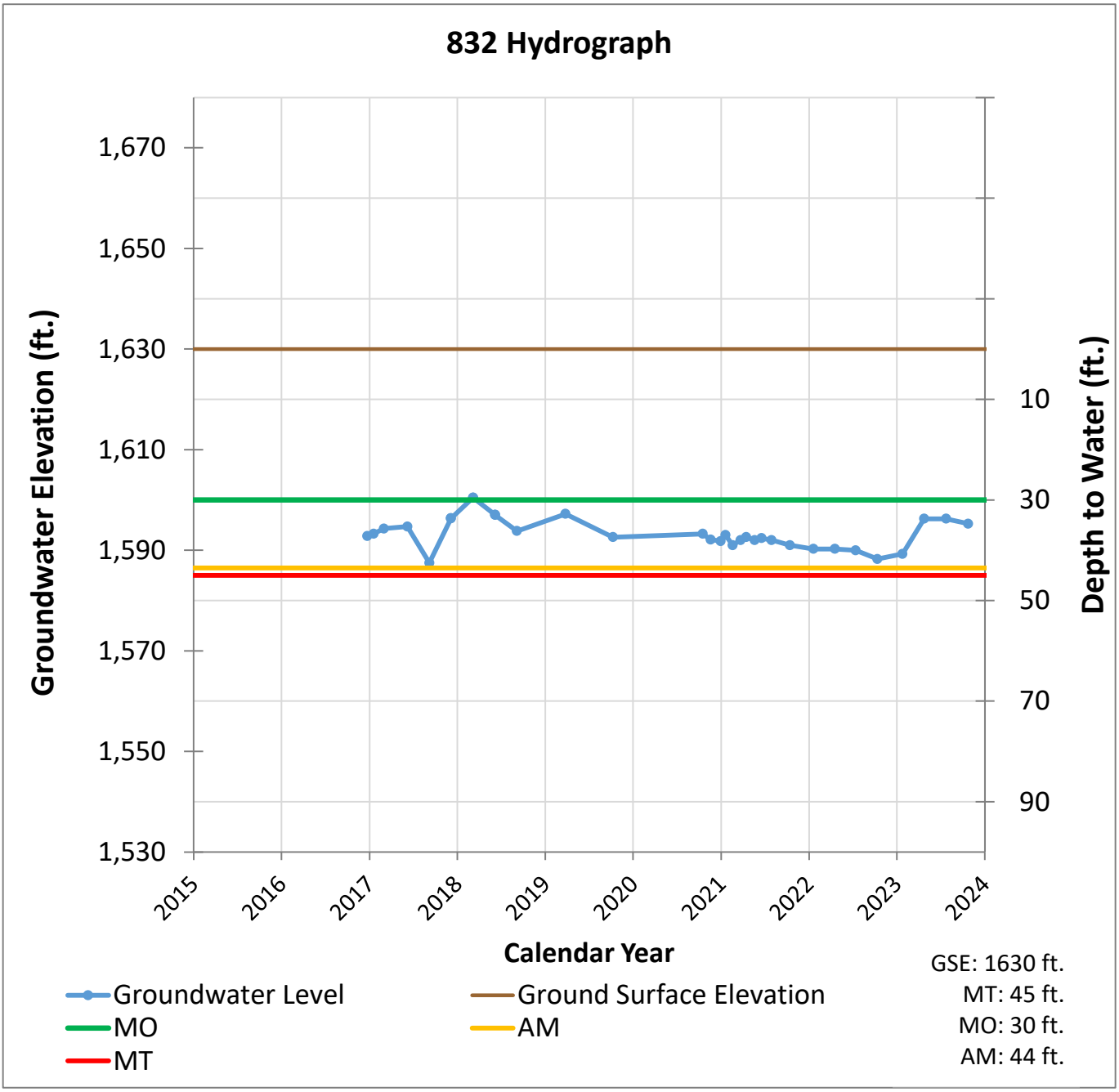

613 Hydrograph
Groundwater Elevation (ft.)
2,330
2,230
2,130
2,030
1,930
1,830
1,730
Depth to Water (ft.)
50
150
250
350
450
550
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2330 ft.
MT: 503 ft.
MO: 475 ft.
AM: 500 ft.

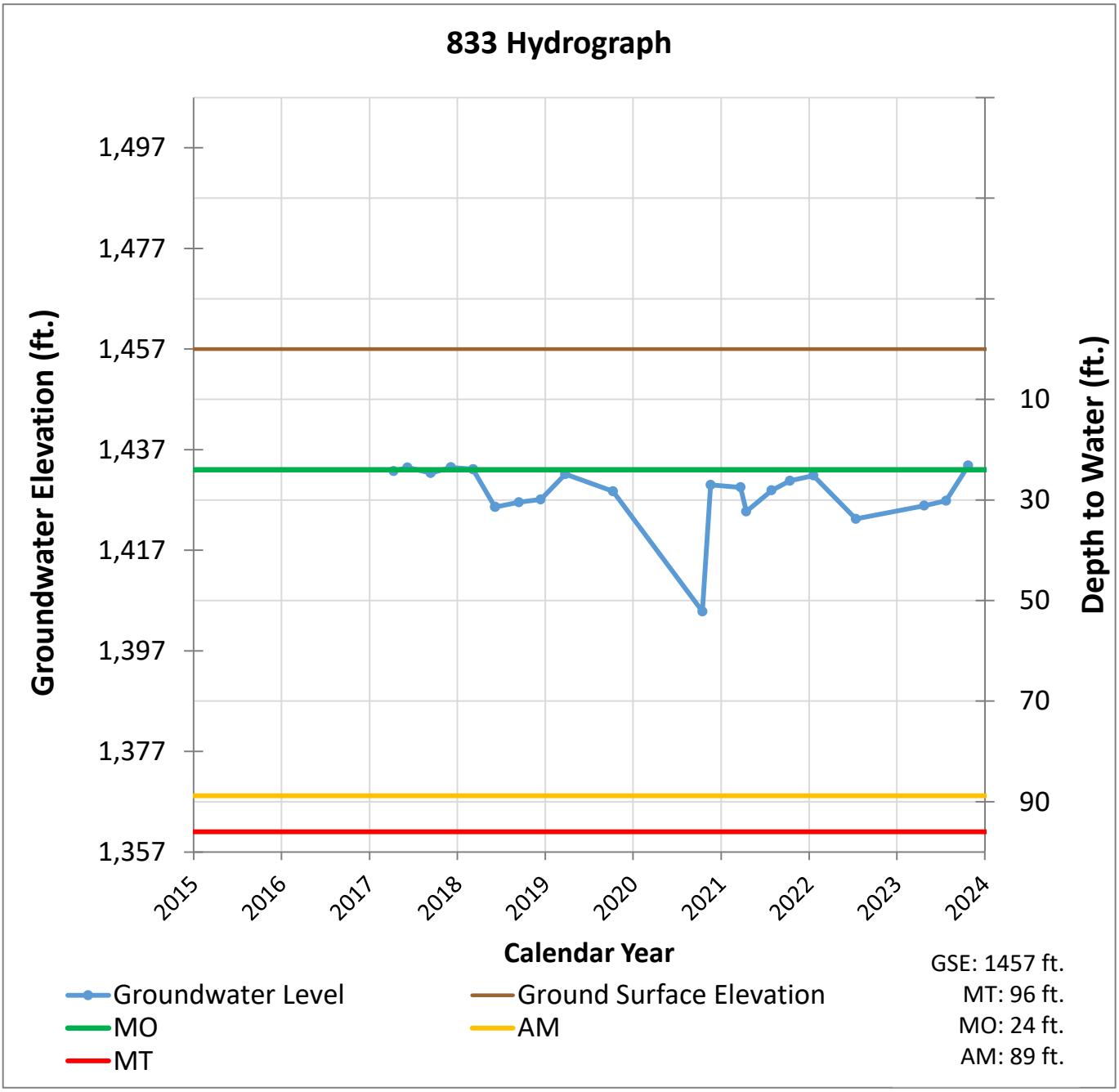

615 Hydrograph
Groundwater Elevation (ft.)
2,327
2,227
2,127
2,027
1,927
1,827
1,727
Depth to Water (ft.)
50
150
250
350
450
550
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2327 ft.
MT: 500 ft.
MO: 468 ft.
AM: 497 ft.

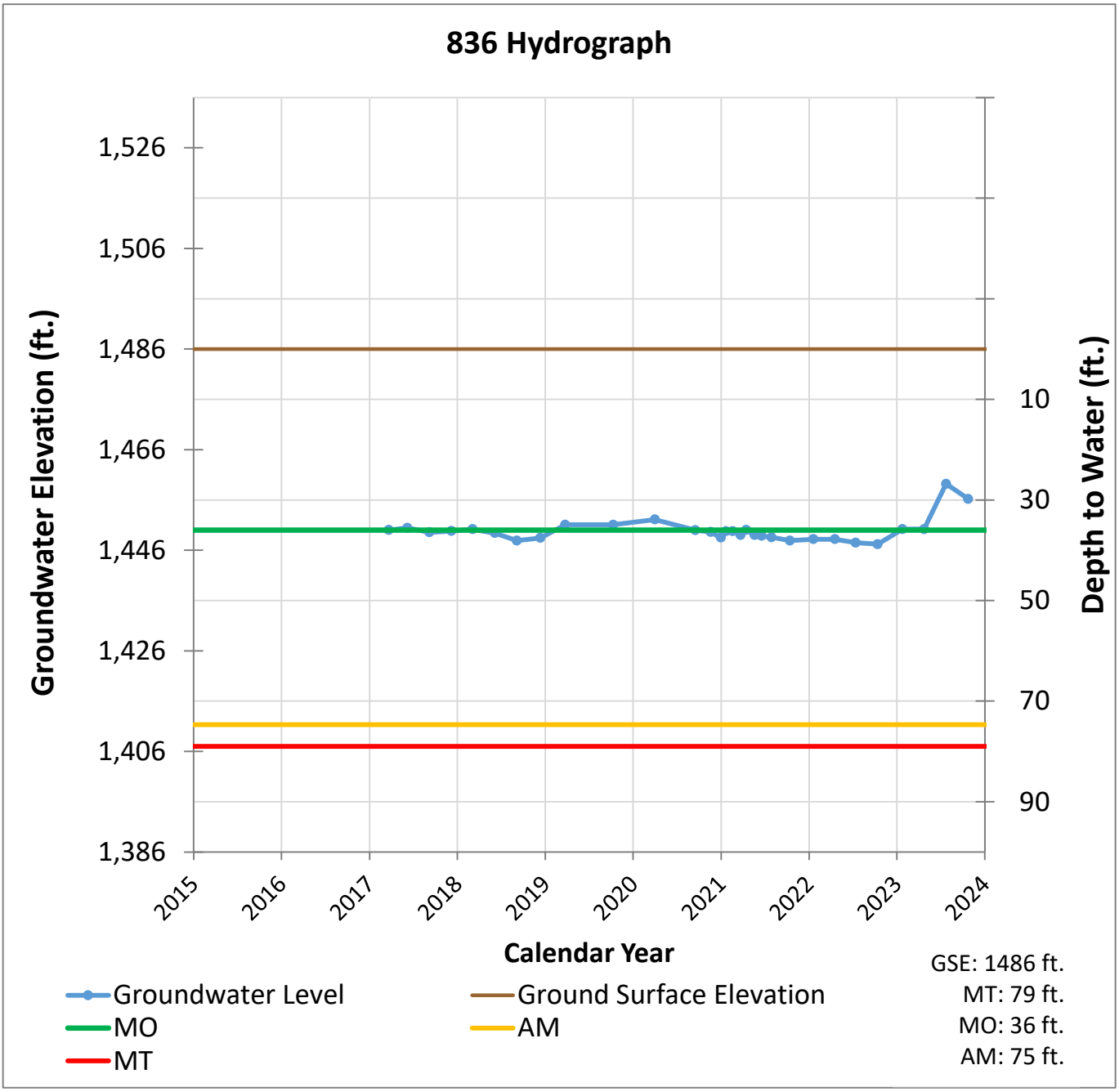

629 Hydrograph
Groundwater Elevation (ft.)
2,379
2,279
2,179
2,079
1,979
1,879
1,779
Depth to Water (ft.)
50
150
250
350
450
550
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2379 ft.
MT: 559 ft.
MO: 527 ft.
AM: 556 ft.

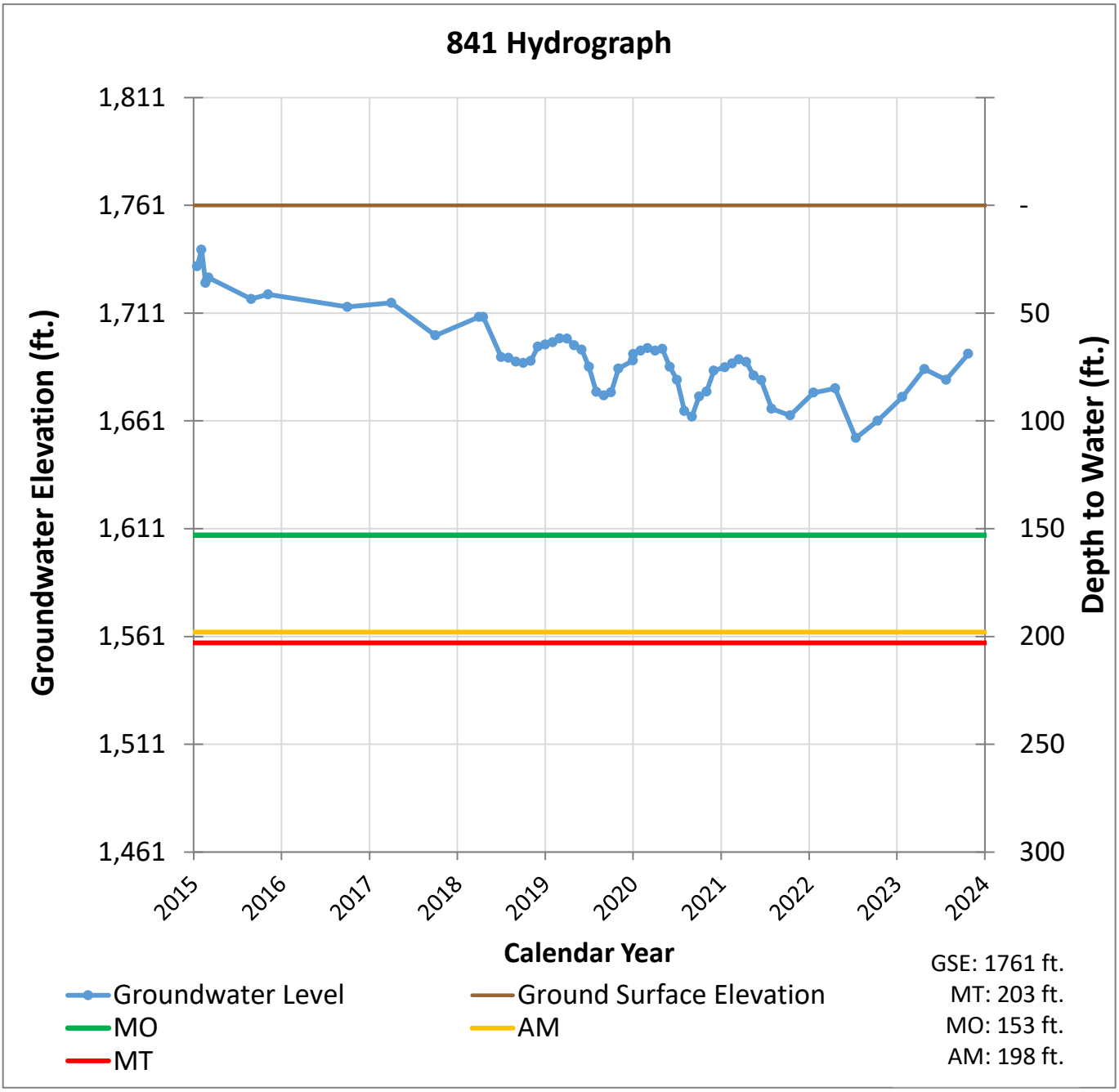

633 Hydrograph
Groundwater Elevation (ft.)
2,364
2,264
2,164
2,064
1,964
1,864
1,764
Depth to Water (ft.)
50
150
250
350
450
550
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 2364 ft.
MT: 547 ft.
MO: 493 ft.
AM: 542 ft.

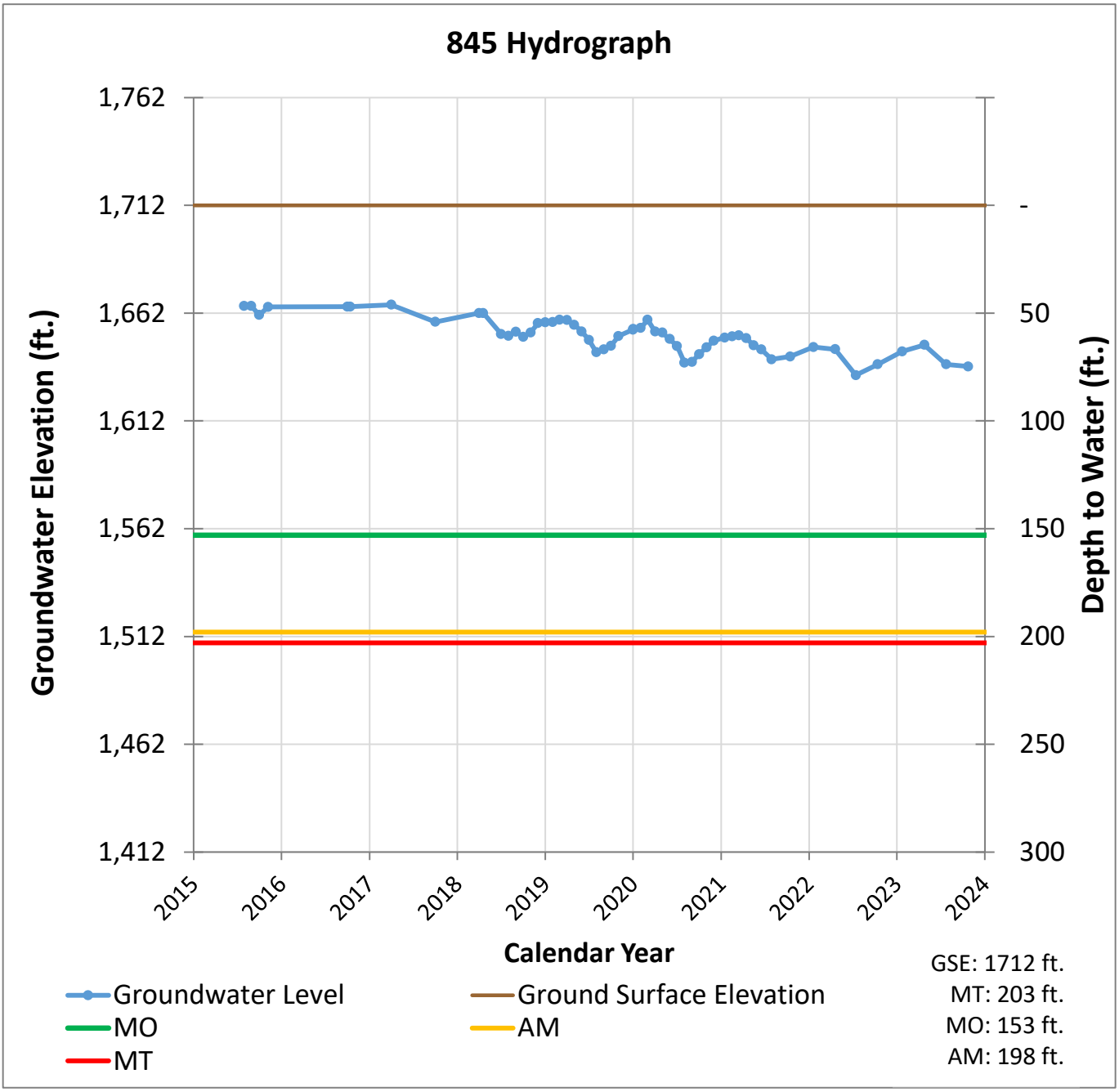

830 Hydrograph
Groundwater Elevation (ft.)
1,611
1,591
1,571
1,551
1,531
1,511
1,491
1,471
Depth to Water (ft.)
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 1571 ft.
MT: 59 ft.
MO: 56 ft.
AM: 59 ft.


832 Hydrograph
Groundwater Elevation (ft.)
Depth to Water (ft.)
1,670
1,650
1,630
1,610
1,590
1,570
1,550
1,530
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 1630 ft.
MT: 45 ft.
MO: 30 ft.
AM: 44 ft.


833 Hydrograph
Groundwater Elevation (ft.)
1,497
1,477
1,457
1,437
1,417
1,397
1,377
1,357
Depth to Water (ft.)
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 1457 ft.
MT: 96 ft.
MO: 24 ft.
AM: 89 ft.


836 Hydrograph
Groundwater Elevation (ft.)
1,526
1,506
1,486
1,466
1,446
1,426
1,406
1,386
Depth to Water (ft.)
10
30
50
70
90
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 1486 ft.
MT: 79 ft.
MO: 36 ft.
AM: 75 ft.


841 Hydrograph
1,811
1,761
1,711
1,661
1,611
1,561
1,511
1,461
-
50
100
150
200
250
300
Groundwater Elevation (ft.)
Depth to Water (ft.)
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 1761 ft.
MT: 203 ft.
MO: 153 ft.
AM: 198 ft.


845 Hydrograph
1,762
1,712
1,662
1,612
1,562
1,512
1,462
1,412
-
50
100
150
200
250
300
Groundwater Elevation (ft.)
Depth to Water (ft.)
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Calendar Year
Groundwater Level
Ground Surface Elevation
MO
AM
MT
GSE: 1712 ft.
MT: 203 ft.
MO: 153 ft.
AM: 198 ft.