# Cuyama Basin Groundwater Sustainability Plan— Annual Report for 2019-2020 Water Year

Prepared by:

WOODARD & CURRAN

**March 2021**

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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 |

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# ES-1 Executive Summary

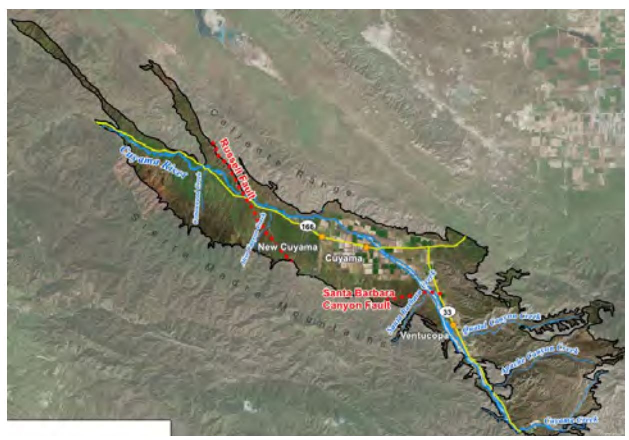
| | |
|---|---|
| §356.2 (a) | General information, including an executive summary and a location map depicting the basin covered by the report. |

# ES-2 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.

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-3 Groundwater Conditions

The Annual Report for the 2020 water year includes groundwater contours for Spring and Fall of 2020, 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 2020 have not changed substantially from 2019 levels and elevations.

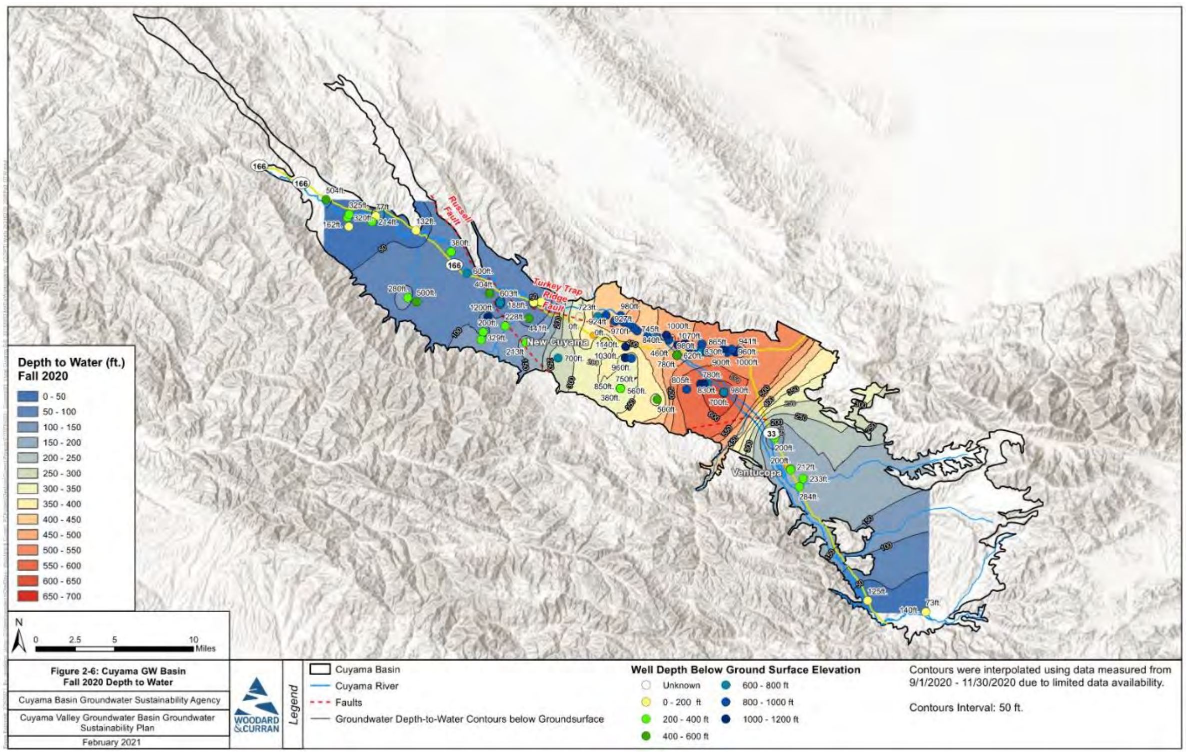



**Figure ES-2: Cuyama Basin Depth to Water Contour Map (Fall 2020)**

# ES-4 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 46,000 acre-feet (AF) in 2019 and about 54,000 AF in 2020. While 2018 had reflected a more average trend in groundwater pumping, 2019 was among the lowest in the 22-year period since 1998. Groundwater pumping in 2020 increased relative to 2019 due to a reduction in the amount of idled agricultural land and a reduction in the amount of precipitation. (See **Figure ES-3**).

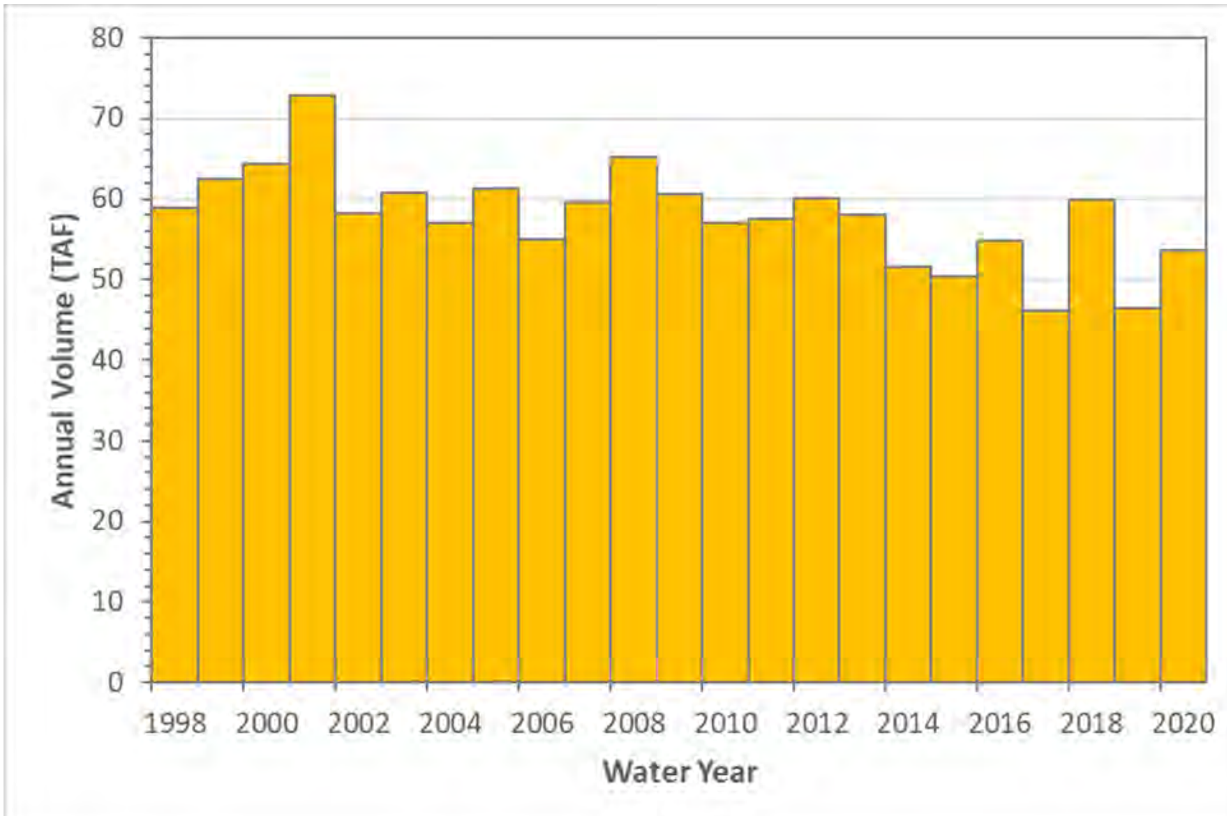



**Figure ES-3: Annual Groundwater Extraction in the Cuyama Basin in Water Years 1998-2019**

# ES-5 Change in Groundwater Storage

It is estimated that there were reductions in Basin groundwater storage of 14,900 AF in 2019 and 23,600 AF in 2020. This continues the 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 2020.

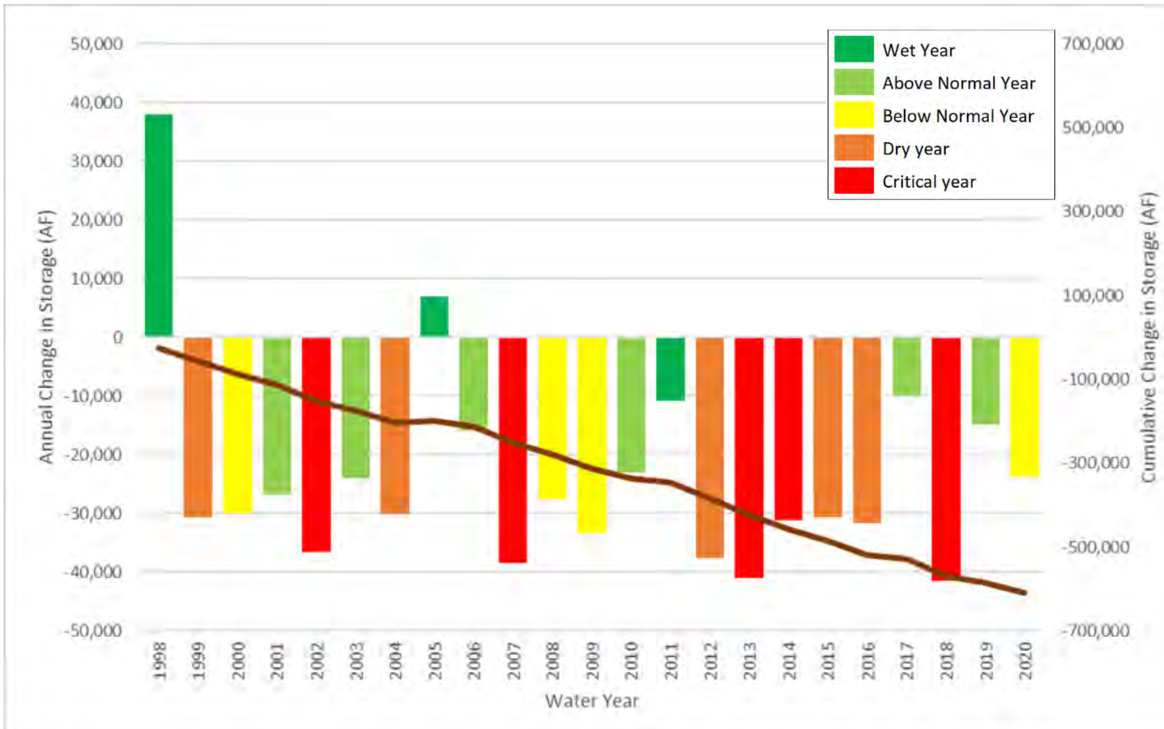



**Figure ES-4: Change in Groundwater Storage by Year, Water Year Type, and Cumulative Water Volume**

[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-6 Plan Implementation

The following plan implementation activities were accomplished in 2020:

- Approval of a groundwater extraction fee and supplemental fee, which is expected to generate $1,533,016 in revenue to cover the administrative costs of the CBGSA for the period from January 1, 2020 through June 30, 2021.
- A total of 12 public meetings were conducted at which GSP development and implementation was discussed.
- The Cuyama Basin Groundwater Sustainability Agency (CBGSA) Board began implementation of the groundwater levels monitoring network, includes monthly monitoring at each monitoring well. This supplements ongoing efforts to install continuous monitoring equipment in wells and surface flow gages under an ongoing DWR grant. In addition, the CBGSA is pursuing DWR Technical Support Services assistance to install three new monitoring wells.
- The CBGSA applied for a Proposition 68 Groundwater Sustainability Implementation Grant for $5 million in funding for implementation activities. In addition, the Cuyama Community Services District (CCSD) procured grant funding from DWR's Integrated Regional Water Management (IRWM) program to install a new production well.
- The GSA continued to coordinate with DWR on the development and preparations required for the Technical Support Services for the installation of 3 additional multicompetent wells in the Basin.
- The GSA is currently working with the United States Geological Survey (USGS) to install two new streamflow gauges on the Cuyama River. These should be installed during 2021.
- An agreement was executed between the CBGSA and Cuyama Basin Water District (CBWD) for the CBWD to administer management actions in the Central Basin 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:

- Derek Yurosek – Chairperson, CBWD
- Lynn Compton – Vice Chairperson, County of San Luis Obispo
- Byron Albano – CBWD
- Cory Bantilan – SBCWA
- Tom Bracken – CBWD
- George Cappello – CBWD
- Paul Chounet –CCSD
- Zack Scrivner – County of Kern
- Glenn Shephard – County of Ventura
- 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. 6 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 11 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 and is available for viewing online at http://cuyamabasin.org/.

## 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 current Bulletin 118 section on the Cuyama Valley Groundwater Basin incorrectly states 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.

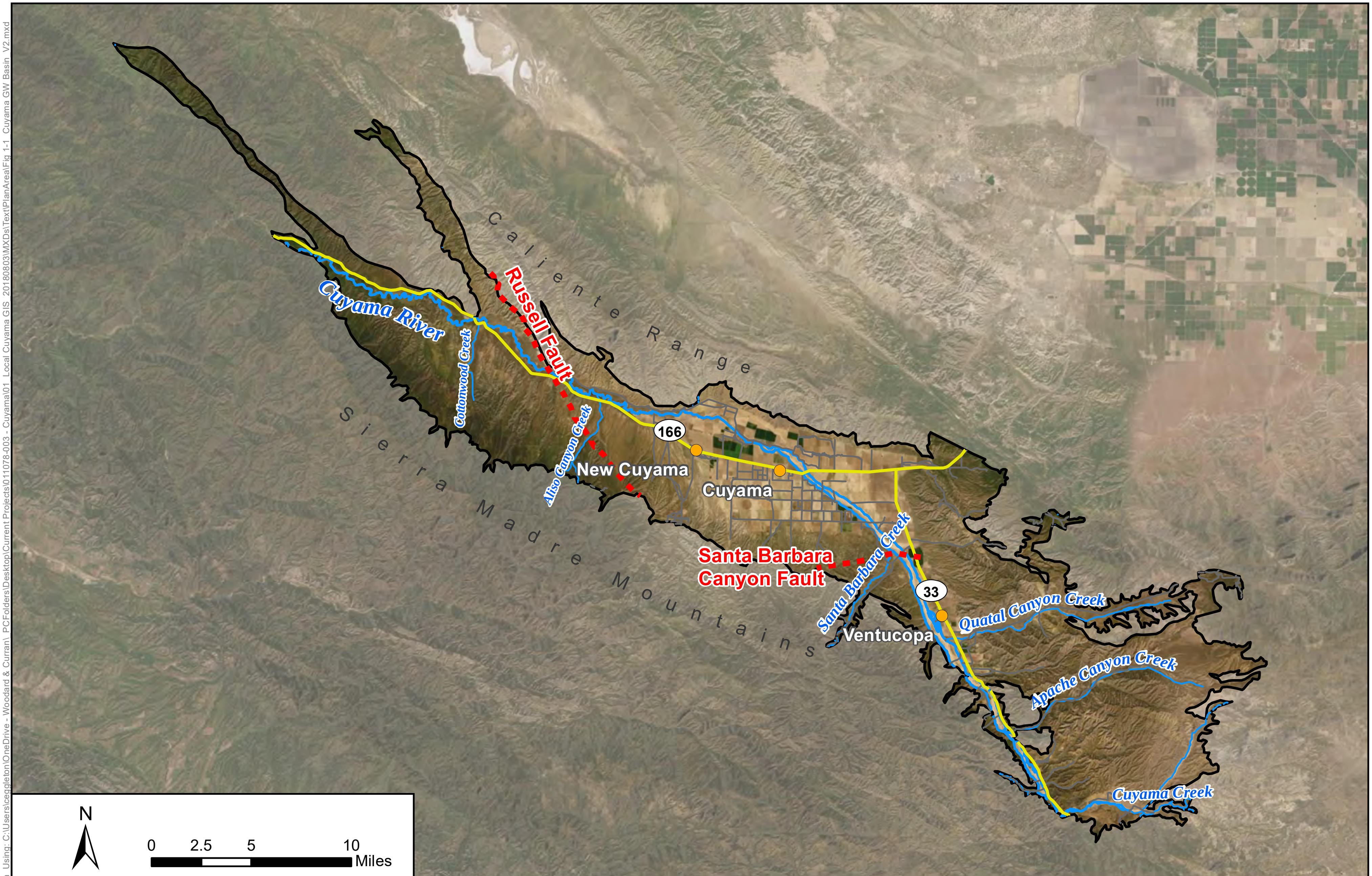


**Figure 1-1 - Cuyama Valley Groundwater Basin**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

March 2021

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*Legend*

- Cuyama Basin
- Towns
- Faults
- Highways
- Local Roads
- Cuyama River
- Streams/Creeks

Figure Exported: 3/26/2021 By: ceggleton Using: C:\Users\ceggleton\OneDrive - Woodard & Curran\ PCFolders\Desktop\Current Projects\011078-003 - Cuyama\01 Local Cuyama GIS 20180803\MXDs\Text\PlanArea\Fig 1-1 Cuyama GW Basin V2.mxd

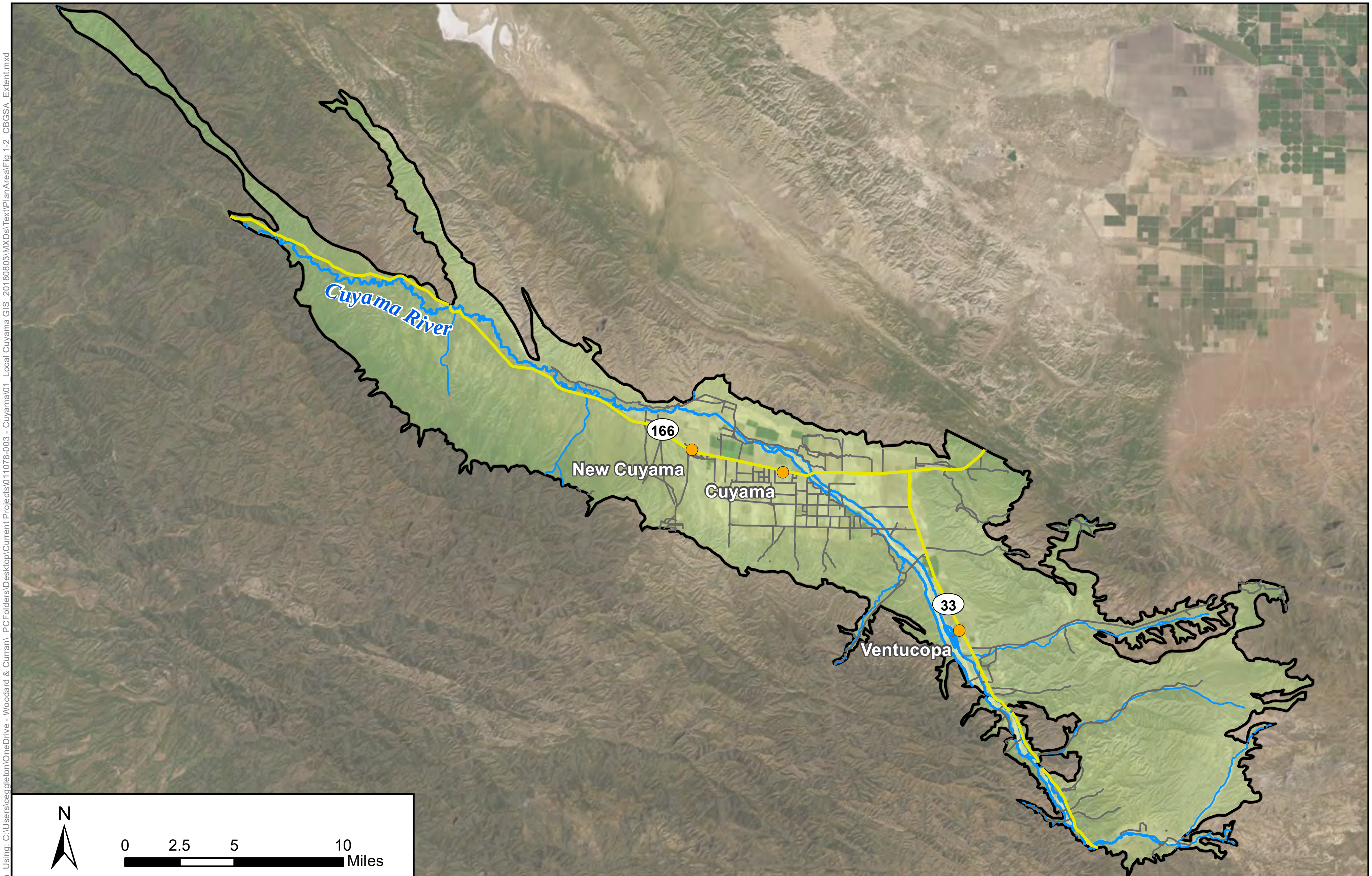


**Figure 1-2 - Cuyama Valley Groundwater Sustainability Agency Boundary**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

March 2021

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*Legend*

- Towns
- Cuyama Basin GSA
- Highways
- Local Roads
- Cuyama River
- Streams/Creeks

# Section 2. Groundwater Conditions

| | |
|---|---|
| §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 groundwater levels representative monitoring network that was included in the GSP 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.

### 2.1.1 Representative Monitoring Network Refinements

The CBGSA has begun the process of refining and improving the groundwater monitoring network within the Basin. The primary focus during GSP development was to ensure that the monitoring network maximized the potential pool of monitoring locations and gain a broad understanding of available data sources. Through this approach, all wells with recent measurements (data taken on or after January 1, 2018) were included in the monitoring network. This resulted in 101 wells in the monitoring network, including 60 representative wells, which achieved a spatial density of 26.7 wells per 100 square miles. The monitoring network included in the GSP is shown in **Figure 2-1**.

Monitoring has been ongoing in the Basin on a monthly basis since August 2020. Based on information gathered to date, the CBGSA Board determined at its January 2021 meeting to reduce the monitoring network to eliminate spatially redundant wells from the network. This will reduce the representative monitoring network to 52 wells at 46 locations (this includes three multi-completion wells), as shown in **Table 2-1** below. However, to address spatial data gaps identified in the GSP, the CBGSA is currently working with DWR's Technical Support Services (TSS) program to add three new multi-completion wells (with a total of three completions each), as well as adding one additional single completion well to the network using grant funding provided by DWR. In addition, a new well is being added to the network in the vicinity of Santa Barbara Canyon. These additions will bring the monitoring network up to 62 wells at 50 locations. The revised monitoring network is shown in **Figure 2-2**.

The refinements to the monitoring network will decrease the monitoring well density from 26.7 wells to 16.4 wells per 100 square miles when considering each completion. This well density is still greater than the recommended 0.2-10 wells per 100 square miles recommended by Heath (1976) as described in the GSP, *Section 4.5.3 Spatial Density*.

Thirteen of the wells in the monitoring network include transducers that provide continuous monitoring. Ten of these transducers were recently added using grant funding from DWR.

**Table 2-1: Refined Groundwater Monitoring Network Well List**

| Opti_ID | Network | Includes a Transducer? | Included in a Multi-Completion Well? | Latitude | Longitude |
|---|---|---|---|---|---|
| Existing Wells | | | | | |
| 2 | Representative | No | No | 34.6985833 | -119.3134722 |
| 62 | Representative | Yes | No | 34.828034 | -119.4665109 |
| 72 | Representative | No | No | 34.9343611 | -119.6898333 |
| 74 | Representative | No | No | 34.94225 | -119.6751667 |
| 77 | Representative | Yes | Yes | 34.9311583 | -119.5952556 |
| 85 | Representative | No | No | 34.8194232 | -119.4523437 |
| 89 | Representative | No | No | 34.7081389 | -119.3785 |
| 91 | Representative | Yes | Yes | 34.8977167 | -119.542125 |
| 95 | Representative | No | No | 34.89975 | -119.5839167 |
| 96 | Representative | No | No | 34.8902555 | -119.616517 |
| 98 | Representative | No | No | 34.8839722 | -119.6354722 |
| 99 | Representative | No | Yes | 34.8997806 | -119.657725 |
| 100 | Representative | No | No | 34.8118889 | -119.4565278 |
| 101 | Representative | No | No | 34.8563889 | -119.4846667 |
| 102 | Representative | Yes | No | 34.9647222 | -119.70475 |
| 103 | Representative | Yes | No | 34.9279167 | -119.6531389 |
| 106 | Representative | No | No | 34.955294 | -119.78764 |
| 107 | Representative | No | No | 34.9494226 | -119.8123579 |
| 110 | Monitoring | No | No | 34.9766439 | -119.7940239 |
| 112 | Representative | No | No | 34.9627553 | -119.7612452 |
| 114 | Representative | No | No | 34.9783102 | -119.748189 |
| 115 | Monitoring | No | No | 34.963411 | -119.807238 |
| 118 | Representative | No | No | 34.975978 | -119.887176 |
| 119 | Monitoring | No | No | 35.0433086 | -119.8729138 |
| 121 | Monitoring | No | No | 34.996523 | -119.853474 |
| 124 | Representative | No | No | 34.968831 | -119.859639 |
| 316 | Representative | Yes | Yes | 34.8977167 | -119.542125 |
| 317 | Representative | Yes | Yes | 34.8977167 | -119.542125 |
| 322 | Representative | No | No | 34.8997806 | -119.657725 |
| 324 | Representative | No | Yes | 34.8997806 | -119.657725 |
| 325 | Representative | No | Yes | 34.8997806 | -119.657725 |
| 420 | Representative | Yes | Yes | 34.9311583 | -119.5952556 |

| Opti_ID | Network | Includes a Transducer? | Included in a Multi-Completion Well? | Latitude | Longitude |
|---|---|---|---|---|---|
| 421 | Representative | Yes | Yes | 34.9311583 | -119.5952556 |
| 474 | Representative | No | No | 34.9405338 | -119.7640232 |
| 568 | Representative | No | No | 34.9773889 | -119.7563333 |
| 571 | Representative | Yes | No | 34.9796111 | -119.8970278 |
| 573 | Representative | No | No | 34.9848333 | -119.806 |
| 604 | Representative | No | No | 34.9612905 | -119.6650121 |
| 608 | Representative | No | No | 34.94643 | -119.6187515 |
| 609 | Representative | No | No | 34.952892 | -119.6400793 |
| 610 | Representative | No | No | 34.9051916 | -119.560696 |
| 612 | Representative | No | No | 34.9404569 | -119.5941622 |
| 613 | Representative | No | No | 34.934845 | -119.5717606 |
| 615 | Representative | No | No | 34.941809 | -119.5675537 |
| 629 | Representative | No | No | 34.93481 | -119.5301644 |
| 633 | Representative | No | No | 34.9375267 | -119.5432505 |
| 830 | Representative | No | No | 35.054073 | -119.934759 |
| 832 | Representative | No | No | 35.0416 | -119.889452 |
| 833 | Representative | No | No | 35.068416 | -119.990897 |
| 836 | Representative | No | No | 35.05534 | -119.964647 |
| 841 | Representative | Yes | No | 35.00323 | -119.83181 |
| 845 | Representative | Yes | No | 35.02252 | -119.84979 |

Note: Additional wells to be added to the network under DWR's TSS program are not shown

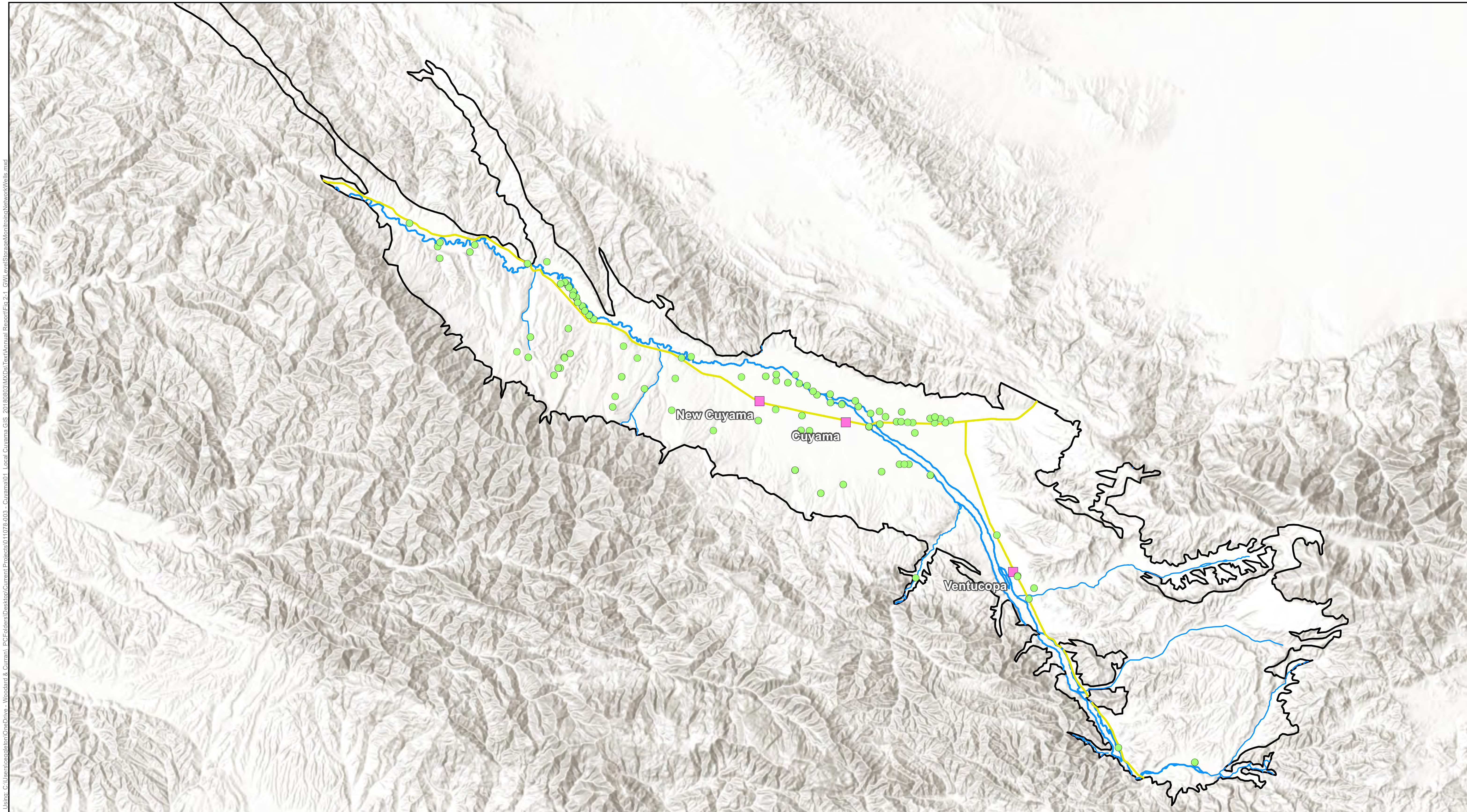


**Figure 2-1: Cuyama GW Basin Groundwater Level & Storage Monitoring Network Wells**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

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*Legend*

- Cuyama Basin
- Towns
- Highways
- Cuyama River
- Streams

**Monitoring Network Wells**

- Monitoring Network Wells

N

0 2.5 5 10 Miles

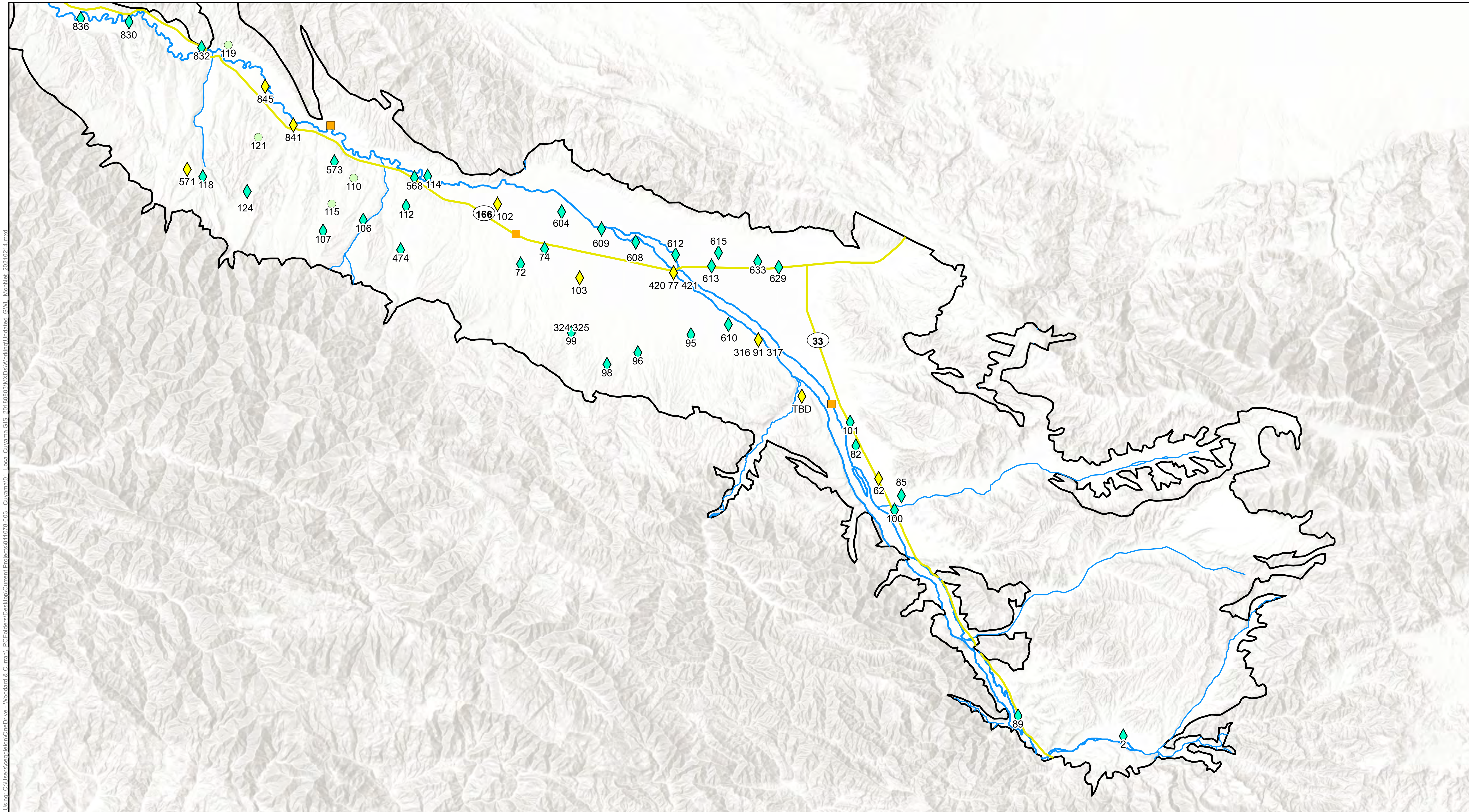


**Figure 2-2: Cuyama GW Basin - Refined Groundwater Monitoring Network**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

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*Legend*

- Cuyama Basin
- Cuyama River
- Representative Well
- Representative Well/ Transducer
- Monitoring Network Well
- TSS Wells

N

0 2.5 5 10 Miles

## 2.2 Groundwater Contour Maps

The 2020 GSP included contour maps up through the spring of 2018. The last Annual Report that was submitted in 2020 included contour maps for fall 2018, spring 2019 and fall 2019. For this Annual Report, analysis was conducted to incorporate data from January 2020 to December 2020 that was received from the United States Geological Survey (USGS), DWR, private landowners, local counties and agencies, and the CBGSA. 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 2020 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 2020.

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:

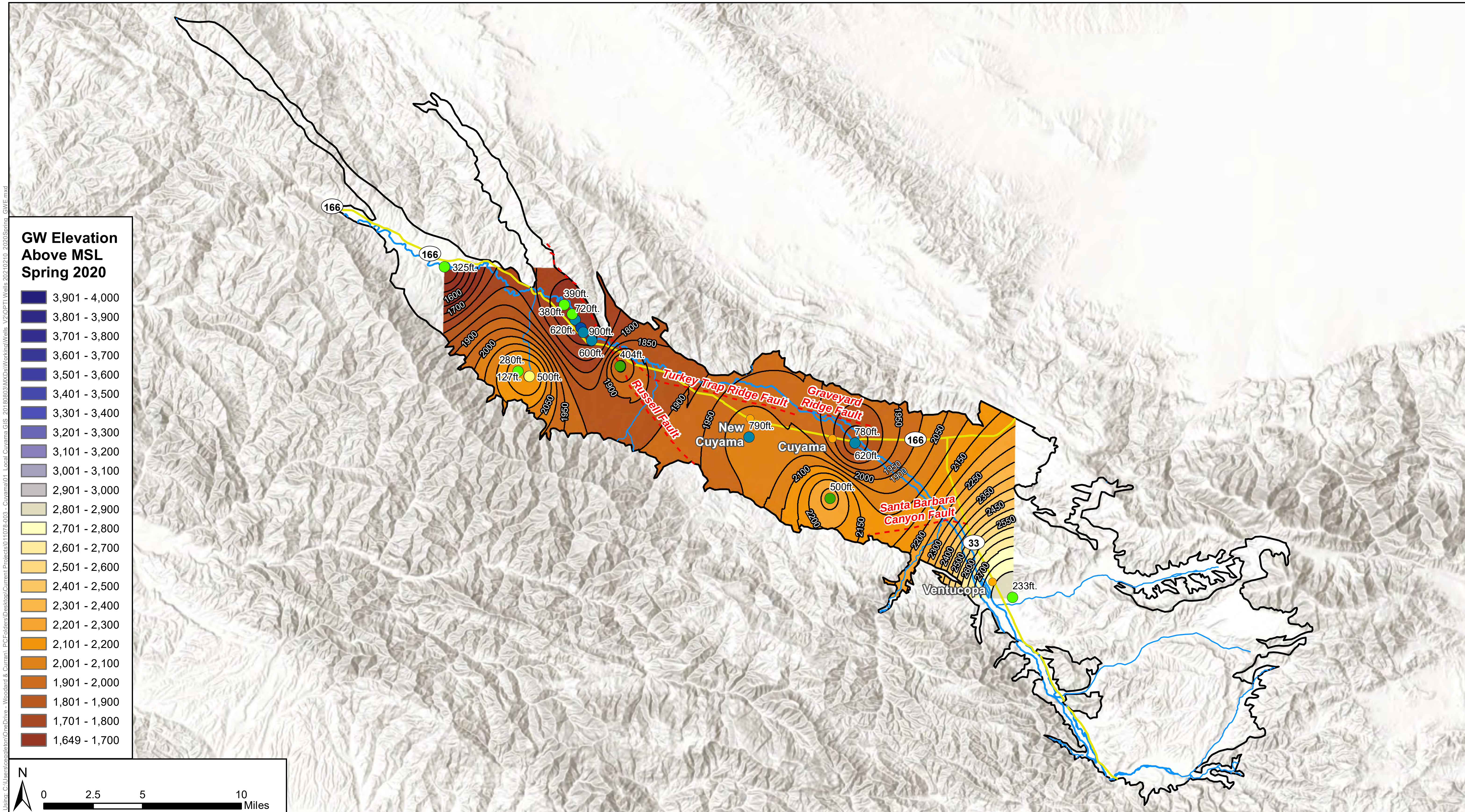
- Measurements from wells of different depths are representative of conditions at that location and there are no significant known vertical gradients. Due to the limited spatial amount of monitoring points, data from wells of a wide variety of depths were used to generate the contours.
- Measurements from dates that may be as far apart temporally as three months 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. Due to the limited temporal resolution of measurement data in the Basin, data from a wide variety of measurement dates were used to generate the contours.

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 2-3** shows groundwater elevation contours for spring of 2020. Data was collected from Santa Barbara County, Ventura County, DWR, USGS, local landowners, and the CBGSA, however, data collected between February and April was very limited and was not available for the south eastern portion of the Basin. The contours developed using the available data show a depression in the central portion of the Basin between Ventucopa and New Cuyama. Groundwater elevations tend to steadily decrease westward across the Basin. Groundwater flows appear to be moving down slope through the Basin towards the west but gradients are significantly reduced through the central portion. **Figure 2-4** shows the depth to groundwater contours for spring 2020 and shows a depression in the central portion of the Basin greater than 450 ft below ground surface. However, due to limited groundwater data available for this time period, this depth may be greater but not represented. 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 older contour maps provided in the 2020 Cuyama Valley Basin GSP.

**Figure 2-5** shows the groundwater elevation contours for fall of 2020. Data for this time period provides greater Basin coverage than in spring of 2020, as additional data was collected by the CBGSA monitoring program, which was active during this time. Groundwater elevations show a clear 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 2019 conditions. 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 2-6** shows the depth to groundwater contours for the fall of 2020. 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 2019 conditions. When compared with **Figure 2-5**, it can be seen that Basin topography is a greater factor in groundwater level changes in the region between Cuyama and Ventucopa, where there are increases in both groundwater elevations and depths below ground surface, than in the region downstream of Cuyama. Groundwater level data was available in fall of 2020 for two monitoring wells in the far east portion of the Basin, and that data indicates that groundwater levels in that area are within 50 feet of the ground surface.




| Figure 2-3: Cuyama GW Basin Spring 2020 Groundwater Elevation |
|---|
| Cuyama Basin Groundwater Sustainability Agency |
| Cuyama Valley Groundwater Basin Groundwater Sustainability Plan |
| February 2021 |

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*Legend*

- Cuyama Basin
- Cuyama River
- Faults
- Groundwater Elevation Above MSL

**Well Depth Below Ground Surface Elevation**

- Unknown
- 0 - 200 ft
- 200 - 400 ft
- 400 - 600 ft
- 600 - 800 ft
- 800 - 1000 ft
- 1000 - 1200 ft

Contours were interpolated using data measured from 2/1/2020 - 4/30/2020 due to limited data availability.

Contours Interval: 50 ft.

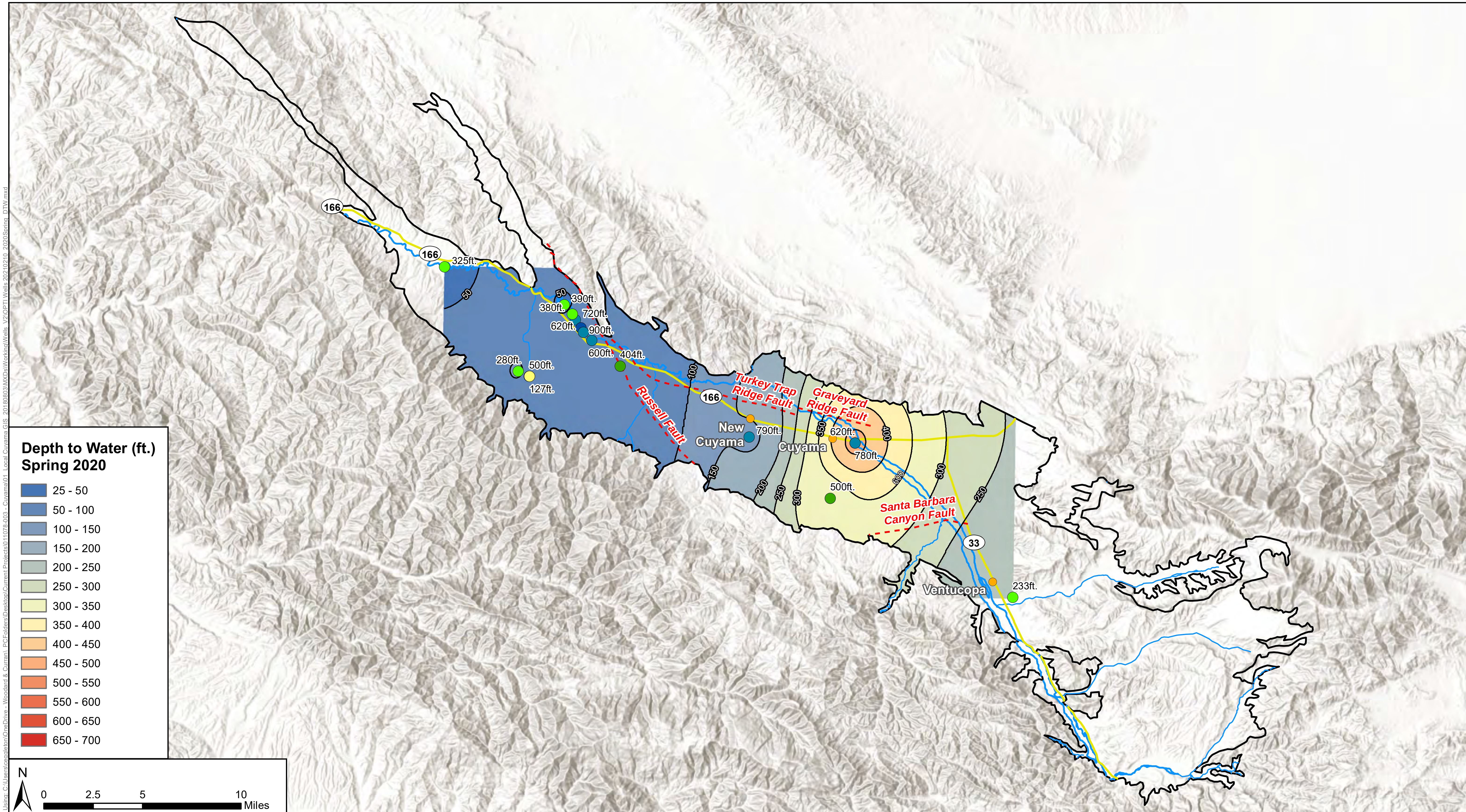


**Figure 2-4: Cuyama GW Basin Spring 2020 Depth to Water**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

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*Legend*

- Cuyama Basin
- Cuyama River
- Faults
- Groundwater Depth-to-Water Contours below Groundsurface

**Well Depth Below Ground Surface Elevation**

- Unknown
- 0 - 200 ft
- 200 - 400 ft
- 400 - 600 ft
- 600 - 800 ft
- 800 - 1000 ft
- 1000 - 1200 ft

Contours were interpolated using data measured from 2/1/2020 - 4/30/2020 due to limitated data availability.

Contours Interval: 50 ft.

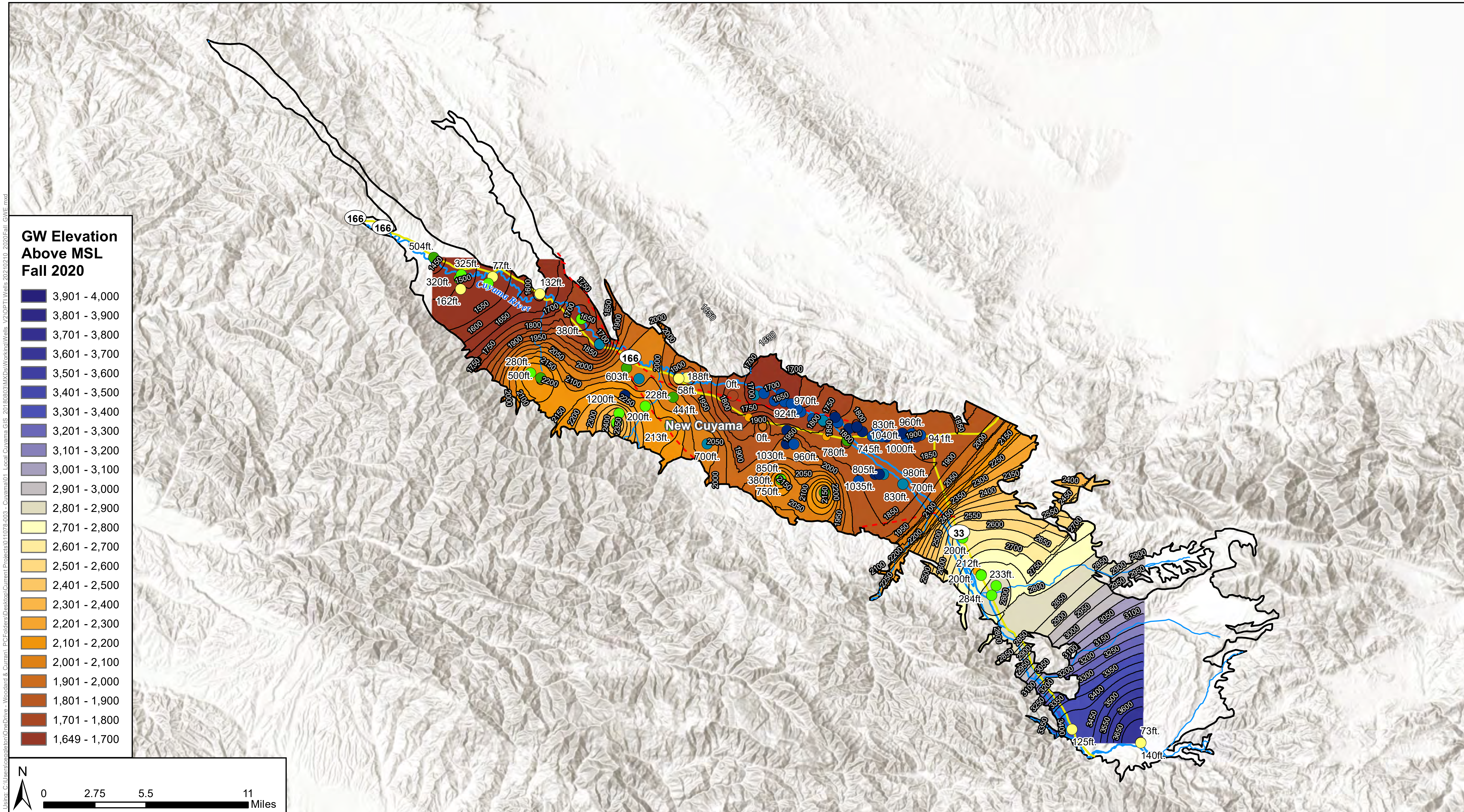


**Figure 2-5: Cuyama GW Basin Fall 2020 Groundwater Elevation**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

February 2021

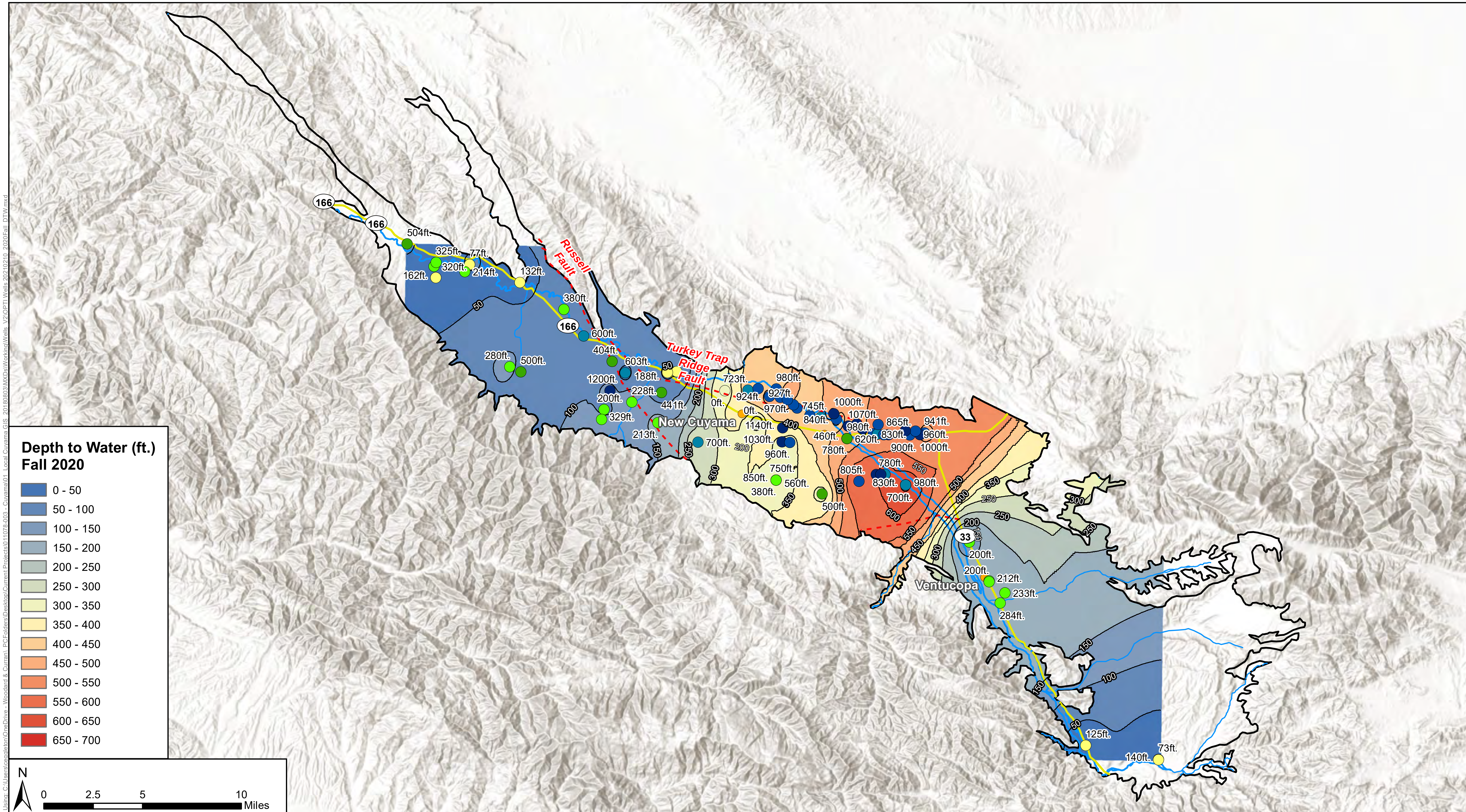


**Figure 2-6: Cuyama GW Basin Fall 2020 Depth to Water**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

February 2021

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*Legend*

- Cuyama Basin
- Cuyama River
- Faults
- Groundwater Depth-to-Water Contours below Groundsurface

**Well Depth Below Ground Surface Elevation**

- Unknown
- 0 - 200 ft
- 200 - 400 ft
- 400 - 600 ft
- 600 - 800 ft
- 800 - 1000 ft
- 1000 - 1200 ft

Contours were interpolated using data measured from 9/1/2020 - 11/30/2020 due to limited data availability.

Contours Interval: 50 ft.

## 2.3 Hydrographs

Groundwater hydrographs were developed for each 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 well are presented in Appendix A.[3]

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 2-2** and are accompanied by hydrographs for an example well in each threshold regions. A map of threshold regions is provided in **Figure 2-7**, which also shows the locations of example wells used in each threshold region.

**Table 2-2: Groundwater Trends by Threshold Regions**

| Threshold Region | Groundwater Trend | Example Well(s) |
|---|---|---|
| Northwestern Region | Slight downward trend influenced by seasonal fluctuations. This is expected as recent changes in land use have begun to pump groundwater. Levels are still approximately 80 ft above the Measurable Objective. | 841 (**Figure 2-8**) |
| Western Region | Levels in this region have either stayed relatively flat or slightly increased. | 571 (**Figure 2-9**) |
| Central Region | Levels have historically had a steady downward trend with some seasonal fluctuations. This pattern remains with trends continuing downward and, in some cases, levels surpassing minimum thresholds. | 74 and 91 (**Figure 2-10 and 2-11**) |
| Eastern Region | This region has seen an overall decline over several decades, however, recent groundwater trends appear to be approaching equilibrium. | 62 (**Figure 2-12**) |
| 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 2-13**) |

[3] Hydrographs in the appendix for this report include those that have recent monitoring data but will be removed based on monitoring network refinements described in this report. Subsequent Annual Reports for the Cuyama Basin will not include these hydrographs.

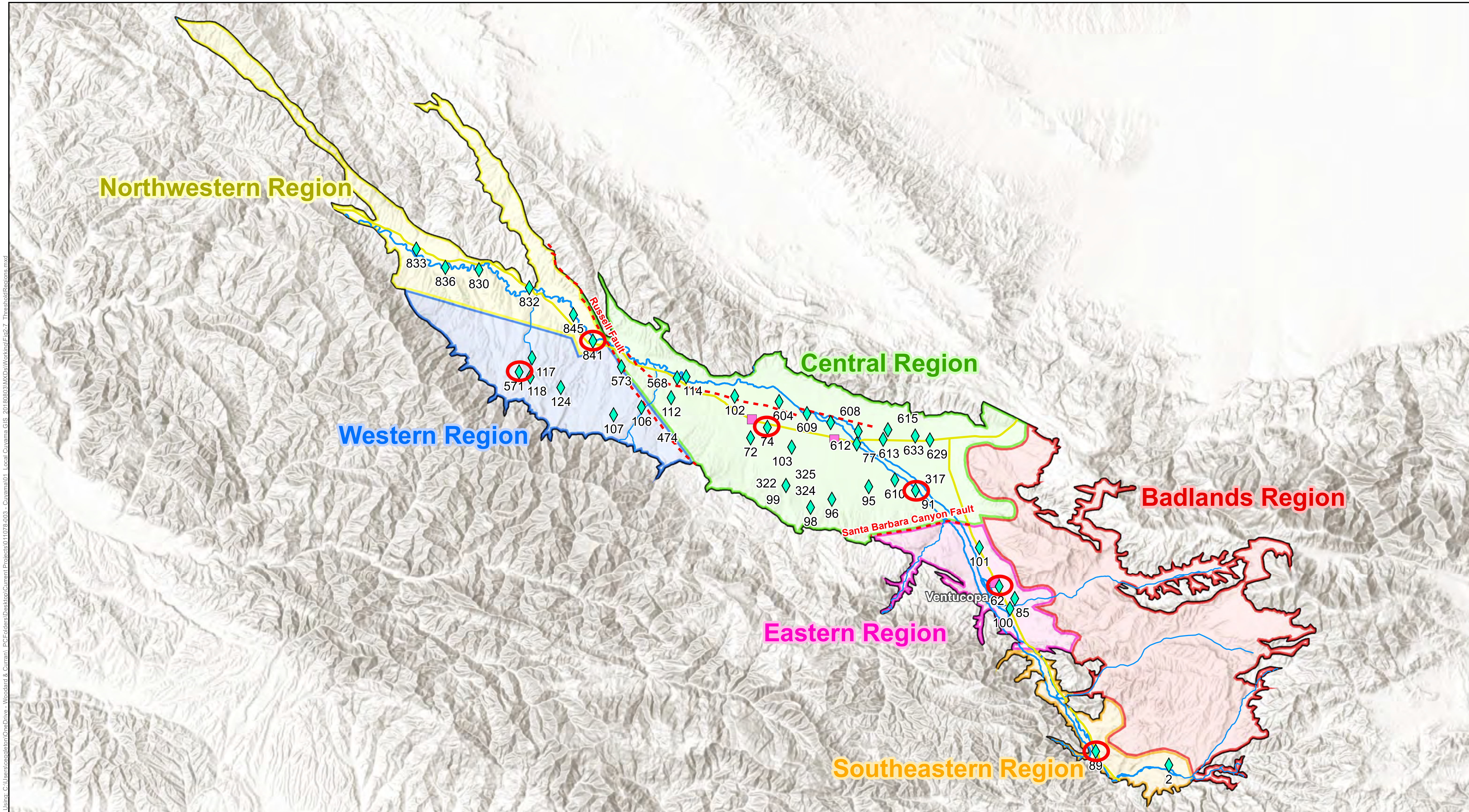


**Figure 2-7: Cuyama GW Basin Groundwater Level Representative Wells & Threshold Regions**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

January 2019

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*Legend*

- Cuyama Basin
- Representative Wells (Refined)
- Towns
- Example Hydrograph Wells
- Faults
- Highways
- Cuyama River
- Streams

**Threshold Regions**

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

N

0 2.5 5 10 Miles

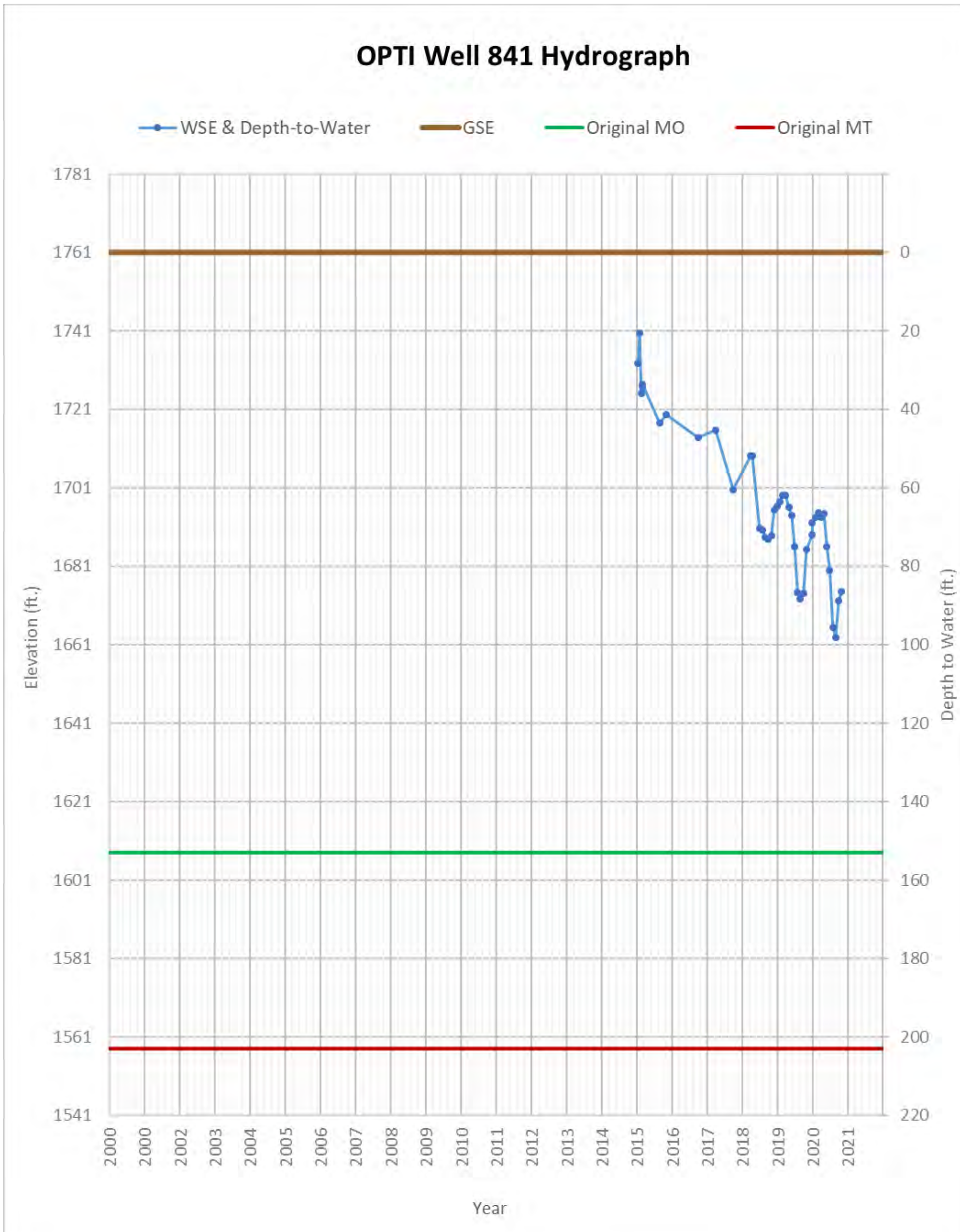


**Figure 2-8: Example Well Hydrographs – Northwestern Region**

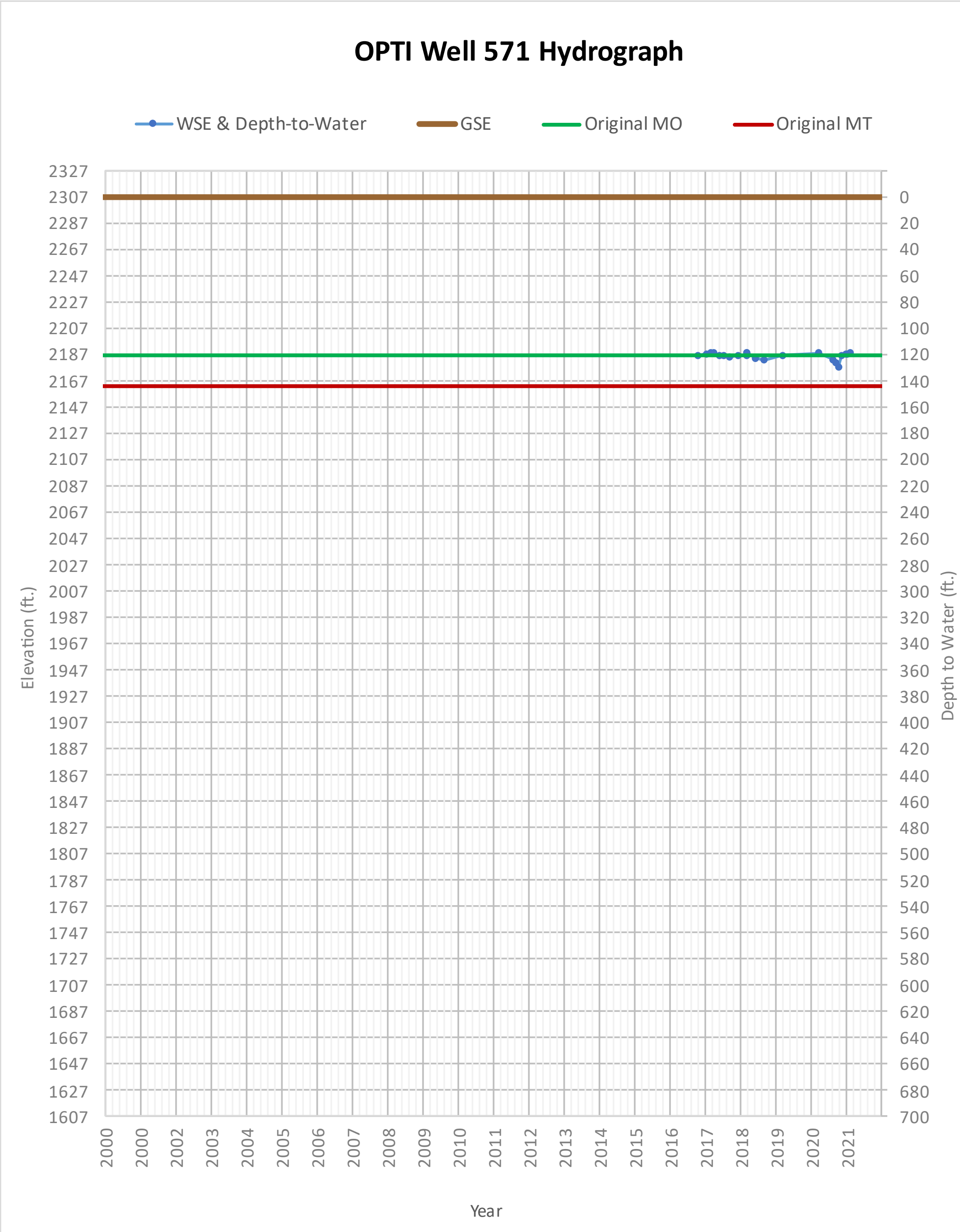


**Figure 2-9: Example Well Hydrographs – Western Region**

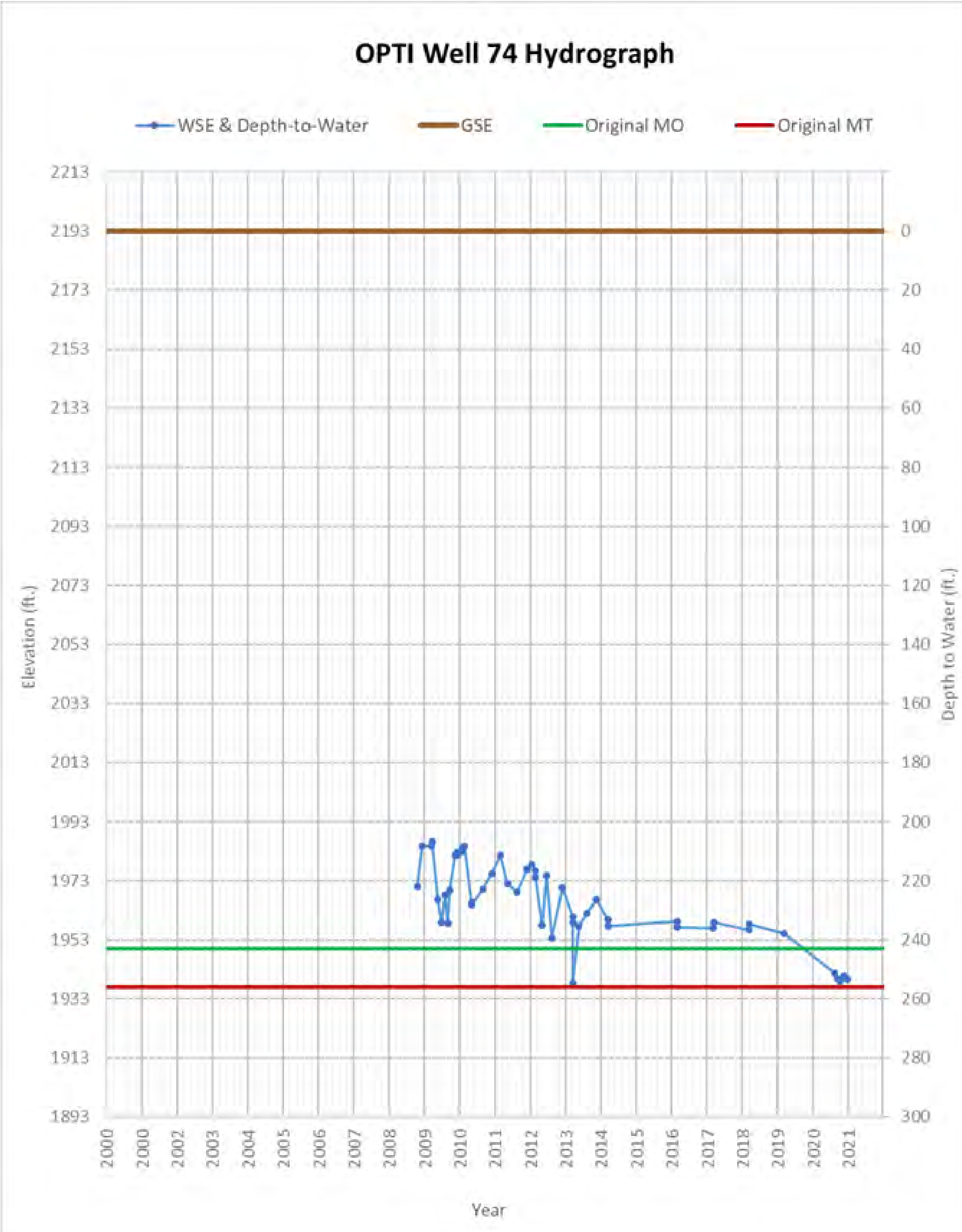


**Figure 2-10: Example Well Hydrographs – Central Region**


**Figure 2-11: Example Well Hydrographs – Central Region**

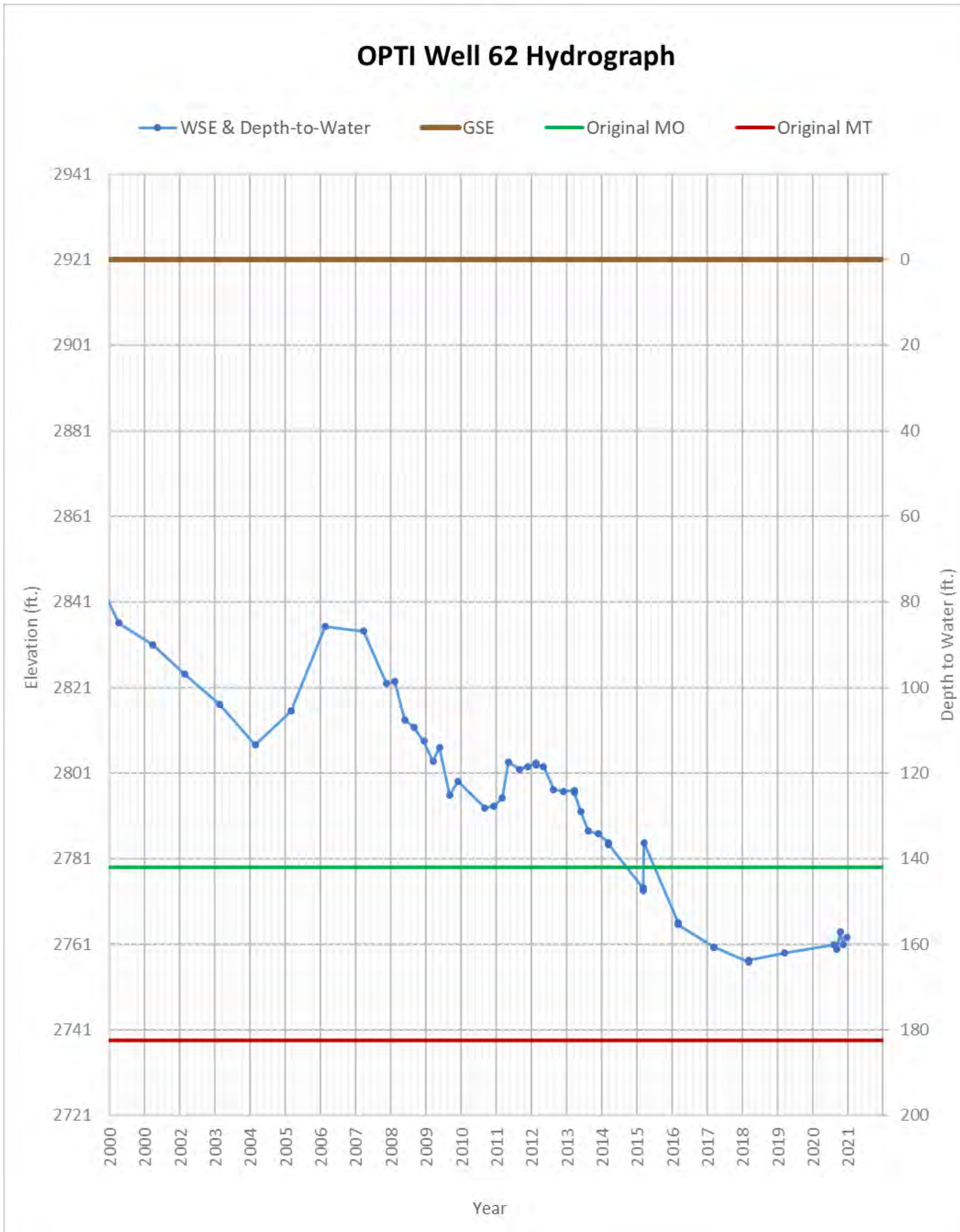


**Figure 2-12: Example Well Hydrographs – Eastern Region**

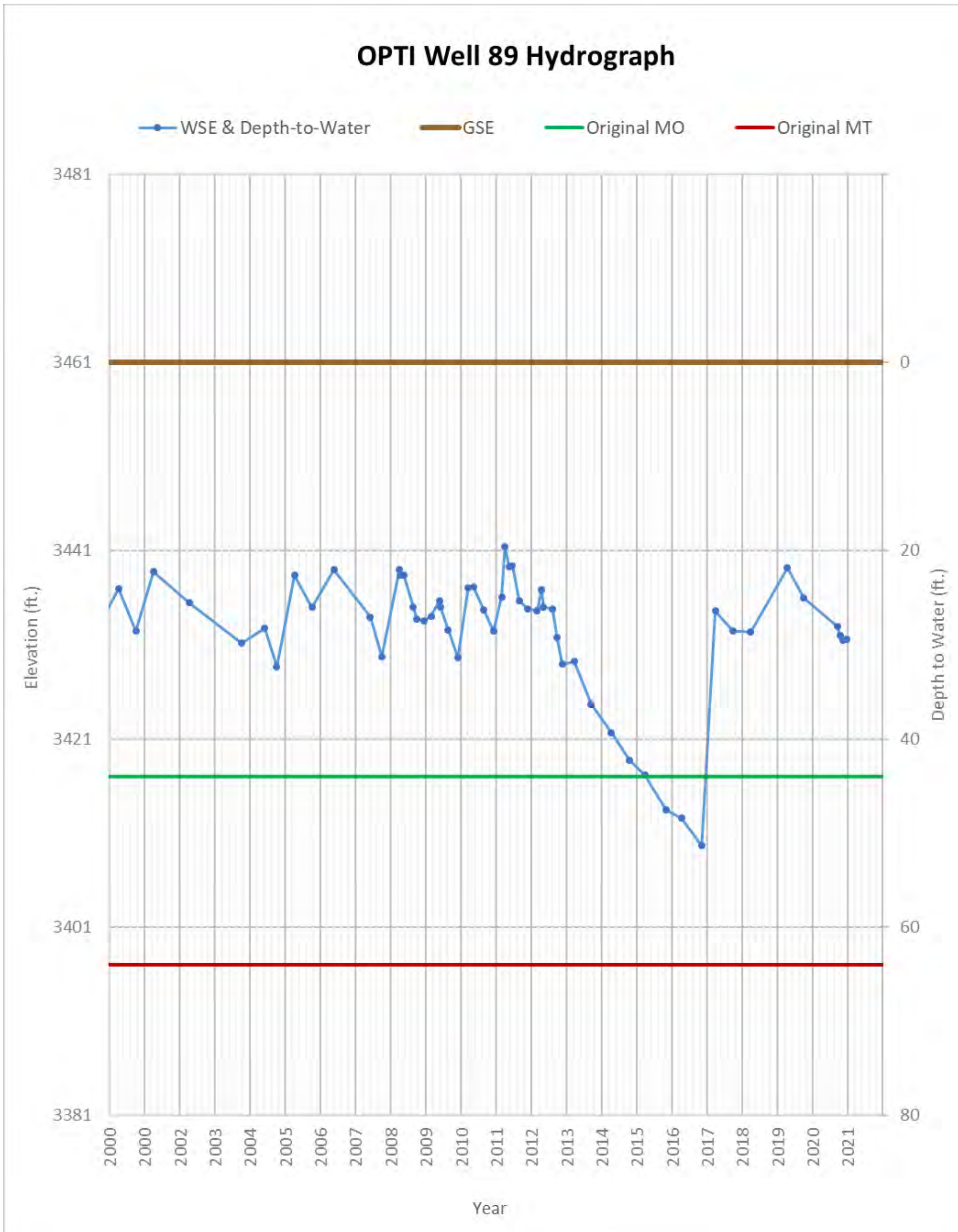


**Figure 2-13: Example Well Hydrographs – Southeastern Region**

# 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%. 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 2020 and 2021 Annual Reports, the CBWRM model was extended to include the 2018 through 2020 water years, utilizing updated land use, temperature and precipitation[4] data from those years.

**Figure 3-1** shows the annual time series of groundwater pumping for the water years 1998 through 2020. The CBWRM estimates the following total groundwater extraction amounts in the Cuyama Basin in the 2018 through 2020 water years:

- 2018 Water Year: 59,900 acre-feet (AF)
- 2019 Water Year: 46,500 AF
- 2020 Water Year: 53,600 AF

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.

[4] It should be noted that 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.

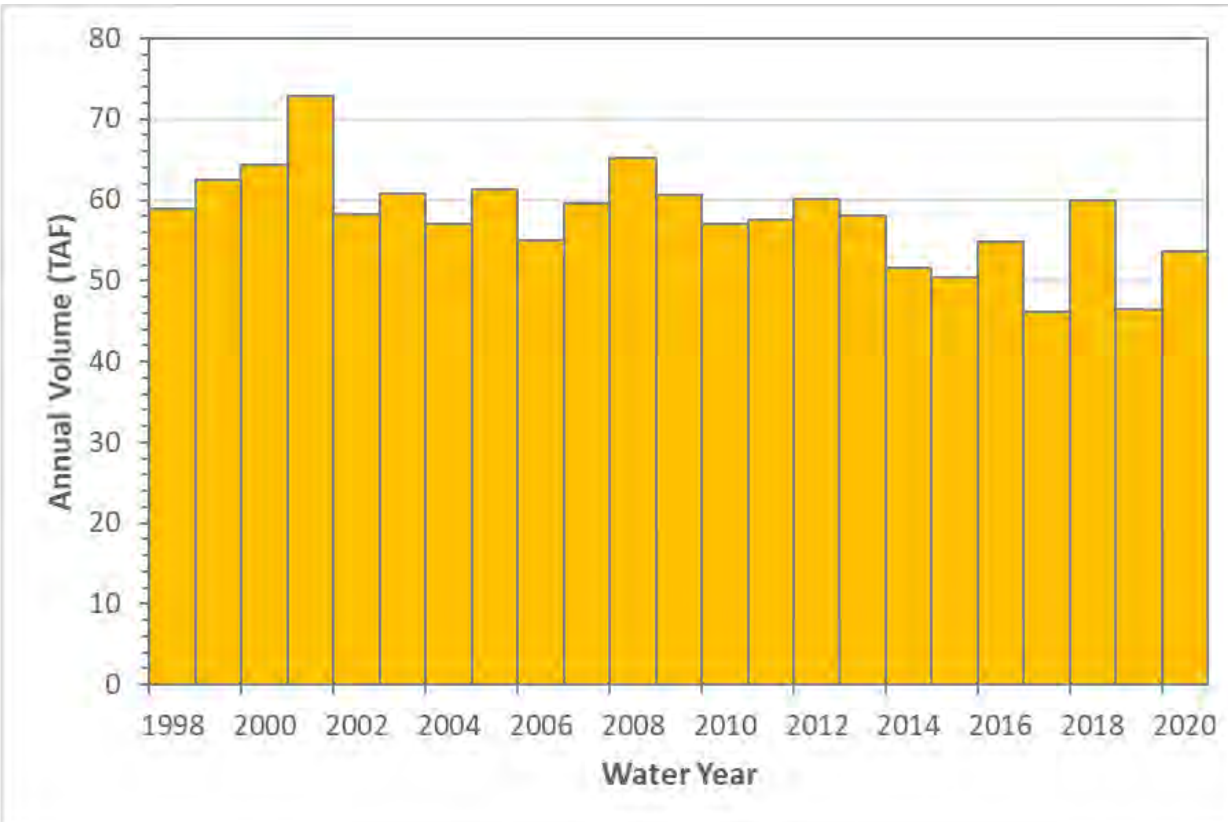


**Figure 3-1: Annual Groundwater Extraction in the Cuyama Basin in Water Years 1998-2019**

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

## 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.

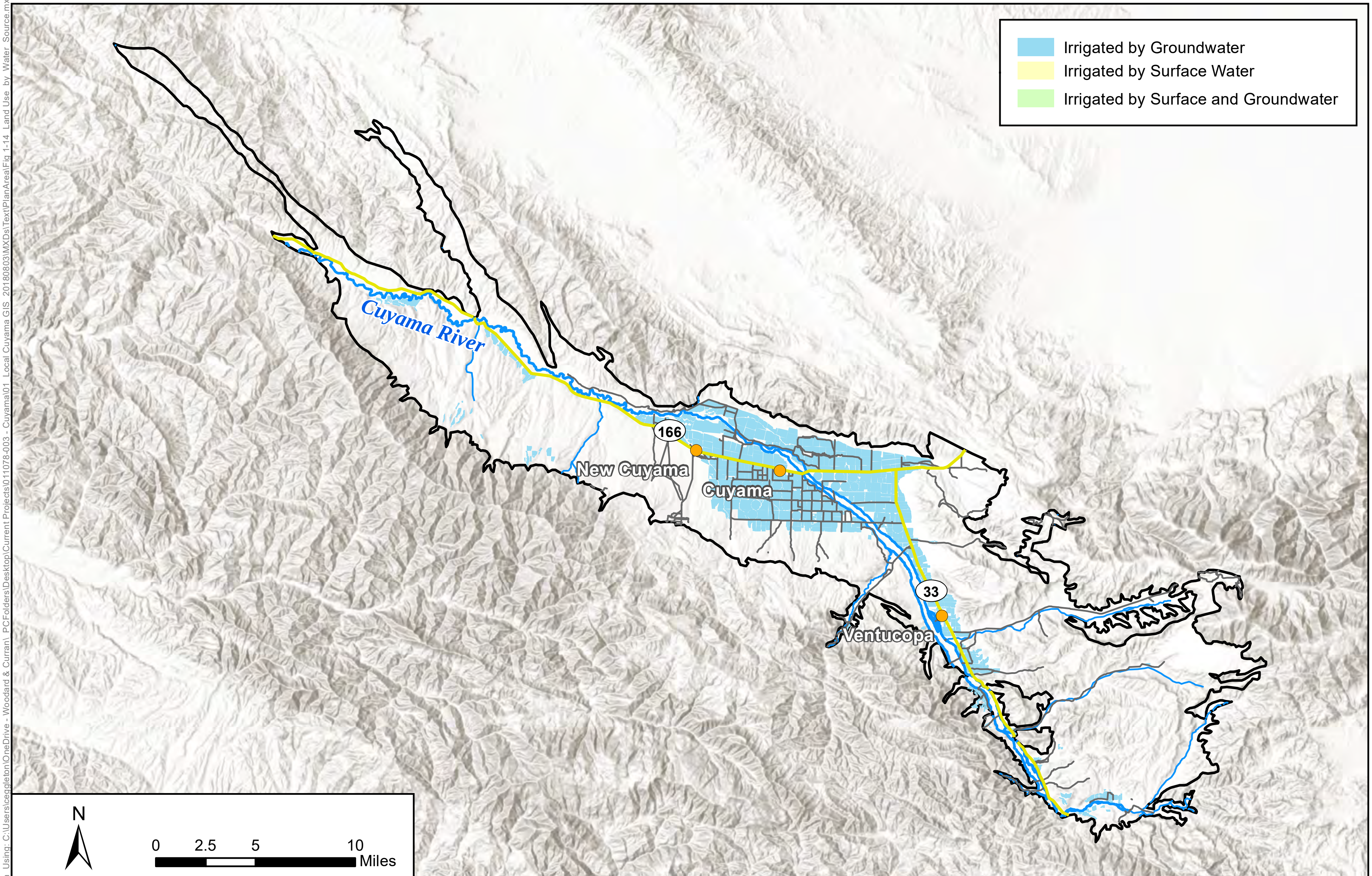


**Figure 3-2 - Land Use by Water Source**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

March 2021

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*Legend*

- Cuyama Basin
- Towns
- Highways
- Local Roads
- Cuyama River
- Streams/Creeks

Source: California Department of Water Resources Statewide Crop Mapping, 2016 dataset.
https://gis.water.ca.gov/app/CADWRLandUseViewer/

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# 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 2019 and 2020. The changes shown are based on historical measurements of groundwater elevations in Cuyama Basin representative wells that have recorded measurements in each year. Since the Cuyama Basin monitoring network was implemented and the GSA started collected data in 2020, the change in groundwater levels are based on only a limited number of wells, especially in the Central Basin. It is expected that the estimated annual change in groundwater levels can be improved in the future as refinements to the monitoring network are finalized and more data is measured through the GSA.

A quantitative estimate of the annual change in groundwater storage was estimated using the CBWRM model, which was extended to include the 2019 through 2020 water years 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 year are shown in **Table 4-1**. The CBWRM estimates reductions in groundwater storage of 14,800 AF in 2019, and 23,600 AF in 2020.

**Table 4-1: Groundwater Budget Estimates for Water Years 2019 and 2020**

| Component | Water Year 2019 (AFY) | Water Year 2020 (AFY) |
|---|---|---|
| **Inflows** | | |
| Deep percolation | 26,200 | 25,700 |
| Stream seepage | 3,900 | 2,800 |
| Subsurface inflow | 1,600 | 1,500 |
| Total Inflow | 31,700 | 30,000 |
| **Outflows** | | |
| Groundwater pumping | 46,500 | 53,600 |
| Total Outflow | 46,500 | 53,600 |
| **Change in Storage** | **-14,800** | **-23,600** |

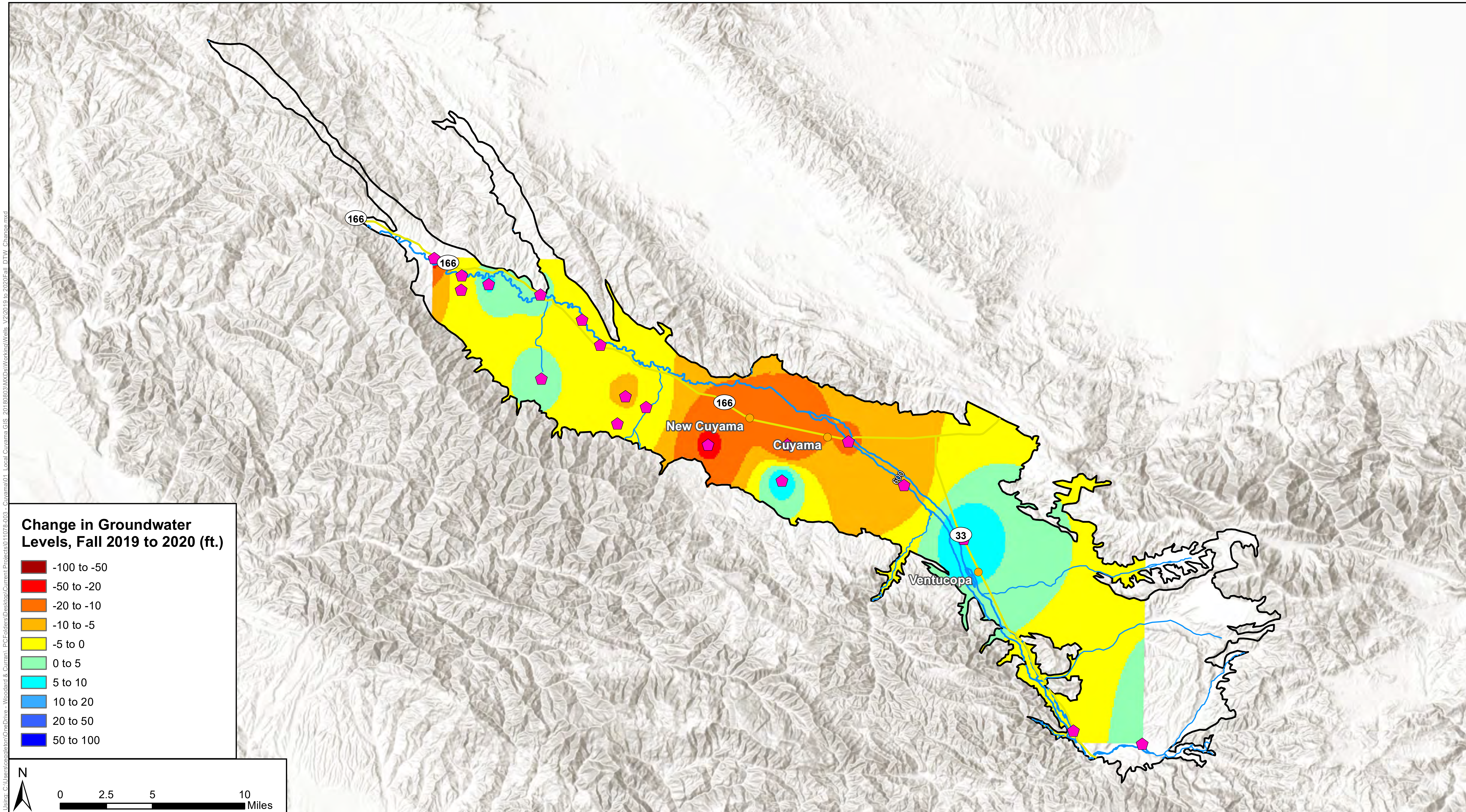


**Figure 4-1: Cuyama GW Basin Fall 2019 to 2020 GWL Change**

Cuyama Basin Groundwater Sustainability Agency

Cuyama Valley Groundwater Basin Groundwater Sustainability Plan

March 2021

WOODARD & CURRAN

*Legend*

- Cuyama Basin
- Cuyama River
- Fall 2019-2020 Overlapping Wells

Rasters have been developed as an estimation tool. Areas of overlapping interpolation data for Fall 2019 and Fall 2020 are interpolated using data measured from September 1st and November 30th of each year due to limiated data avilability. It should be noted this information should be used with individual well hydrographs to make a more informative analysis of groundwater conditions.

**Figure 4-2** shows the historical change in groundwater storage by year, water year type,[5] and cumulative water volume in each year for the period from 1998 through 2020. 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.

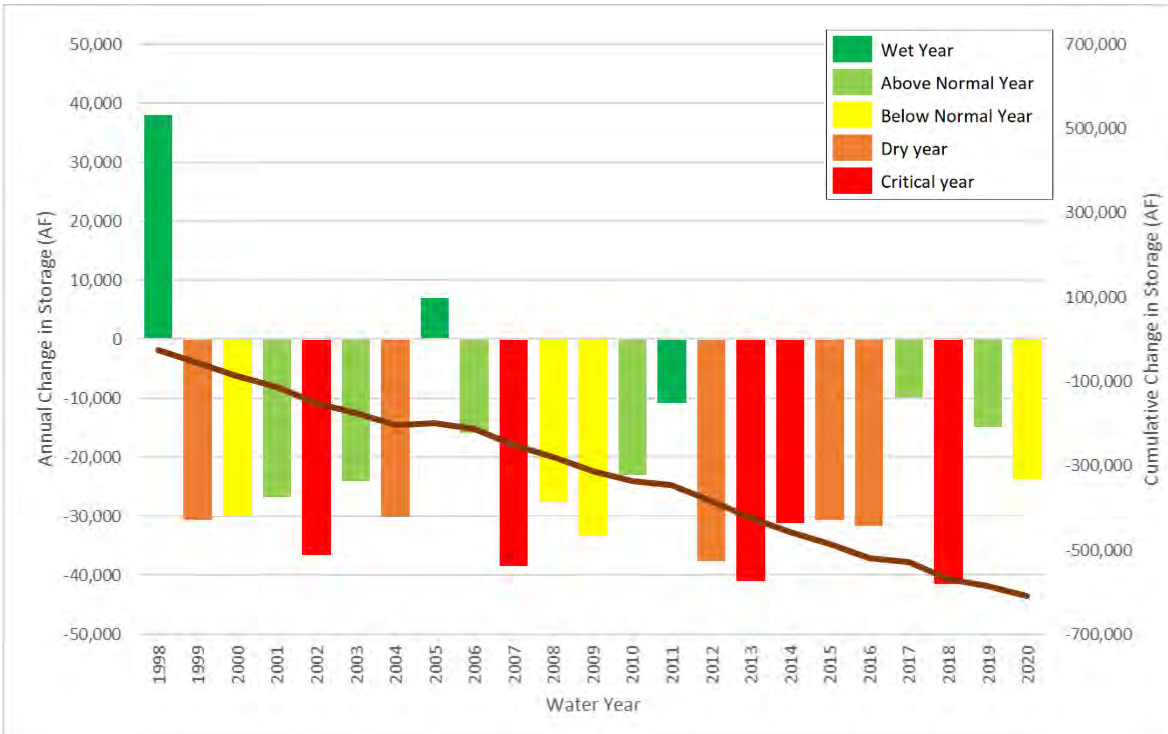


**Figure 4-2: Change in Groundwater Storage by Year, Water Year Type, and Cumulative Water Volume**

[5] 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.

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# 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, all of which are representative. Because the CBGSA is still in the initial phases of plan implementation, groundwater quality data has just started to be collected in early 2021. At the time of this report, results from the first samples have not yet been received. The CBGSA expects to provide additional information and data in the next Annual Report.

# 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, a result that causes significant and unreasonable reduction in the viability of the uses of infrastructure over the planning and implementation horizon. This result 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 2020 was downloaded from UNAVCO[6] and the subsidence trend for CUHS was recalculated. Current subsidence rates in the central portion of the Basin are now -16.9 mm per year or -0.67 inches per year. This is rate is still below the minimum threshold, and thus undesirable results for subsidence are not occurring in the Basin.

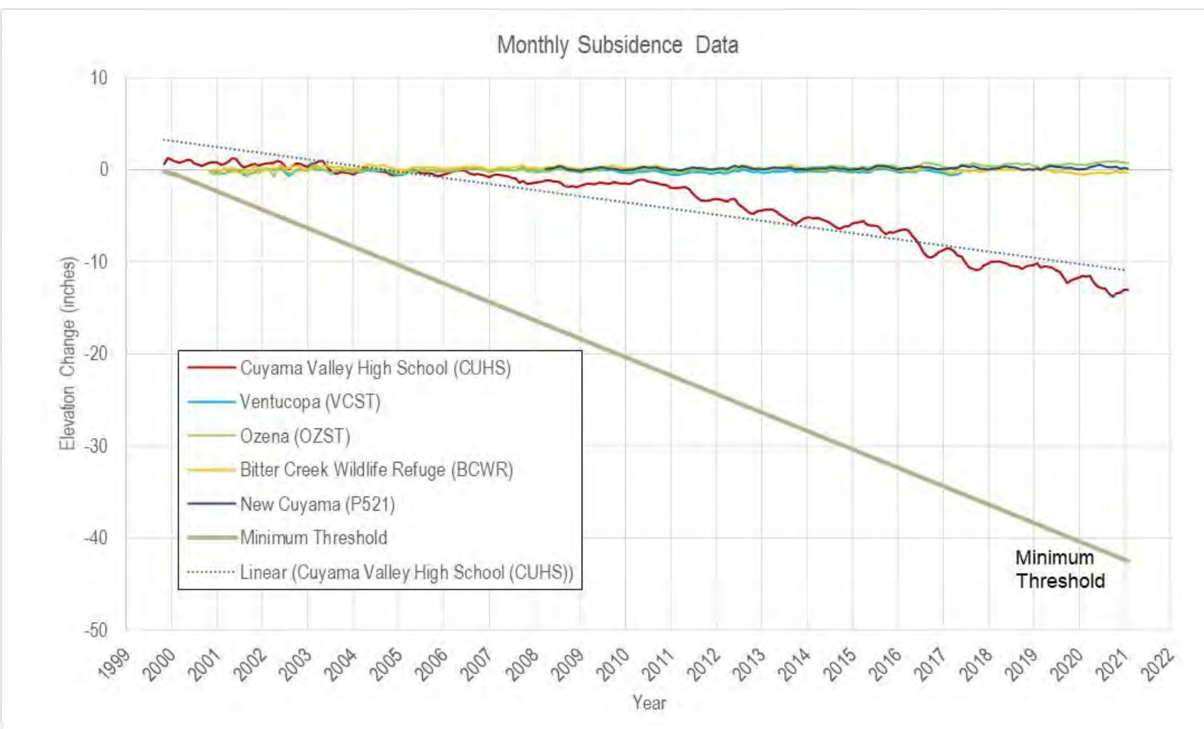


**Figure 6-1: Subsidence Monitoring Data**

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

# 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 monthly groundwater condition reports based on the data collected to monitoring groundwater levels. Current data collection occurs monthly with corresponding reports, however, at its January 2021 meeting, the CBGSA Board determined to shift to quarter monitoring in the near future after refinements to the monitoring network are finalized.

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) taken in November and December of 2020 at each well and compares them to their respective 2025 IMs. As is shown in the table, 33 wells are currently above their IM, while 16 are below, relative to the most recent measurement. Eleven wells did not have data available either in November or December, either because an access agreement has not granted, or the well was inaccessible. As there are still four year before 2025, the CBGSA will use its regular groundwater condition reports to closely monitor the Basin's progress towards sustainability and its IMs.

**Table 7-1: Measured Depths to Groundwater in November & December 2020 Compared to 2025 Interim Milestones**

| Well | Region | Nov-20 DTW (feet) | Dec-20 DTW (feet) | 2025 IM (feet) | Status |
|---|---|---|---|---|---|
| 72 | Central | - | - | 169 | Unknown |
| 74 | Central | 252 | 253 | 256 | Above IM |
| 77 | Central | 471 | 467 | 450 | Below IM |
| 91 | Central | 656 | 680 | 625 | Below IM |
| 95 | Central | 596 | 595 | 573 | Below IM |
| 96 | Central | 335 | 334 | 333 | Below IM |
| 98 | Central | - | - | 450 | Unknown |
| 99 | Central | 293 | 293 | 311 | Above IM |
| 102 | Central | 328 | - | 235 | Below IM |
| 103 | Central | 319 | 301 | 290 | Below IM |
| 112 | Central | 84 | - | 87 | Above IM |
| 114 | Central | 46 | - | 47 | Above IM |
| 316 | Central | 657 | 656 | 623 | Below IM |
| 317 | Central | 657 | 655 | 623 | Below IM |
| 322 | Central | 294 | 292 | 307 | Above IM |
| 324 | Central | 296 | 293 | 311 | Above IM |
| 325 | Central | 294 | 292 | 300 | Above IM |
| 420 | Central | 473 | 468 | 450 | Below IM |
| 421 | Central | 476 | 470 | 446 | Below IM |
| 422 | Central | - | - | 444 | Unknown |
| 474 | Central | 170 | - | 188 | Above IM |
| 568 | Central | 38 | 37 | 37 | Above IM |
| 604 | Central | 491 | 479 | 526 | Above IM |
| 608 | Central | 440 | 436 | 436 | Above IM |
| 609 | Central | 380 | 365 | 458 | Above IM |
| 610 | Central | 626 | 622 | 621 | Below IM |
| 612 | Central | 460 | 467 | 463 | Below IM |
| 613 | Central | 516 | 514 | 503 | Below IM |
| 615 | Central | 491 | 505 | 500 | Below IM |
| 620 | Central | 616 | 618 | 606 | Below IM |
| 629 | Central | 559 | 556 | 559 | Above IM |

| Well | Region | Nov-20 DTW (feet) | Dec-20 DTW (feet) | 2025 IM (feet) | Status |
|---|---|---|---|---|---|
| 633 | Central | 563 | 561 | 547 | Below IM |
| 62 | Eastern | 160 | 158 | 182 | Above IM |
| 85 | Eastern | 204 | 202 | 233 | Above IM |
| 100 | Eastern | 154 | 151 | 181 | Above IM |
| 101 | Eastern | 111 | 109 | 111 | Above IM |
| 840 | Northwestern | - | - | 203 | Unknown |
| 841 | Northwestern | 86 | 77 | 203 | Above IM |
| 843 | Northwestern | - | - | 203 | Unknown |
| 845 | Northwestern | 66 | 63 | 203 | Above IM |
| 849 | Northwestern | - | - | 203 | Unknown |
| 2 | Southeastern | 30 | 31 | 72 | Above IM |
| 89 | Southeastern | 30 | 30 | 64 | Above IM |
| 106 | Western | 143 | 143 | 154 | Above IM |
| 107 | Western | 83 | 83 | 91 | Above IM |
| 108 | Western | - | - | 165 | Unknown |
| 117 | Western | - | - | 160 | Unknown |
| 118 | Western | 56 | 56 | 124 | Above IM |
| 123 | Western | - | - | 31 | Unknown |
| 124 | Western | - | - | 73 | Unknown |
| 127 | Western | - | - | 42 | Unknown |
| 571 | Western | 120 | 120 | 144 | Above IM |
| 573 | Western | 71 | - | 118 | Above IM |
| 830 | Far-West Northwestern | 56 | 56 | 59 | Above IM |
| 831 | Far-West Northwestern | 38 | 52 | 77 | Above IM |
| 832 | Far-West Northwestern | 38 | 38 | 45 | Above IM |
| 833 | Far-West Northwestern | 27 | - | 96 | Above IM |
| 834 | Far-West Northwestern | 40 | 41 | 84 | Above IM |
| 835 | Far-West Northwestern | 36 | 37 | 55 | Above IM |
| 836 | Far-West Northwestern | 36 | 38 | 79 | Above IM |

## 7.2 Funding to Support GSP Implementation

On November 6, 2019, the CBGSA Board approved the implementation of a groundwater extraction fee to fund the CBGSA administration and implementation activities for 2020. The $19 per acre-foot fee was based on model-estimated 2019 water use totaling 60,000 acre-feet (AF) and the Fiscal Year 2019-20 budget totaling $1,115,690. Water use and payments were submitted based on user-reported data and resulted in the collection of $585,536 representing water use totaling 30,711 AF. The under collection was due to an overrepresentation of water use in the model, and therefore, on August 13, 2020, the CBGSA approved a supplemental fee of $44 per AF to cover the Fiscal Year 20-21 period which resulted in the collection of $947,480.

Due to a combination of metered use and crop factor use being reported by users, the Board required the supplemental fee be based fully on evapotranspiration crop factors. This methodology resulted in user-reported water use of 25,357 AF. For FY 21-22, the CBGSA will likely continue to administer the annual fee based on crop factors, but meters are being required for all pumpers by December 31, 2021 and future fees may be based on actual pumping.

Additionally, the CBGSA applied for Proposition 68 SGM Implementation Grant funding from DWR in January of 2021 to support implementation activities including:

1. The installation of piezometers to better understand the infiltration of surface water flows into the groundwater aquifer and potential impacts of GSP actions on GDEs located in the Basin
2. Installation of ten dedicated multi-completion monitoring wells to provide groundwater level data needed to better understand how Basin water levels change in response to groundwater pumping and surface and subsurface flows
3. Enhancements of the DMS to report monitoring data and their relationship with sustainability indicators
4. Develop updated land use dataset for years 2018 to 2020 to better understand current and cyclical land use trends and to facilitate updating of water use estimates in the Basin
5. Correct issues with the current weather (CIMIS) station in the Basin and install additional weather stations to improve the accuracy and geographic coverage of precipitation and ET measurements
6. Perform short and long-term aquifer tests in portions of the Basin to improve understanding of hydrogeological conditions in areas of the Basin that the GSP identified as having limited information for characterization
7. Update the Cuyama Basin numerical model parameter values and calibration using the data provided by the above tasks and other recent CBGSA collected data
8. Utilize the updated numerical model to perform additional sustainability scenarios prior to implementation of GSP management actions to provide the information needed for optimal implementation of those actions
9. 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
10. 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

The total requested grant amount was $5,000,000. While the Cuyama Basin was not included in the draft list of grant awards, the Basin intends to seek alternate funding for the above activities going forward.

In addition, the Cuyama Community Services District received grant funding during 2020 from DWR's IRWM program to install a new ground water production well.

## 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 2020.

- CBGSA Board meetings: March 4, May 6, June 3, June 25, August 13, and November 4
- Standing Advisory Committee (SAC) meetings: February 27, April 30, May 28, June 25, August 13, and October 29

## 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 | Conceptual project evaluated in 2015 | • Feasibility study: 0 to 5 years<br>• Design/Construction: 5 to 15 years | • Study: $1,000,000<br>• Flood and Stormwater Capture Project: $600-$800 per AF ($2,600,000 – 3,400,000 per year) |
| Project 2: Precipitation Enhancement | Initial Feasibility Study completed in 2016 | • Refined project study: 0 to 2 years<br>• Implementation of Precipitation Enhancement: 0 to 5 years | • Study: $200,000<br>• 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<br>• Implementation in 5 to 15 years | • Study: $200,000<br>• Transfers/Exchanges: $600-$2,800 per AF (total cost TBD) |
| Project 4: Improve Reliability of Water Supplies for Local Communities | Preliminary studies/planning complete | • Feasibility studies: 0 to 2 years<br>• Design/Construction: 1 to 5 years | • Study: $100,000<br>• Design/Construction:<br>• $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 | Preliminary coordination begun | • Pumping Allocation Study completed: 2022<br>• Allocations implemented: 2023 through 2040 | • Plan: $300,000<br>• Implementation: $150,000 per year |
| Adaptive Management | Not yet begun | Only implemented if triggered; timing would vary | TBD |

| Activity | Current Status | Anticipated Timing | Estimated Cost[a] |
|---|---|---|---|
| [a] Estimated cost based on planning documents and professional judgment<br>AF = acre-feet | | | |

### 7.4.1 Project 1: Flood and Stormwater Capture

The CBGSA applied for Proposition 68 SGM Implementation Grant funding from DWR in January of 2021 which included tasks 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.

### 7.4.2 Project 2: Precipitation Enhancement

The CBGSA applied for Proposition 68 SGM Implementation Grant funding from DWR in January of 2021 which included tasks 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.

### 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.

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

As noted above, the CCSD received a grant award from DWR's IRWM program to install a new production well.

## 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

An agreement was executed between the CBGSA and CBWD for the CBWD to administer management actions in the Central Basin management area. Beyond that agreement, no significant actions have been taken toward implementation of this management action since completion of the GSP in January 2020.

## 7.6 Adaptive Management

No adaptive management activities have been conducted since completion of the GSP in January 2020.

## 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

As described in the previous annual report, on December 4, 2019, the CBGSA Board approved a task to begin implementation of the groundwater levels monitoring network. As part of this task, well information sheets were prepared for each well in the monitoring network to allow for implementation of regular monitoring at each well. This work was completed in early 2021, and now monthly groundwater data are collected at each well in the monitoring network.

As described in Section 2.1 above, the CBGSA has begun to refine the groundwater monitoring network to be more efficient, manageable, and economical for monitoring while retaining reliability and adequate representation of the Basin. The refined monitoring network is included in **Table 2-1** and **Figure 2-2**, and is anticipated to be in operation in 2021.

In addition, under a Category 1 grant from DWR, continuous monitoring equipment was installed in 10 additional wells in early 2021. These wells are also identified in **Table 2-1** and **Figure 2-2** shows the locations selected for installation.

The CBGSA has also approved applications to be submitted to DWR's Technical Support Services (TSS) for installation of three new multi-completion monitoring wells within the Basin and is actively coordinating with DWR for the installation of these new wells.

Finally, the CBGSA intends to complete its survey of all the groundwater level monitoring network wells in 2021. This includes re-measuring latitudes, longitudes, elevations, and other metadata associated with each well. Groundwater level measurement data collected before this survey will be adjusted and reuploaded to DWR after surveying is complete to adequate reflect the difference in elevations caused because of the difference between the reference point elevation and ground surface elevation. This is something the CBGSA is fully aware of, and it is understood that groundwater levels may adjust by up to approximately 1-2 feet for some of the measurements.

### 7.7.2 Surface Water Monitoring Network

Under a Category 1 grant from DWR, it is expected that two new surface flow gages will be installed on the Cuyama River during 2021.

# 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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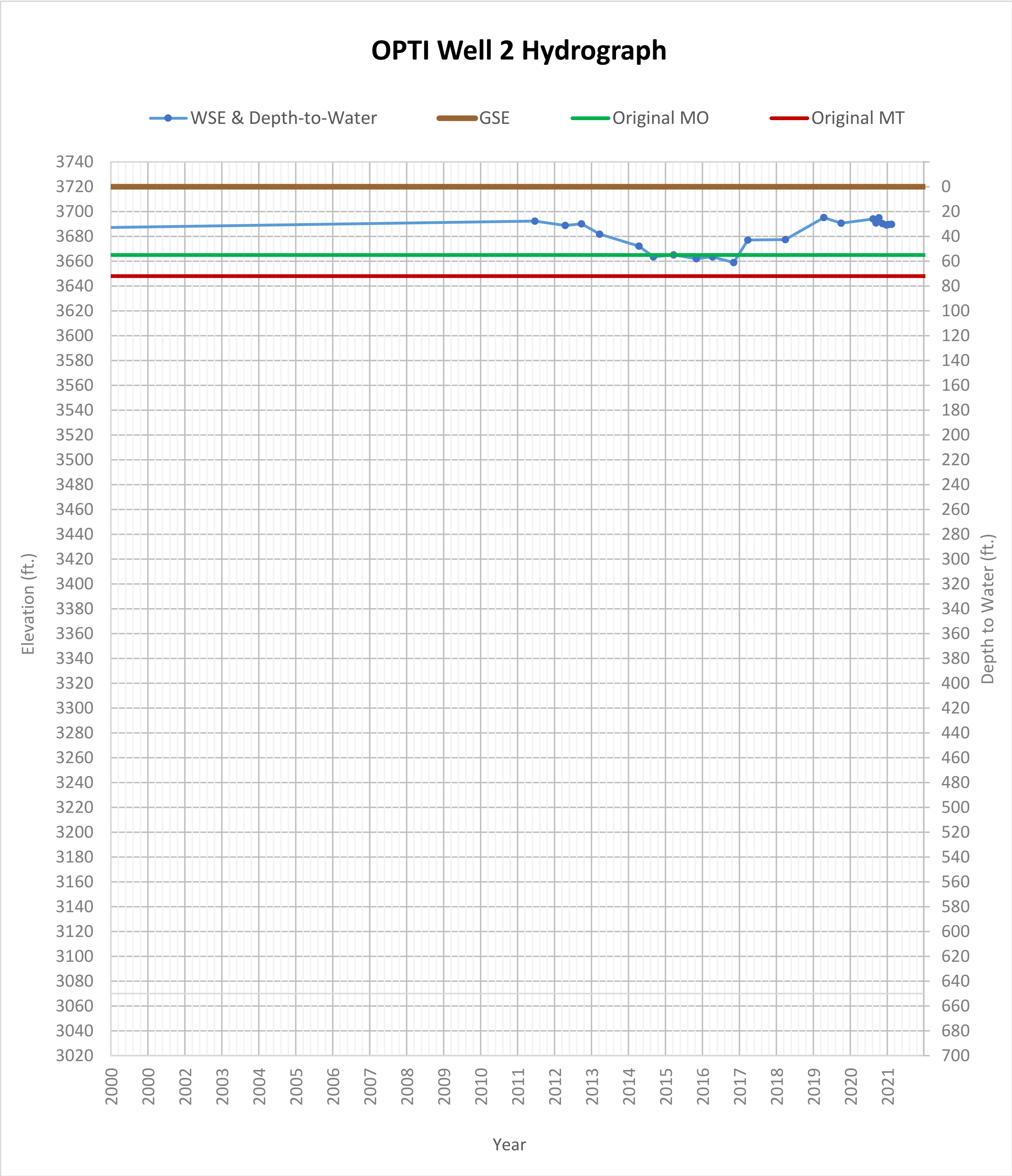
# Appendix A
# Updated Hydrographs for Representative Wells


OPTI Well 2 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
3740
3720
3700
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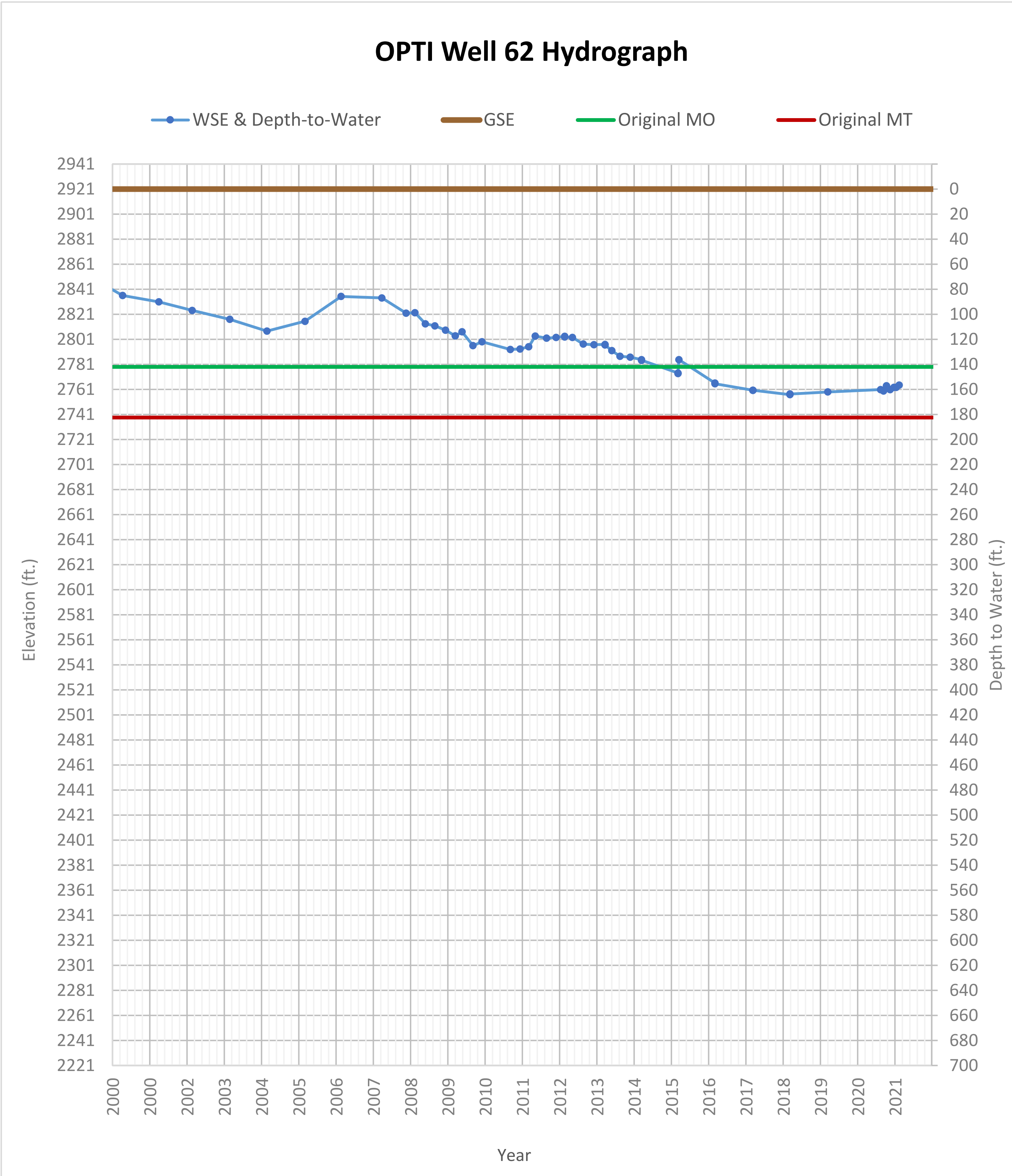
OPTI Well 62 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
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2941
2921
2901
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2861
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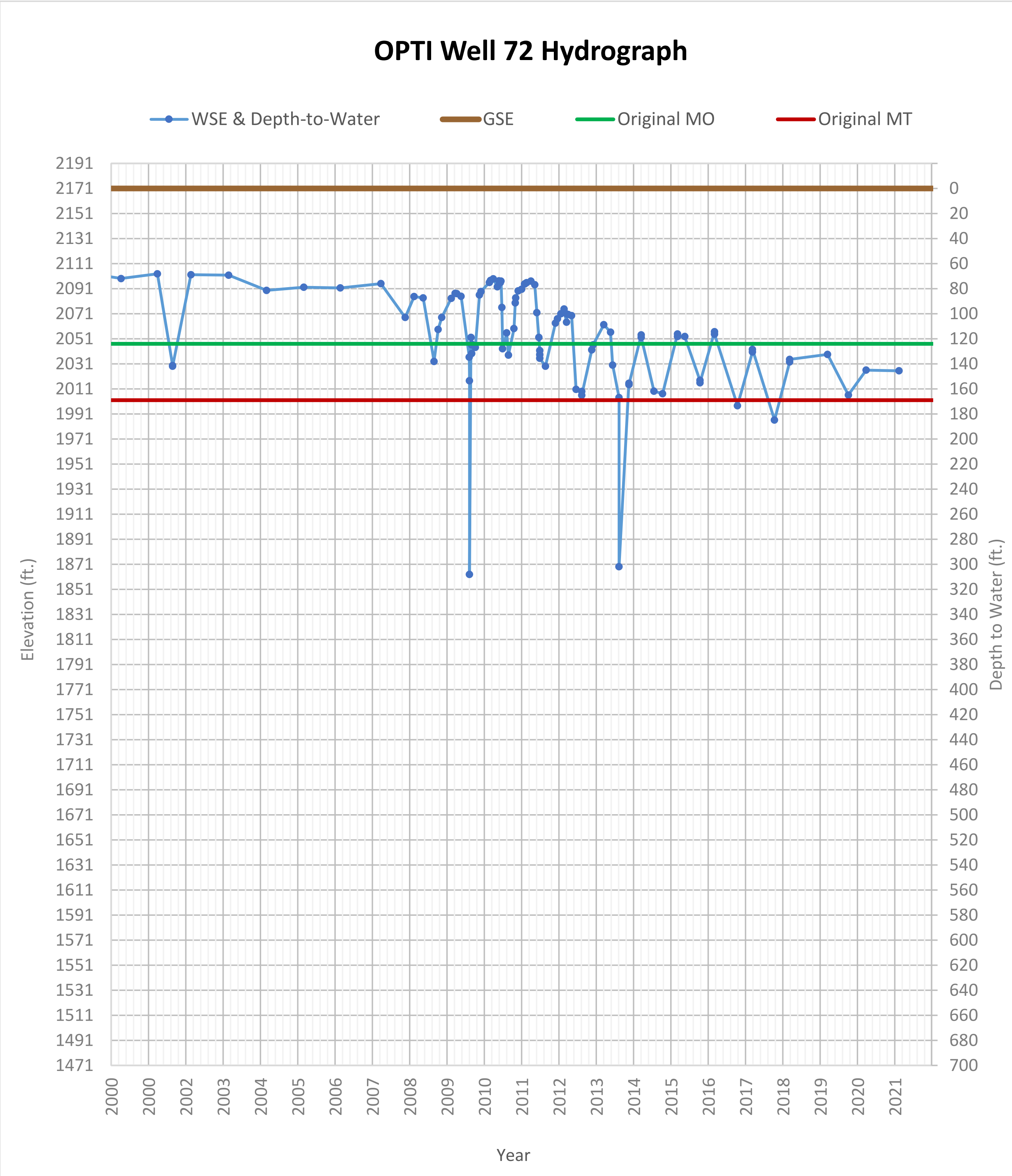
OPTI Well 72 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2191
2171
2151
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2111
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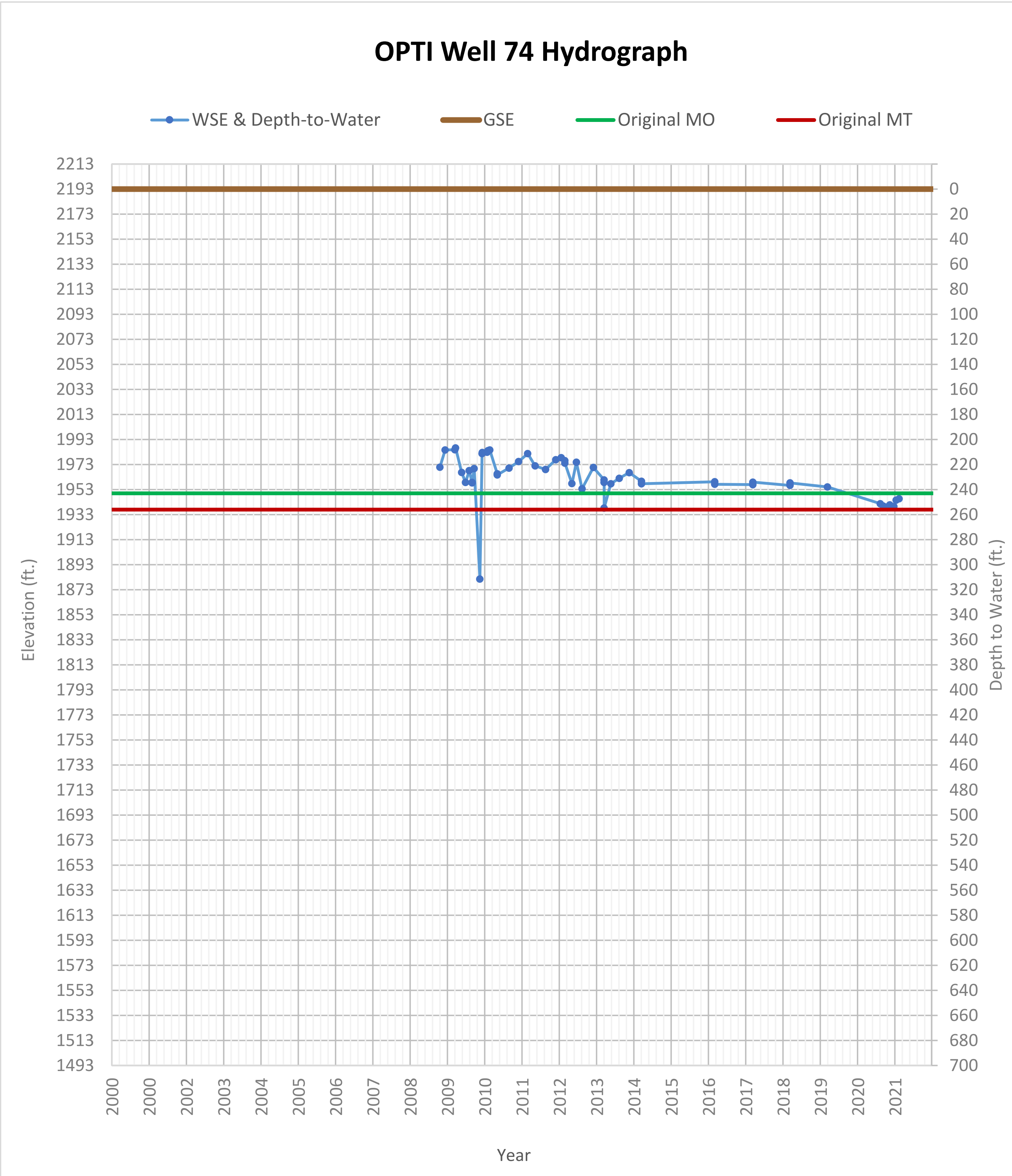
OPTI Well 74 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2213
2193
2173
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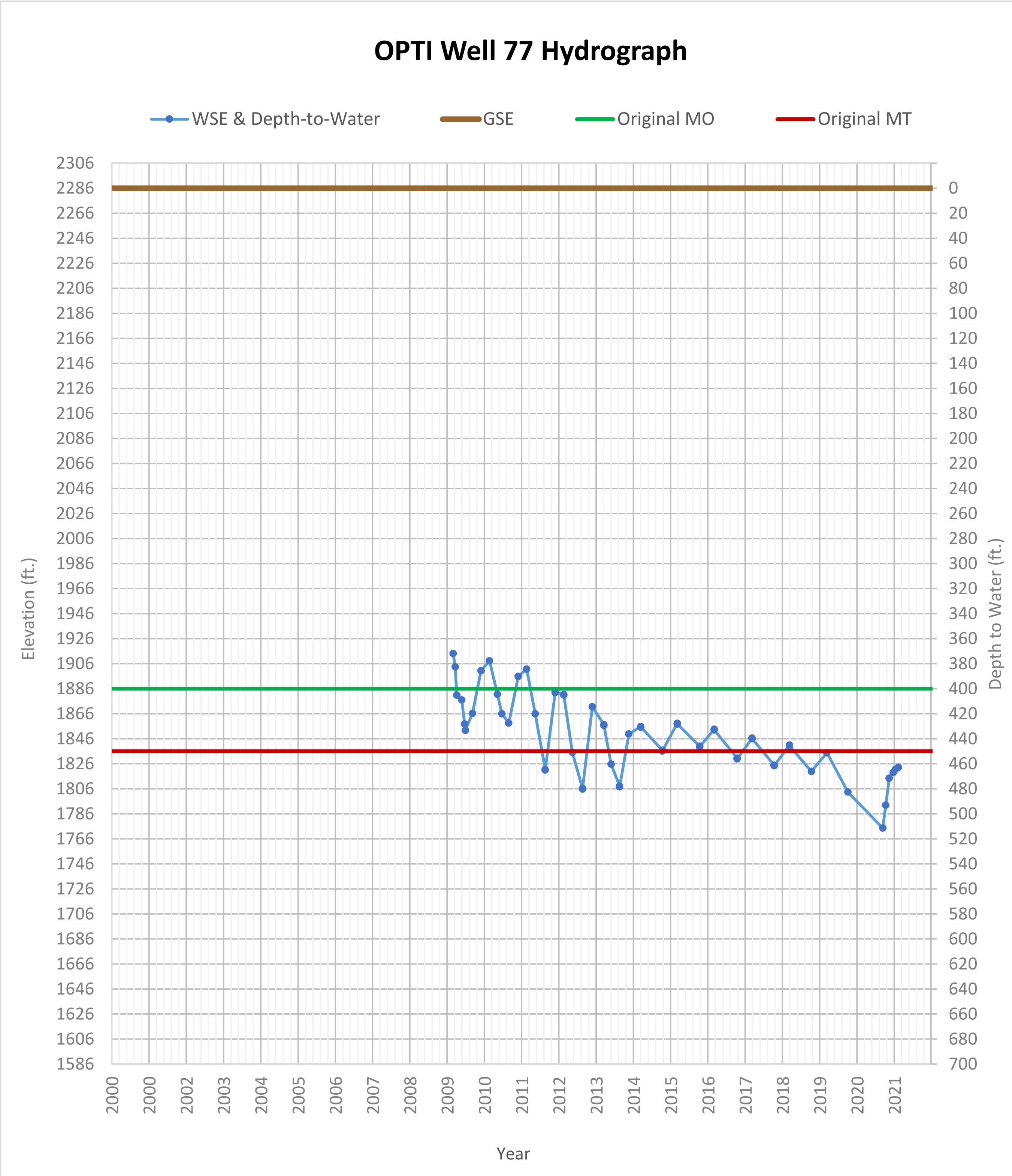

OPTI Well 77 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2306
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2246
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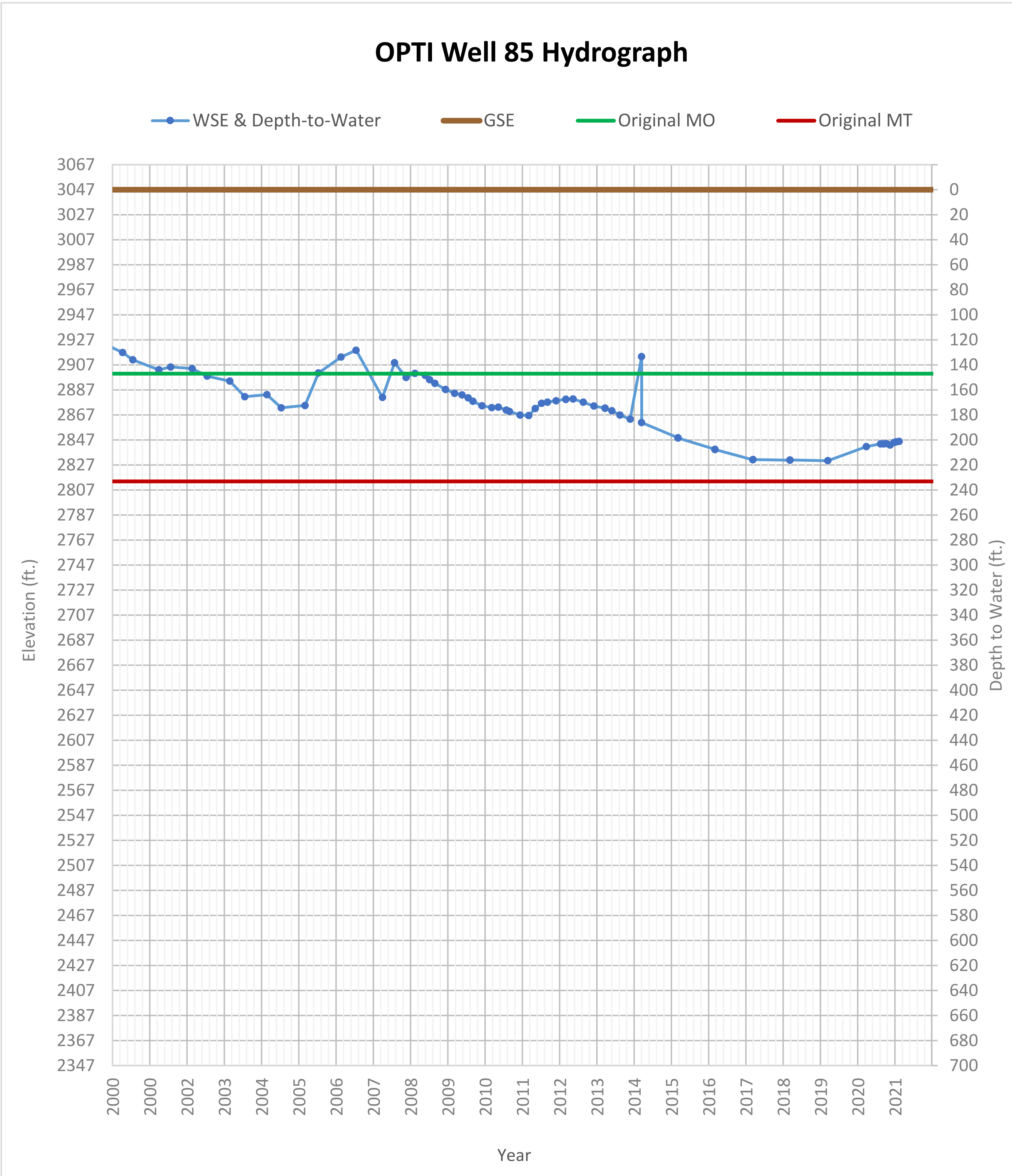

OPTI Well 85 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
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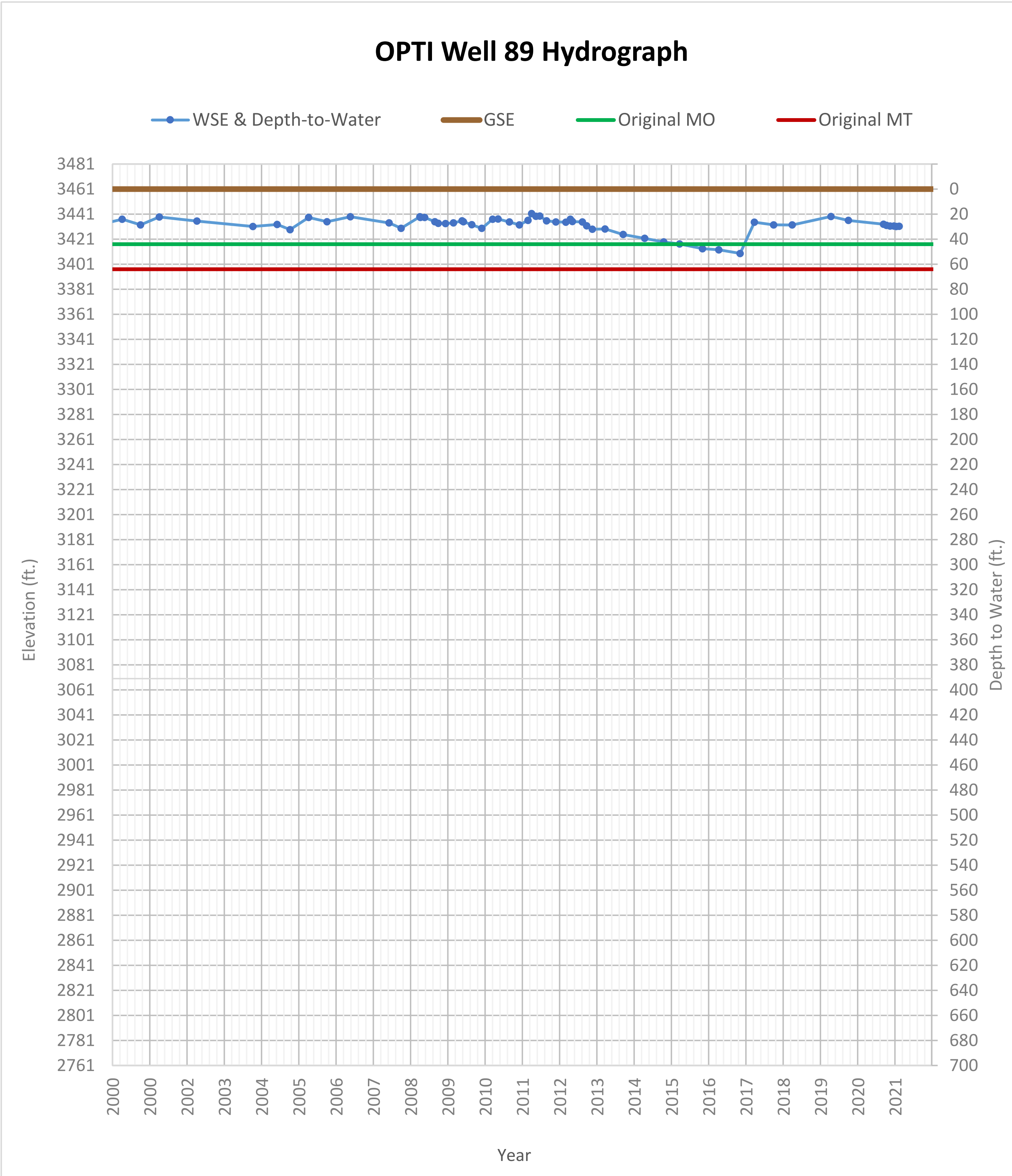
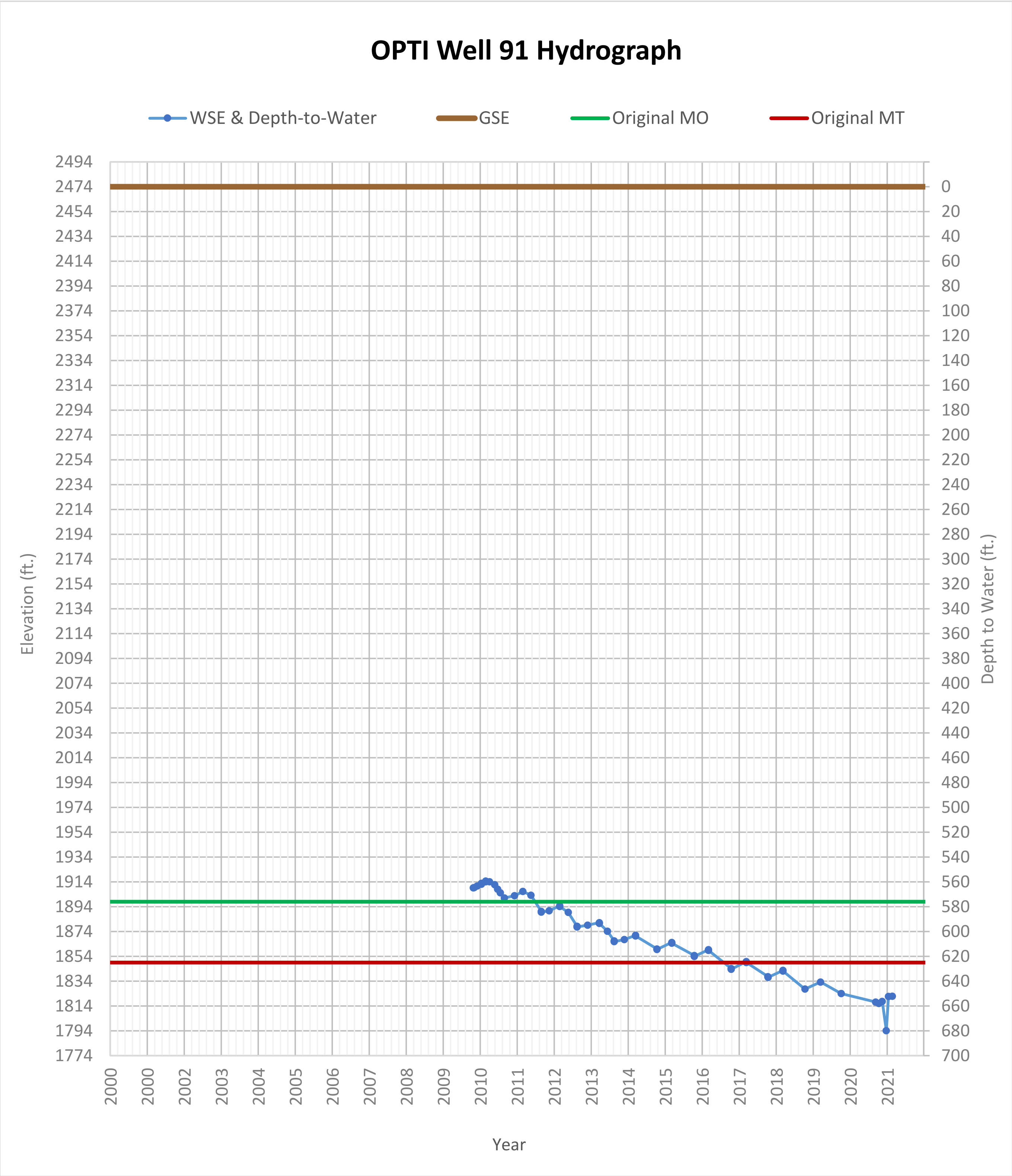

OPTI Well 89 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year



OPTI Well 91 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
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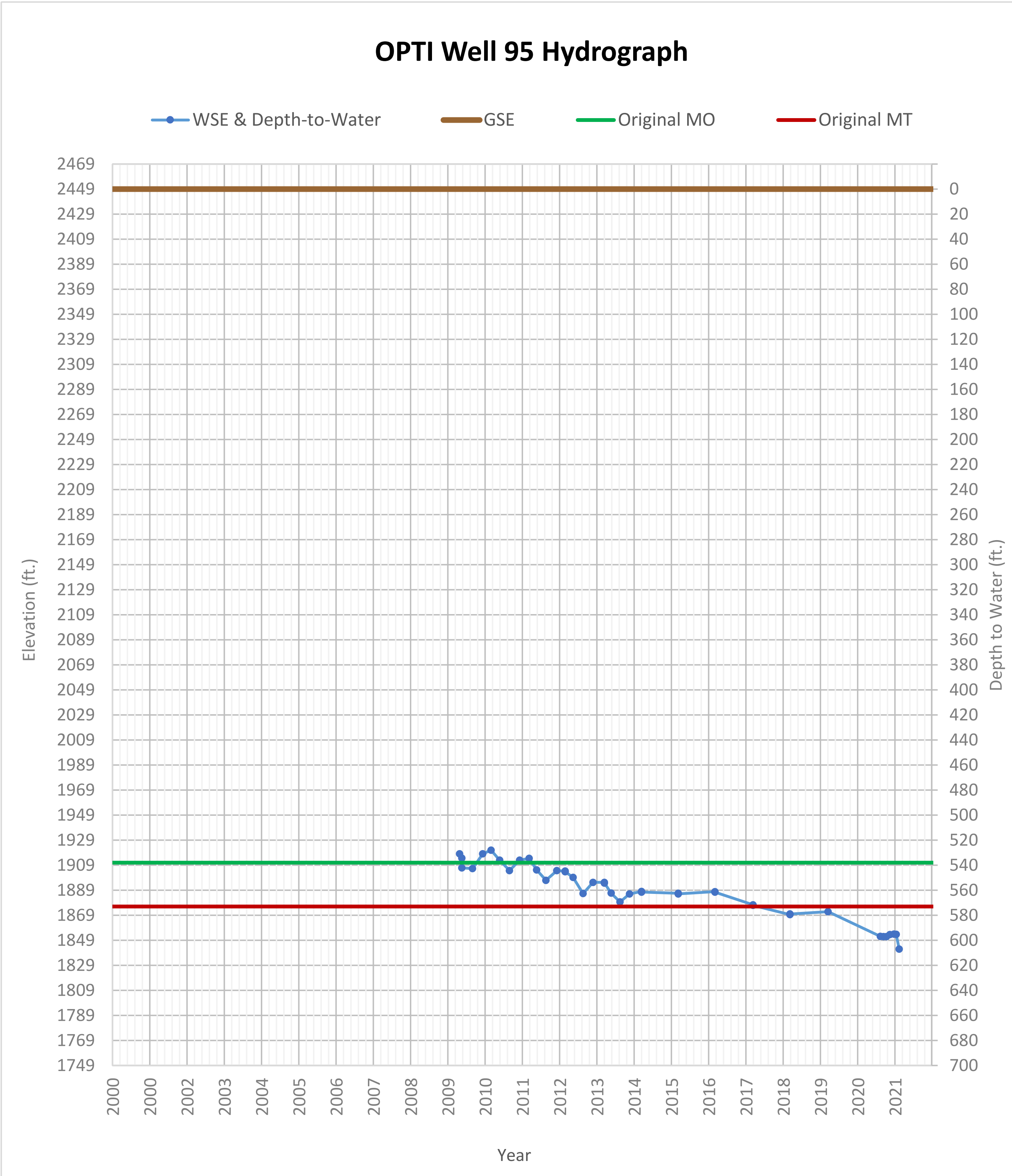

OPTI Well 95 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
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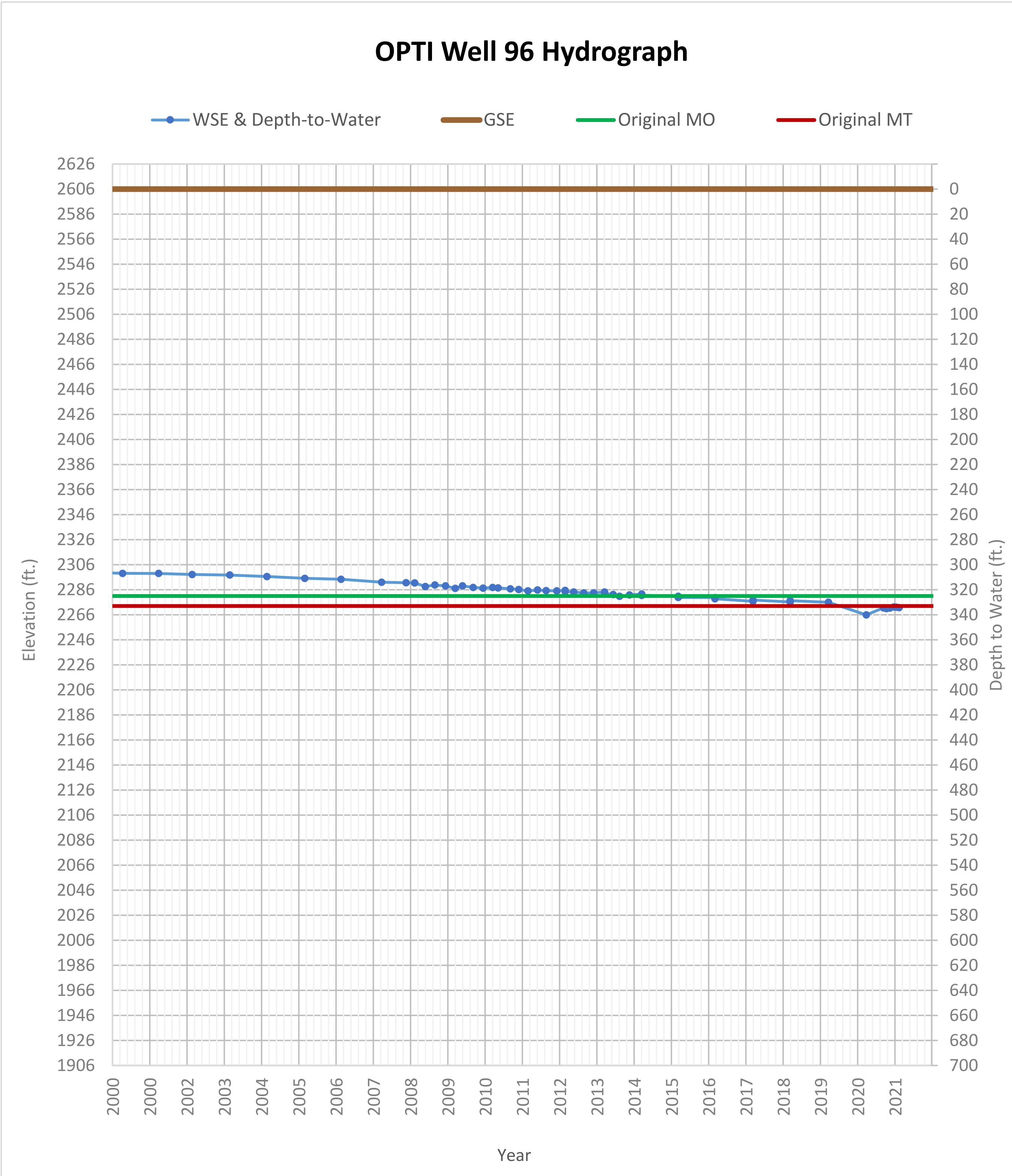
OPTI Well 96 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
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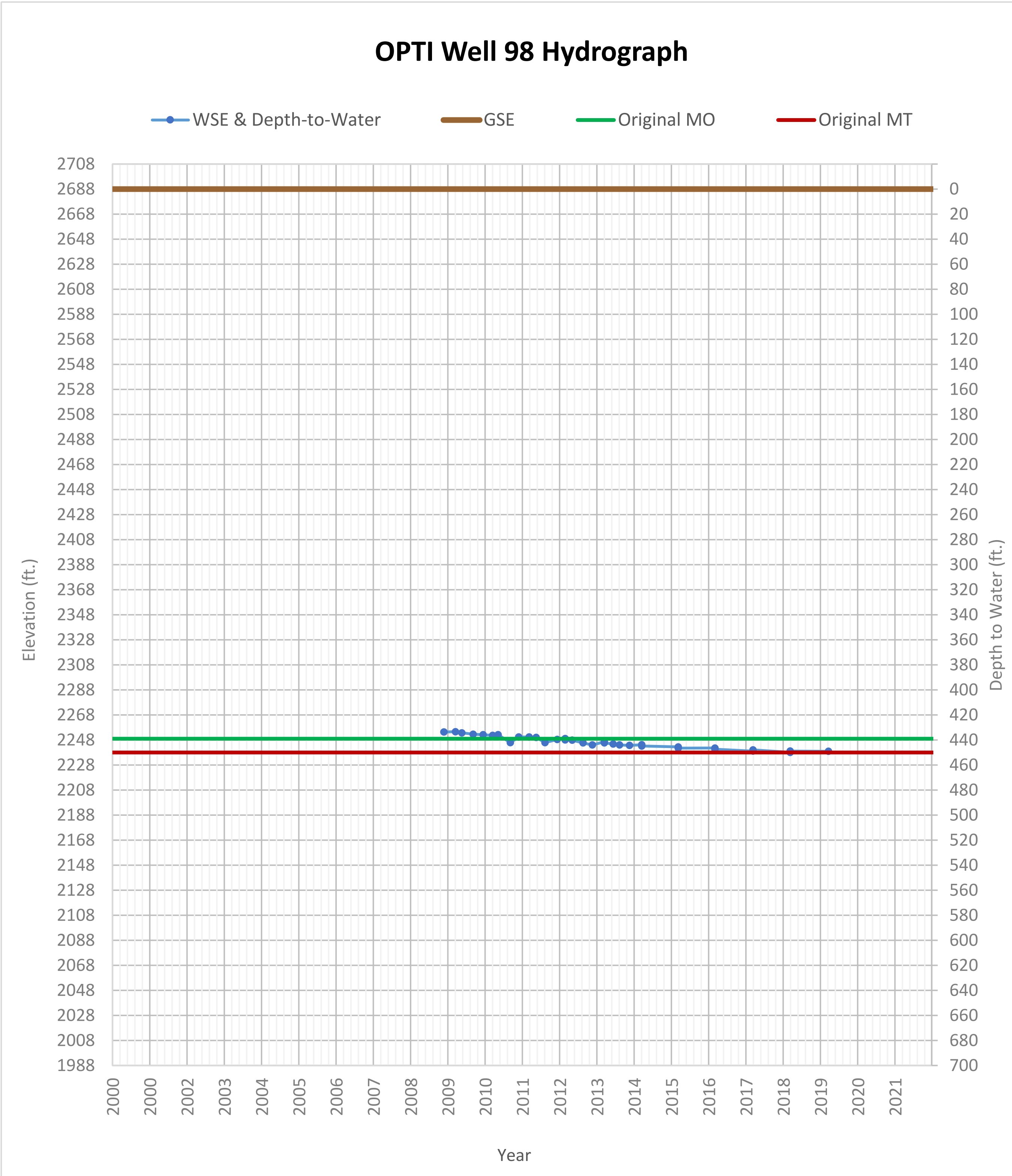
OPTI Well 98 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
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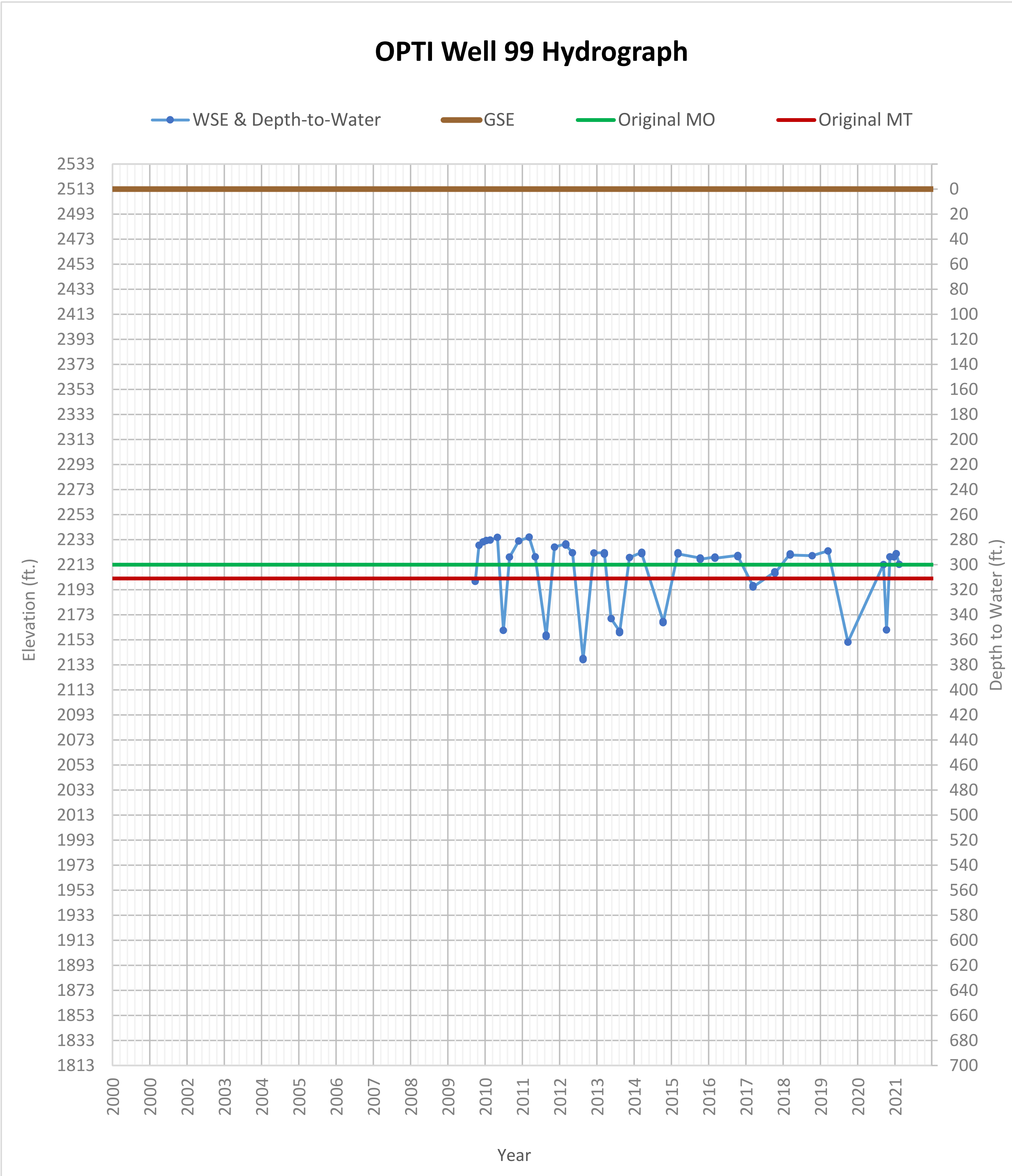

OPTI Well 99 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
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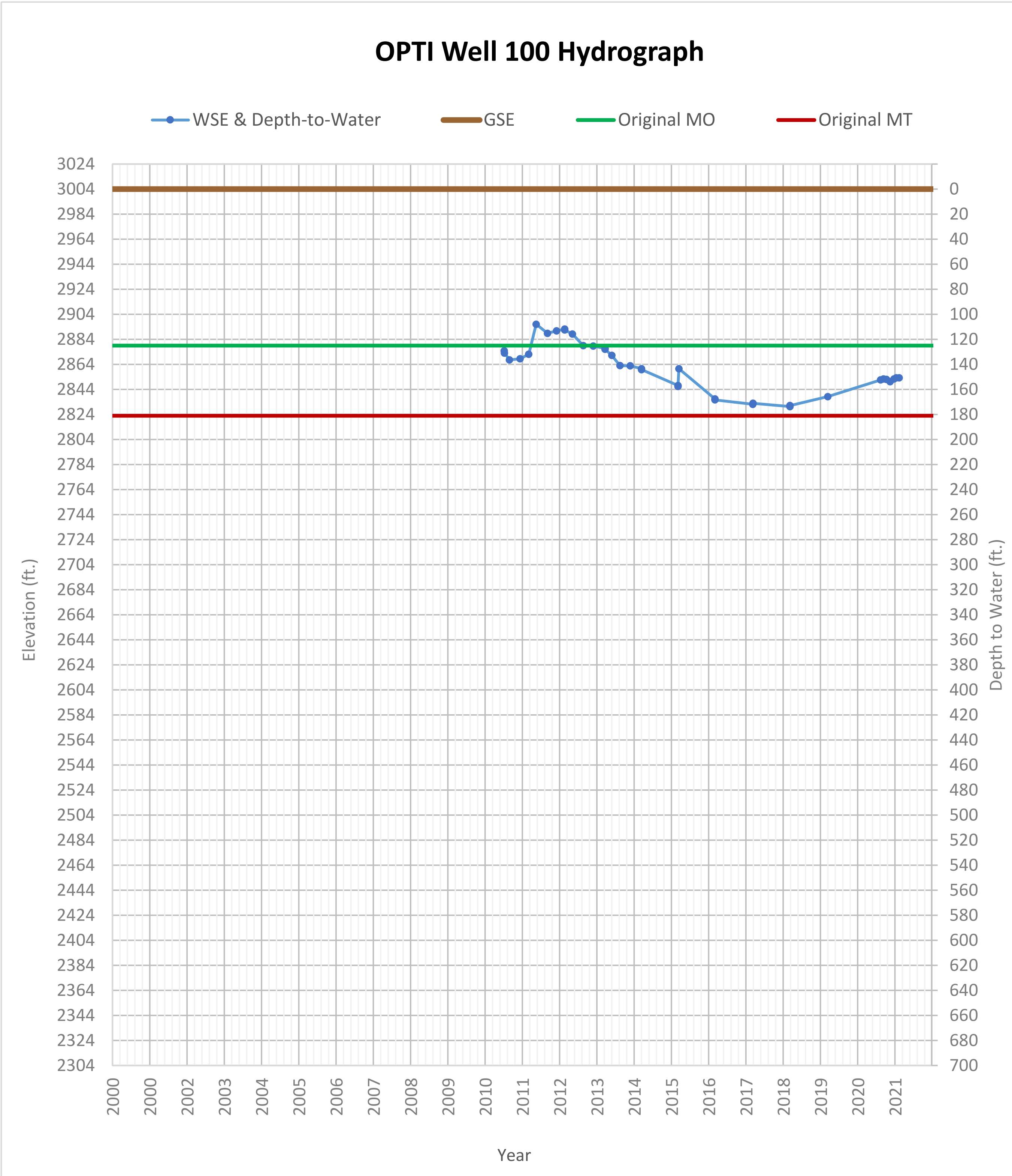
OPTI Well 100 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
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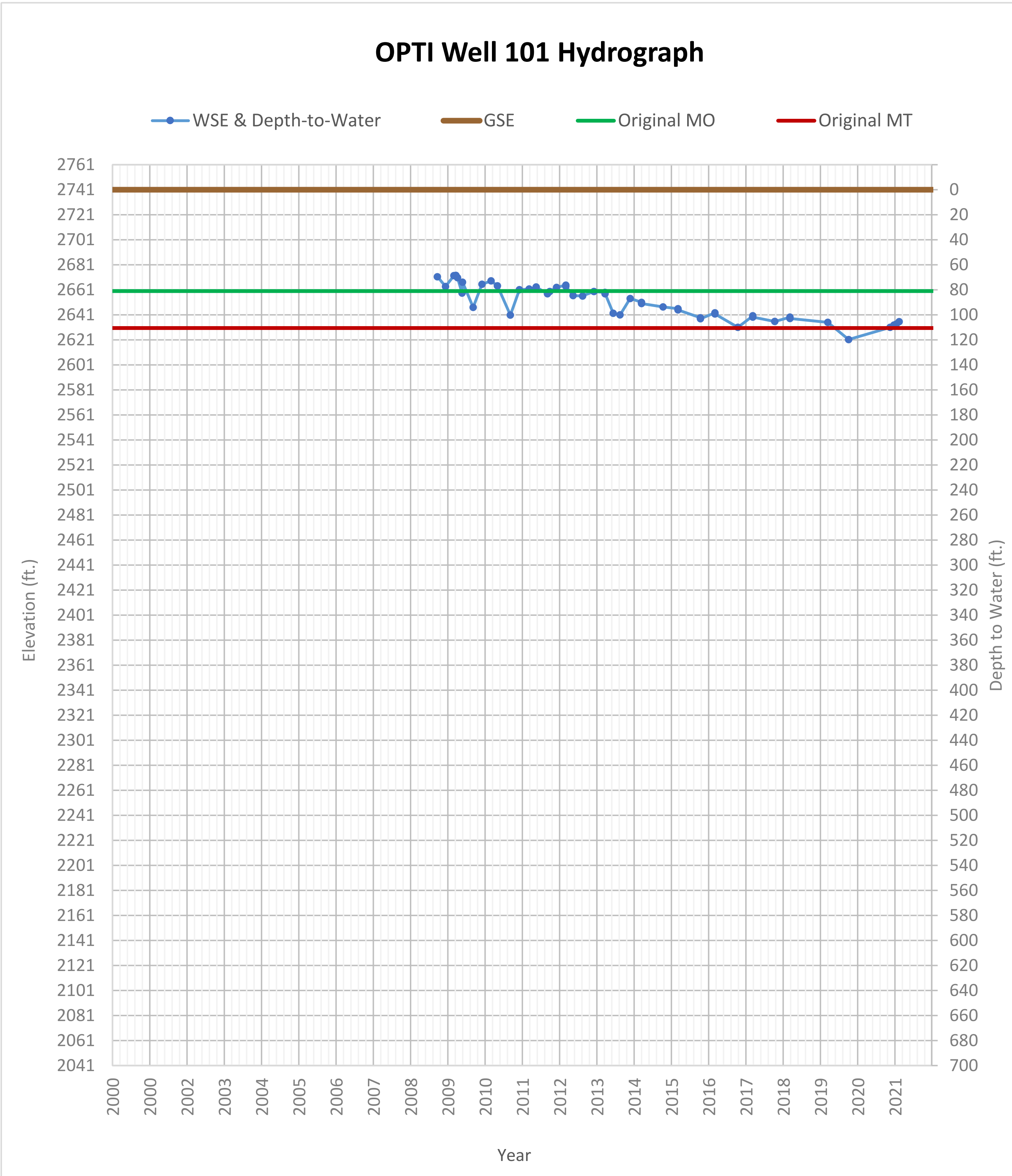
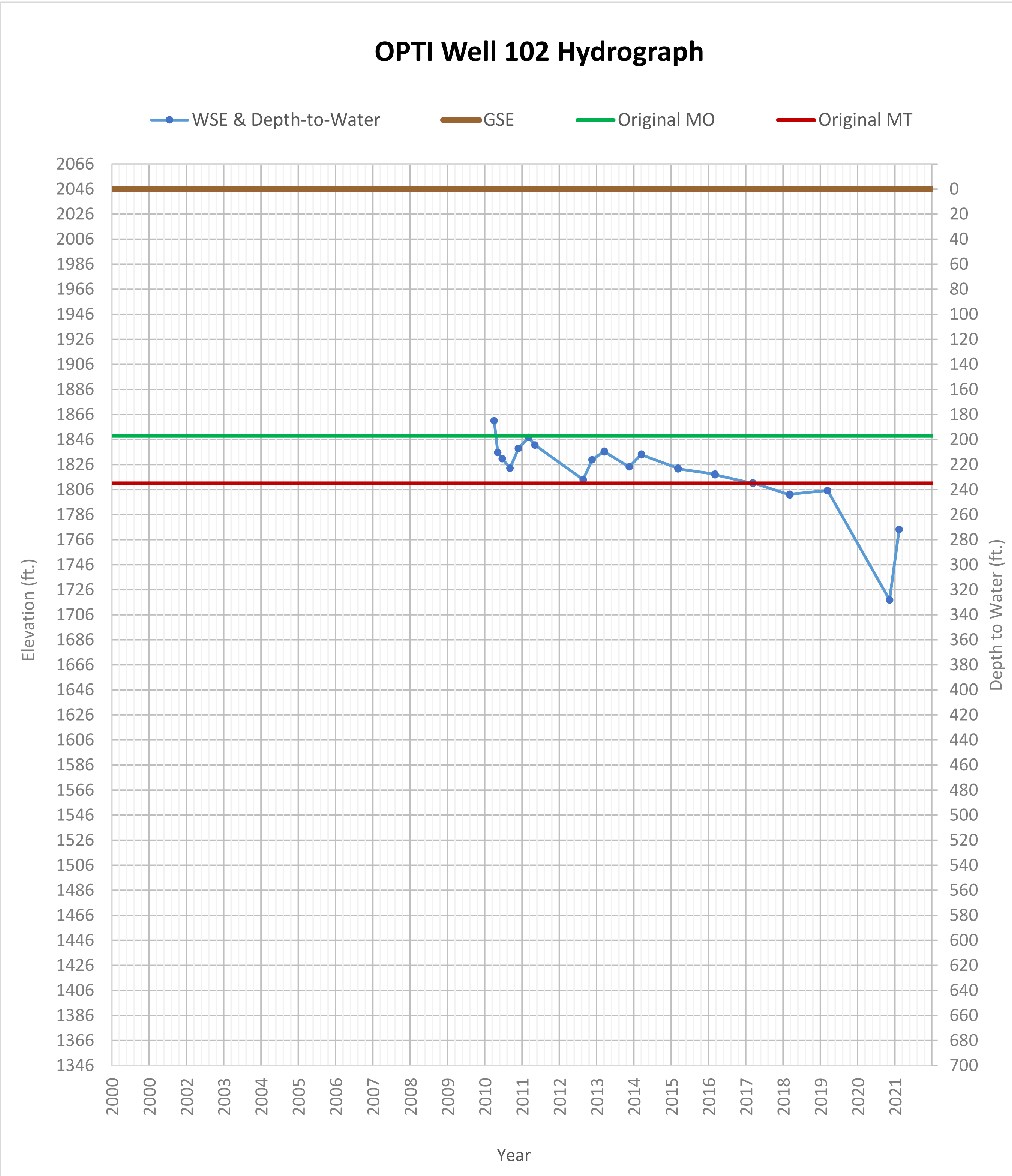

OPTI Well 101 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year


OPTI Well 102 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
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Elevation (ft.)
Depth to Water (ft.)
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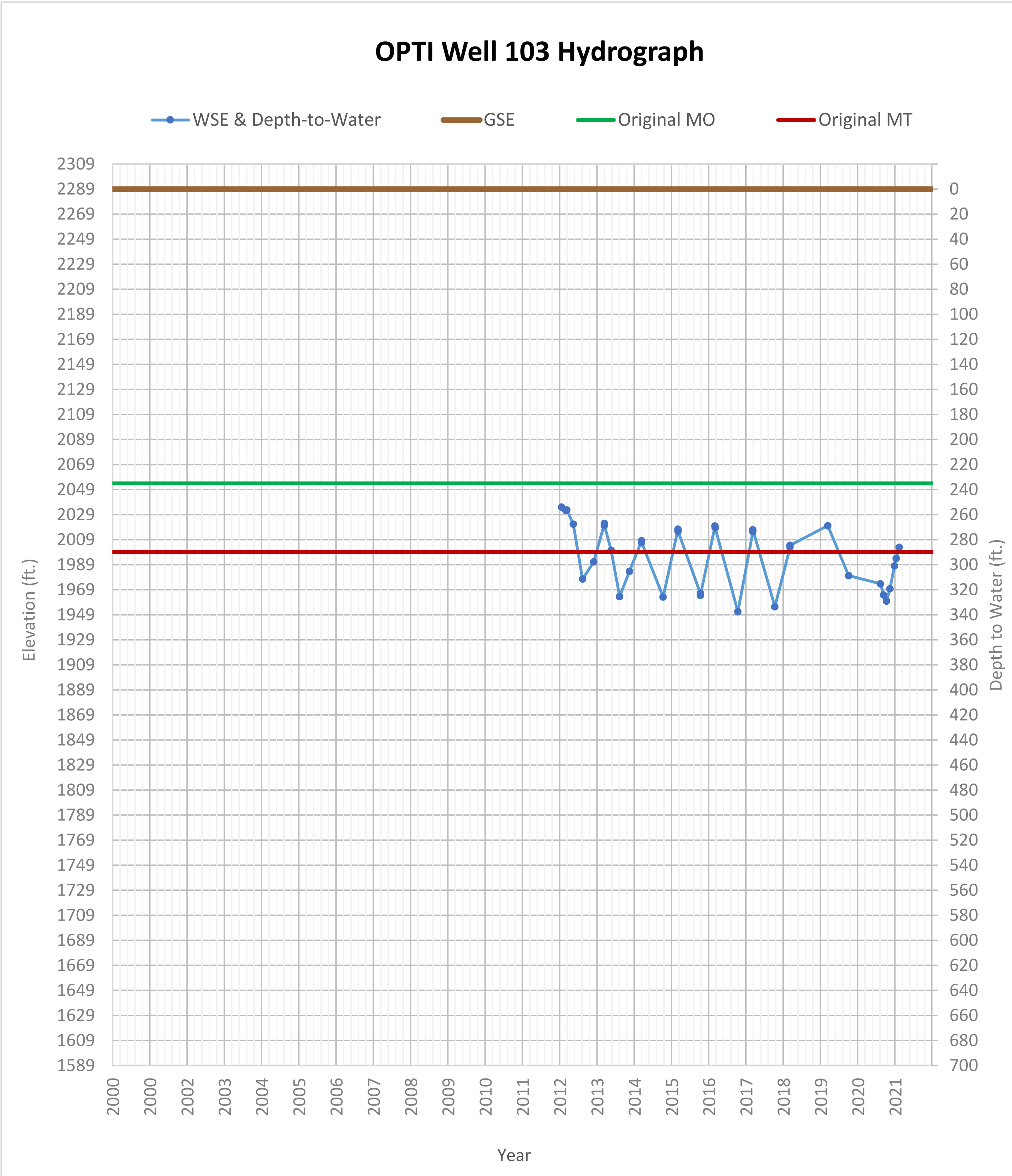
OPTI Well 103 Hydrograph
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GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
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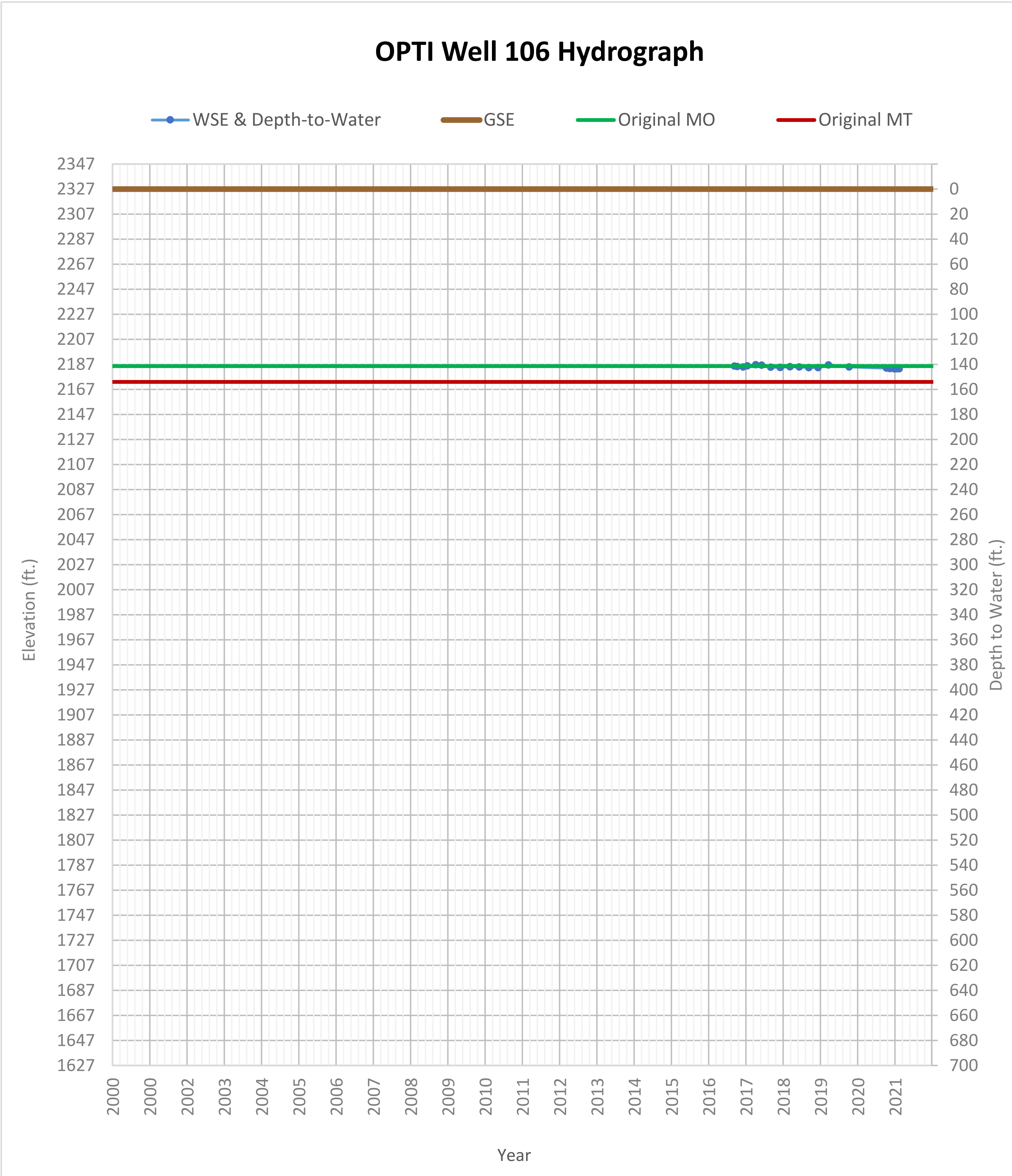
OPTI Well 106 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
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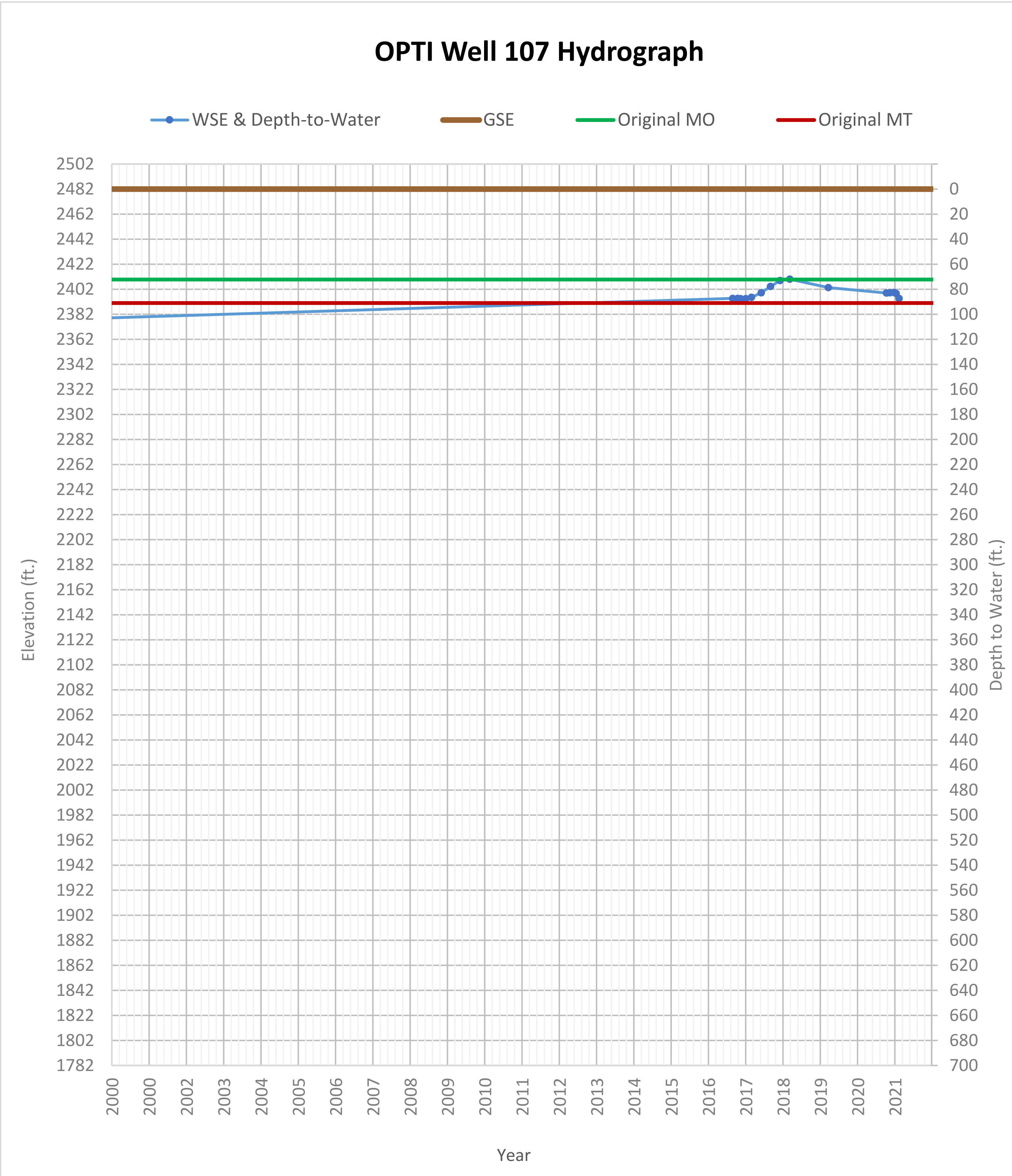
OPTI Well 107 Hydrograph
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GSE
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Original MT
Elevation (ft.)
Depth to Water (ft.)
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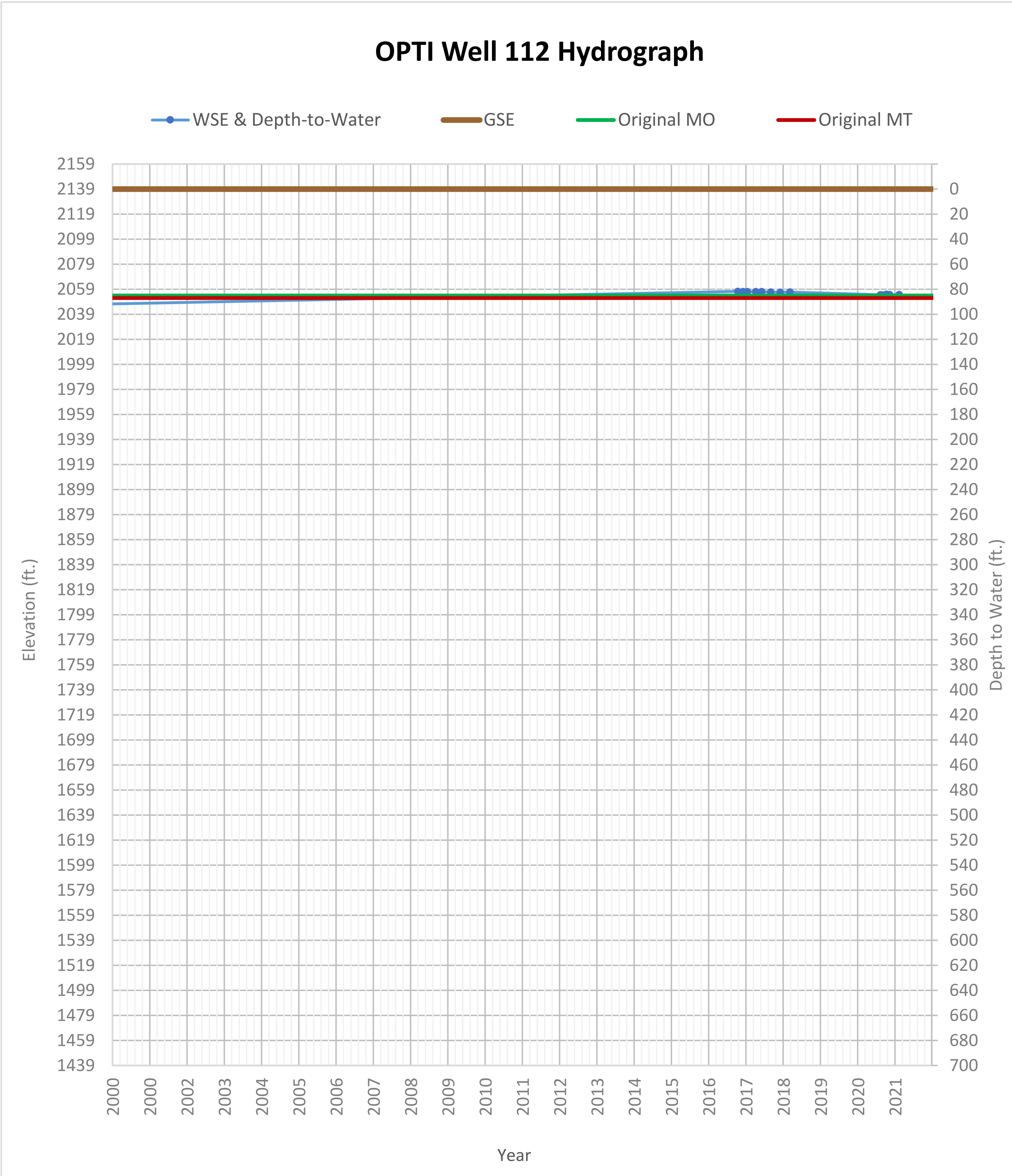
OPTI Well 112 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
2159
2139
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Depth to Water (ft.)
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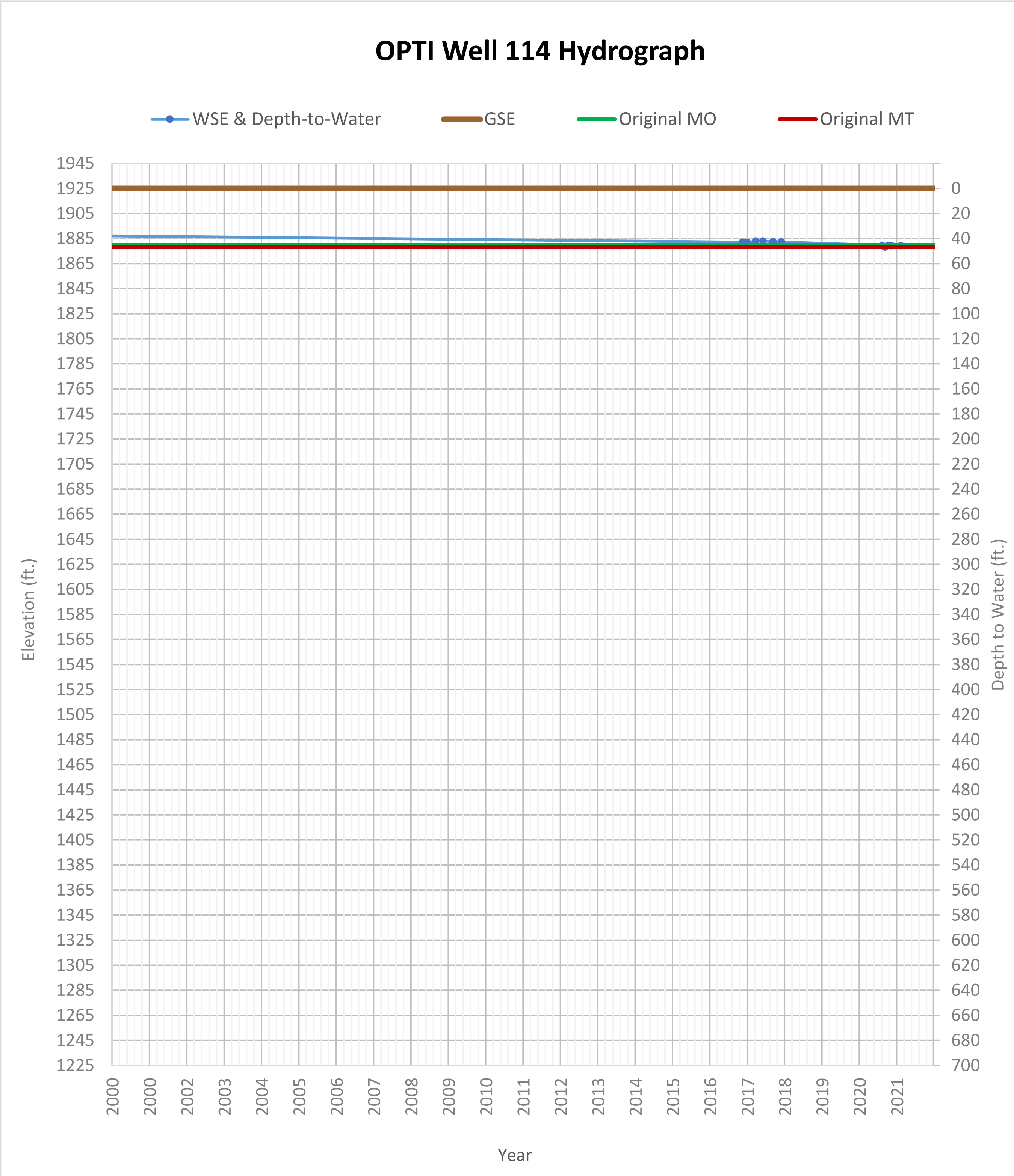
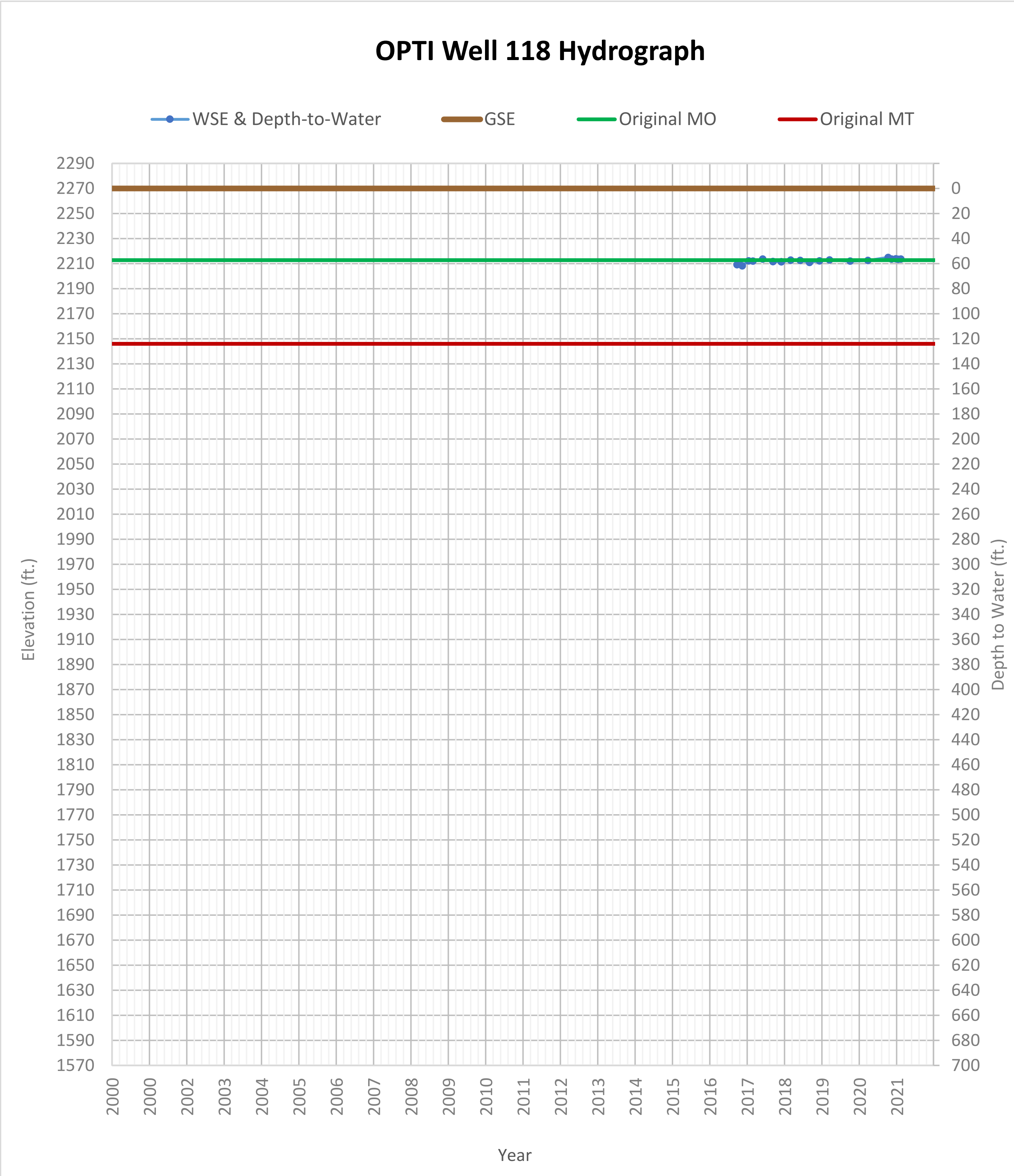

OPTI Well 114 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year


OPTI Well 118 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2290
2270
2250
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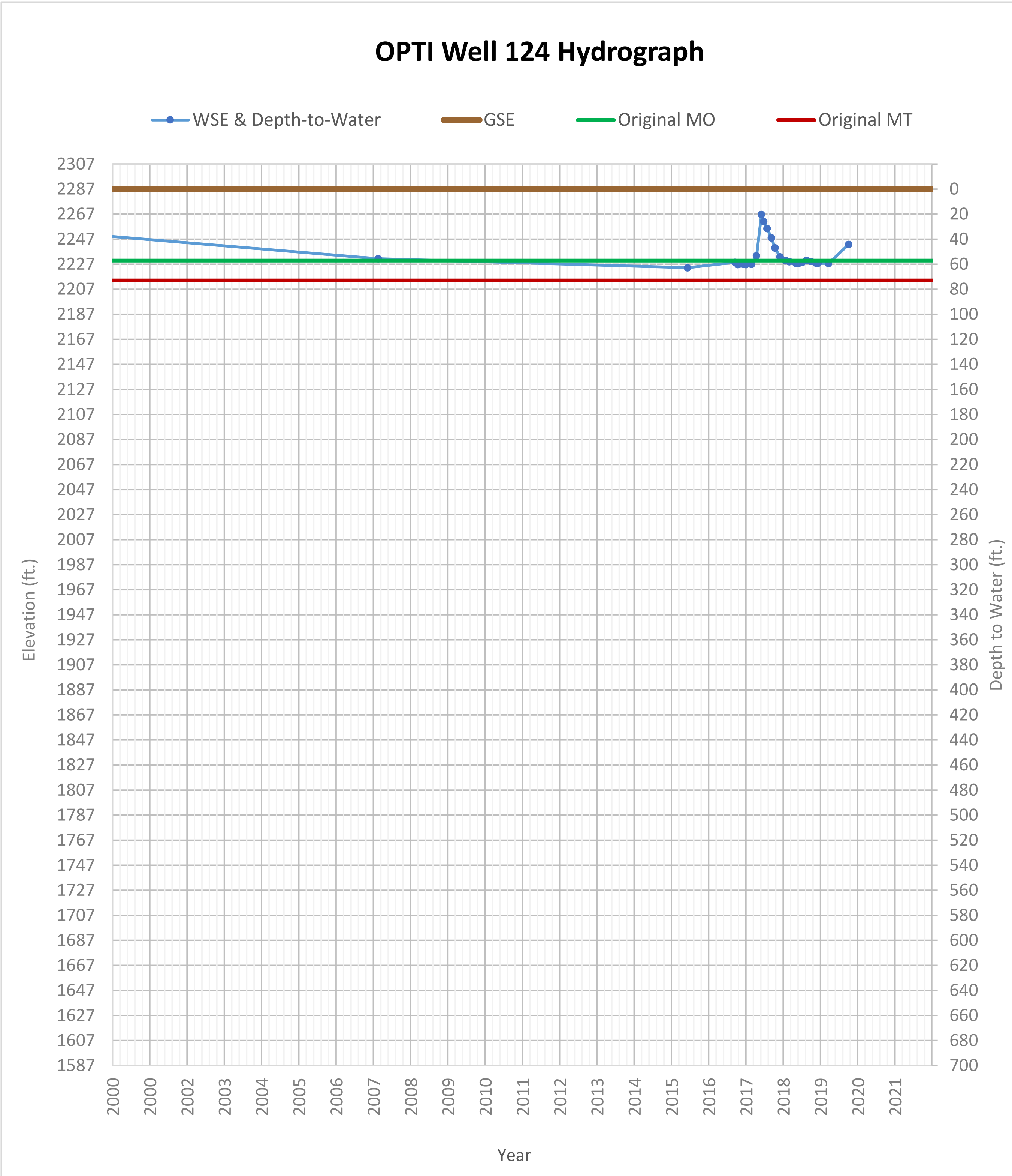

OPTI Well 124 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2307
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2247
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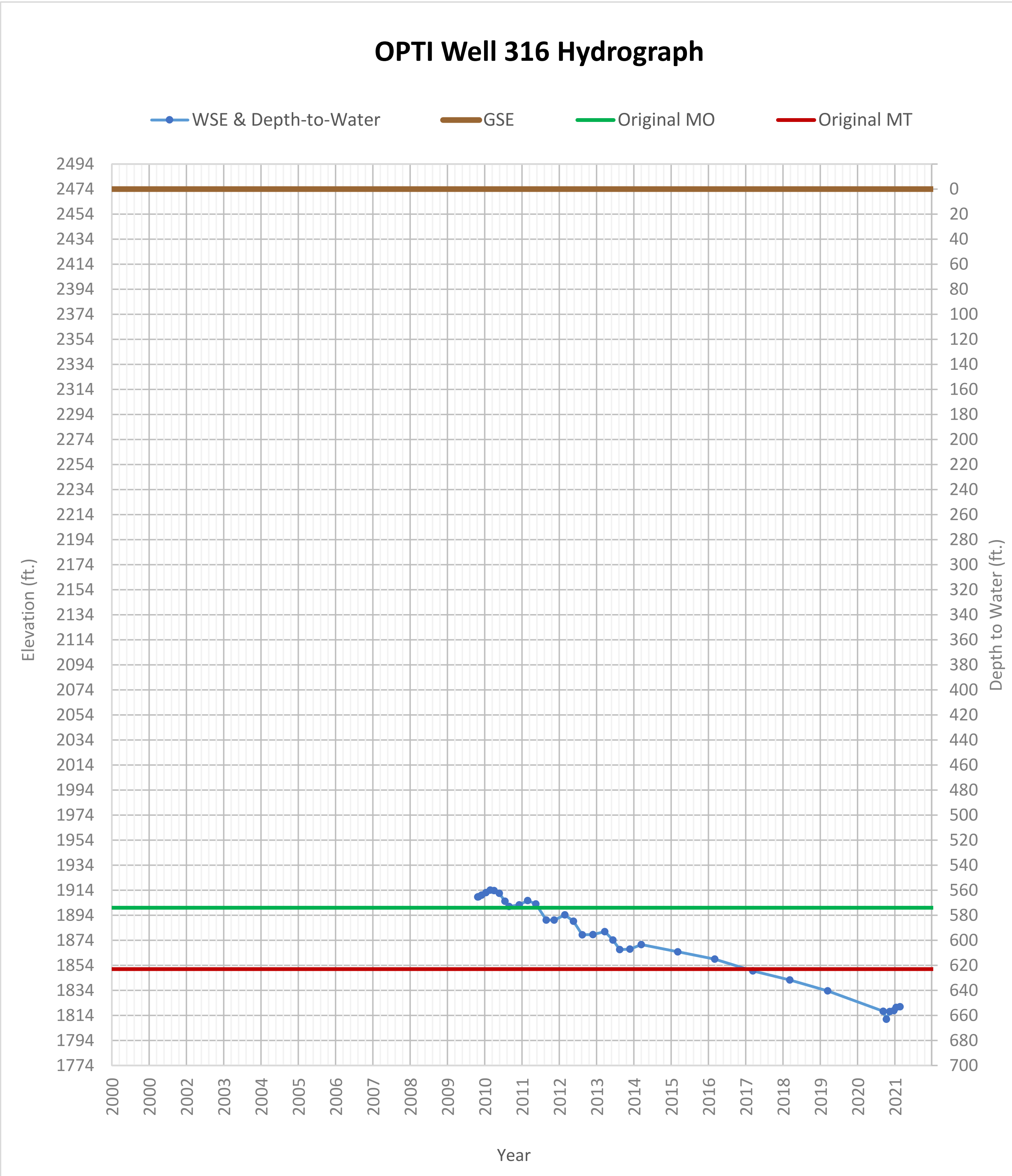

OPTI Well 316 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2494
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2254
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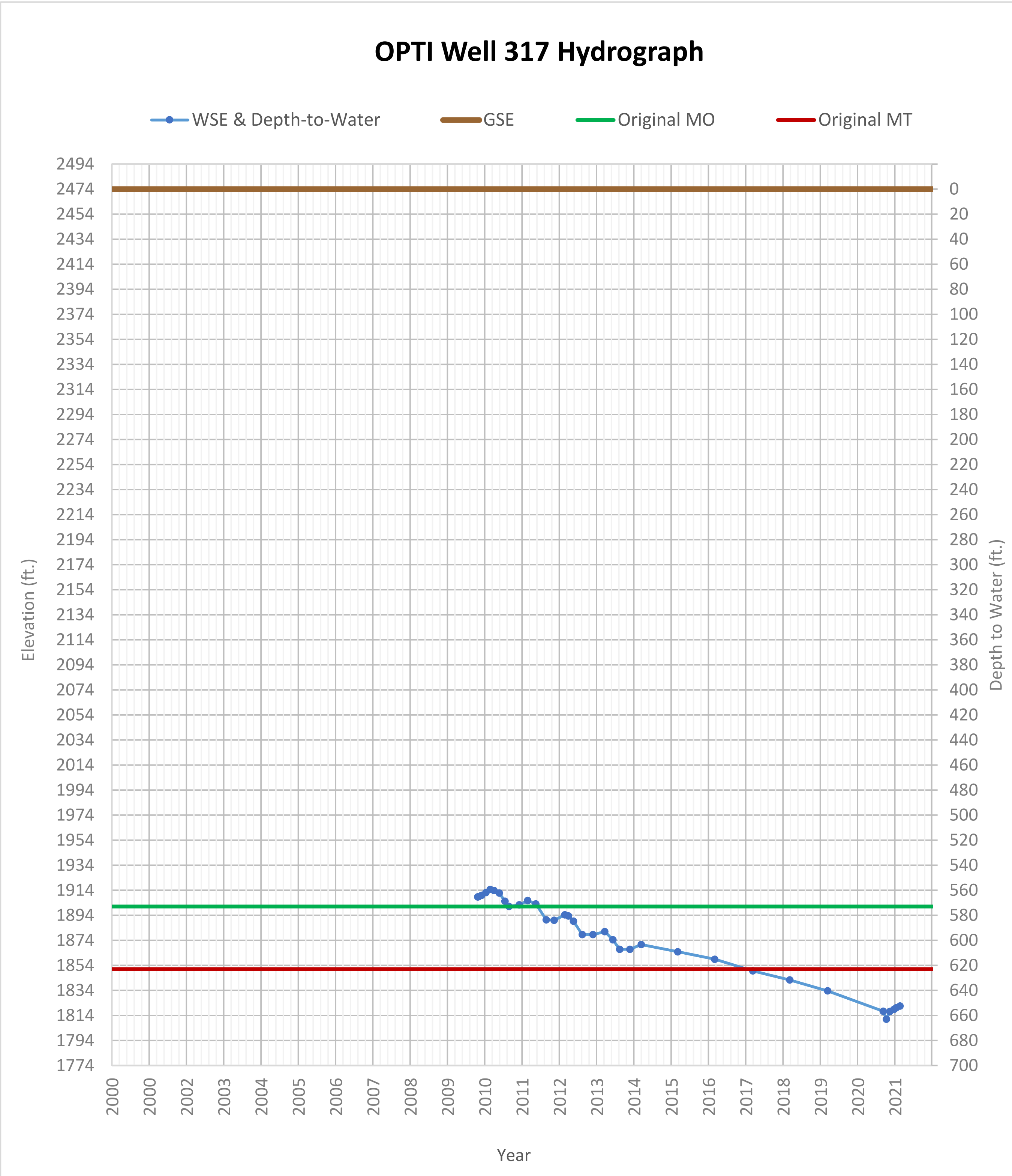

OPTI Well 317 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
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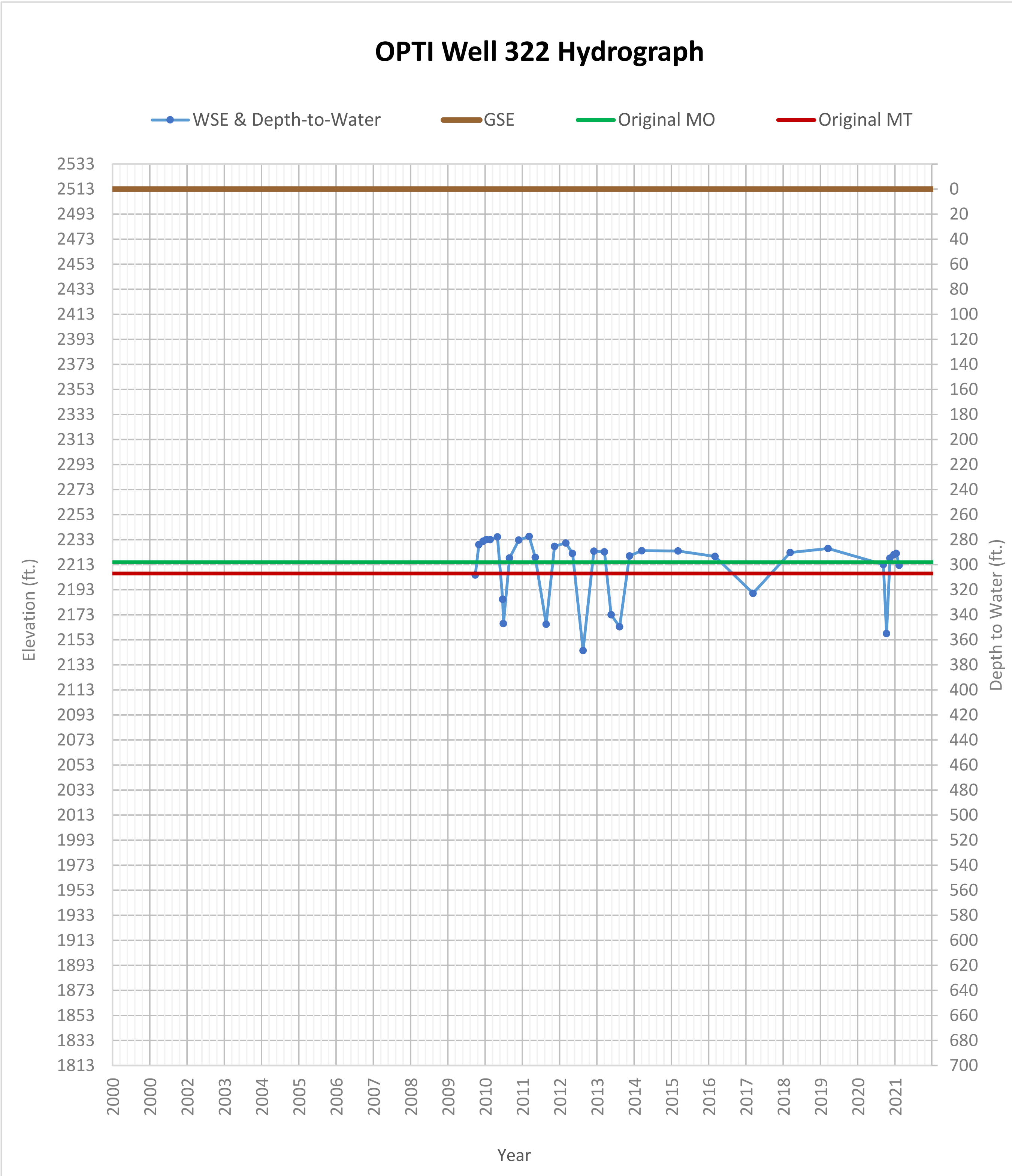

OPTI Well 322 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2533
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2493
2473
2453
2433
2413
2393
2373
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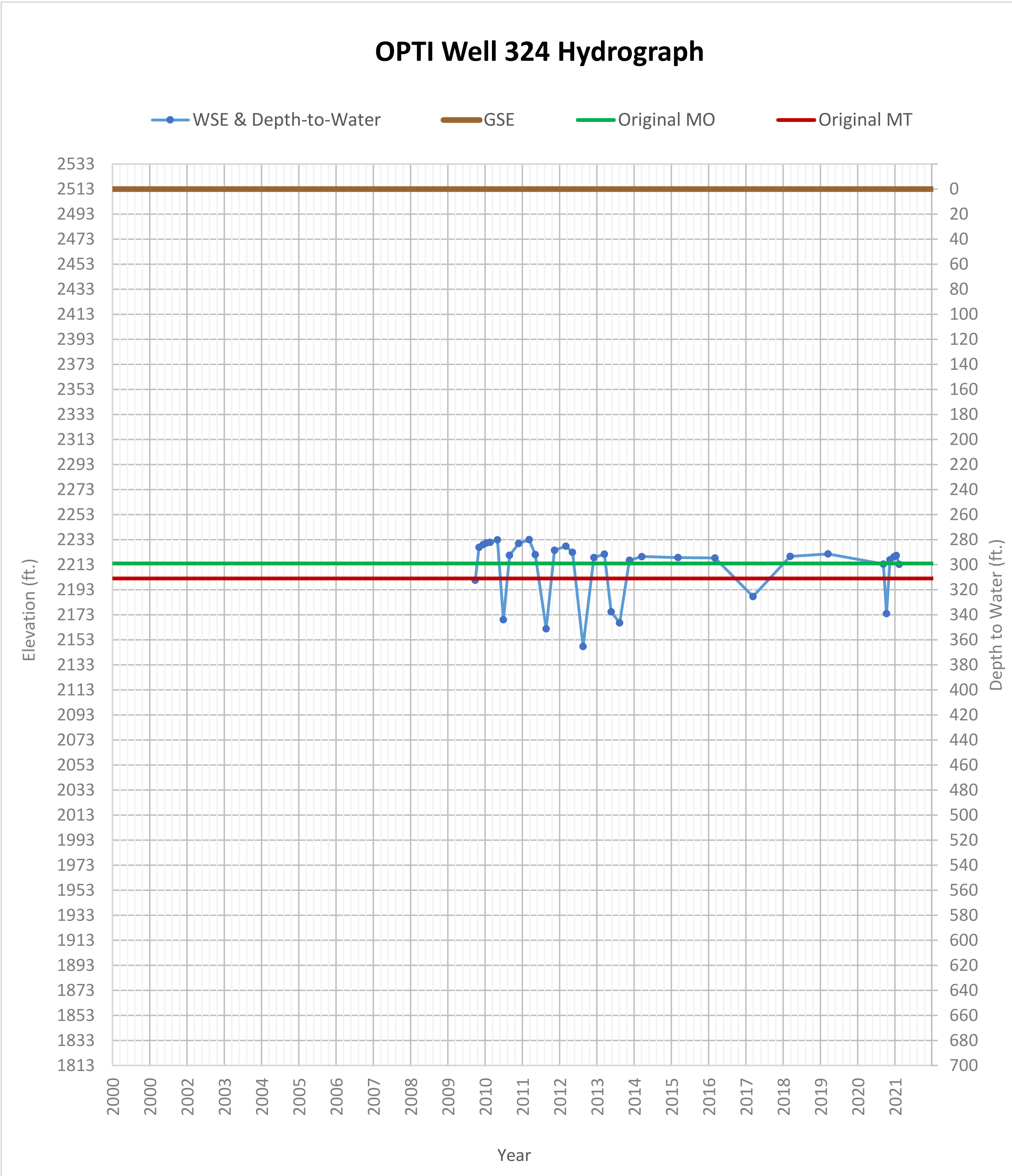

OPTI Well 324 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
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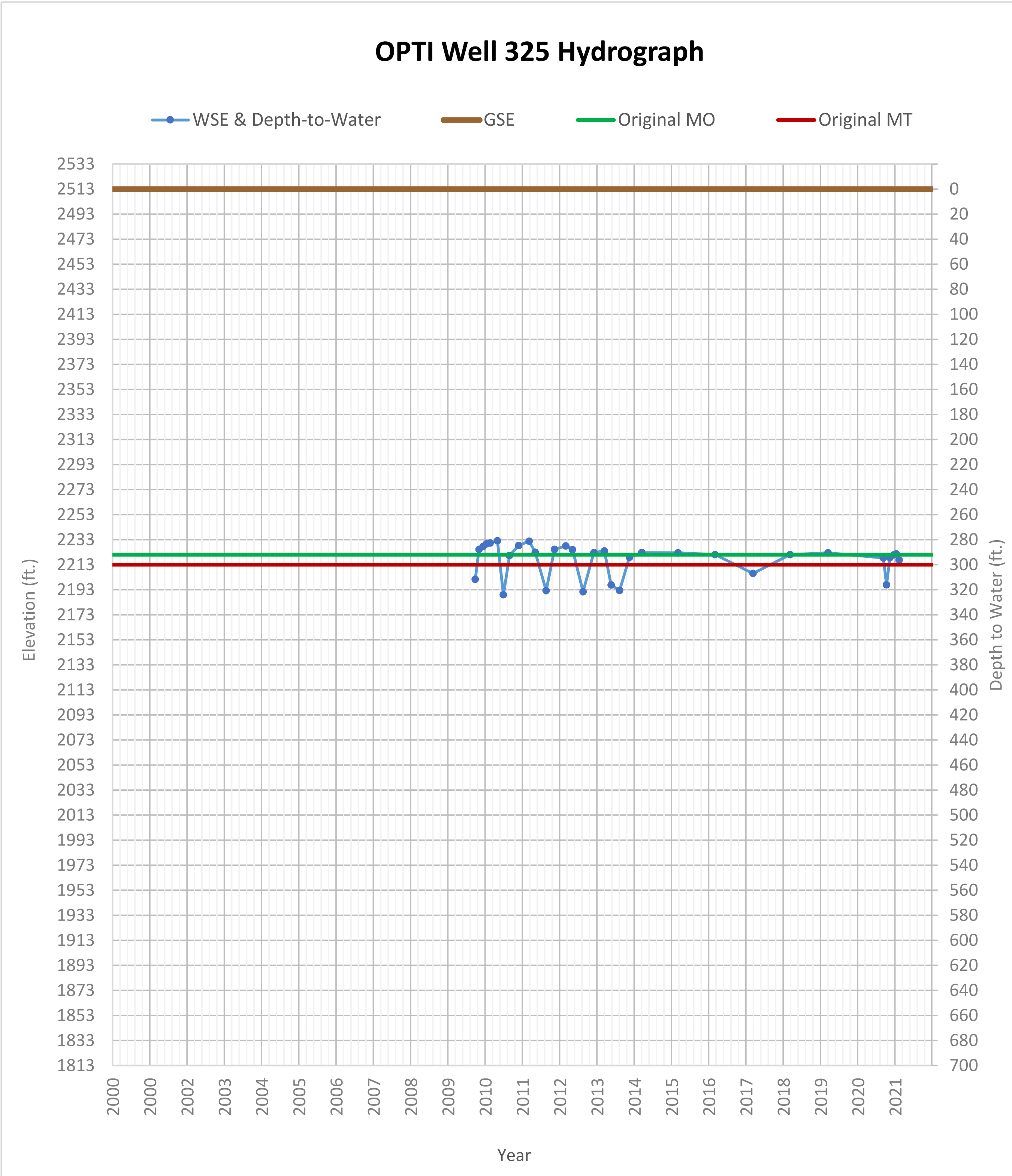
OPTI Well 325 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
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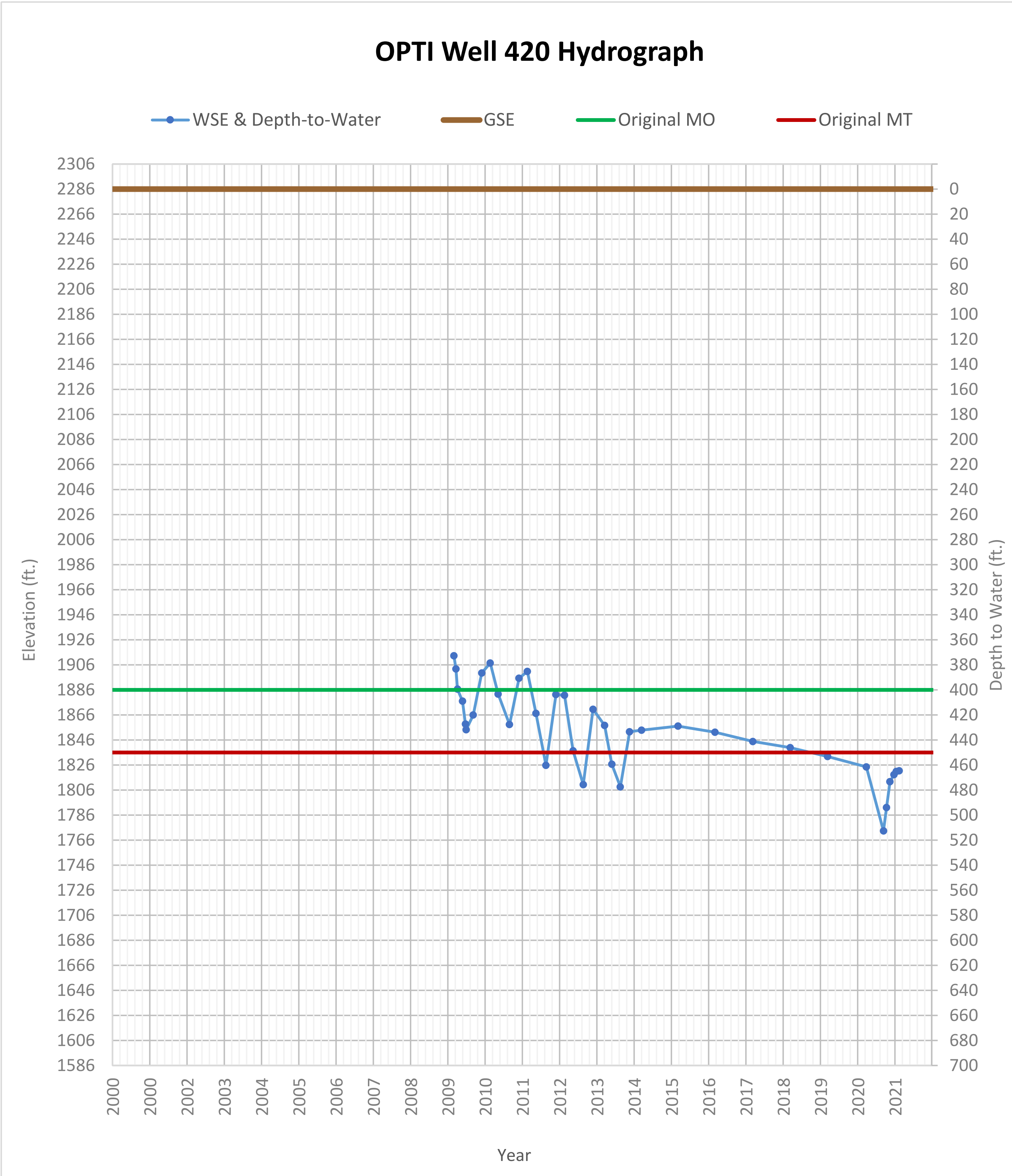

OPTI Well 420 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2306
2286
2266
2246
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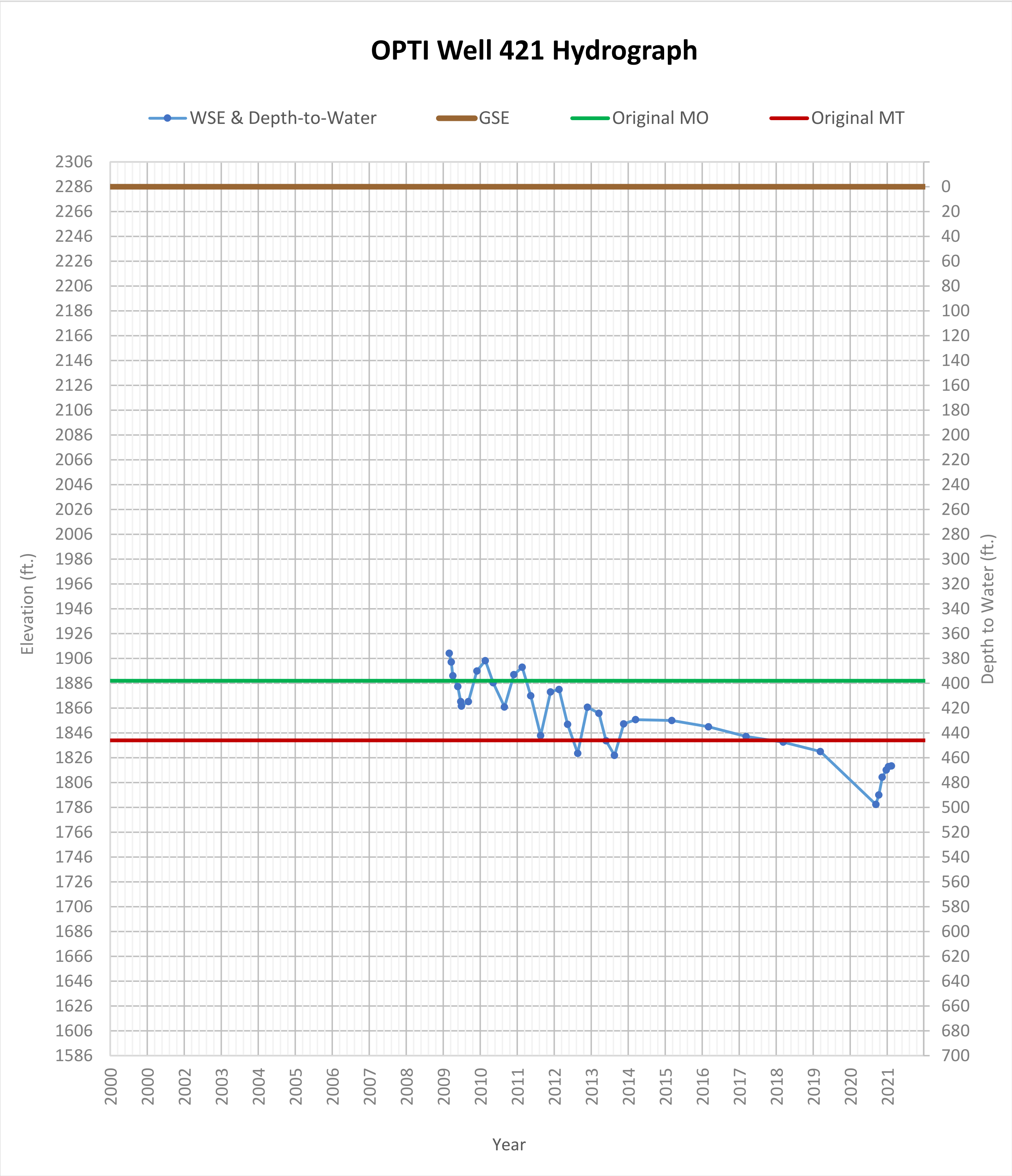

OPTI Well 421 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2306
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2246
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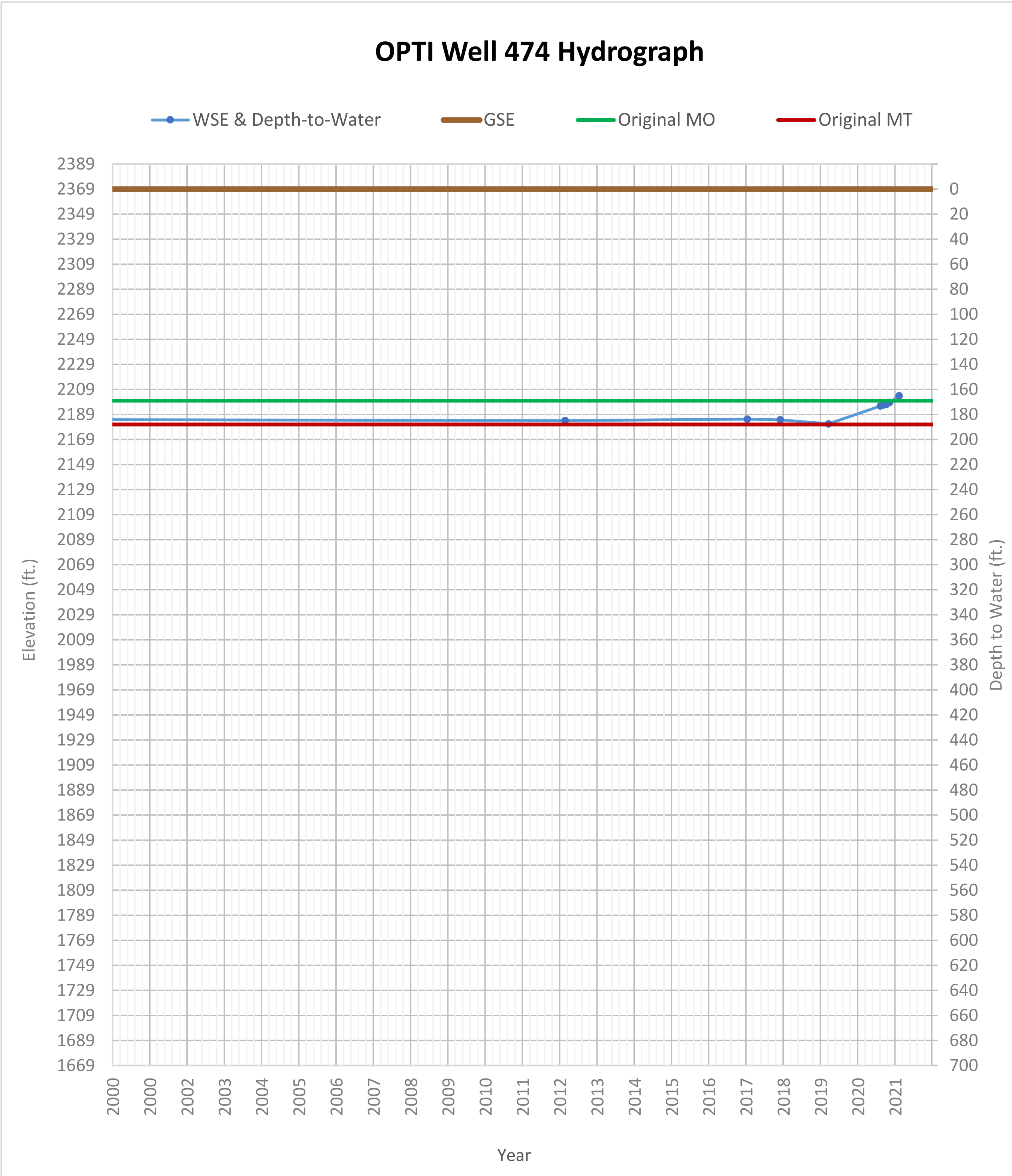
OPTI Well 474 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2389
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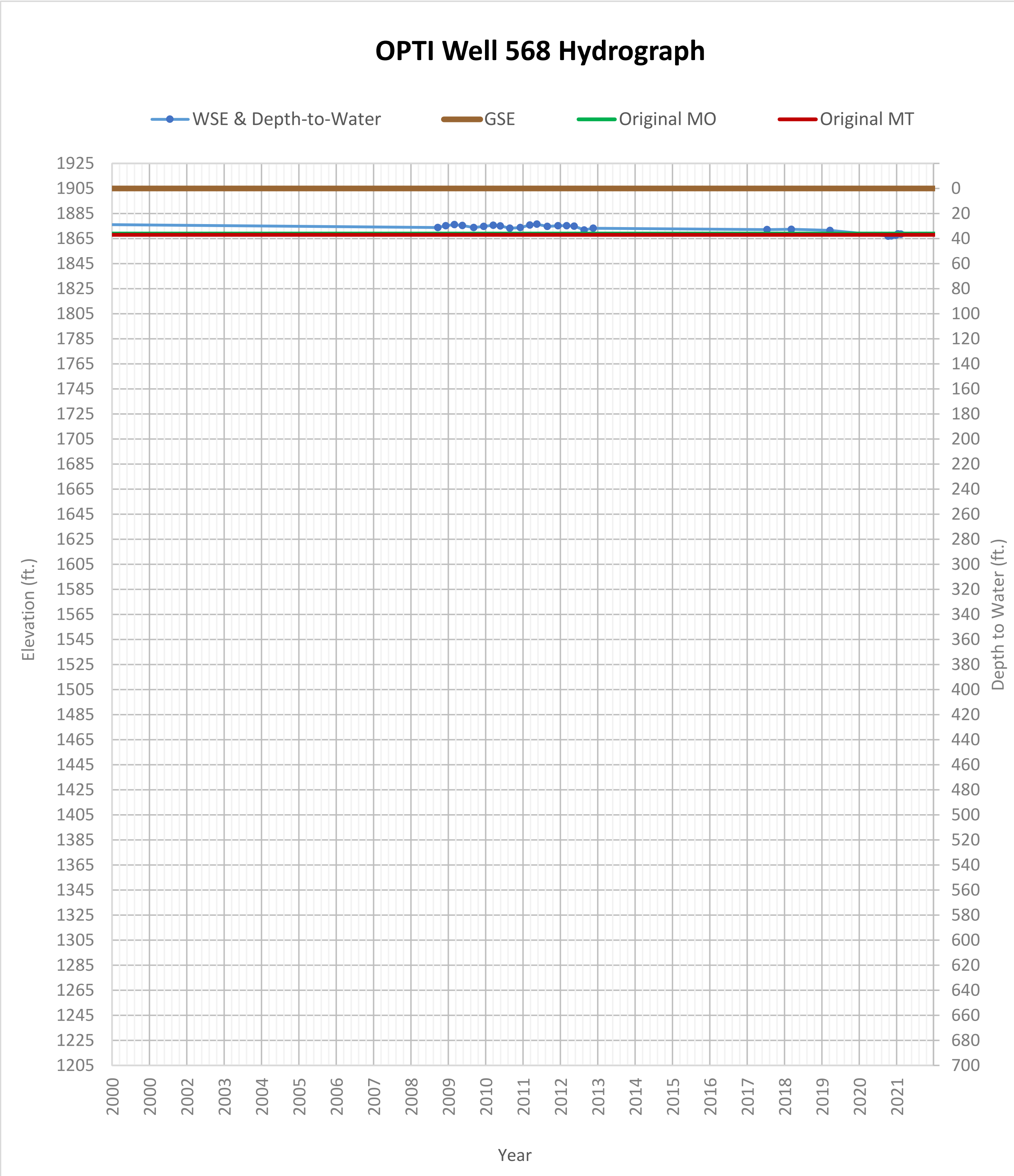
OPTI Well 568 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
1925
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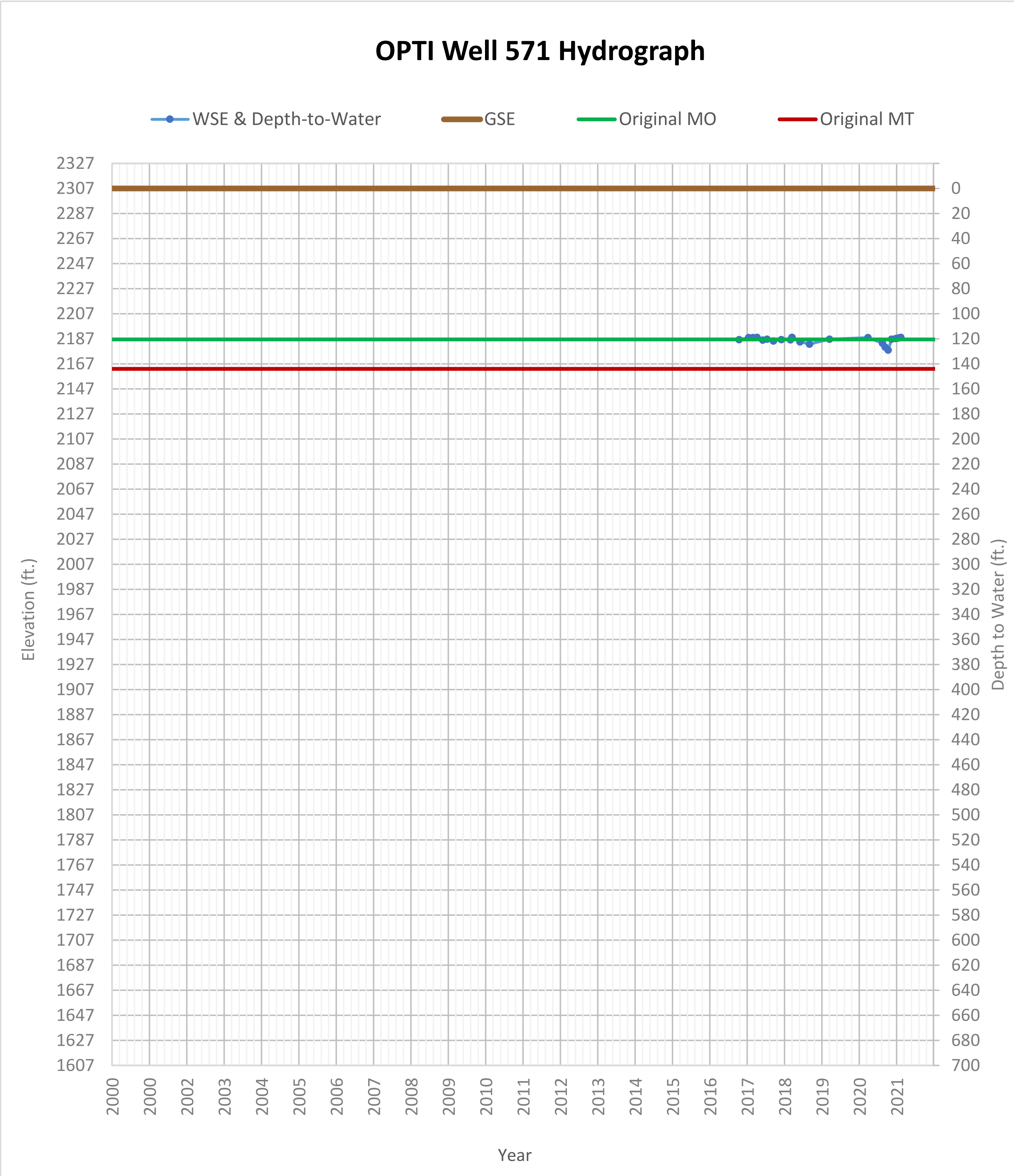

OPTI Well 571 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2327
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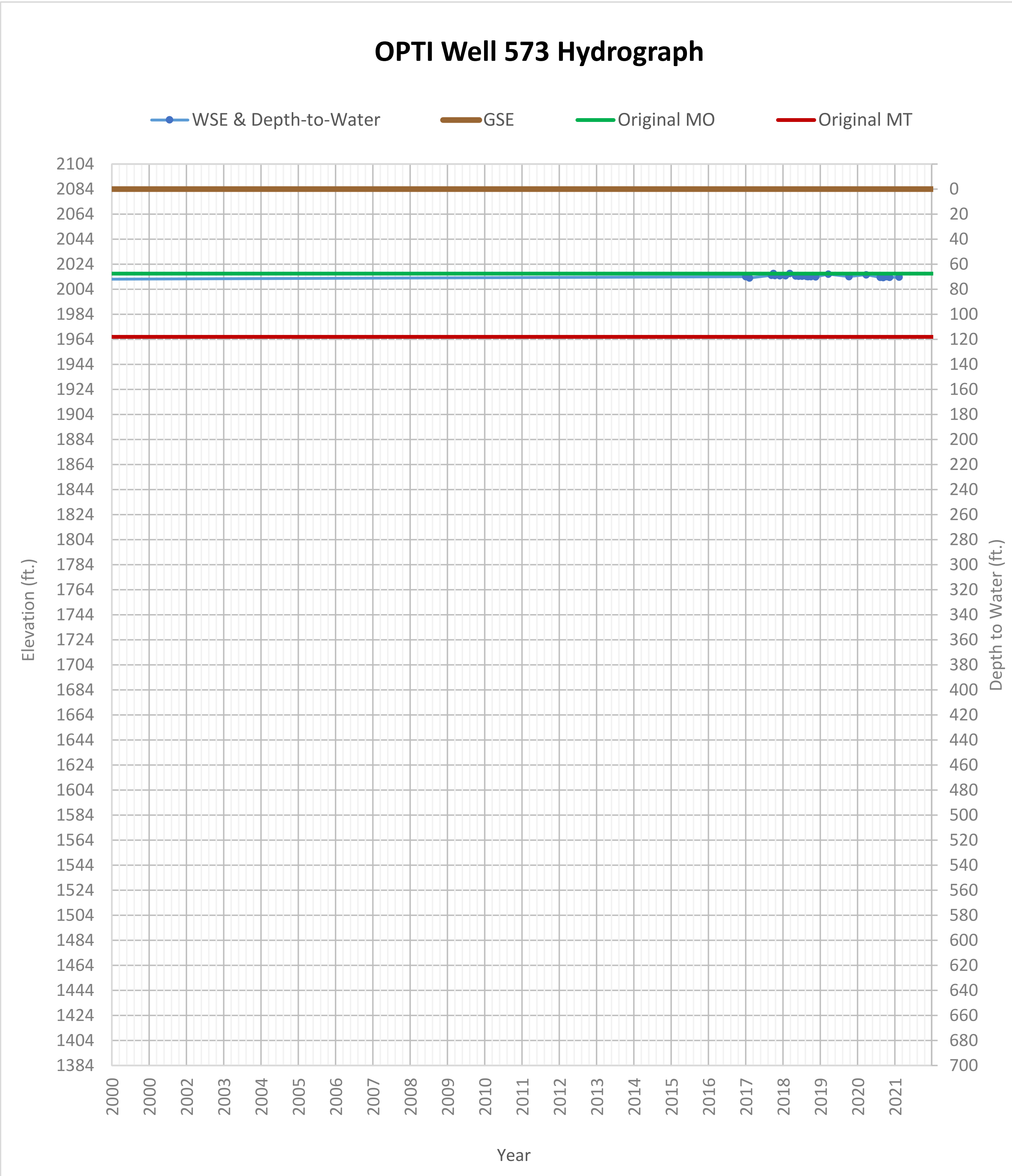
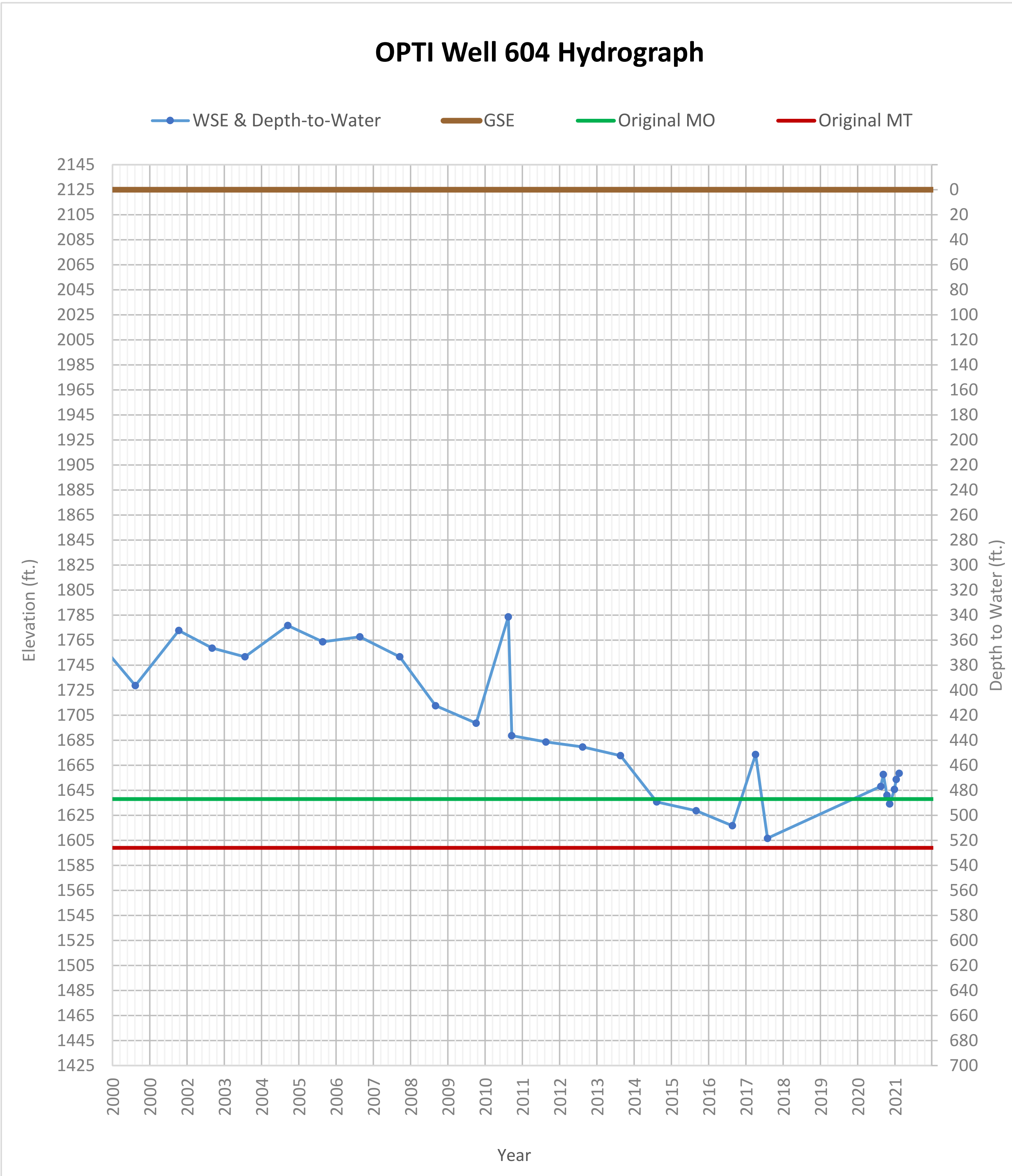


OPTI Well 573 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year


OPTI Well 604 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2145
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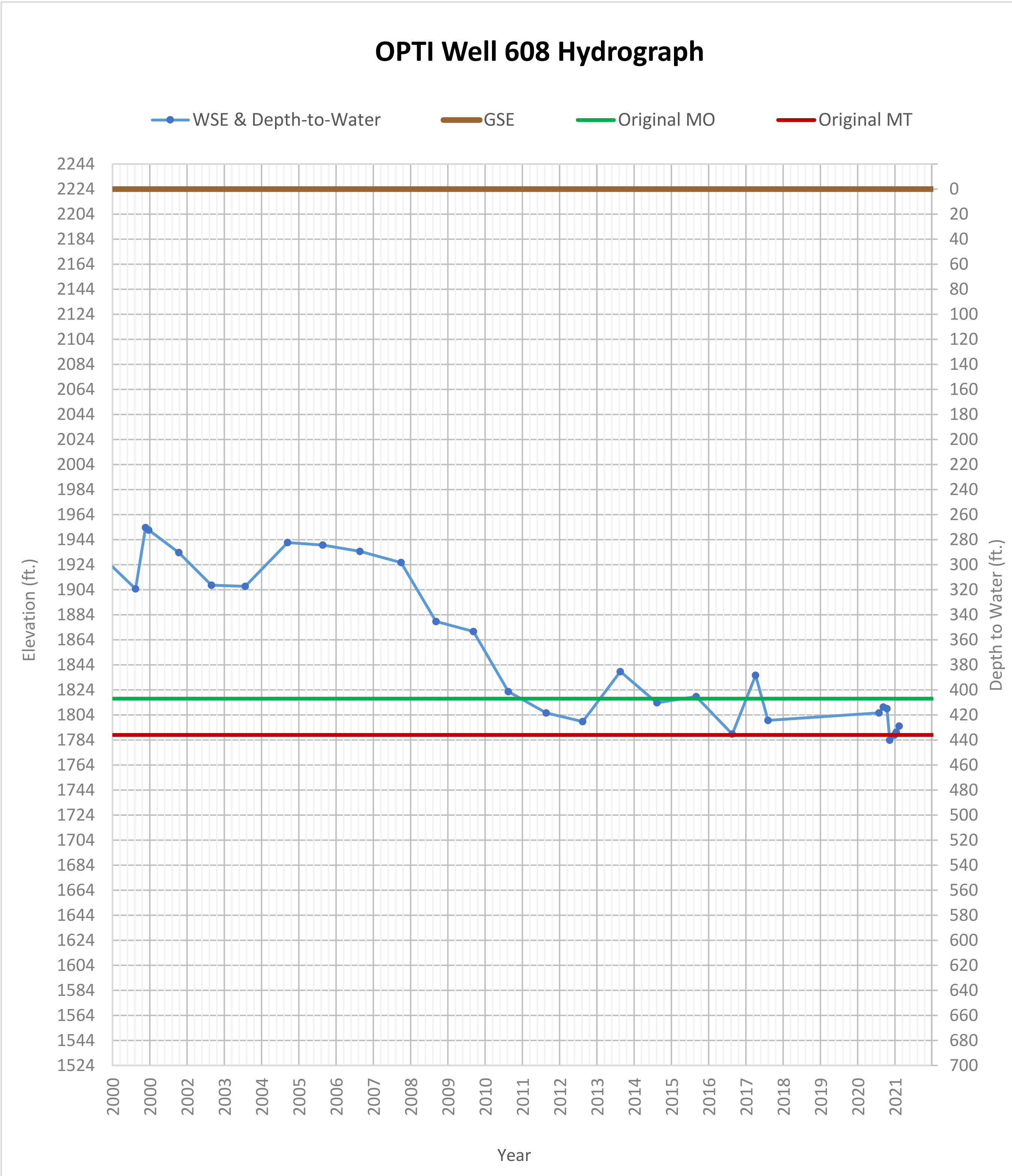

OPTI Well 608 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2244
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2184
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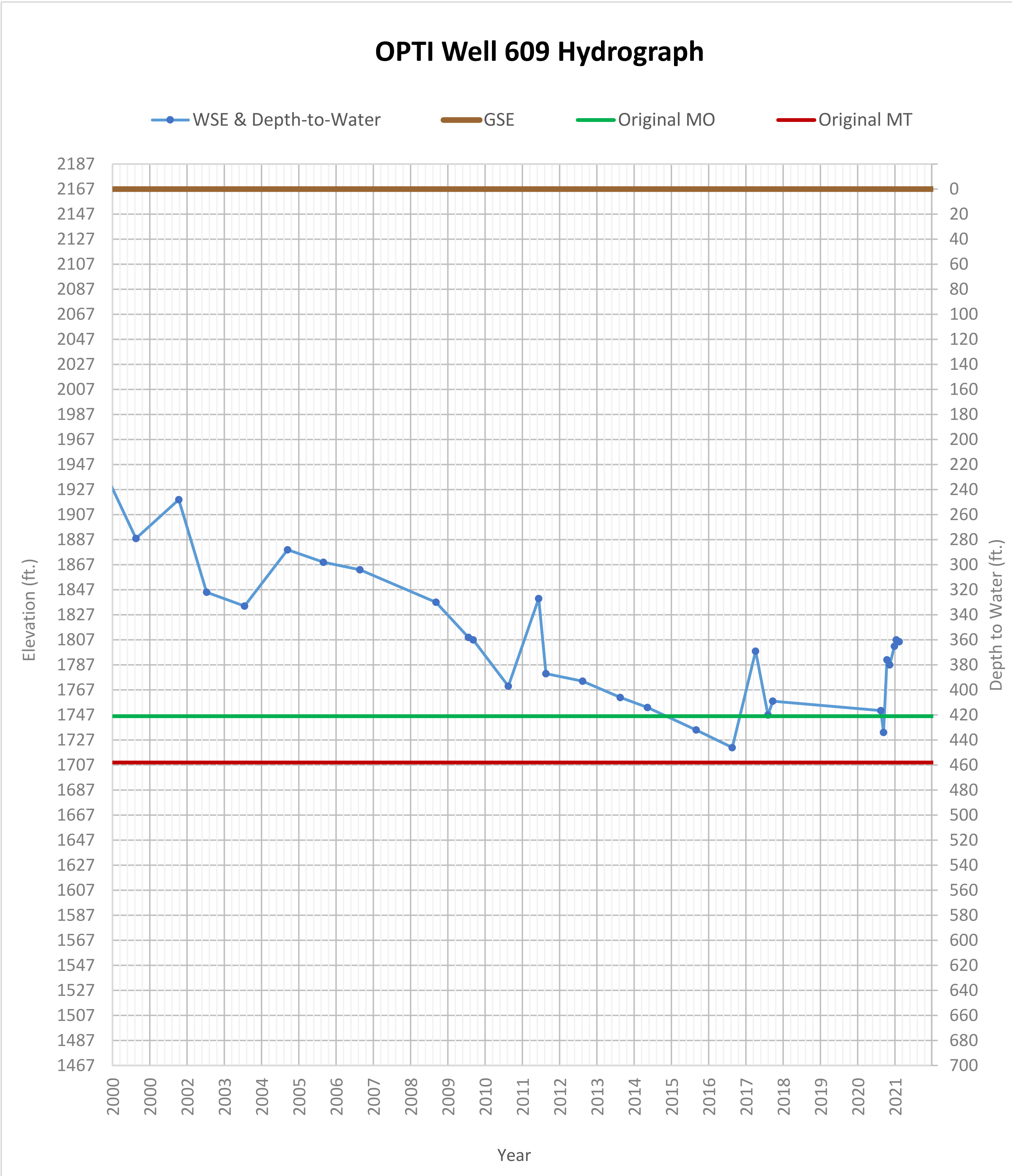

OPTI Well 609 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2187
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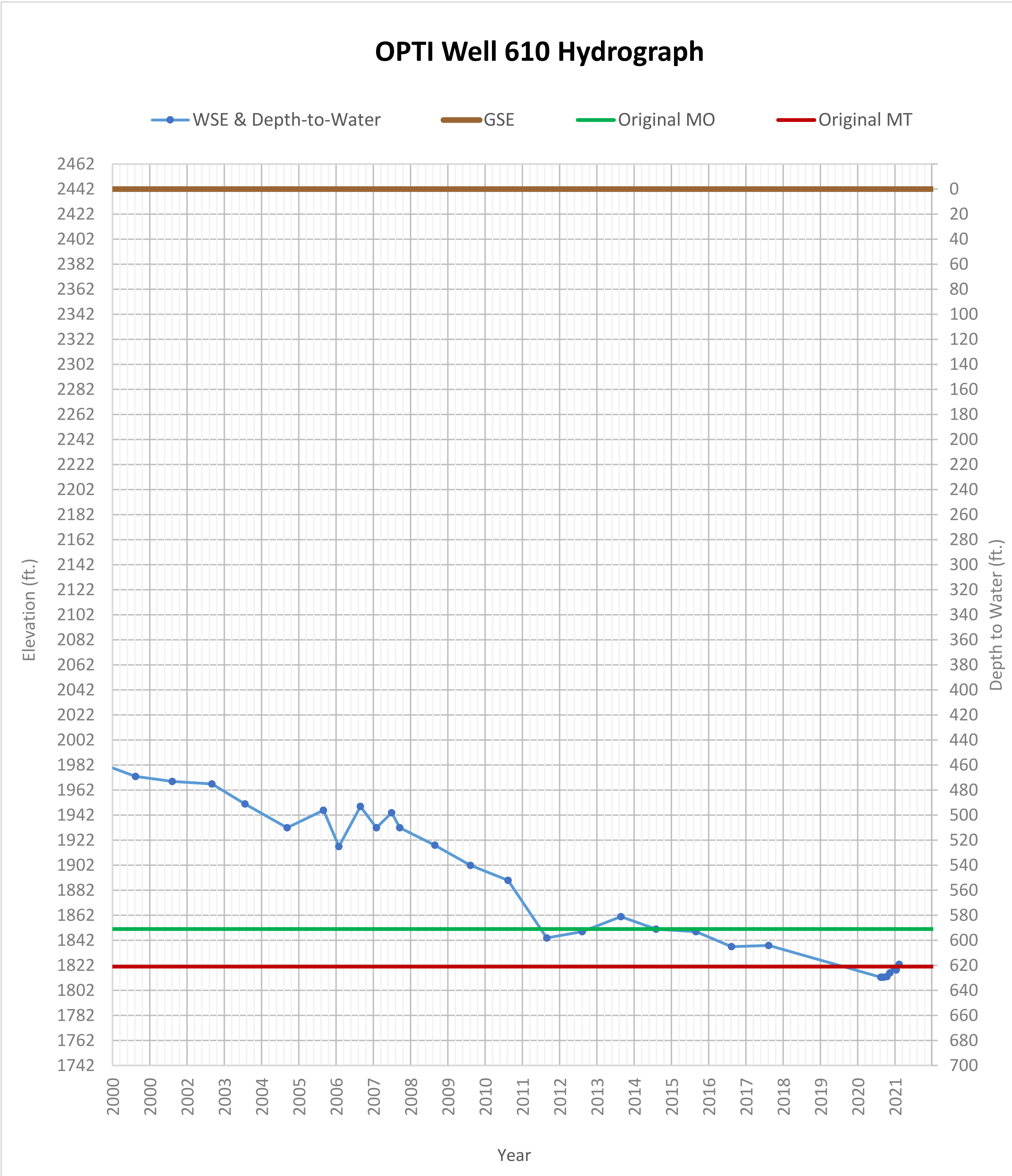
OPTI Well 610 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2462
2442
2422
2402
2382
2362
2342
2322
2302
2282
2262
2242
2222
2202
2182
2162
2142
2122
2102
2082
2062
2042
2022
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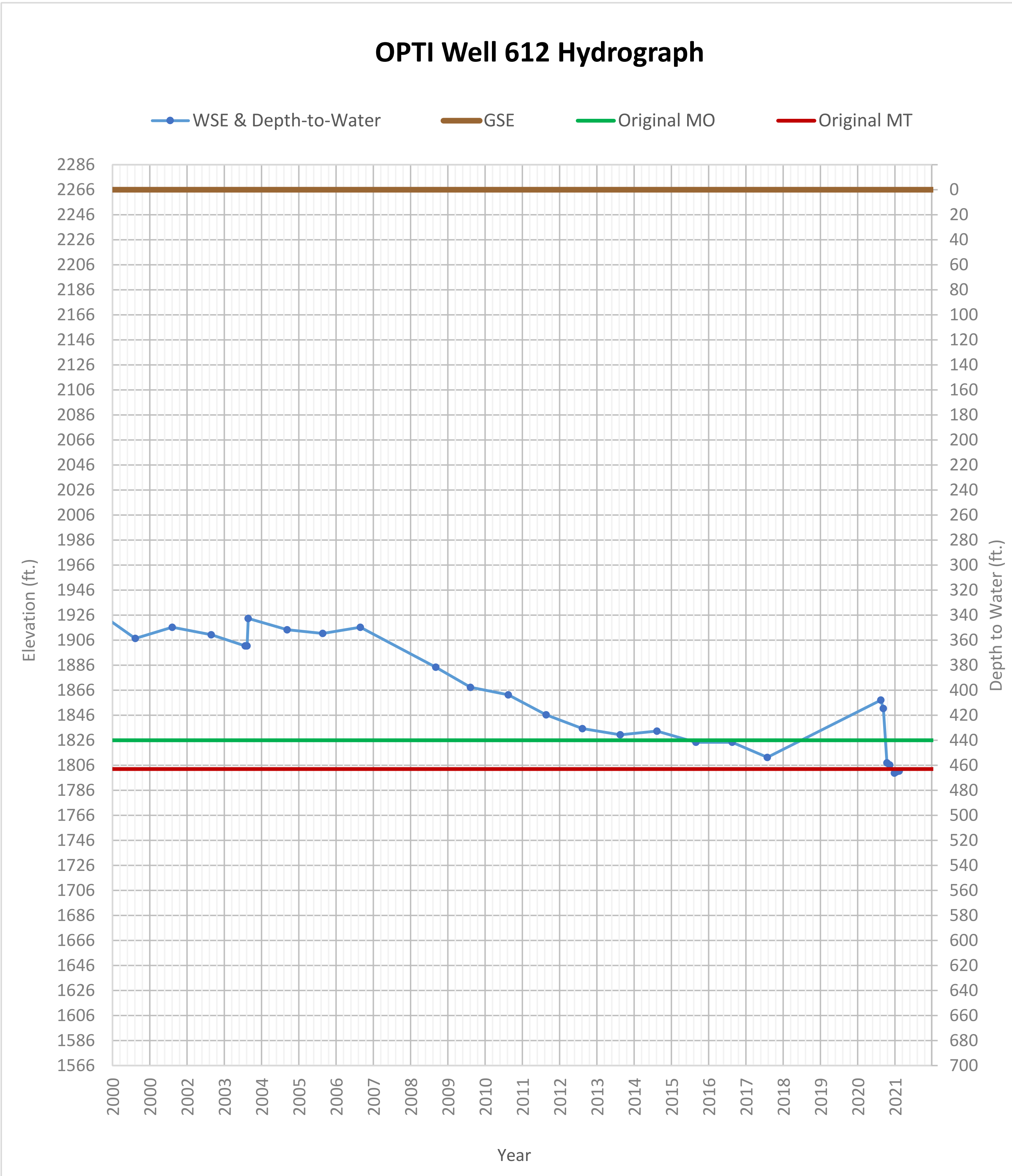
OPTI Well 612 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
2286
2266
2246
2226
2206
2186
2166
2146
2126
2106
2086
2066
2046
2026
2006
1986
1966
1946
1926
1906
1886
1866
1846
1826
1806
1786
1766
1746
1726
1706
1686
1666
1646
1626
1606
1586
1566
Depth to Water (ft.)
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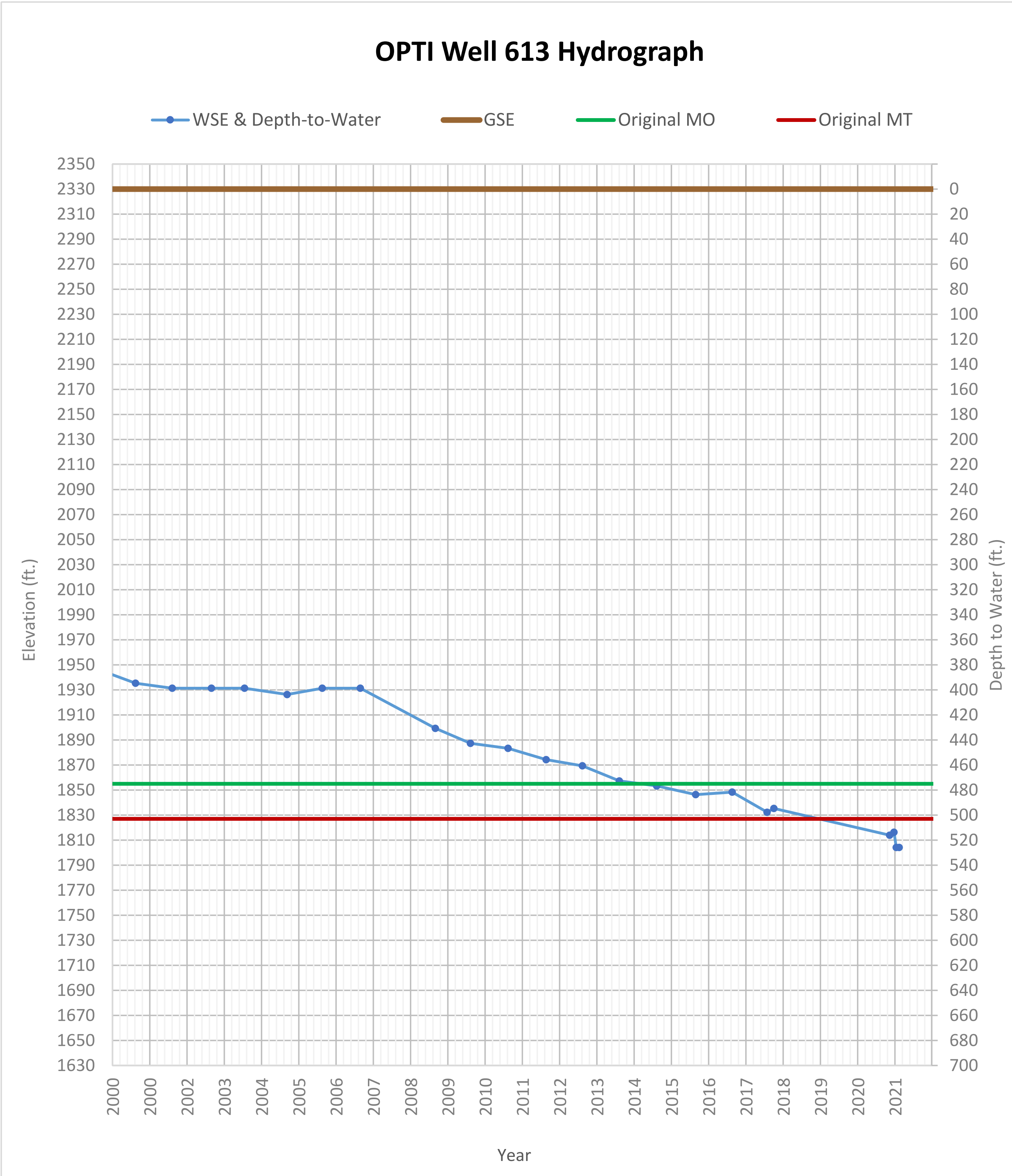

OPTI Well 613 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2350
2330
2310
2290
2270
2250
2230
2210
2190
2170
2150
2130
2110
2090
2070
2050
2030
2010
1990
1970
1950
1930
1910
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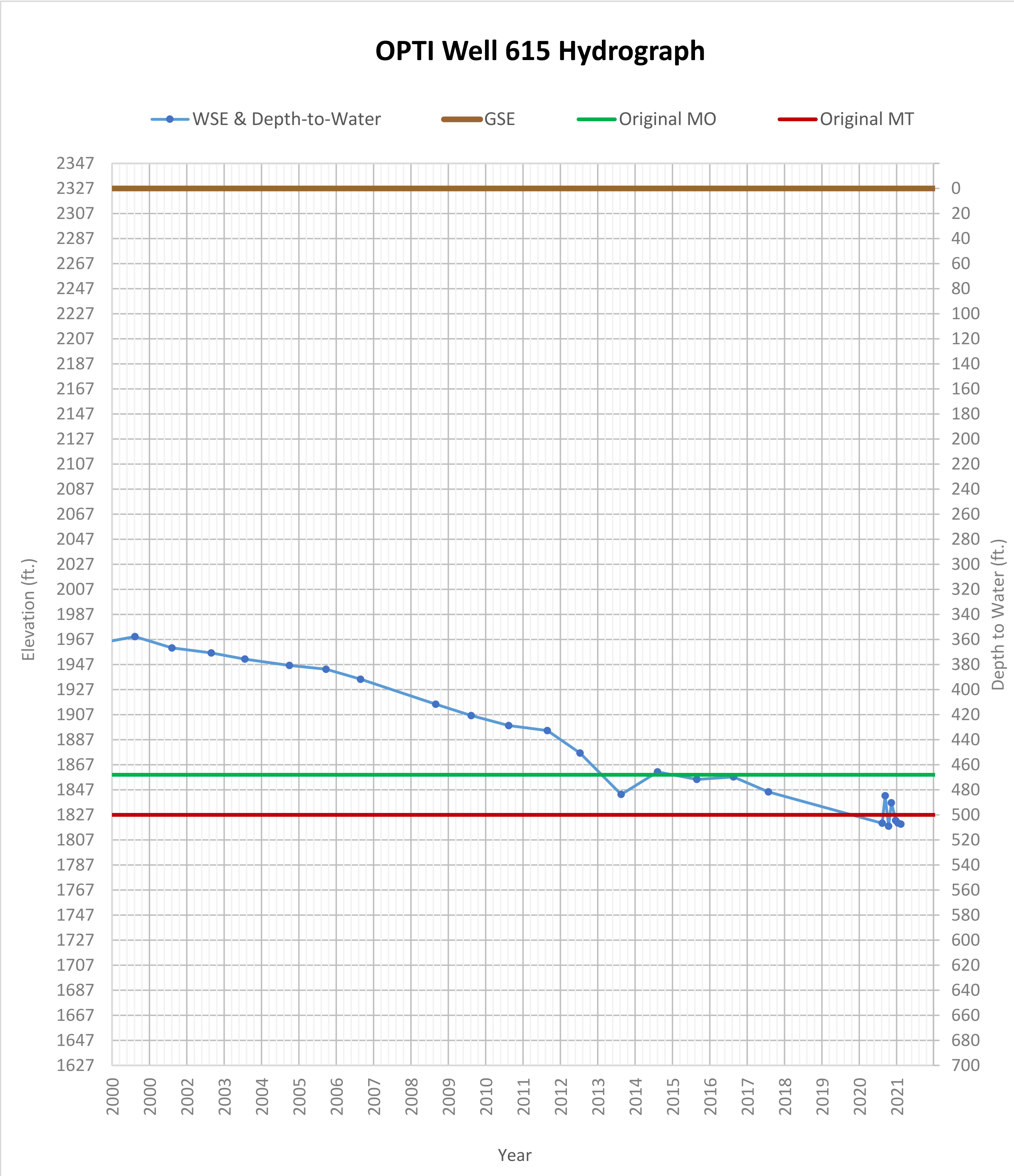

OPTI Well 615 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2347
2327
2307
2287
2267
2247
2227
2207
2187
2167
2147
2127
2107
2087
2067
2047
2027
2007
1987
1967
1947
1927
1907
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1867
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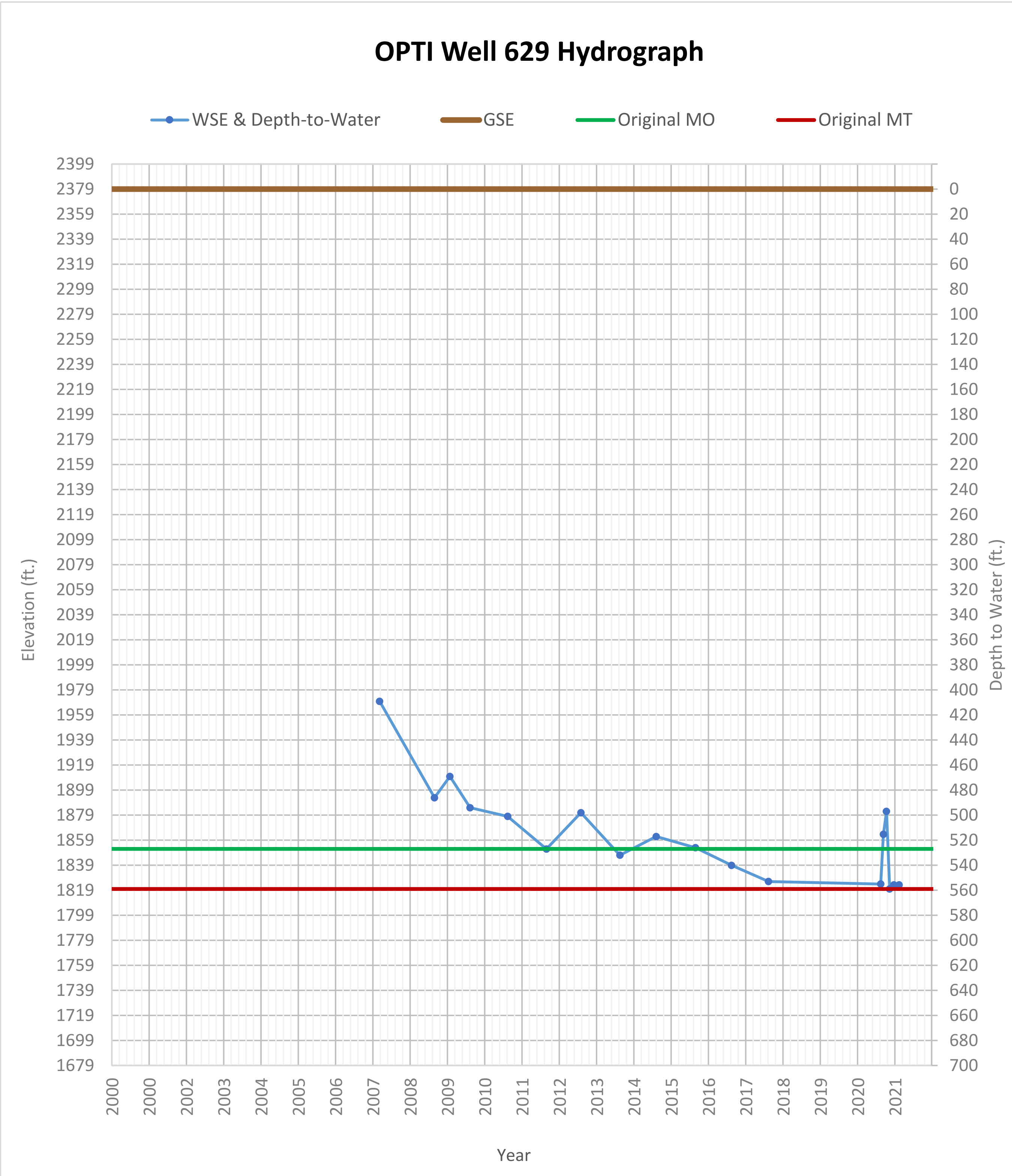

OPTI Well 629 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2399
2379
2359
2339
2319
2299
2279
2259
2239
2219
2199
2179
2159
2139
2119
2099
2079
2059
2039
2019
1999
1979
1959
1939
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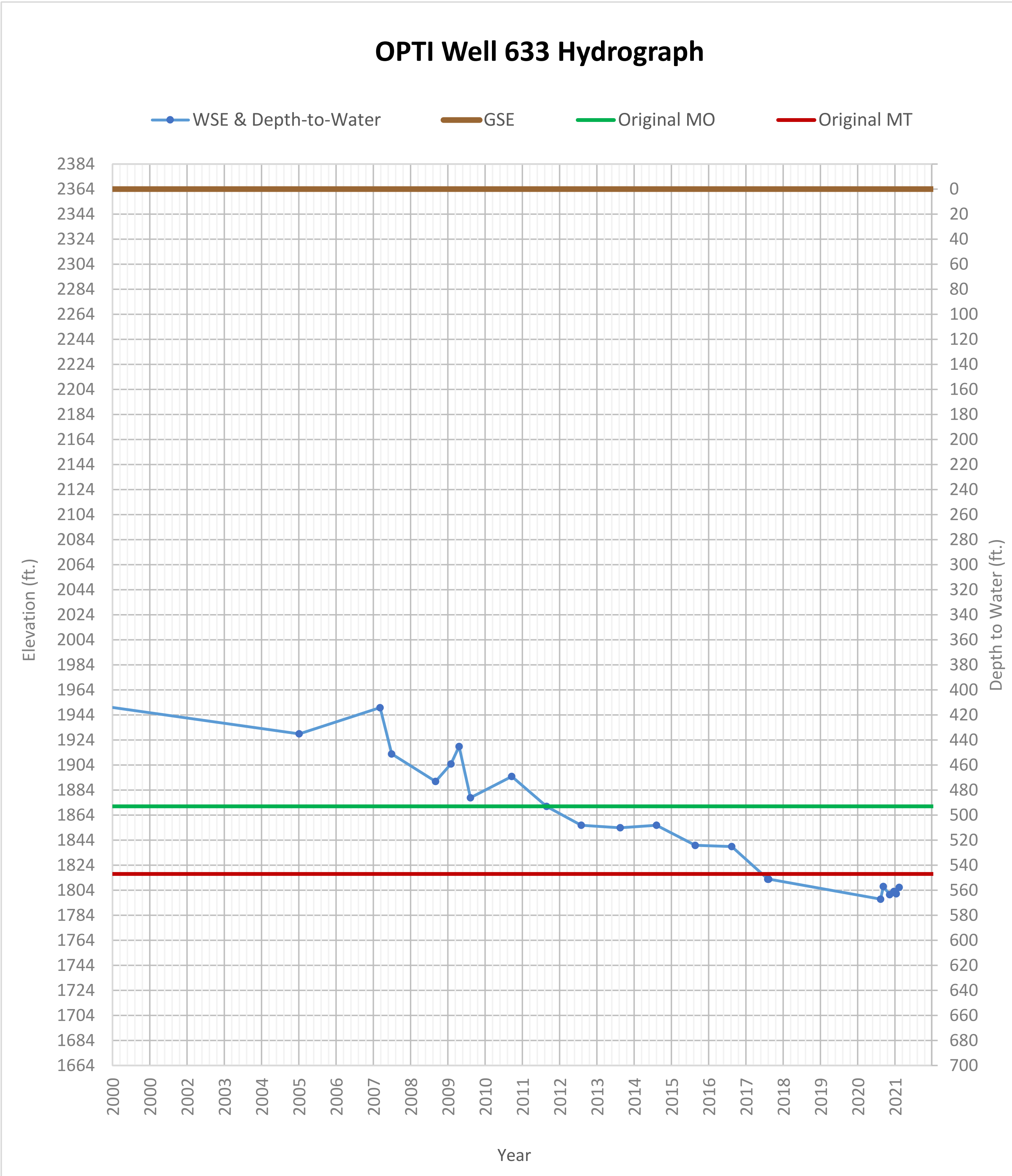
OPTI Well 633 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
2384
2364
2344
2324
2304
2284
2264
2244
2224
2204
2184
2164
2144
2124
2104
2084
2064
2044
2024
2004
1984
1964
1944
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1904
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1704
1684
1664
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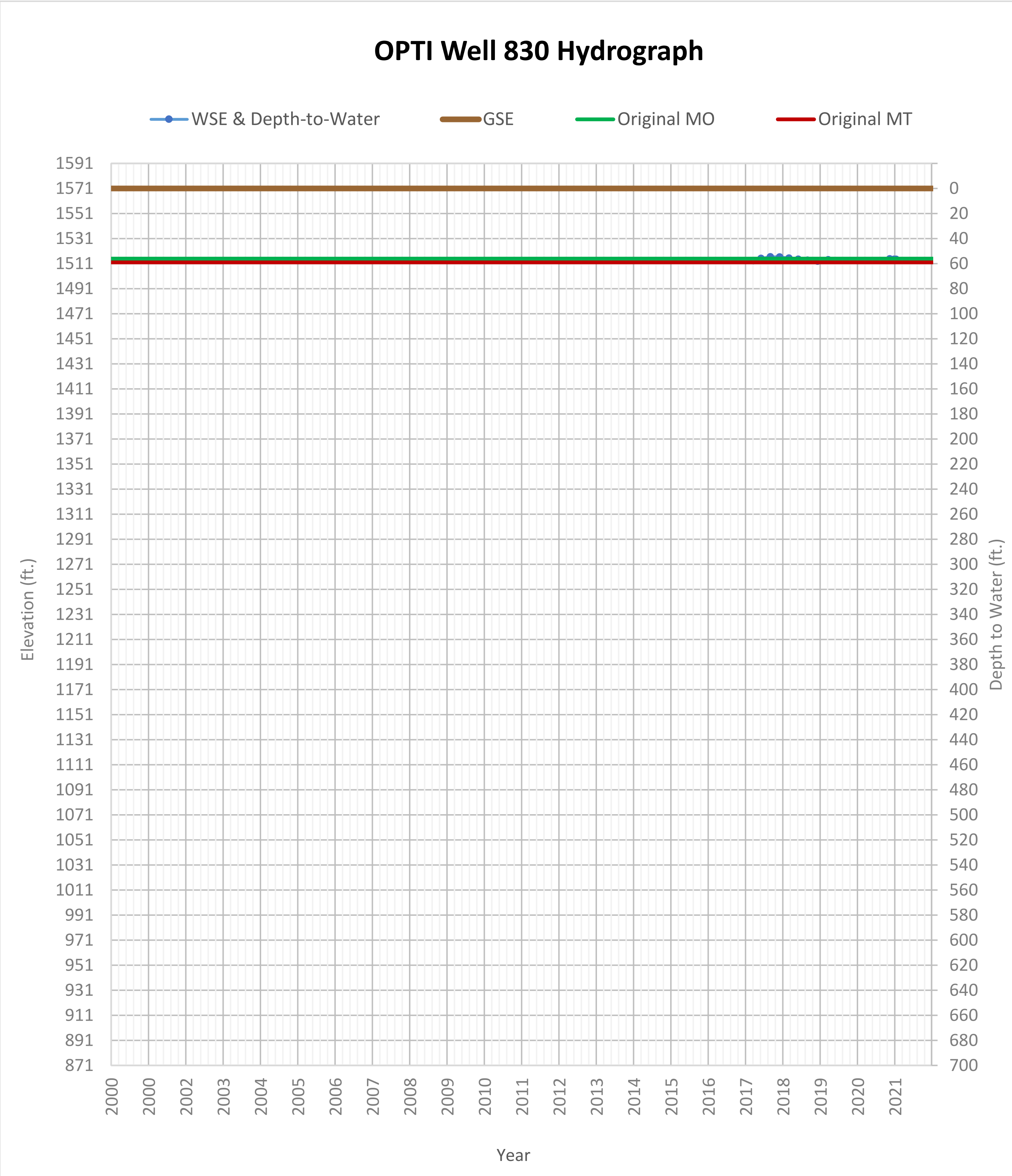
OPTI Well 830 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
1591
1571
1551
1531
1511
1491
1471
1451
1431
1411
1391
1371
1351
1331
1311
1291
1271
1251
1231
1211
1191
1171
1151
1131
1111
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871
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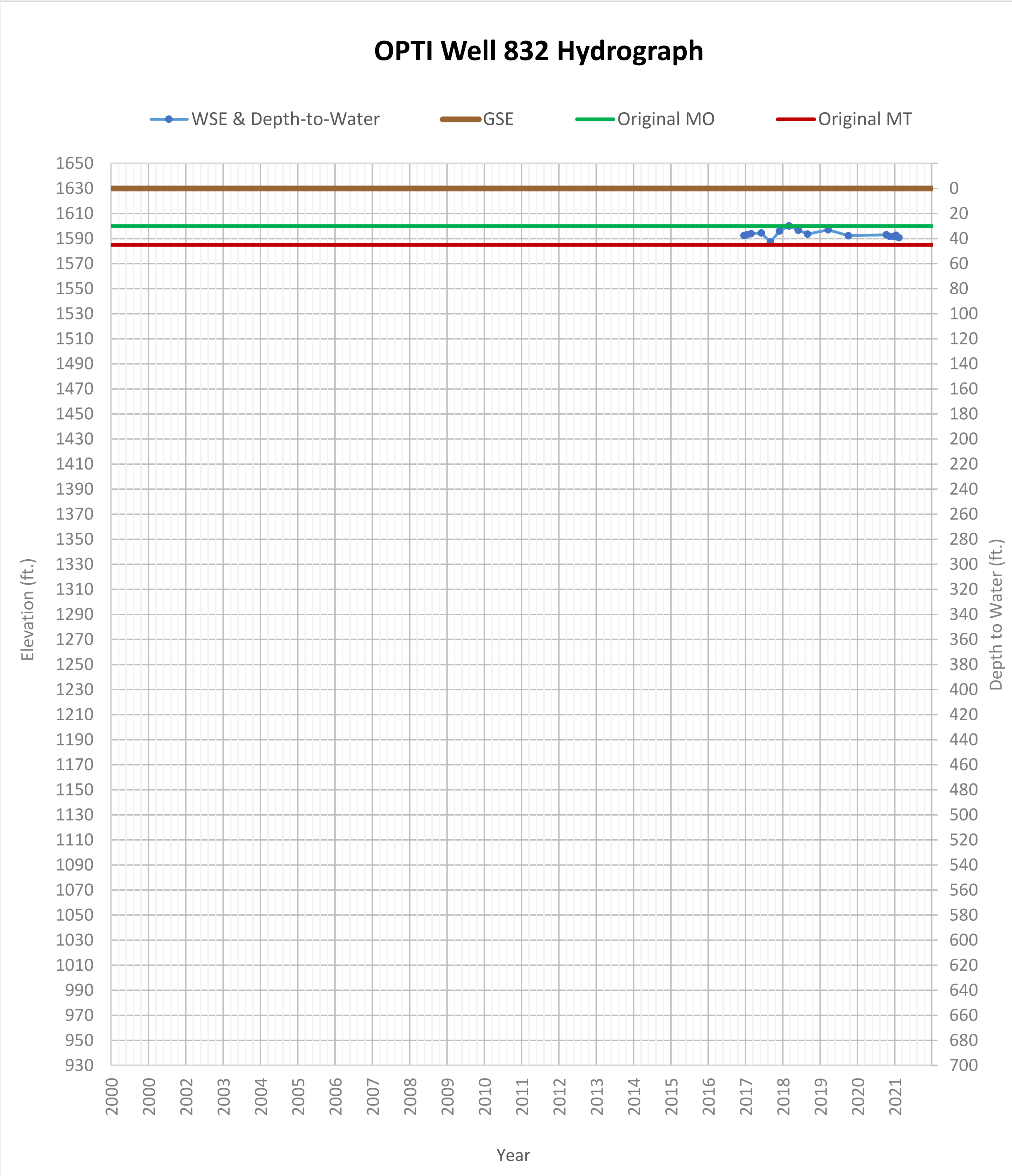

OPTI Well 832 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
1650
1630
1610
1590
1570
1550
1530
1510
1490
1470
1450
1430
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1330
1310
1290
1270
1250
1230
1210
1190
1170
1150
1130
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1010
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930
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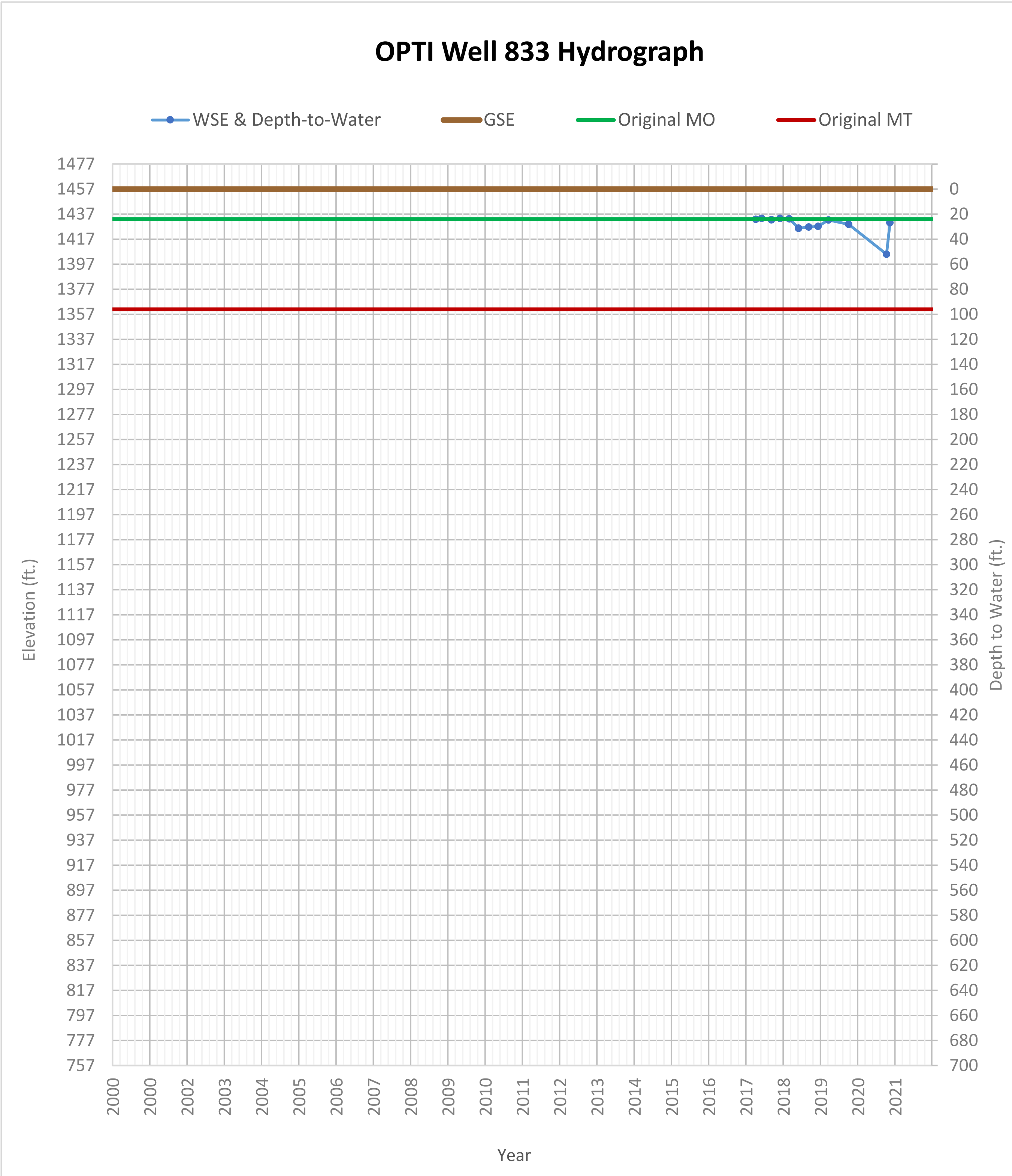

OPTI Well 833 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
1477
1457
1437
1417
1397
1377
1357
1337
1317
1297
1277
1257
1237
1217
1197
1177
1157
1137
1117
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1057
1037
1017
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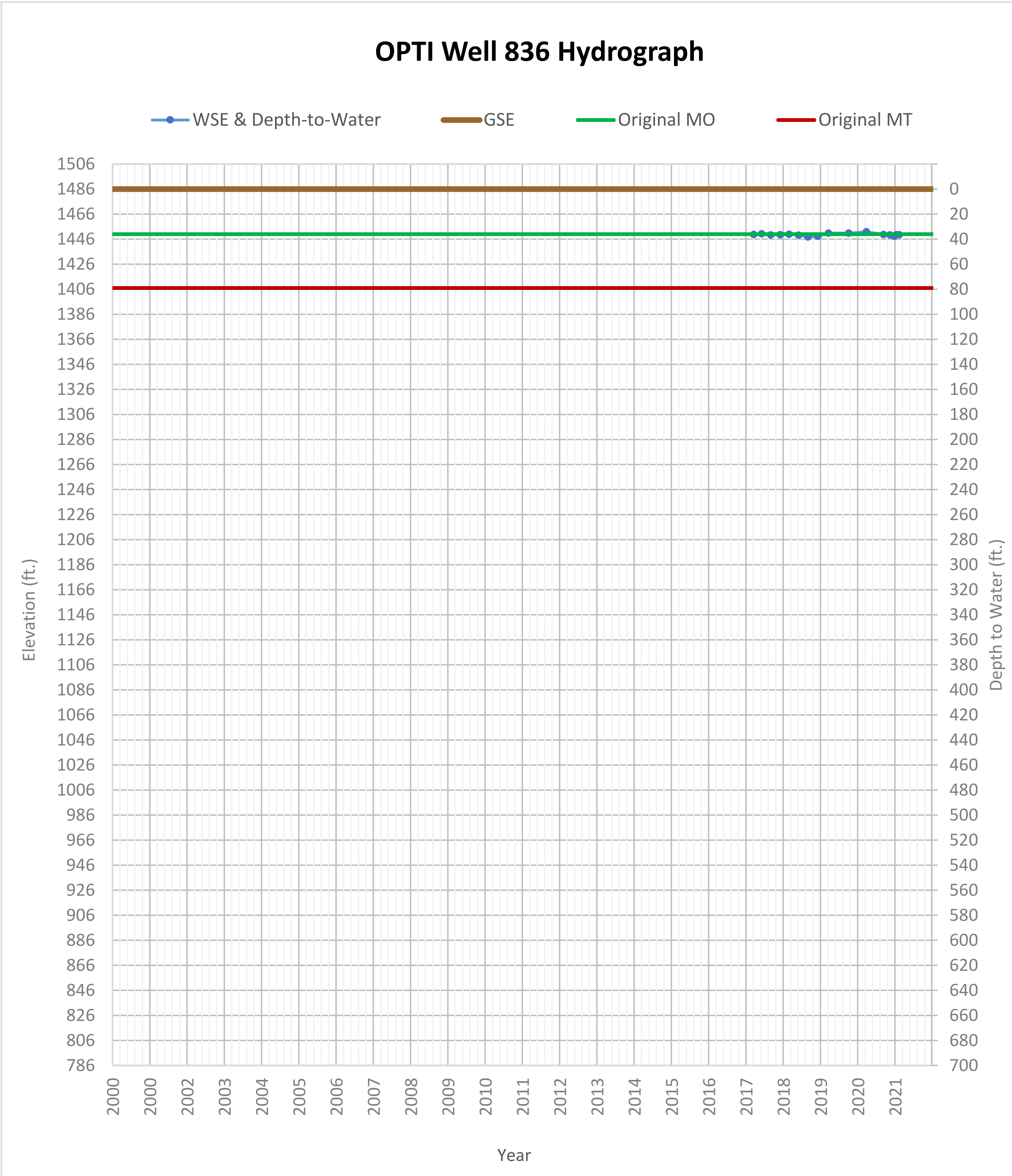
OPTI Well 836 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
1506
1486
1466
1446
1426
1406
1386
1366
1346
1326
1306
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1246
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1206
1186
1166
1146
1126
1106
1086
1066
1046
1026
1006
986
966
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926
906
886
866
846
826
806
786
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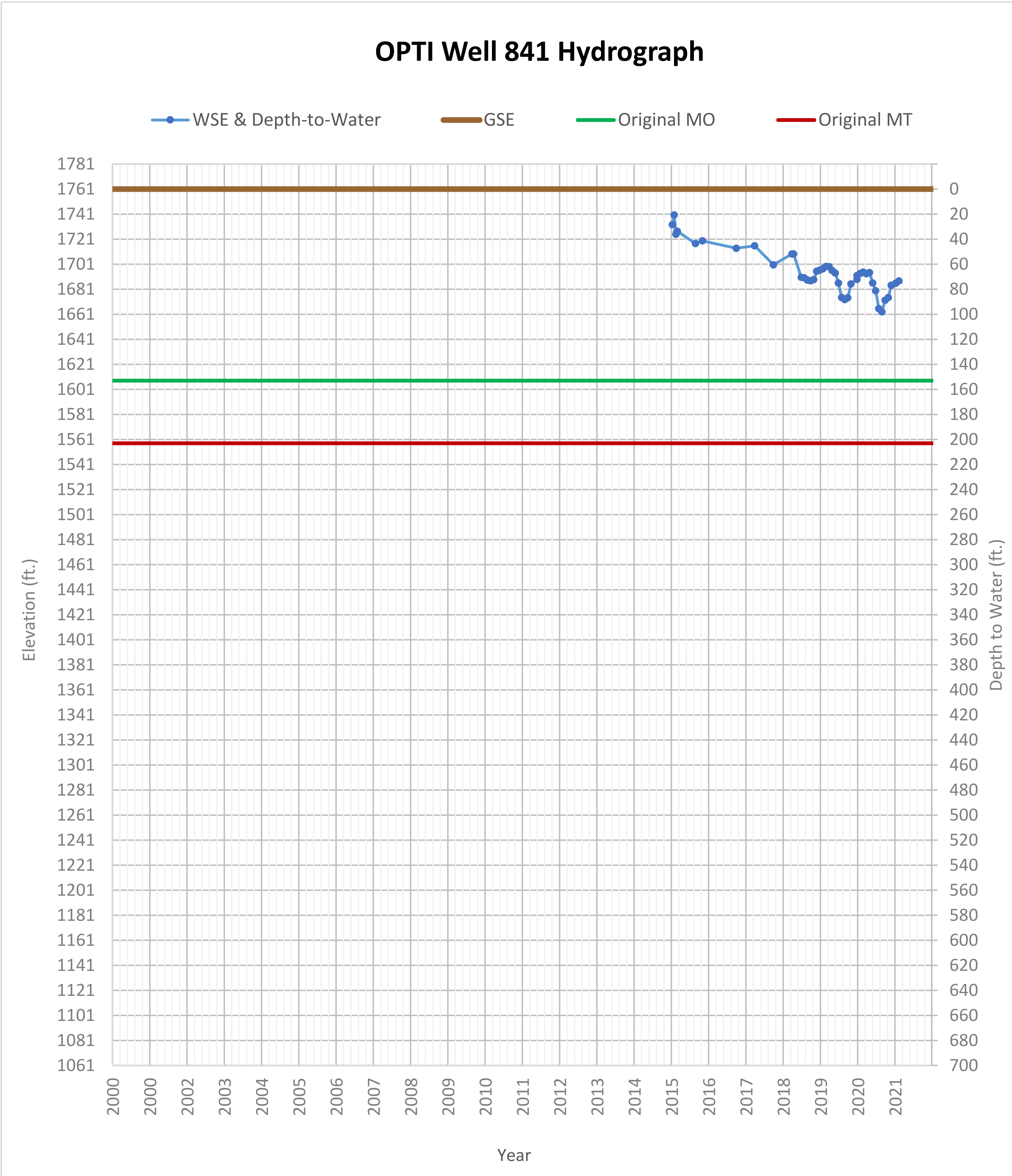

OPTI Well 841 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year
1781
1761
1741
1721
1701
1681
1661
1641
1621
1601
1581
1561
1541
1521
1501
1481
1461
1441
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1381
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1301
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1201
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1161
1141
1121
1101
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1061
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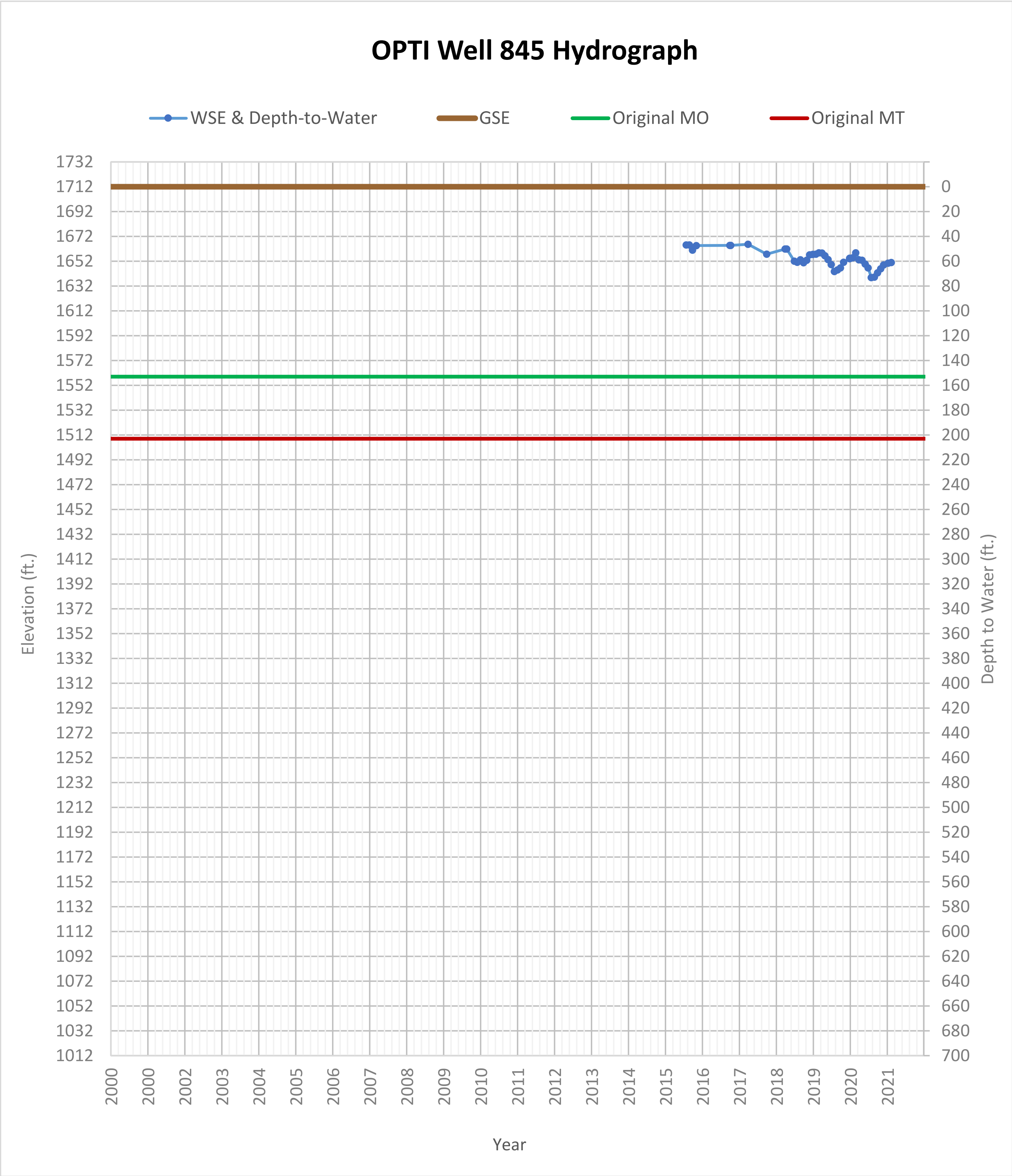

OPTI Well 845 Hydrograph
WSE & Depth-to-Water
GSE
Original MO
Original MT
Elevation (ft.)
Depth to Water (ft.)
Year

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