Borrego Springs Watermaster
Board of Directors Meeting
July 11, 2024
AGENDA ITEM IV.A

To: Board of Directors

From: Lauren Salberg, Associate Geologist, West Yost

Date: July 8, 2024, amended July 19 2024

Subject: Semi-Annual Report of Groundwater Level and Quality Results for the Borrego Springs Subbasin: Spring 2024

☐ **Recommended Action** ☐ **Provide Direction to Staff** ✓ **Information and Discussion**

☐ **Fiscal Impact** ☐ **Cost Estimate**

Recommended Action

Board discussion

Fiscal Impact: None.

Background and Previously Related Actions by the Board

On April 6, 2023, the Watermaster adopted an updated *Groundwater Monitoring Program for the Borrego Springs Subbasin* (2023 Monitoring Program) that defined (1) the wells included groundwater monitoring network and (2) the actions and schedule to fill data gaps and improve monitoring documentation and reporting protocols. Generally, the main objectives of the monitoring program are to collect the data that can be used to:

- Demonstrate progress toward meeting the Sustainability Goal of the Groundwater Management Plan (GMP), which is to ensure that by 2040 the Subbasin is operated within its Sustainable Yield without causing Undesirable Results. The main Undesirable Results to be avoided are the significant and unreasonable occurrences of the following Sustainability Indicators[1]: chronic lowering of groundwater levels; reduction in groundwater storage; and degradation of groundwater quality.
- Inform adaptive management to achieve the Sustainability Goal.
- Improve the Borrego Valley Hydrologic Model (BVHM) in a cost-effective manner that offers the most benefit for the resources expended.

[1] "Sustainability Indicator" refers to any of the effects caused by groundwater conditions occurring throughout the Basin that, when significant and unreasonable, cause undesirable results (California Water Code Section 10721(x)).

To demonstrate progress towards sustainability, the monitoring program data is used to track and monitor specific parameters relative to Minimum Thresholds[2,3] for the relevant Sustainability Indicators for the Basin. The GMP identified a subset of the wells in the monitoring program as Representative Monitoring Wells to assess groundwater conditions within the three management areas of the Basin (North, Central, and South)[4].

Monitoring is performed semi-annually in the spring and fall of each year by Watermaster staff and the Borrego Water District. Wells in the groundwater—quality monitoring program are sampled for the parameters in the following table. The five constituents of concern (COCs) identified in the GMP are TDS, nitrate, arsenic, sulfate, and fluoride. The remaining parameters are monitored to assist in source water characterization and general water quality characterization.

Groundwater Quality Monitoring Program: Water Quality Parameters	
Alkalinity (including bicarbonate and carbonate)	Nitrite
Arsenic	Magnesium
Calcium	Potassium
Chloride	Sodium
Fluoride	Sulfate
Nitrate	Total dissolved solids

This report summarizes the most recent semi-annual event that occurred in April 2024. This report includes:

- A description of the groundwater-level and groundwater-quality monitoring networks as of spring 2024.

[2] Minimum Thresholds are quantitative values that represent the groundwater conditions at a Representative Monitoring Well that, when exceeded individually or in combination with Minimum Thresholds at other monitoring sites, may cause an Undesirable Result(s) in the Basin.

[3] In its work to prepare the five-year assessment of the GMP and perform modeling for the Redetermination of Sustainable Yield, Watermaster staff determined that there are problems with some of the Sustainable Management Criteria (SMCs) established in the GMP—specifically the Measurable Objectives (MOs) and Minimum Thresholds (MTs) for groundwater levels—for a number of wells in the Basin. Staff is still trying to understand and work out the details of the various methods used at each well to establish the MOs and MTs, but at this time it's clear there are at least a couple problems with the SMCs: (1) at some Representative Monitoring Wells, the MT elevations are higher than the MO elevations, which is not logical, and (2) the simulation of future pumping in the South Management Area did not accurately reflect planned pumping under the Rampdown—specifically, it appears no pumping was assumed in the future and thus any SMCs based on the model projections do not represent reasonable operational flexibility. Given that Watermaster is in the process of updating and recalibrating the groundwater model (the BVHM), including plans to simulate new future scenarios of pumping under the Rampdown and Redetermined Sustainable Yield, the plan is to use the improved model and projections to update all SMCs for groundwater elevations and estimate of groundwater in storage in the Basin. For the purpose of this report, groundwater levels are only compared to MTs, with the understanding that the SMCs will be evaluated and changed, as appropriate, when the modeling work is completed (late 2024).

[4] The GMP identifies representative monitoring wells for groundwater-levels only. For groundwater-quality, this report shows results for all wells monitored.

- A summary of the activities that occurred during the spring 2024 event.
- Characterization of the data collected during the spring 2024 event, including:
    - Comparison of groundwater-level data at the Representative Monitoring Wells against Minimum Thresholds.
    - Time-series charts of groundwater-level data at all wells monitored in spring 2024 (showing entire period of historical data at each well).
    - Spatial distribution maps of groundwater-quality results for the five COCs at all wells sampled in spring 2024.
    - Time-series charts of groundwater-quality at all wells monitored in spring 2024 (showing entire period of historical data at each well.

Status of Groundwater Monitoring Network

Table 1 lists i) wells in the groundwater-level and groundwater-quality monitoring programs, and ii) wells evaluated in spring 2024 for potential future inclusion in the monitoring program, by management area. Table 1 identifies the local or alias[5] well name, State Well ID, well use (if known), type of monitoring performed, and, if applicable, the reason(s) why a sample or measurement was not collected during spring 2024. Wells in the groundwater-level monitoring network and the groundwater-quality monitoring network are shown on Figures 1 and 2, respectively. Wells evaluated in spring 2024 for inclusion in the monitoring program that are not yet considered part of the program are shown in Figure 3 and are described in the section below entitled *Expansion of the Groundwater Monitoring Program*.

Of the wells in the monitoring programs, some are strictly observation wells (no pumping), while others are used to pump groundwater for municipal, recreation (e.g., golf courses), and other purposes. As shown in Table 1, the monitoring network currently consists of 52 groundwater wells. Of the 52 wells in the network:

- 51 wells are monitored for groundwater-levels. Figure 1 shows the locations of the wells that are currently or have recently been in the groundwater-level monitoring network. Of these 51 wells:
    - 31 wells have groundwater-level measurements collected manually. Manual measurements are collected semi-annually in the spring and fall of each year.
    - 20 wells have groundwater-level measurements collected at a high frequency interval (15 minutes to 1 hour) using a pressure transducer with an integrated data logger. Manual water level measurements are also collected semi-annually at these wells while the transducer data is downloaded.

[5] Due to data confidentiality agreements, some wells being considered for inclusion in the groundwater-quality monitoring program are not identified by name or owner. Instead, they are assigned anonymous names based on their relative location in the Management Area.

- 32 wells are monitored for groundwater-quality. Figure 2 shows the locations of the wells that are currently in the groundwater-quality monitoring network. Of these 32 wells:
    - 10 wells are wells used for drinking water.
    - 14 wells are non-potable wells used for agricultural and recreation irrigation, and other purposes (not used for drinking water).
    - 8 wells are dedicated monitoring wells.

Summary of Spring 2024 Groundwater Monitoring Event

The spring 2024 semi-annual monitoring event took place from April 14 to April 18, 2024, and included the following activities:

- Groundwater-level measurements at 49 of the 51 wells (see Table 1 and Figure 1), including:
    - Manual measurement of depth to groundwater at 50 wells, including:
        - All 20 wells equipped with transducers.[6]
        - 29 of the 31 wells monitored using manual groundwater-level methods. Notable outcomes include:
            - One well, Nel Well, was not able to be monitored because of the presence of an active beehive in the well lid. If the beehive remains in the well lid during the fall 2024 monitoring event, it will need to be removed by a professional prior to making a groundwater-level measurement.
            - One well, Airport 2, was not able to be monitored because the well casing had collapsed. A groundwater level measurement has not been able to be taken since spring 2023. If it is not feasible to conduct a well rehabilitation, the Airport 2 well should be removed from the groundwater-level monitoring program. Given that this well is a Representative Monitoring Well, a replacement will need to be selected. These options will be explored as part of the 5-year GMP Assessment.
            - For the first time, groundwater-level monitoring occurred at the Auxiliary Well 2 in the North Management Area because a new sounding tube was installed by the State Park staff. This well has been added to the groundwater-level monitoring program.
    - Depth to groundwater measurements at 19 of the 20 wells that are equipped with transducers. Notable outcomes include:
            - Transducer data were not able to be downloaded from RH-4 due to technical issues. While in the field, a backup transducer was installed to replace the malfunctioning unit. The malfunctioning transducer was

[6] Additionally, the barologger installed in the BSR 6 well was downloaded. The barologger data is used to compensate transducer measurements taken at surrounding wells for variations in barometric pressure.

later returned to In-Situ, where some of the groundwater-level measurements were able to be recovered. The transducer was under warranty and was replaced by In-Situ; the replaced transducer is now a backup for the monitoring program.

- For the first time, transducer data were downloaded at three wells with transducers installed in fall 2023 (Auxiliary 3, Hanna Flowers, and ID1-10).

- Water quality grab samples were collected at 30 of 32 wells (see Table 1 and Figure 2). Notable outcomes include:
  - One well (RH-5) did not have water quality samples collected by Watermaster staff due to well construction activities during the timeframe of the sampling event.
  - One well (ID1-8) did not have water quality samples collected by BWD staff because the well has been taken offline indefinitely. Watermaster staff is assessing if this well should be removed from the groundwater-quality monitoring network moving forward.

Expansion of Groundwater Monitoring Program

The Groundwater Monitoring Plan identified and recommended areas for additional monitoring to improve the monitoring programs. The Watermaster continues efforts to expand the network of monitoring wells for both the groundwater-level and groundwater-quality monitoring programs through public outreach.

Although no new wells were officially added to the groundwater monitoring network during the spring 2024 monitoring event, efforts to expand the groundwater monitoring program included collecting manual groundwater-level measurements at four wells and groundwater-quality samples at seven wells in the North and Central Management Areas. Figure 3 shows the location of the 11 wells sampled and evaluated during the spring 2024 monitoring network and identifies if the well is being considered for either the groundwater-level or groundwater-quality monitoring program. Additionally, Figure 3 shows the location of the evaluated wells relative to the areas of recommended additional monitoring identified in the 2023 Groundwater Monitoring Program. These wells are also listed in Table 1.

Of the 11 wells groundwater wells evaluated by Watermaster staff in spring 2024, five wells are active pumping wells used for recreation and agricultural irrigation, two wells are inactive pumping wells previously used for irrigation, and four wells are abandoned. The groundwater-level and groundwater-quality data were processed and added to the Watermaster's database and will inform Watermaster staff's recommendations to include the wells or not, and discussions with the well owners to secure long-term approval for monitoring.

Spring 2024 Groundwater Monitoring Results

The following additional figures and tables were prepared to summarize and analyze the results of the spring 2024 monitoring event, including i) wells in the groundwater-level and groundwater-quality monitoring programs, and ii) wells evaluated in spring 2024 for potential future inclusion in the monitoring program:

Table 2 – Current Groundwater Elevations at Representative Monitoring Wells Compared to Minimum Threshold. For each well, this table lists the groundwater elevation in spring 2024, the Minimum Threshold[7], and the difference between the spring 2024 groundwater elevation and Minimum Threshold. If the difference is positive, current elevations are above the Minimum Threshold. **Table 2 shows that groundwater-levels are above the Minimum Thresholds at all Representative Monitoring Wells.**

Table 3 – Groundwater Level Trends at Representative Monitoring Wells – Fall 2019 to Spring 2024. For each well, the table lists the groundwater elevation in fall 2019 (*i.e.,* the start of Physical Solution implementation period in WY 2020), the groundwater elevation in spring 2024, the change in groundwater-level, the rate of change in groundwater level from fall 2019 to spring 2024, and the historical groundwater-level trend (average decline in feet per year prior to fall 2019). Table 3 shows that since fall 2019:

- Groundwater levels decreased at 13 Representative Monitoring Wells, ranging from -0.7 to -11.9 feet.
- Groundwater levels increased at 3 Representative Monitoring Wells, ranging from 0.3 to 1.9 feet.
- Generally, the rate of decline in groundwater-levels at the Representative Monitoring Wells is slowing compared to historical rates of change. However, one wells exhibited an increase in the rate of decline groundwater-level compared to the historical rate of change (ID4-11). This observation is consistent with observations from prior monitoring events.

Figures 4a – 4p – Groundwater Level and Sustainable Management Criteria at Representative Monitoring Wells. For each well, these time-series charts show historical groundwater elevations prior to the start of GMP implementation, groundwater elevations since the start of GMP implementation (*i.e.,* fall 2019), and the Minimum Threshold. Figures 4a-4p show that groundwater-levels are above the Minimum Thresholds at all Representative Monitoring Wells.[8]

Table 4 – Water Quality Standard Exceedance Report. This table lists all groundwater-quality sample results that exceeded a California or EPA drinking water standard (*e.g.,* California Maximum Contaminant Level [MCL]) for the constituents tested during the spring 2024 monitoring event. For each well with a water quality standard exceedance, the table lists: the well owner, well name, well use (e.g. public supply, non-potable irrigation, or observation), the water quality parameter(s) exceeded, the date of the water quality sample, the spring 2024 parameter concentration, and the water quality standard. Amongst the wells sampled in the groundwater-quality monitoring program,

[7] As defined in the GMP, the Minimum Threshold for water levels is expressed as the maximum allowable decline in groundwater levels from the beginning of the Physical Solution implementation through 2040. Watermaster staff converted the decline into an elevation for comparison to current elevations.

[8] Figures 4d, 4f, and 4n show that the lowest groundwater elevations are periodically below the Minimum Thresholds for the RH-1, ID1-16, and MW-3 wells, respectively. The groundwater elevations below the Minimum Threshold occur during well operation (i.e. pumping) of the RH-1 and ID1-16 wells. For MW-3, the lowest groundwater elevations occur when a nearby pumping well (ID1-8) is in operation. The groundwater elevations that occur while the wells are pumping or influenced by pumping are not representative of static groundwater conditions and, therefore, are not considered to be below the Minimum Threshold.

the COC concentrations that exceeded water-quality standards were generally similar to past results, with the exception of the results at MW-5A. The concentrations of TDS and sulfate at MW-5A were greater than previous results, which may have been due to sampling from a lower depth within the well screen interval. Therefore, these results from the spring 2024 may be revealing a depth-specific profile of higher TDS and sulfate concentrations with increasing depth. Moving forward, MW-5A will be sampled at the deeper location within the well screen to confirm the spring 2024 results and better understand the depth-specific differences in groundwater-quality at this location.

All seven wells evaluated for inclusion in the groundwater-quality monitoring program had groundwater-quality exceedances. Of the seven wells sampled for evaluation:

- Two wells exceeded the lower limit of the secondary MCL for TDS (500 mg/L)
- Four wells exceeded the upper limit of the secondary MCL for TDS (1,000 mg/L)
- Five wells exceeded the MCL for nitrate (10 mg/L)
- Two wells exceeded the secondary MCL for sulfate (250 mg/L)

The owners of the evaluated wells were provided the results of the groundwater-quality samples and given the opportunity to meet with Watermaster Staff to discuss them.

Table 5 - Summary of Exceedances of Water Quality Standard by Standard Type and Well Type. This table summarizes the number of water-quality results that exceeded a California or EPA drinking water standard by well type (*i.e.* drinking water, non-potable, or observation well).

Figures 6 through 10. These figures characterize groundwater-quality for the five COCs constituents of concern identified in the GMP: TDS, nitrate, arsenic, sulfate, and fluoride. Each figure includes:

- A map that illustrates the spatial distribution of water quality concentrations at all wells sampled in spring 2024.
- Time-series charts of historical concentration trends at selected wells in each of the Management Areas to demonstrate the range of concentrations observed at select wells with long records of groundwater-quality results.

Appendix A (A-1 through A-55). These figures show time-series charts of the historical groundwater elevation data for all wells in the groundwater level monitoring network and wells evaluated for inclusion in the monitoring network in spring 2024. Appendix A is available as a handout only – to access click on this LINK or visit the Meetings page of the Watermaster's website

Appendix B (B-1 through B-195). This appendix includes time-series charts of the five constituents of concern for the wells in the groundwater-quality monitoring network and wells evaluated for inclusion in the monitoring network in spring 2024 (arsenic, TDS, sulfate, fluoride, and nitrate). The primary or secondary MCLs for drinking water quality standards for each constituent are also plotted on each chart. The figures also identify the general well location and the total depth, and screened interval of the well. Appendix B is available as a handout only – to access click on this LINK or visit the Meetings page of the Watermaster's website.

Enclosures

Figure 1. Groundwater-Level Monitoring Program

Figure 2. Groundwater-Quality Monitoring Program

Figure 3. Groundwater Wells Evaluated in Spring 2024 for Expansion of the Monitoring Network

Figures 4a – 4p. Groundwater Level and Sustainable Management Criteria at Representative Monitoring Wells

Figure 5. Total Dissolved Solids (TDS) in Groundwater

Figure 6. Nitrate in Groundwater

Figure 7. Arsenic in Groundwater

Figure 8. Sulfate in Groundwater

Figure 9. Fluoride in Groundwater

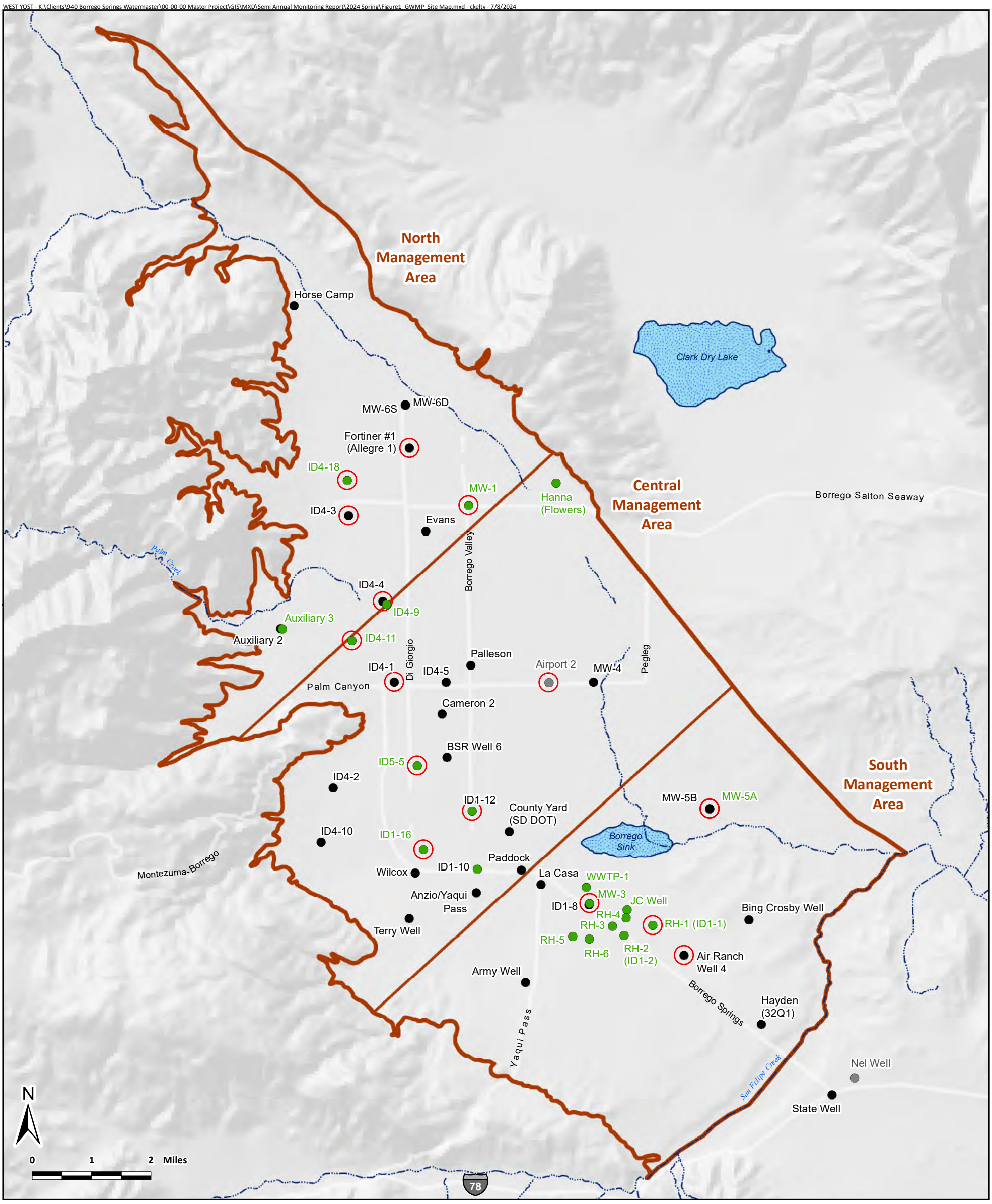
Table 1. Groundwater Level and Quality Monitoring Network and Wells Monitored in Spring 2024

Table 2. Current Groundwater Elevations at Representative Monitoring Wells Compared to Minimum Thresholds

Table 3. Groundwater Level Trends at Representative Monitoring Wells - Fall 2019 to Spring 2024

Table 4. Water Quality Standard Exceedance Report

Table 5. Summary of Exceedances of Water Quality Standard by Standard Type and Well Type



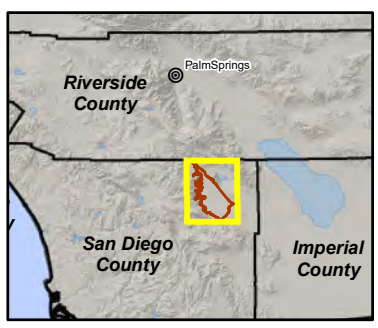
Groundwater-Level Monitoring Network

- Representative Monitoring Site

Borrego Springs Subbasin with Management Area Divisions

Wells Monitored for Groundwater Level in Spring 2024

- Manual Water-Level Data
- Transducer Water-Level Data
- Unable to Measure Water-Level



Borrego Springs Watermaster

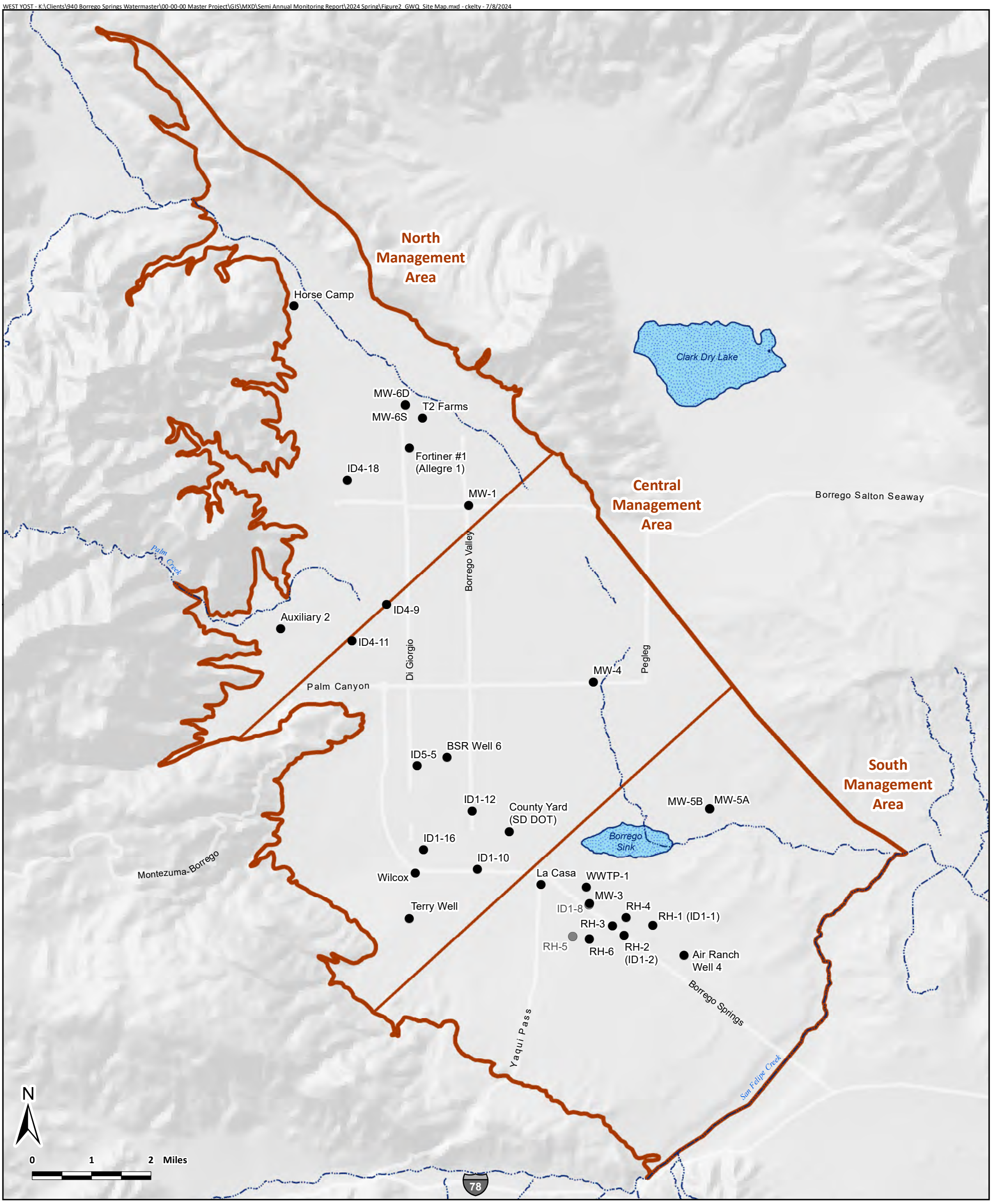
Groundwater Monitoring Plan

Prepared by:

WEST YOST

Figure 1

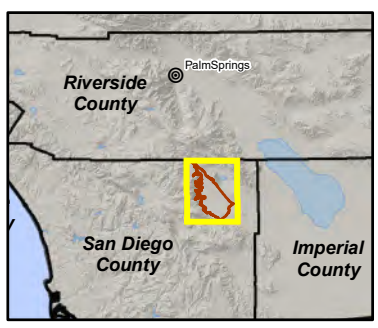
Groundwater-Level Monitoring Network
Spring 2024



Groundwater-Quality Monitoring Network - Spring 2024

- ● Well Sampled for Water Quality
- ● Unable to Sample Well for Water Quality

Borrego Springs Subbasin with Management Area Divisions



Borrego Springs Watermaster
Groundwater Monitoring Plan

Prepared by:
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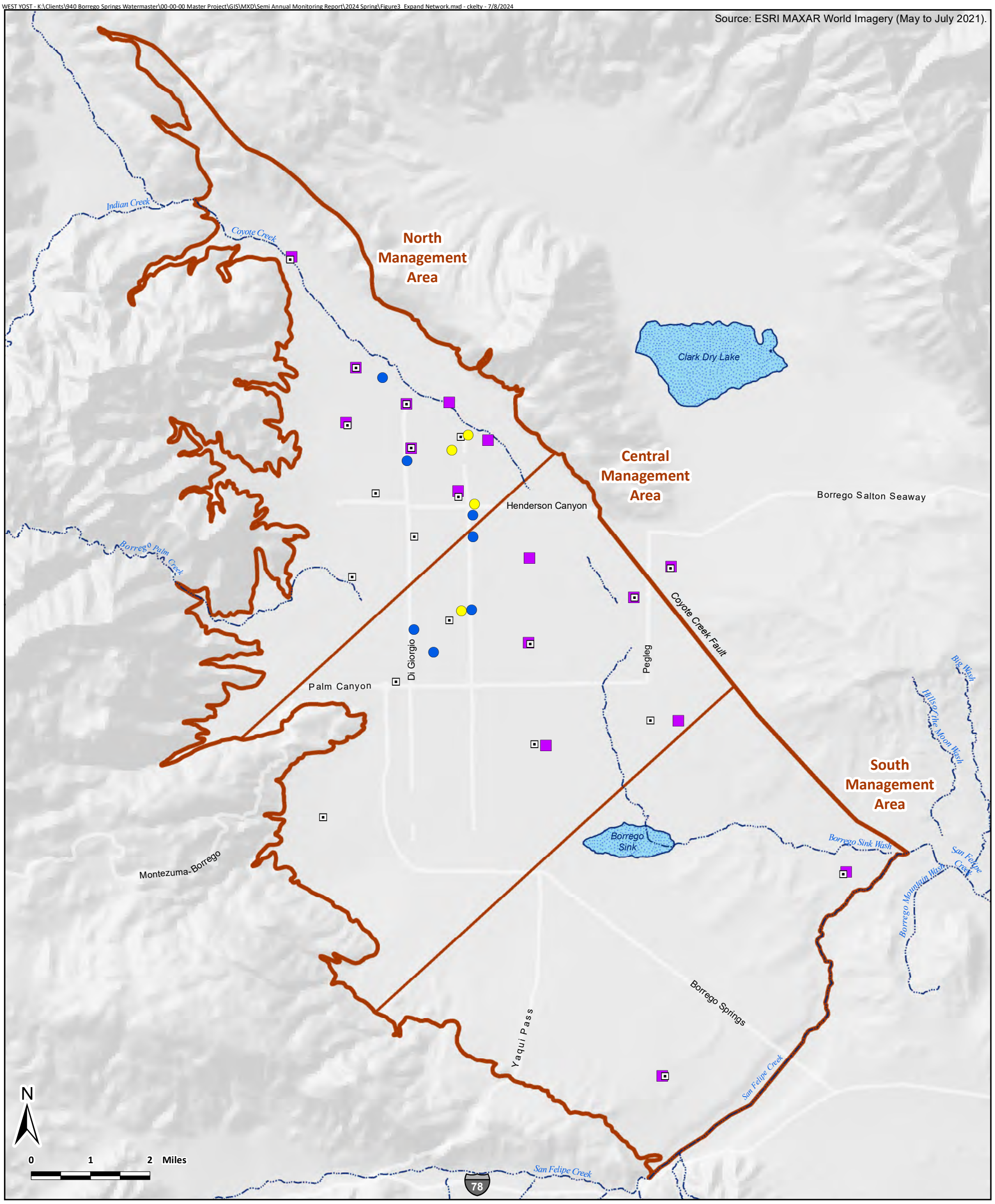
Figure 2
Groundwater-Quality Monitoring Network
Spring 2024

WEST YOST - K:\Clients\940 Borrego Springs Watermaster\00-00-00 Master Project\GIS\MXD\Semi Annual Monitoring Report\2024 Spring\Figure3_Expand Network.mxd - ckelty - 7/8/2024

Source: ESRI MAXAR World Imagery (May to July 2021).

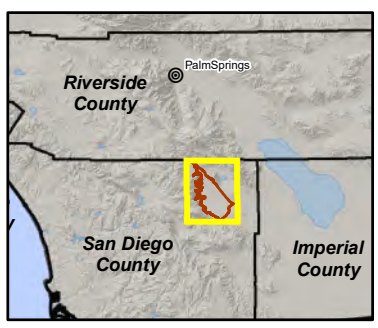


Groundwater Wells Evaluated in Spring 2024

- Well Being Considered for Groundwater-Level Monitoring Network
- Well Being Considered for Groundwater-Quality Monitoring Network

Other Features

- Area of Recommended Additional Water-Level Monitoring
- Area of Recommended Additional Water-Quality Monitoring
- Borrego Springs Subbasin with Management Area Divisions



Borrego Springs Watermaster

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Figure 3

Groundwater Wells Evaluated in Spring 2024 for Expansion of the Monitoring Network

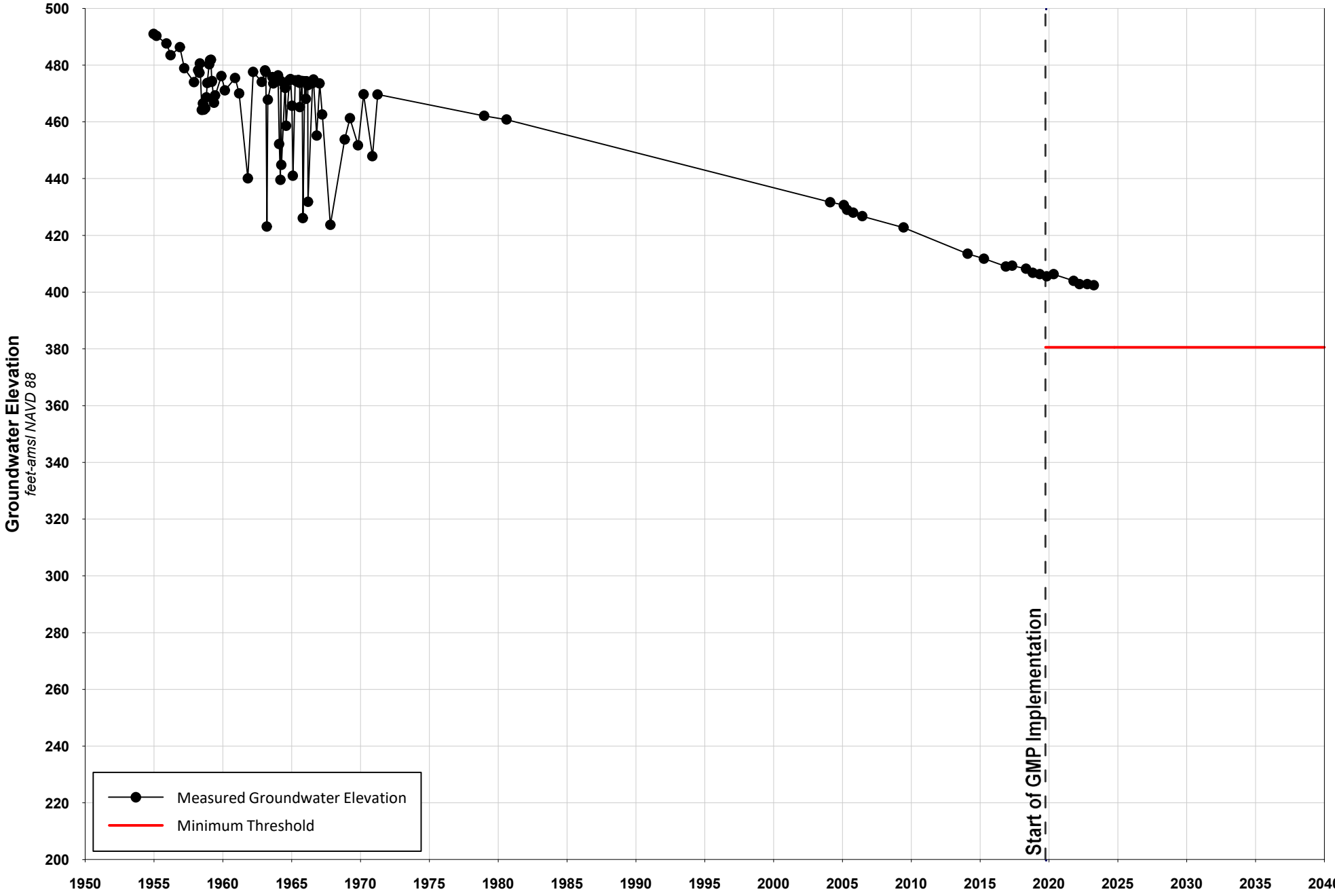
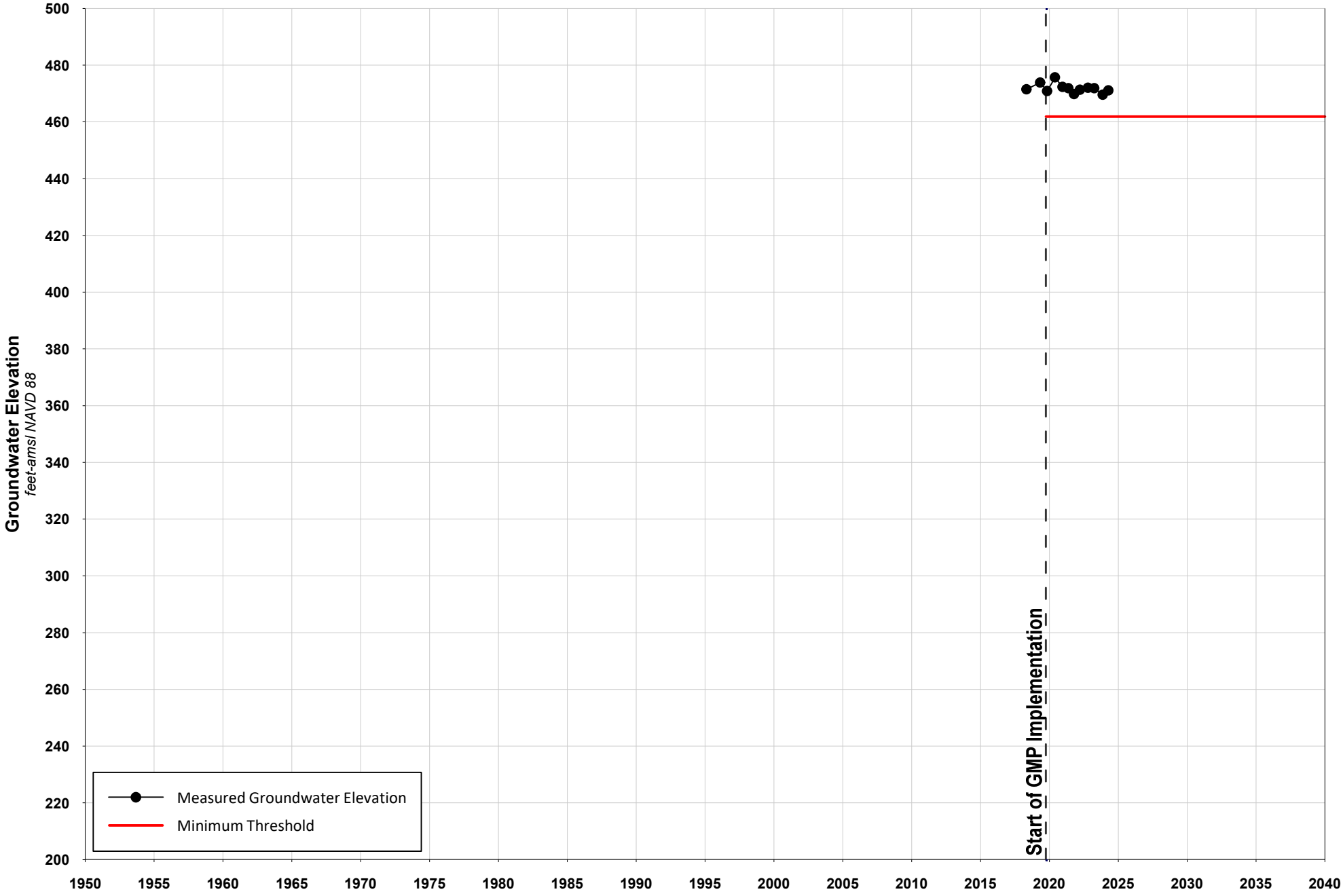


Figure 4a

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well Airport 2

WEST YOST
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4a_GW Levels in Airport 2.grf



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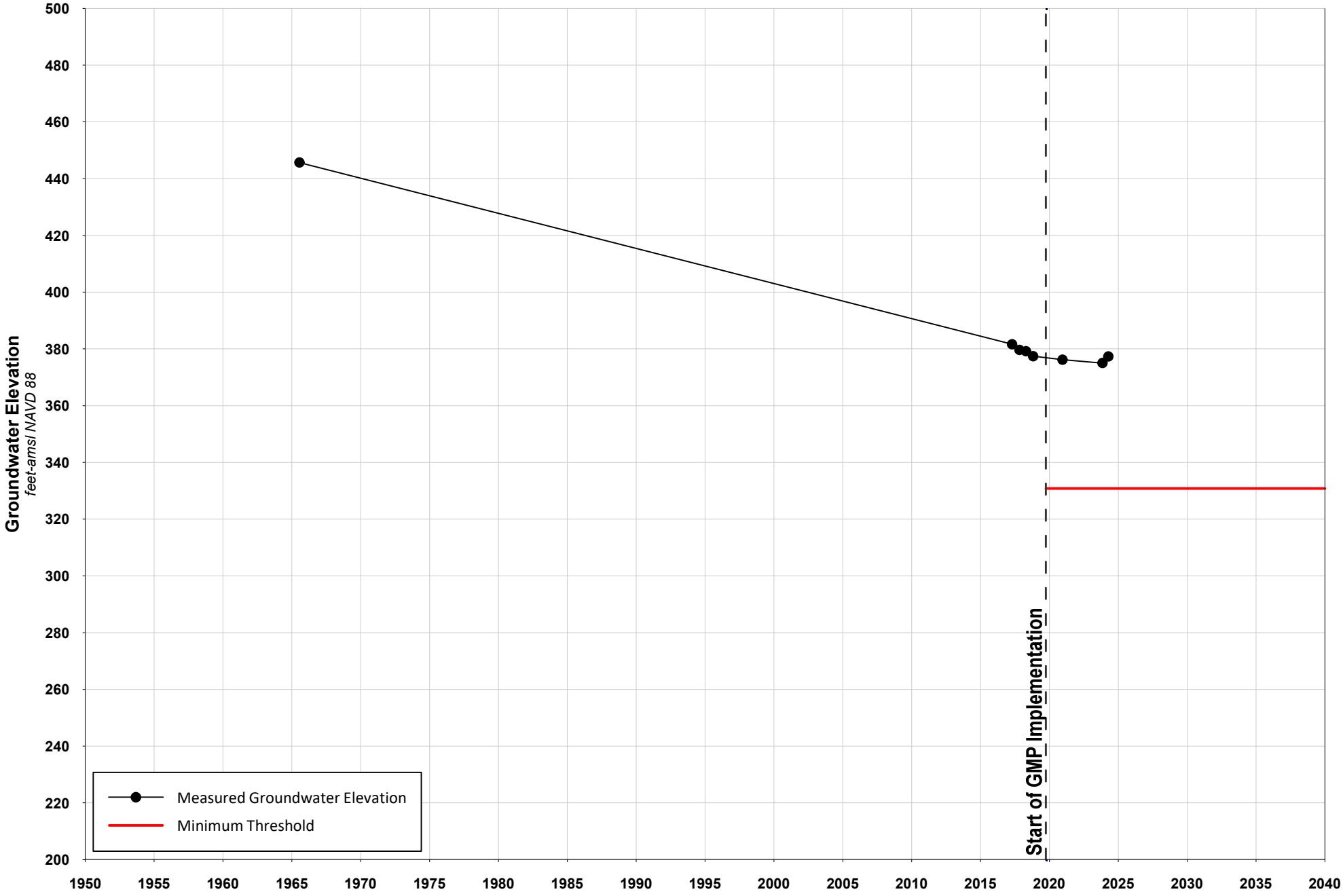
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4b_GW Levels in Air Ranch 4.grf

Figure 4b

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well Air Ranch 4



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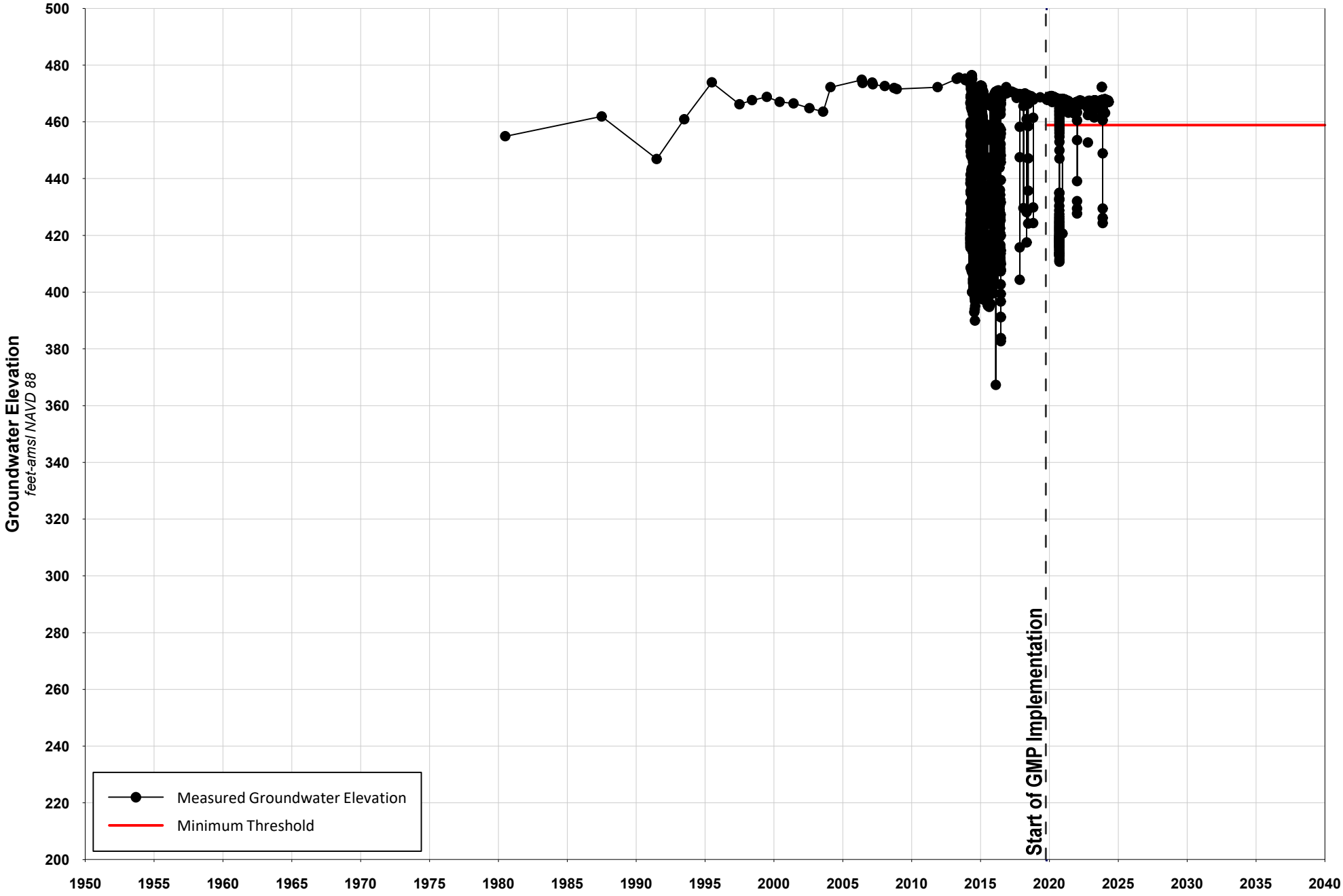
Author: CK
Date: 20240602
File: Figure4c_GW Levels in Fortiner.grf

Figure 4c

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well Fortiner #1



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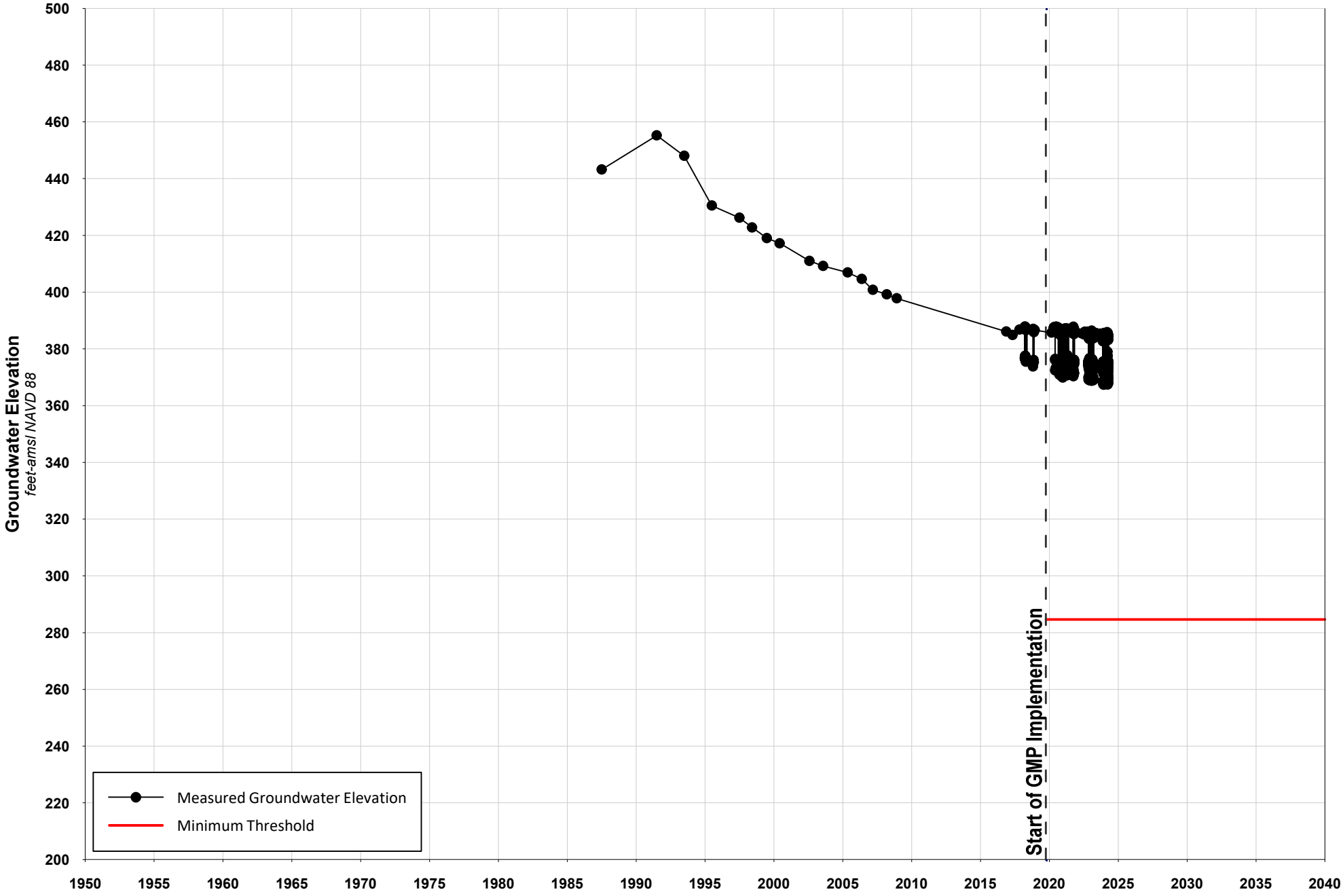
Author: CK
Date: 20240602
File: Figure4d_GW Levels in RH-1.grf

Figure 4d

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well RH-1



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Author: CK
Date: 20240602
File: Figure4e_GW Levels in ID1-12.grf

Figure 4e

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well ID1-12

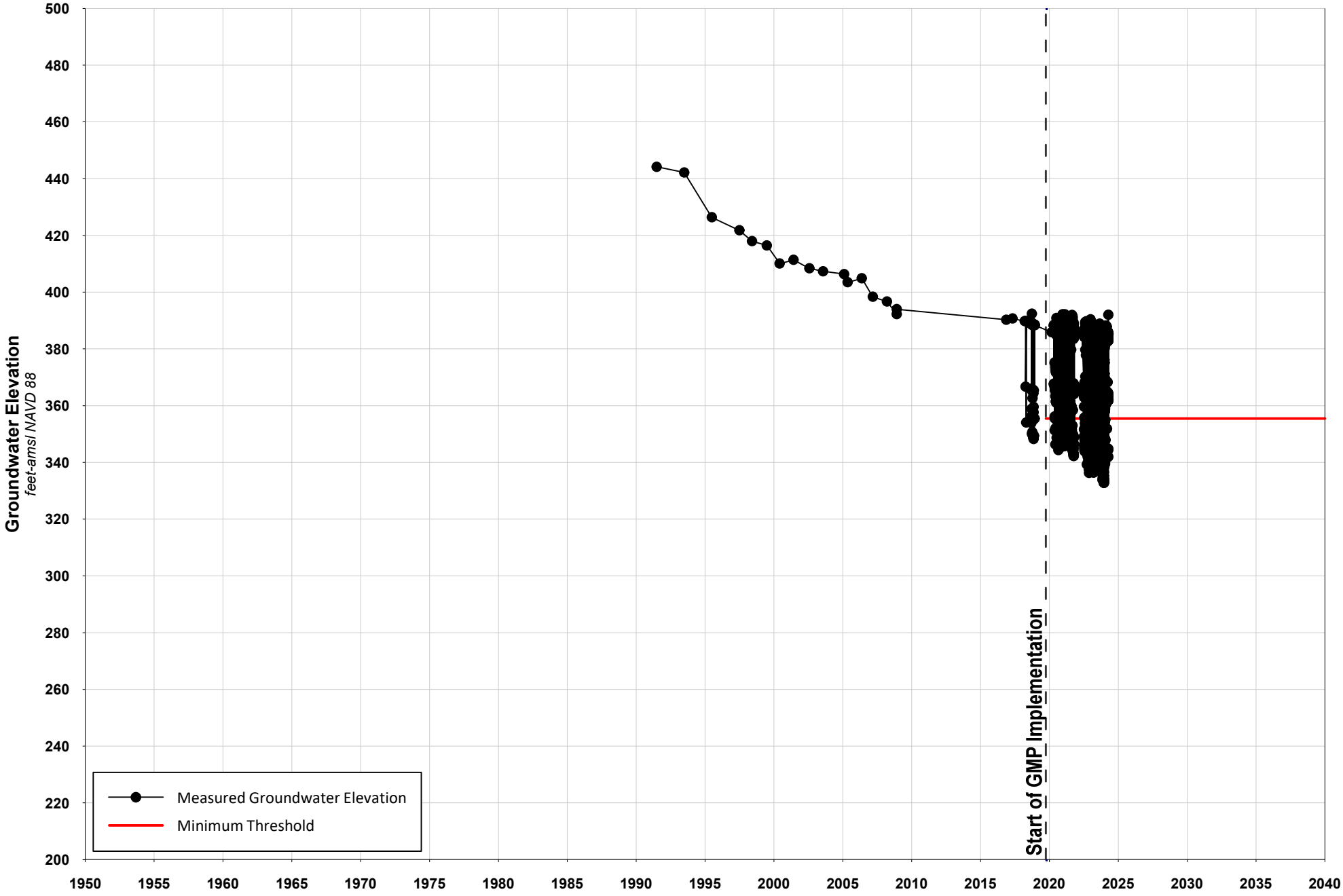

Figure 4f

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well ID1-16

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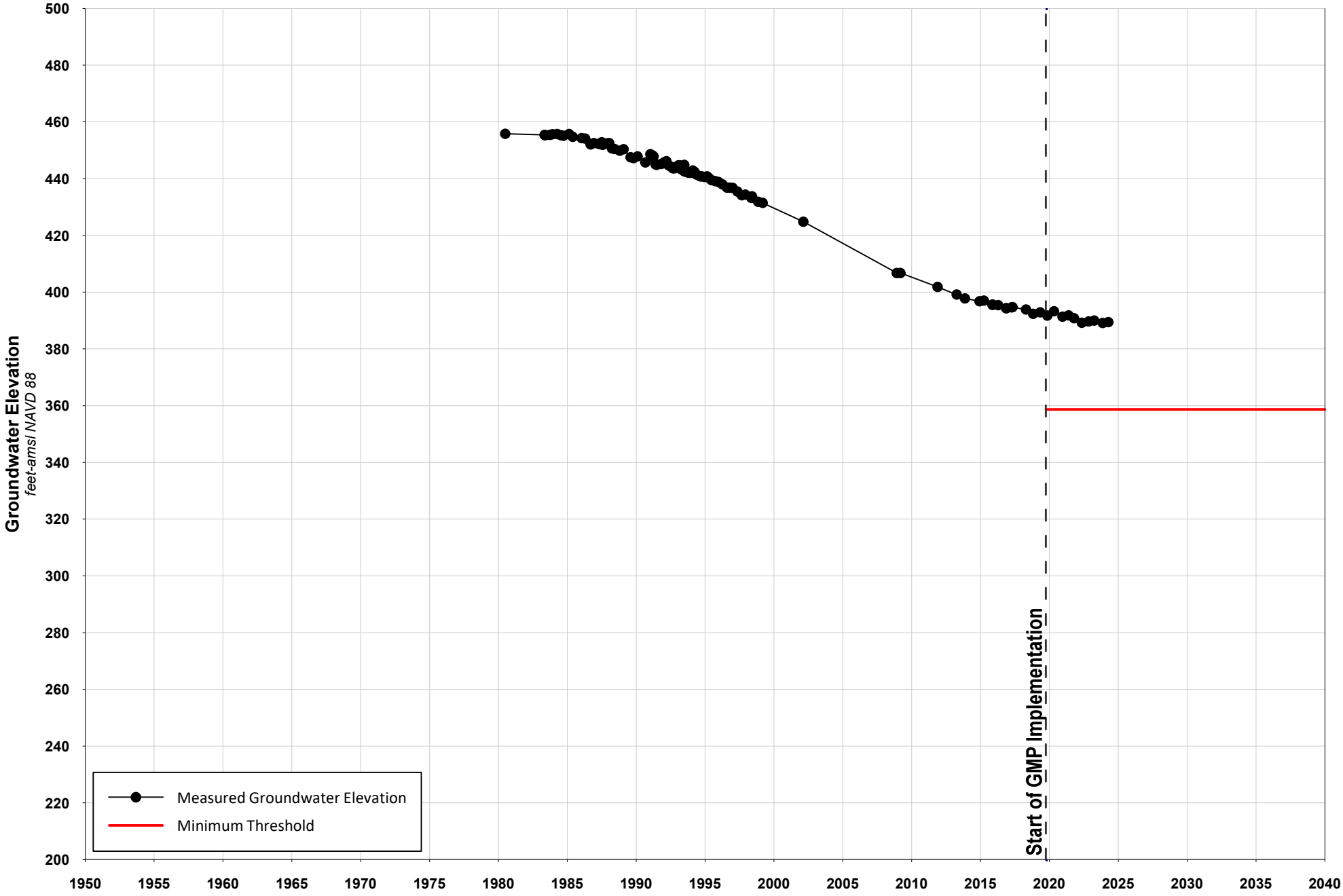
Date: 20240602
File: Figure4f_GW Levels in ID1-16.grf



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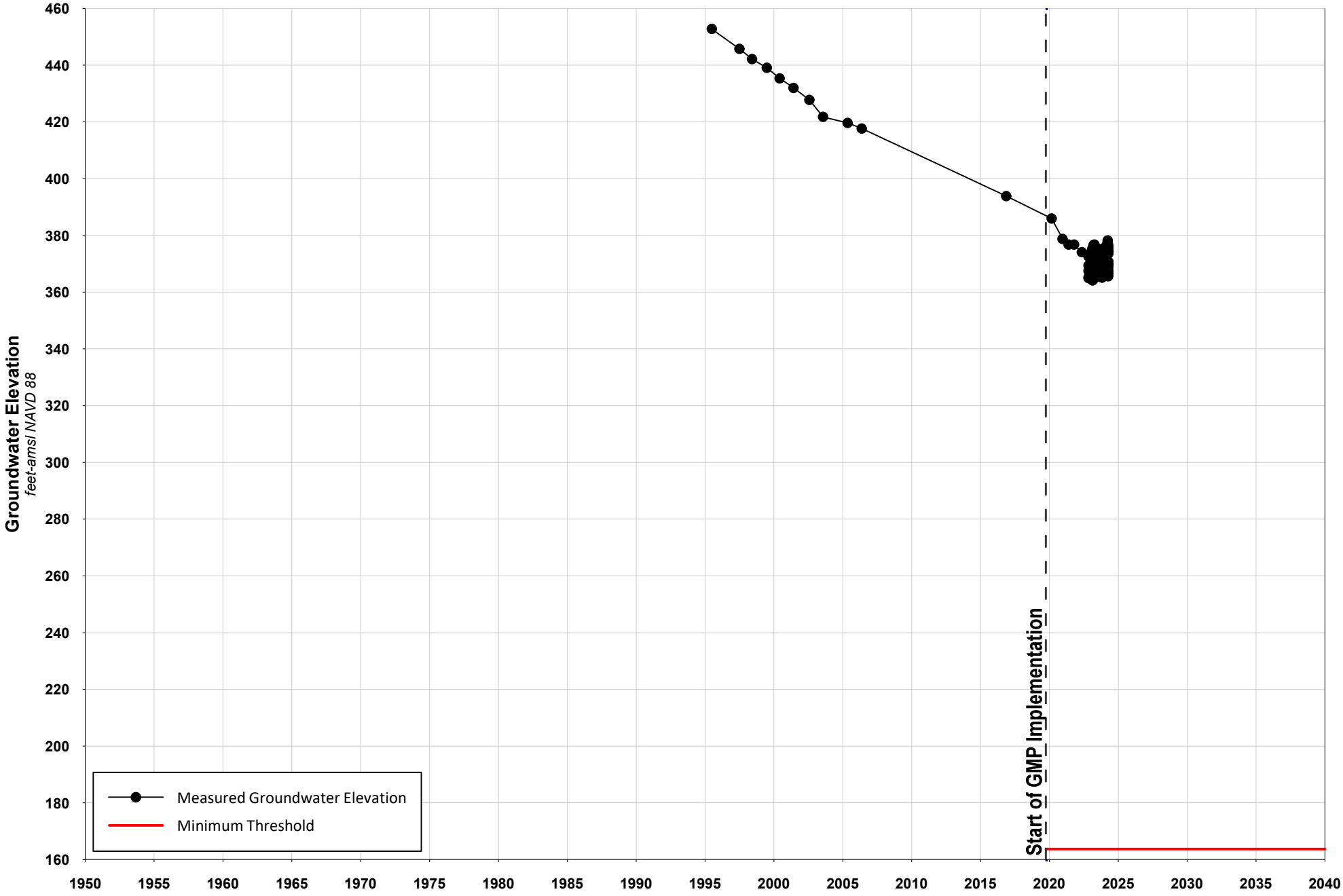
Author: CK
Date: 20240602
File: Figure4g_GW Levels in ID4-1.grf

Figure 4g

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well ID4-1



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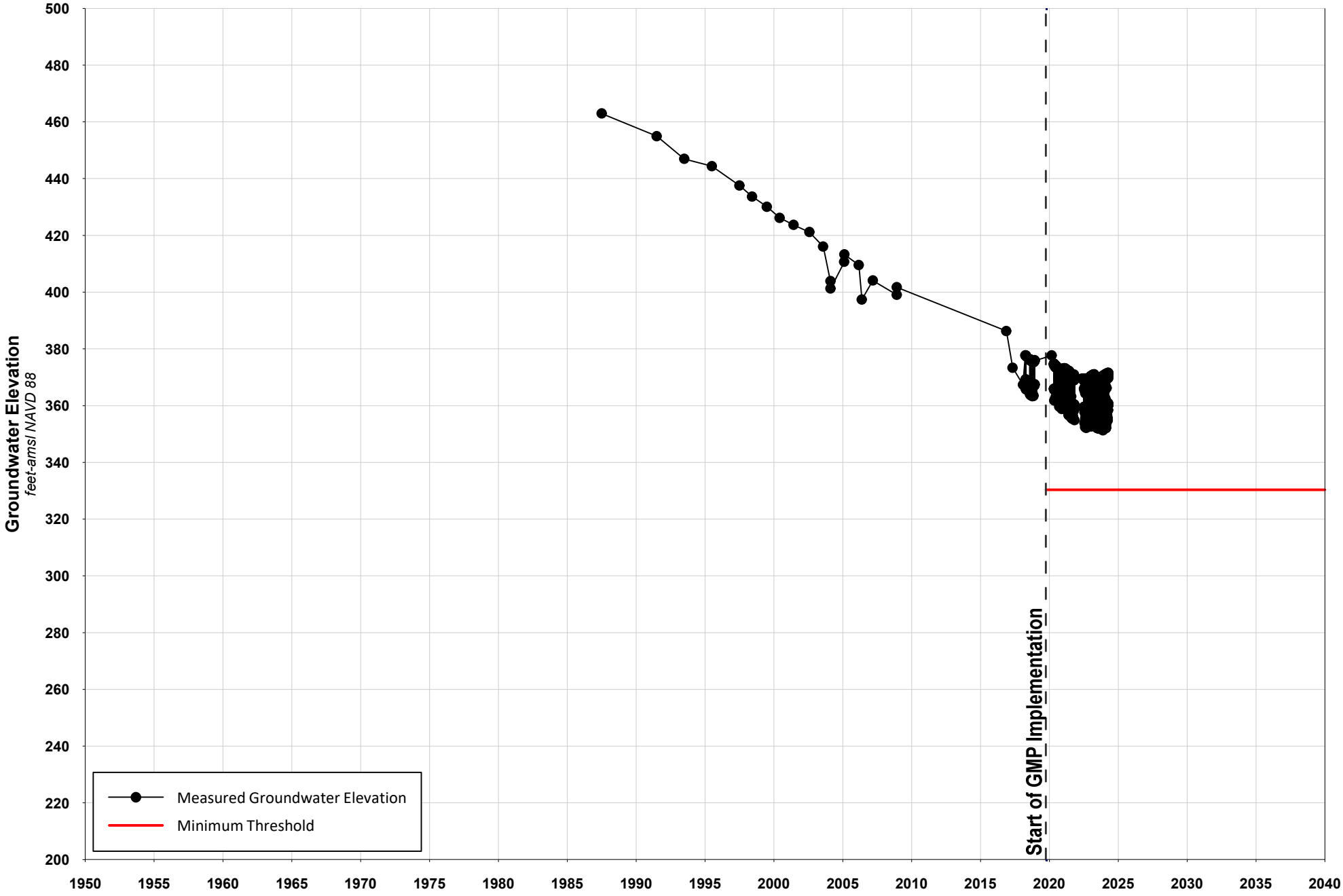
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4h_GW Levels in ID4-11.grf

Figure 4h

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well ID4-11



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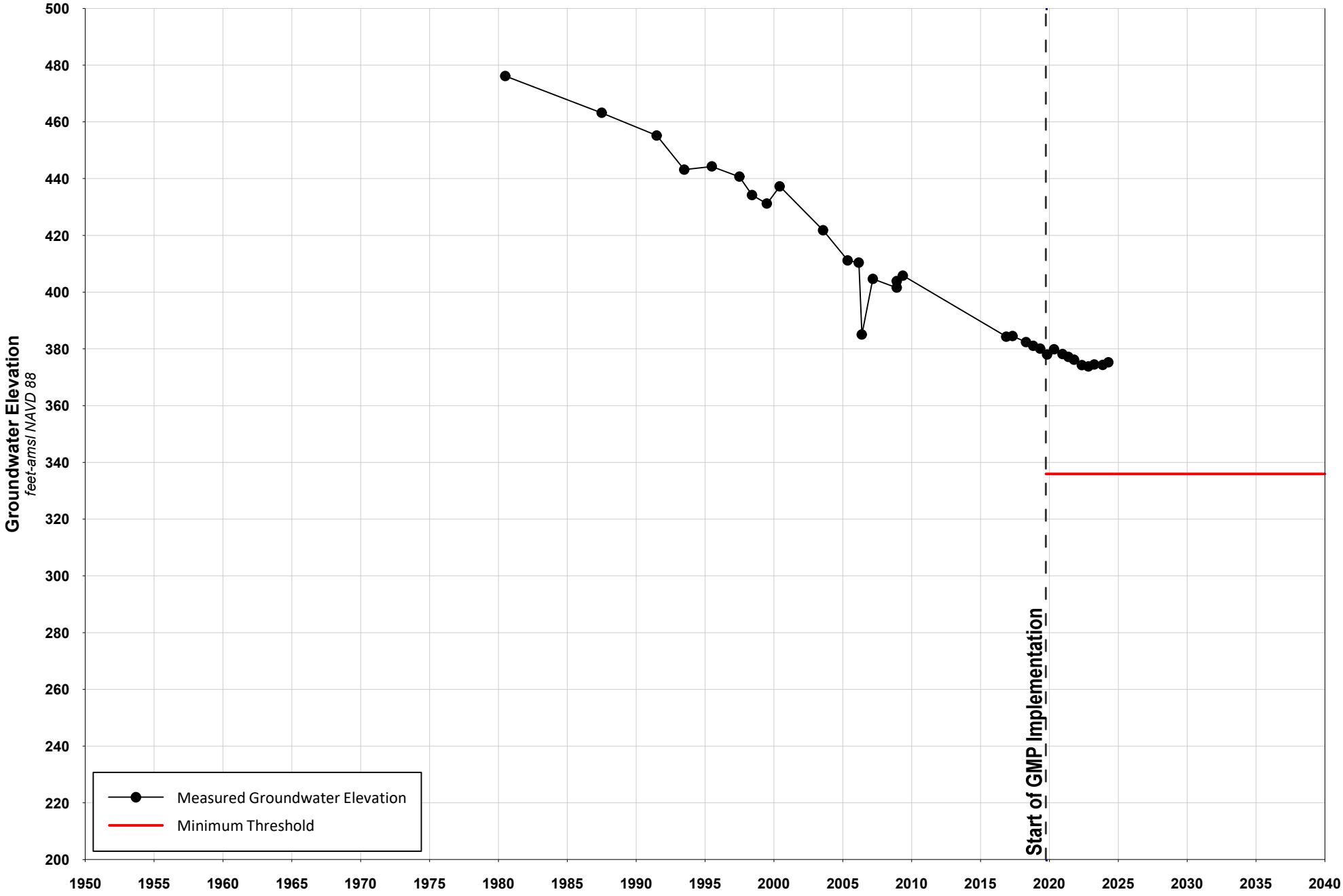
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4i_GW Levels in ID4-18.grf

Figure 4i

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well ID4-18



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Water. Engineered.

Author: CK
Date: 20240602
File: Figure4j_GW Levels in ID4-3.grf

Figure 4j

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well ID4-3

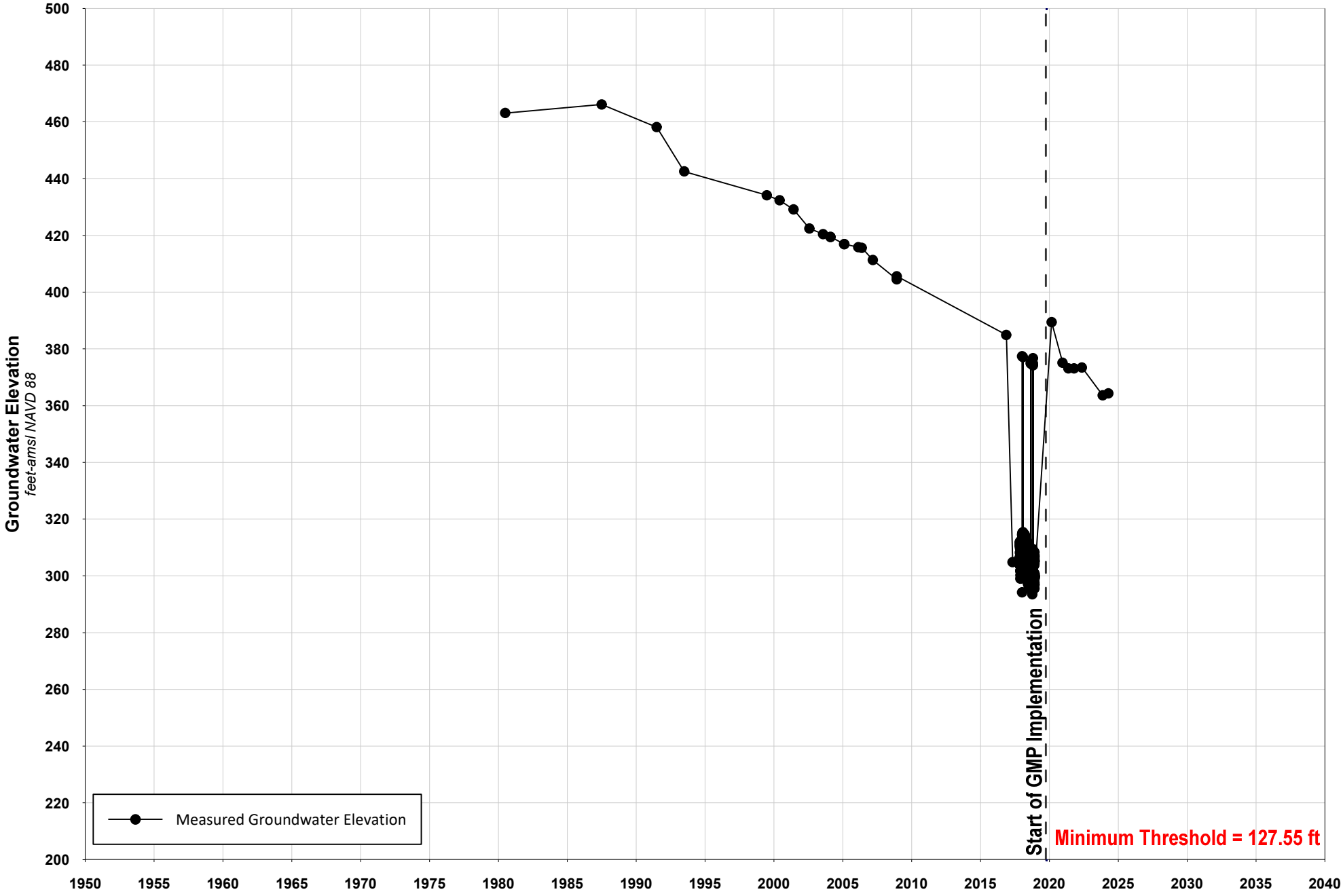
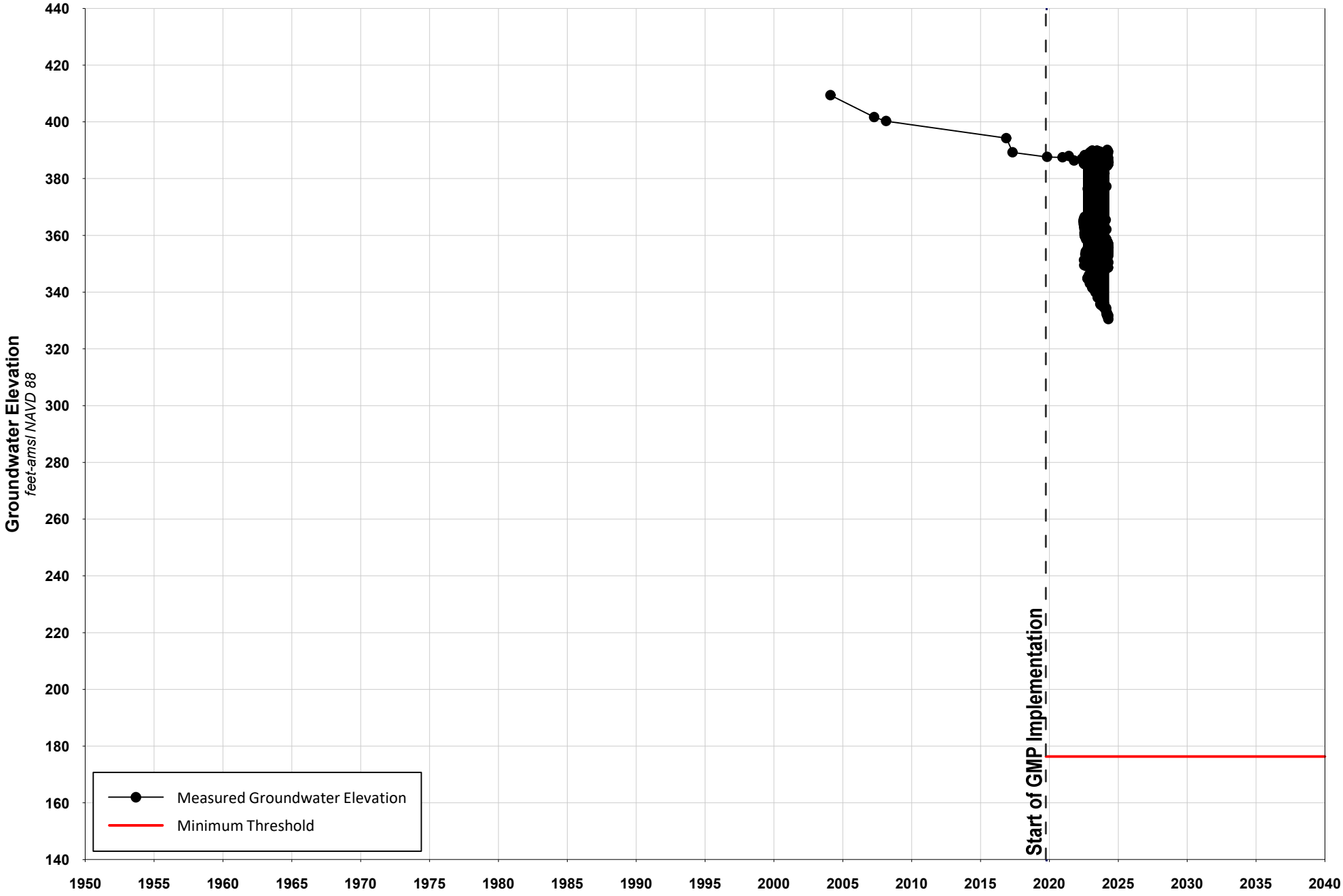


Figure 4k

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well ID4-4

WEST YOST
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4k_GW Levels in ID4-4.grf



WEST YOST
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4l_GW Levels in ID5-5.grf

Figure 4l

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well ID5-5

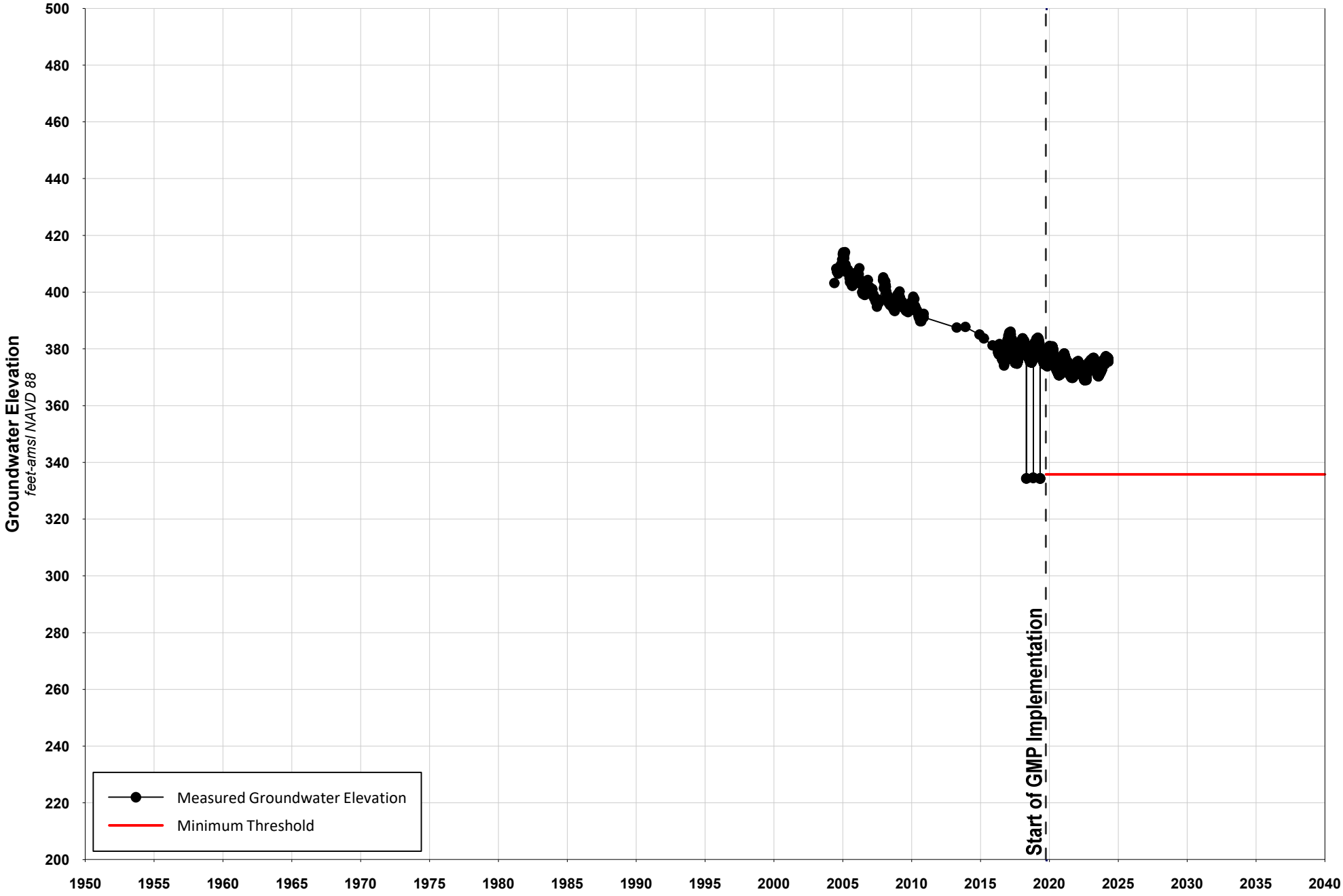
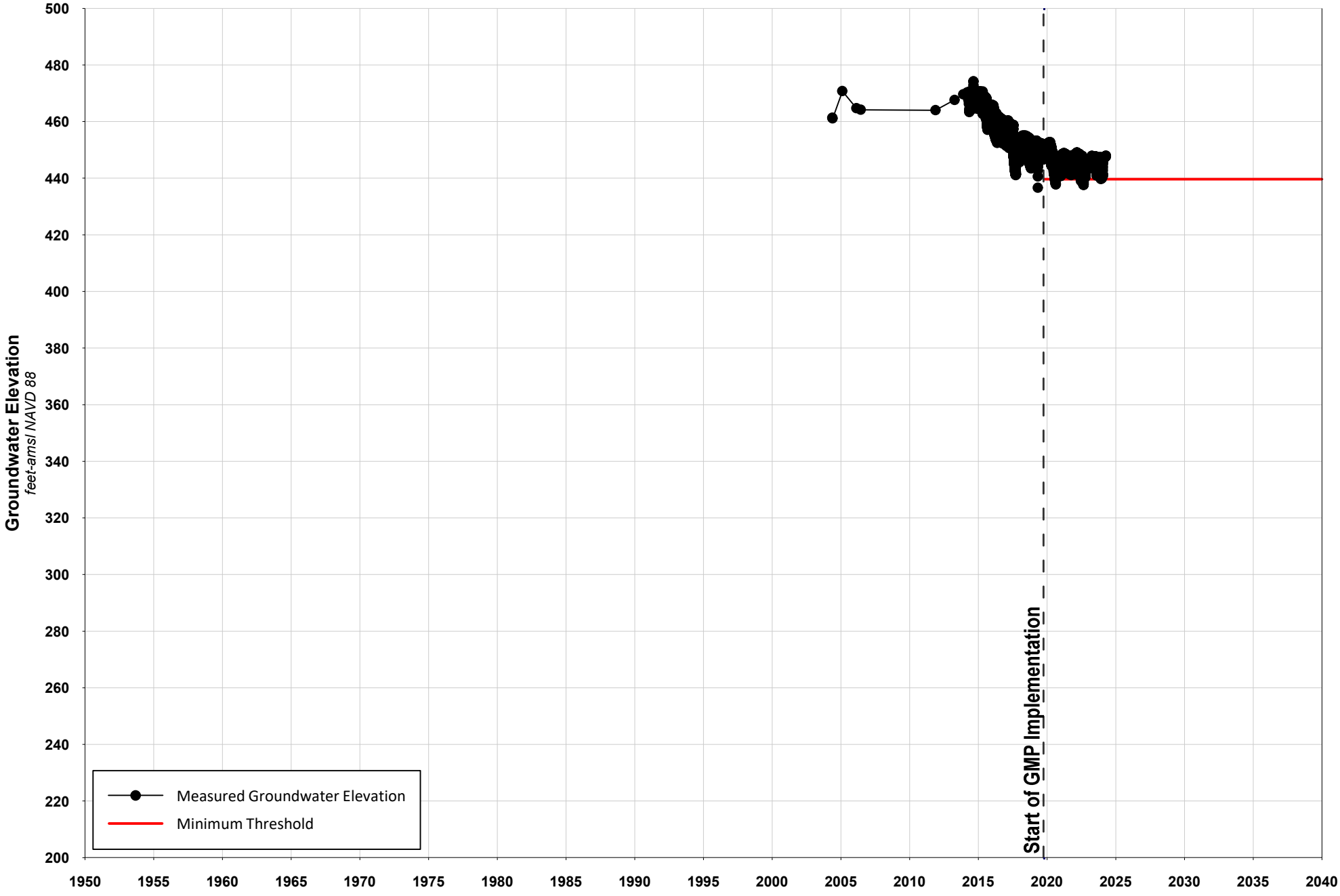


Figure 4m

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well MW-1

WEST YOST
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4m_GW Levels in MW-1.grf



WEST YOST
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4n_GW Levels in MW-3.grf

Figure 4n

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well MW-3

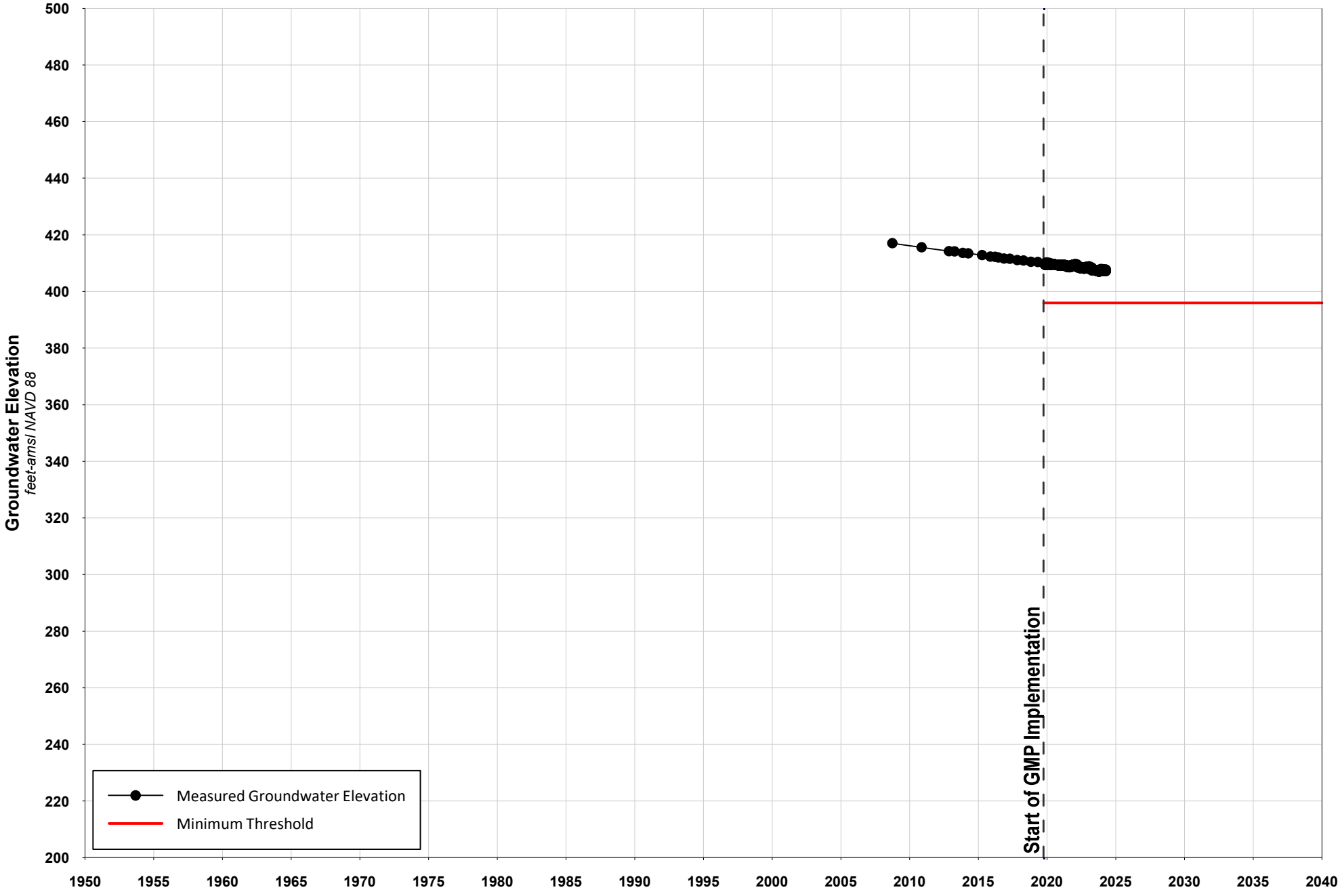


Figure 4o

Groundwater Level and Sustainable Management Criteria
at Representative Monitoring Well MW-5A

WEST YOST
Water. Engineered.

Author: CK
Date: 20240602
File: Figure4o_GW Levels in MW-5A.grf

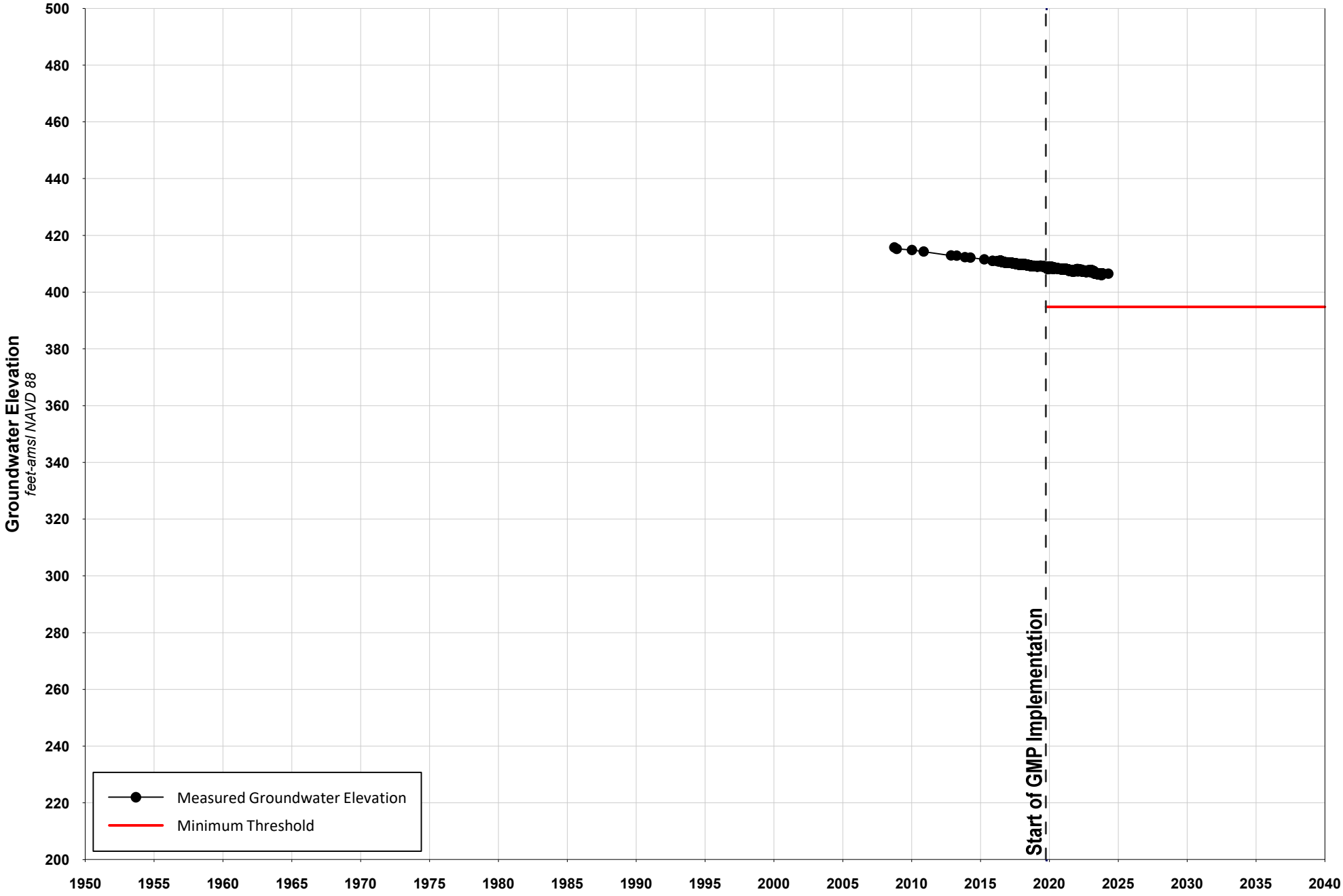


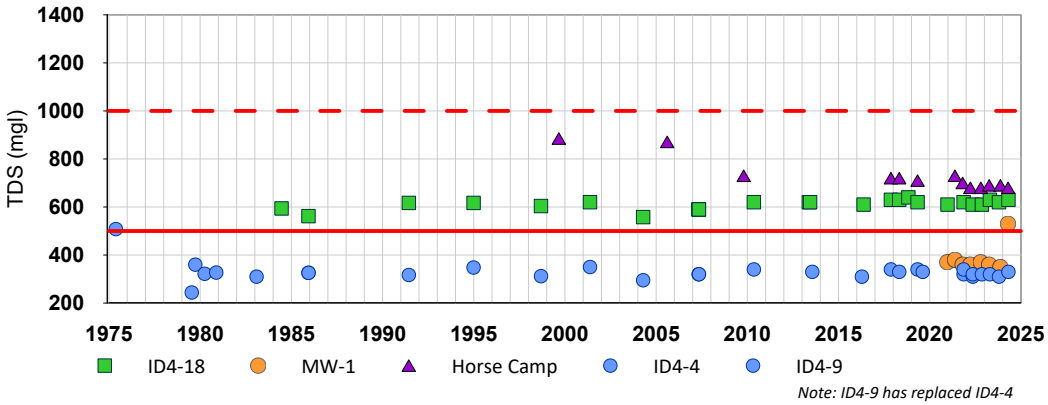
Figure 4p

Groundwater Level and Management Sustainable Criteria
at Representative Monitoring Well MW-5B

WEST YOST
Water. Engineered.

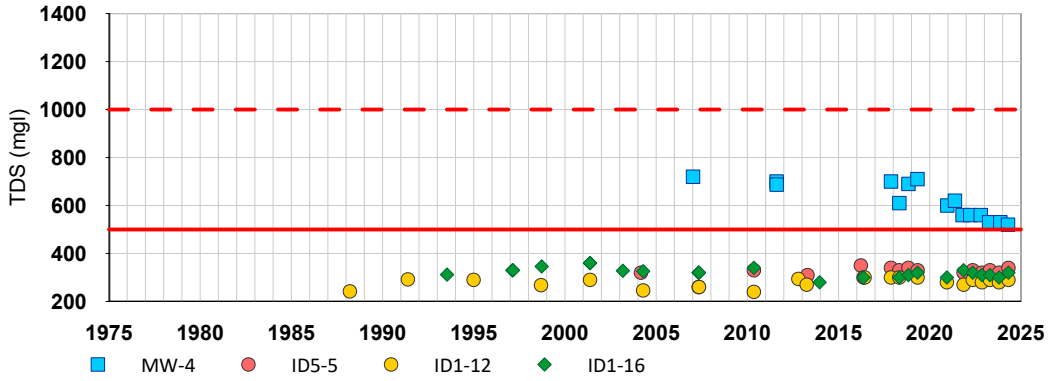
Author: CK
Date: 20240602
File: Figure4p_GW Levels in MW-5B.grf

North Management Area

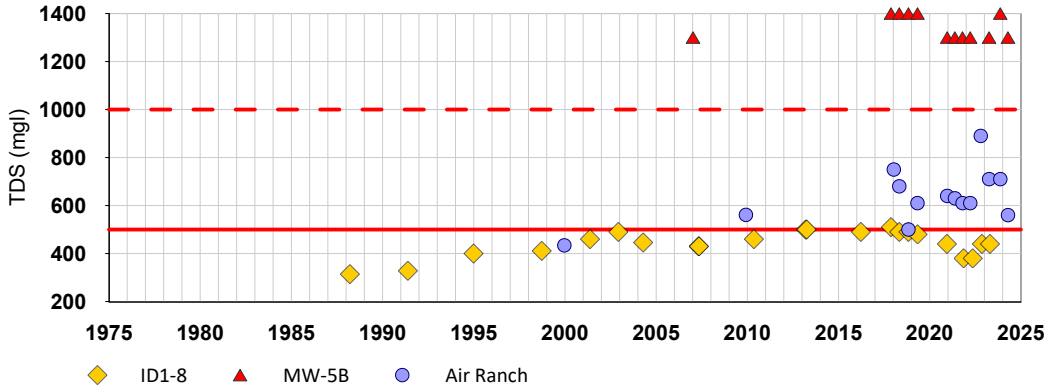


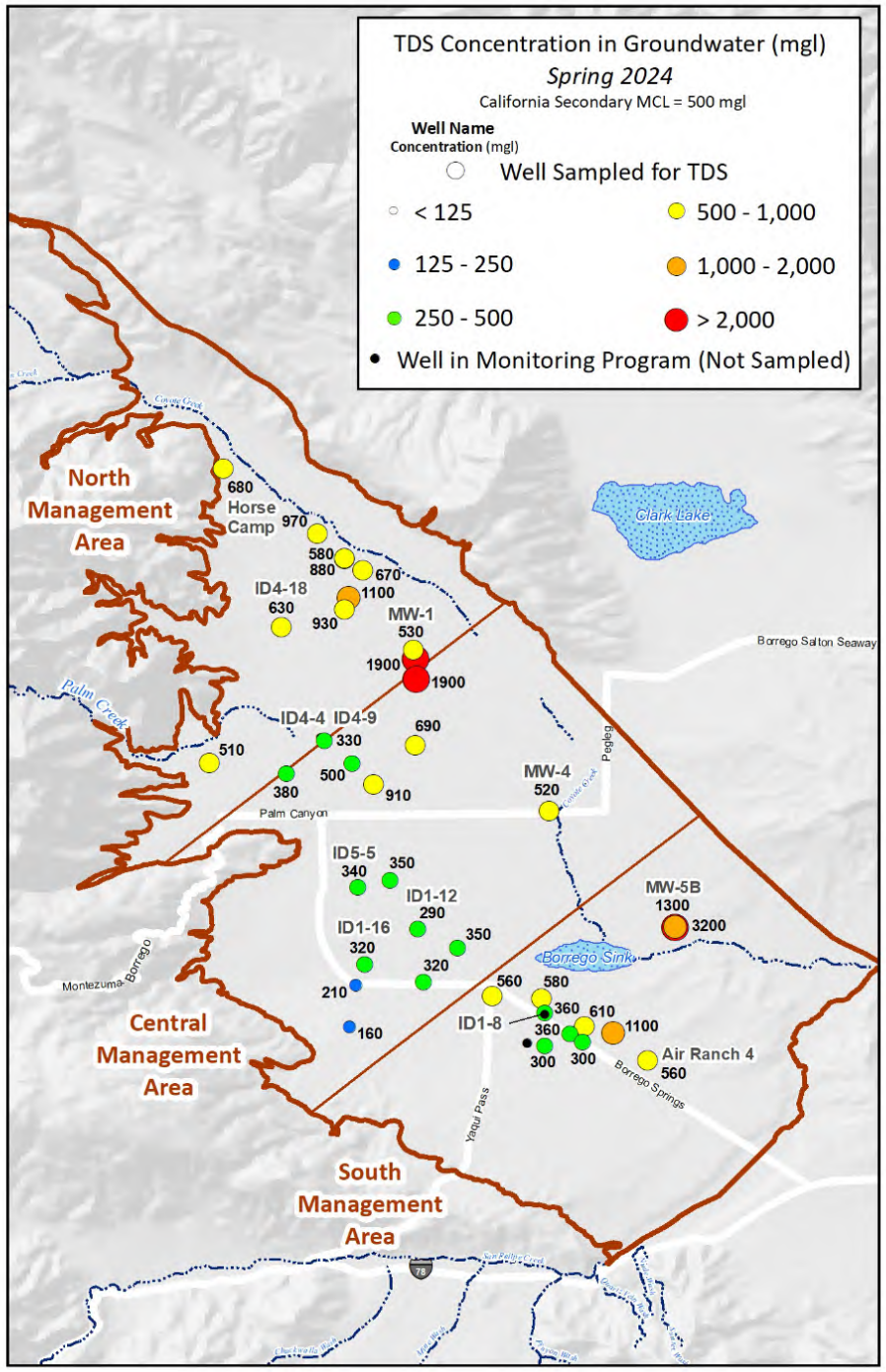
Note: ID4-9 has replaced ID4-4

Central Management Area



South Management Area





Wells by Principal Aquifer

- △ Upper
- ◊ Lower
- □ Upper and Middle
- ◇ Upper, Middle, and Lower
- ○ Middle and Lower

Maximum Contaminant Level

- Upper Secondary MCL
- Recommended Secondary MCL

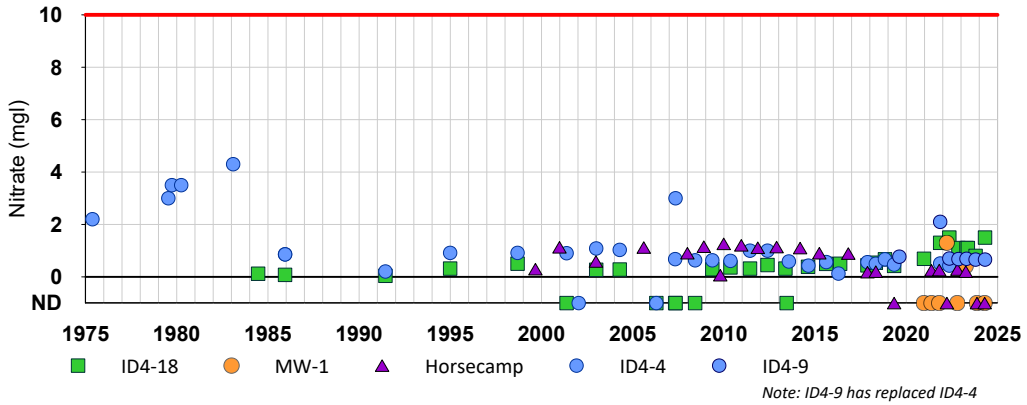
WEST YOST
Water. Engineered.

Author: CK
Date: 20240603
File: TDS

Figure 5

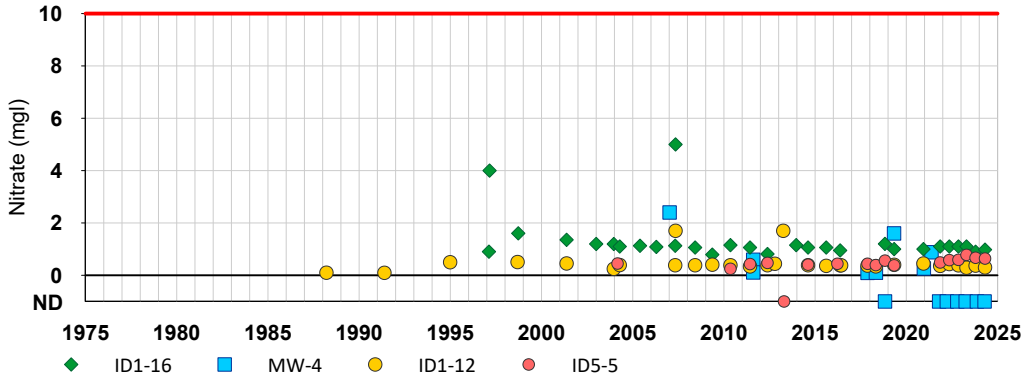
Total Dissolved Solids (TDS) in Groundwater

North Management Area

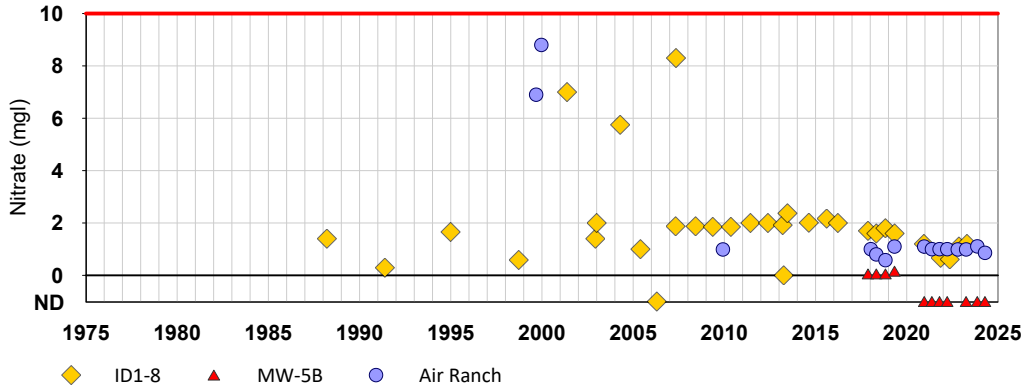


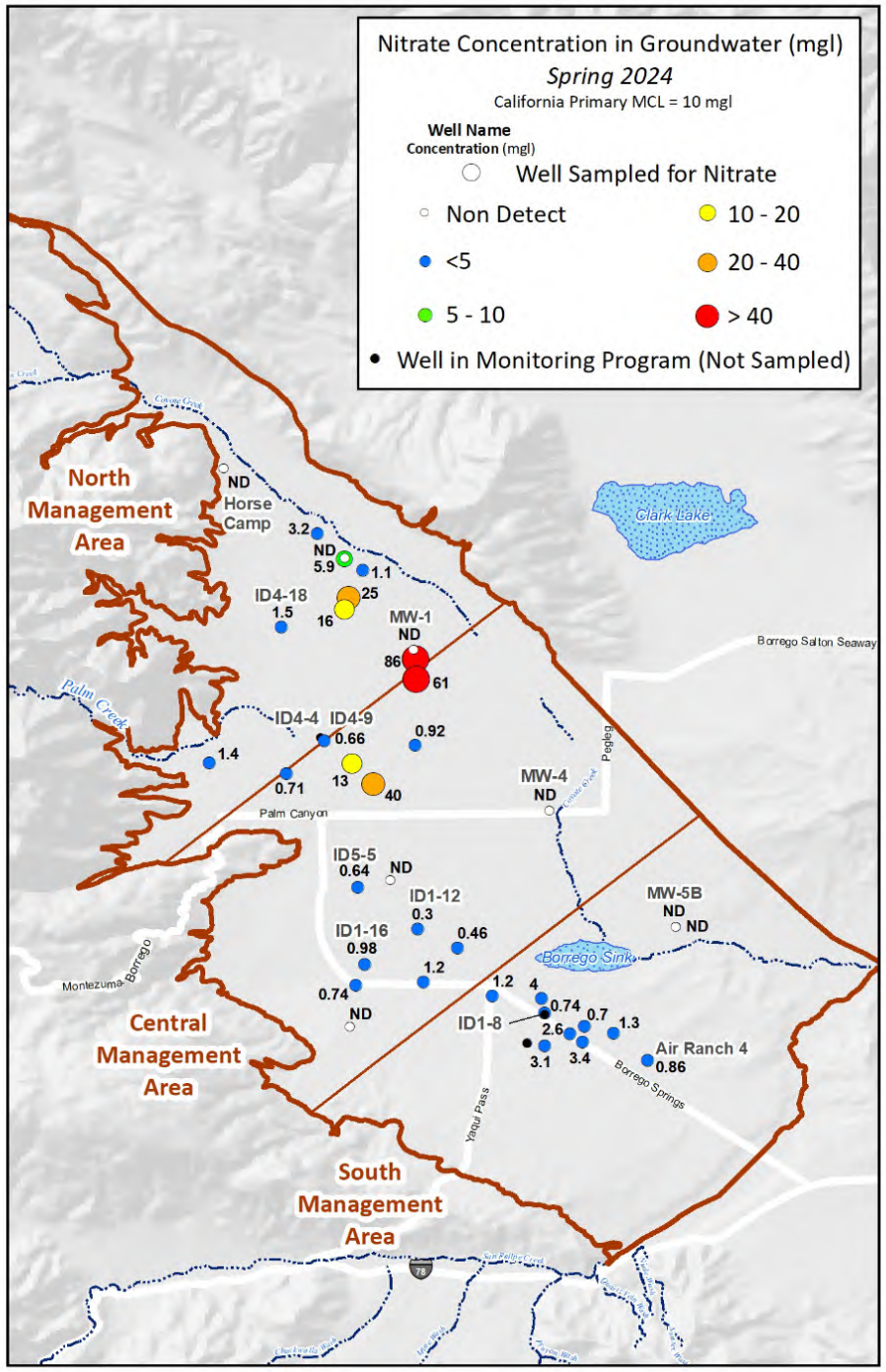
Note: ID4-9 has replaced ID4-4

Central Management Area



South Management Area





Wells by Principal Aquifer

- △ Upper
- ◊ Lower
- □ Upper and Middle
- ◇ Upper, Middle, and Lower
- ○ Middle and Lower

Maximum Contaminant Level

- Primary MCL

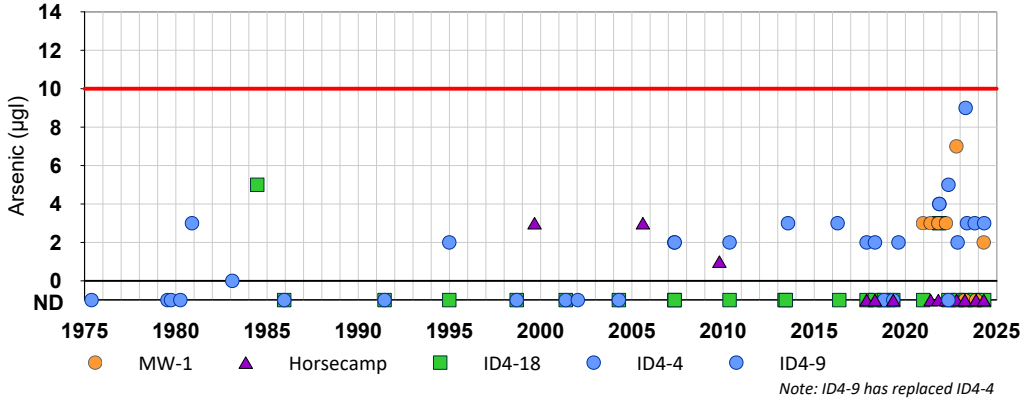
WEST YOST
Water. Engineered.

Author: CK
Date: 20240603
File: Nitrate

Figure 6

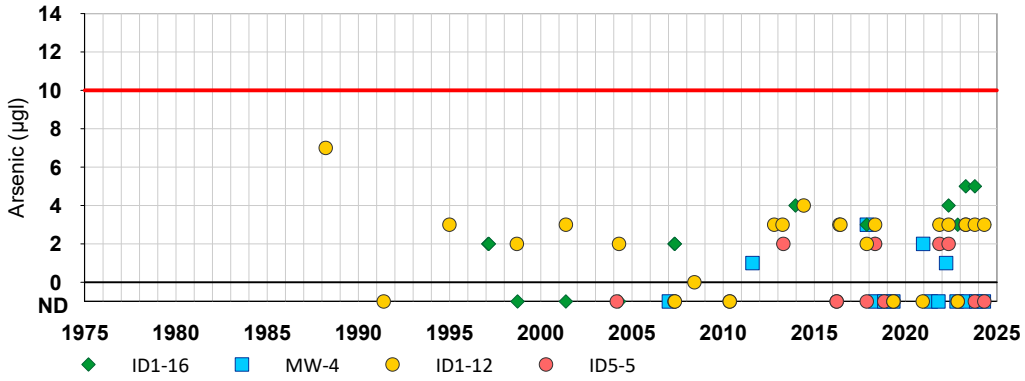
Nitrate (as Nitrogen) in Groundwater

North Management Area

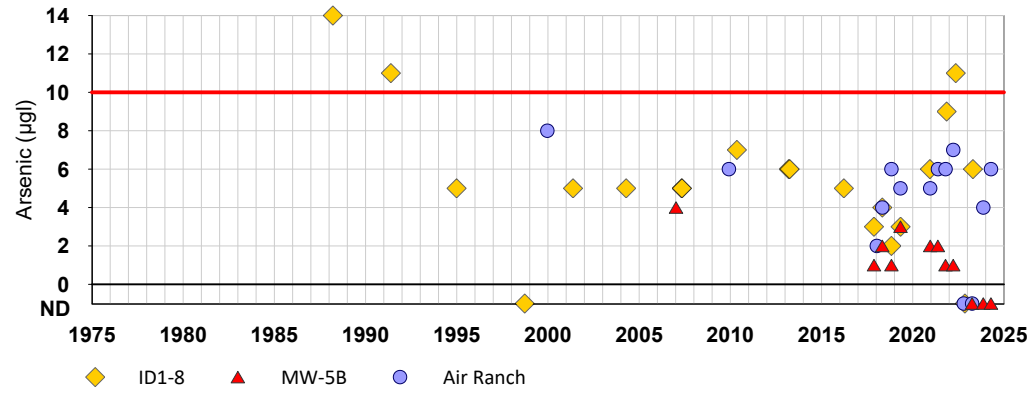


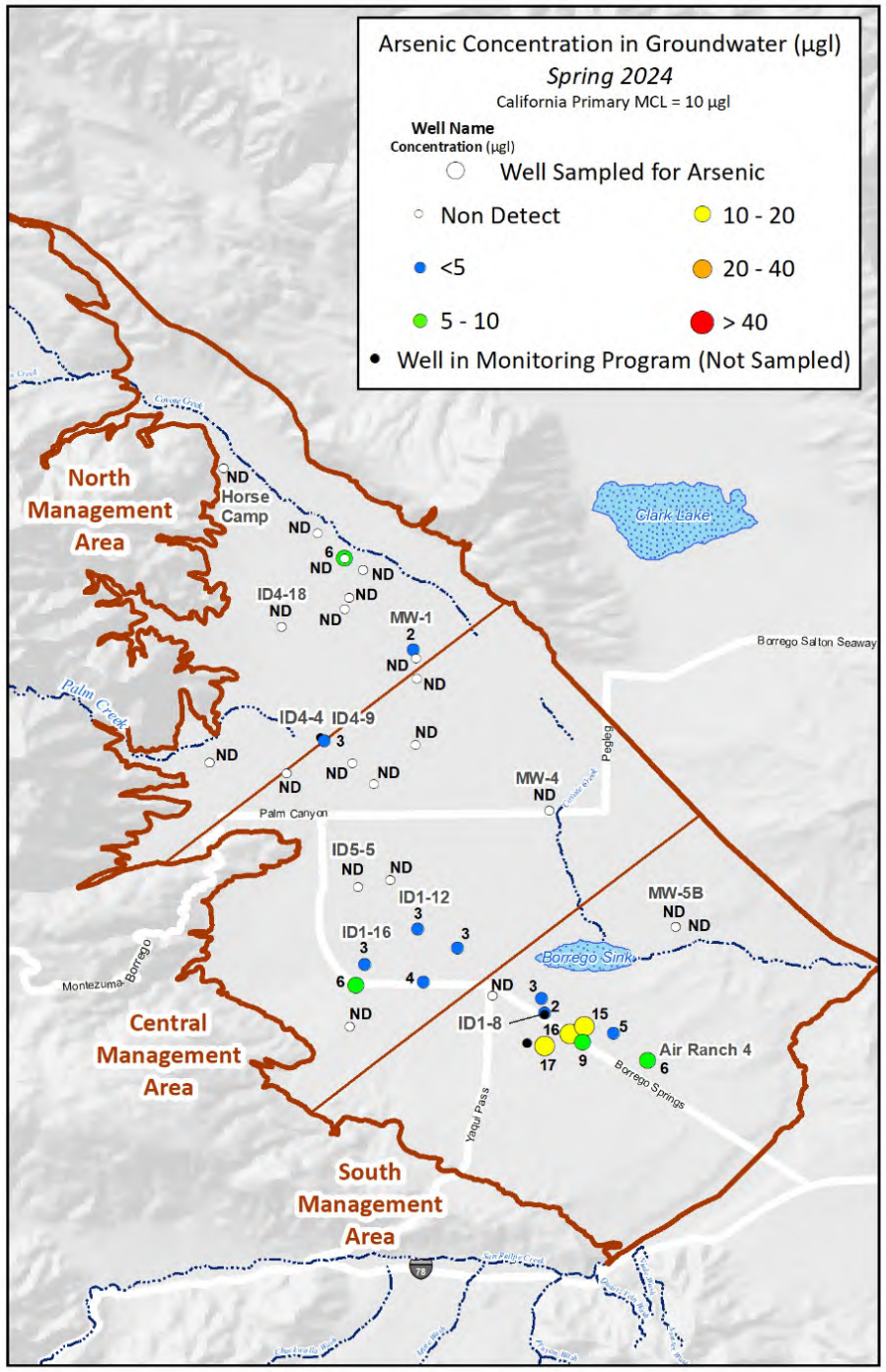
Note: ID4-9 has replaced ID4-4

Central Management Area



South Management Area





Wells by Principal Aquifer

- △ Upper
- ◊ Lower
- □ Upper and Middle
- ◇ Upper, Middle, and Lower
- ○ Middle and Lower

Maximum Contaminant Level

- Primary MCL

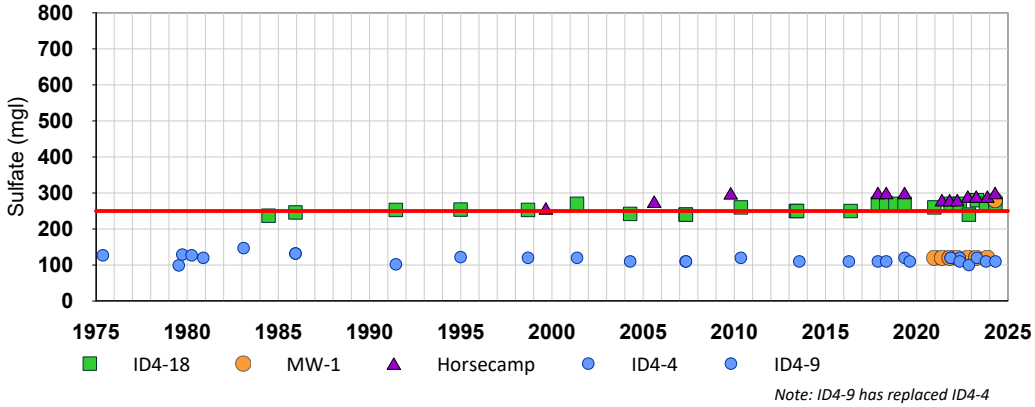
WEST YOST
Water. Engineered.

Author: CK
Date: 20240603
File: Arsenic

Figure 7

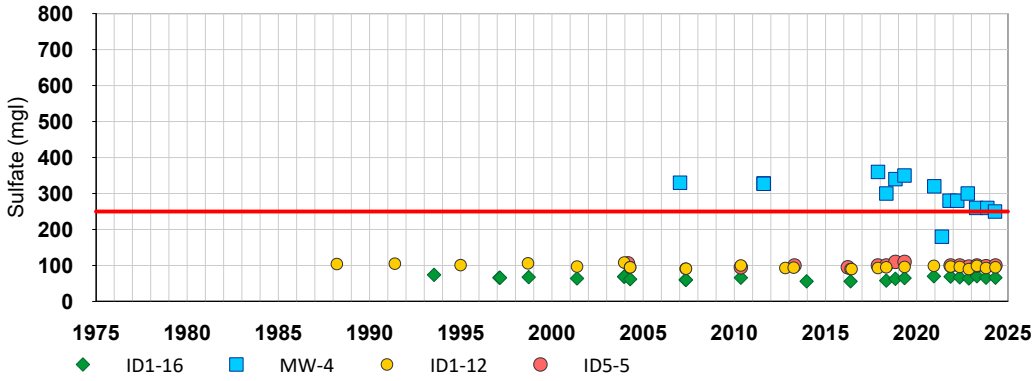
Arsenic in Groundwater

North Management Area

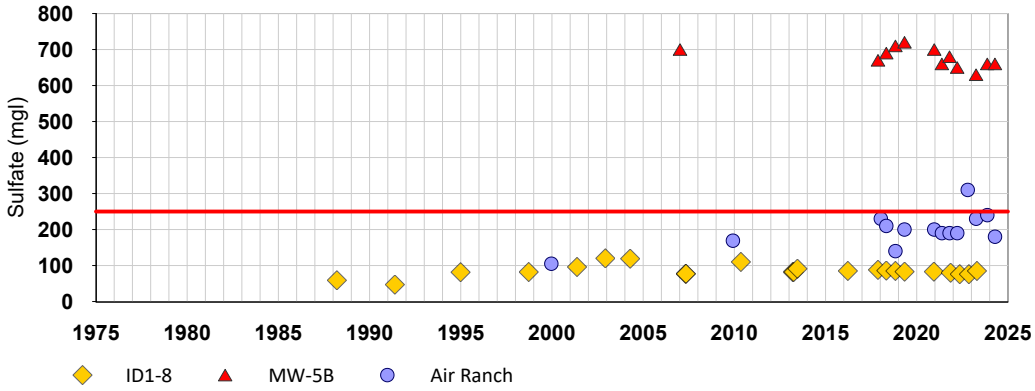


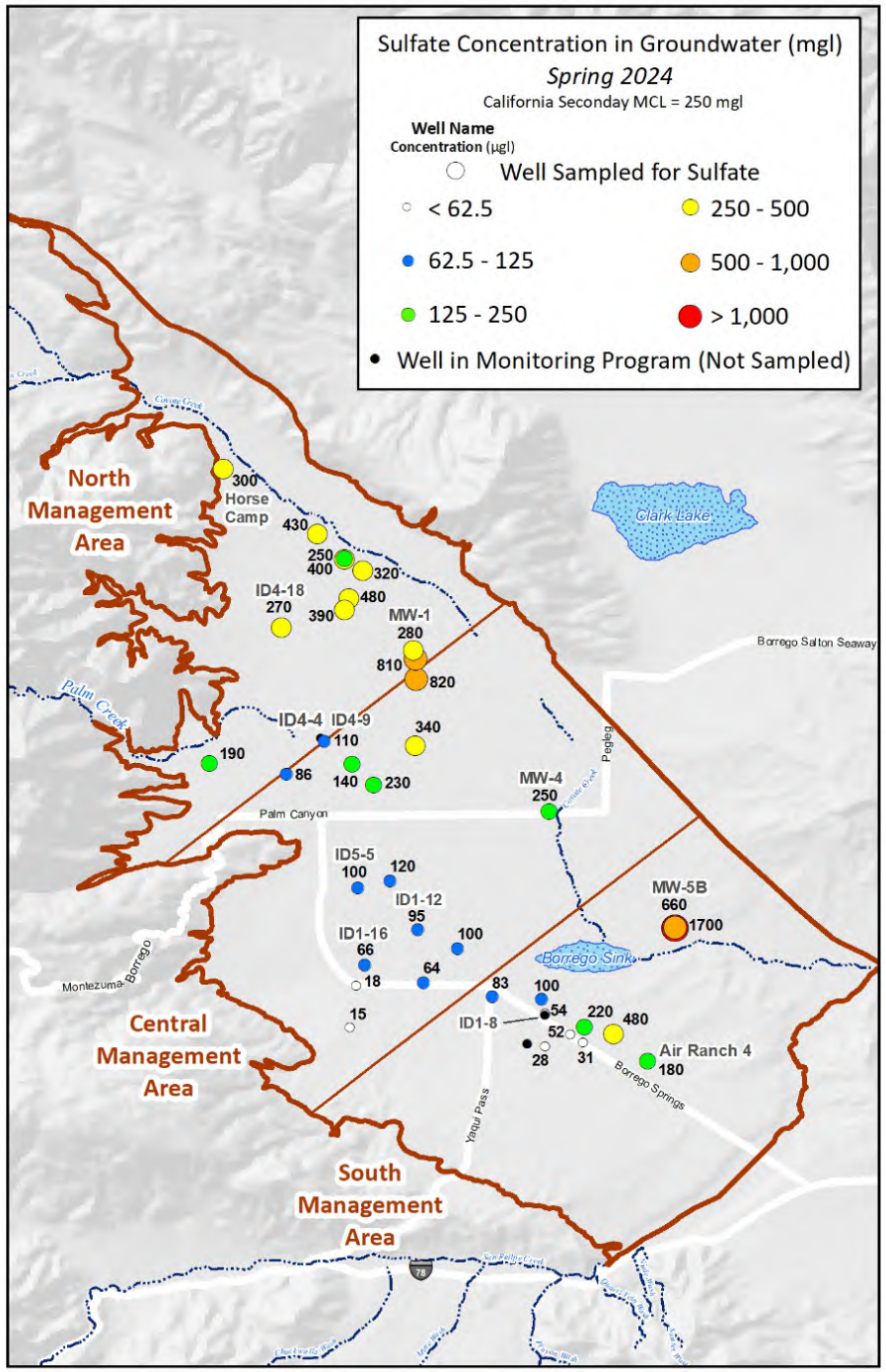
Note: ID4-9 has replaced ID4-4

Central Management Area



South Management Area





Wells by Principal Aquifer

- △ Upper
- ◊ Lower
- □ Upper and Middle
- ◇ Upper, Middle, and Lower
- ○ Middle and Lower

Maximum Contaminant Level

- Secondary MCL

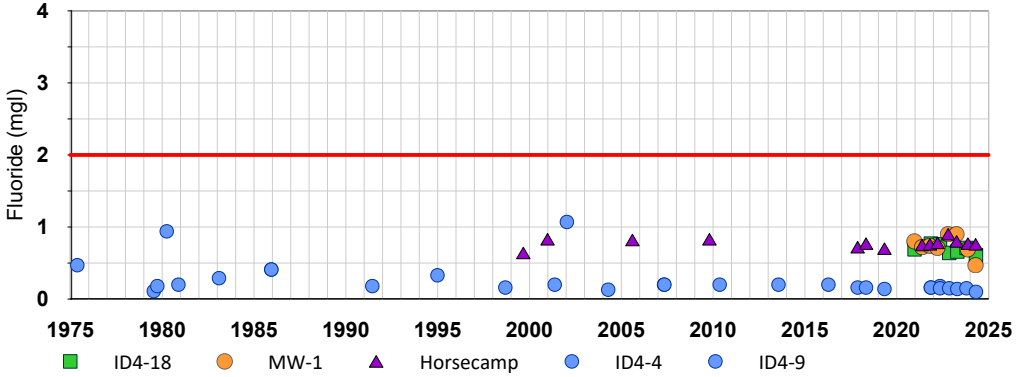
WEST YOST
Water. Engineered.

Author: CK
Date: 20240603
File: Sulfate

Figure 8

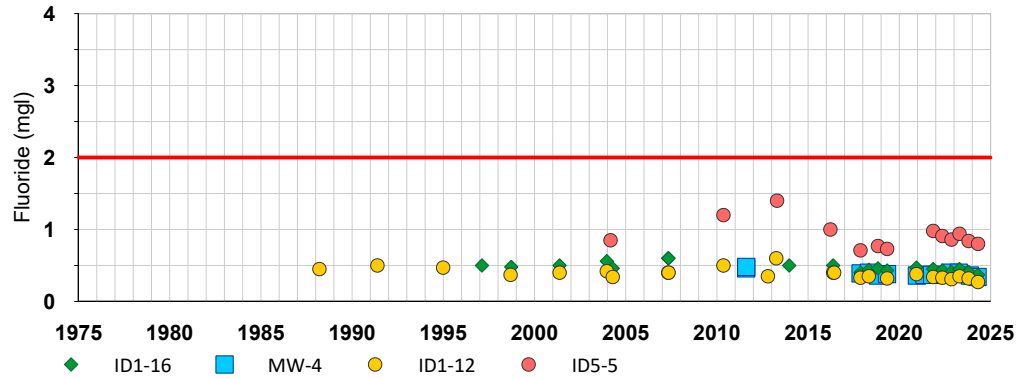
Sulfate in Groundwater

North Management Area

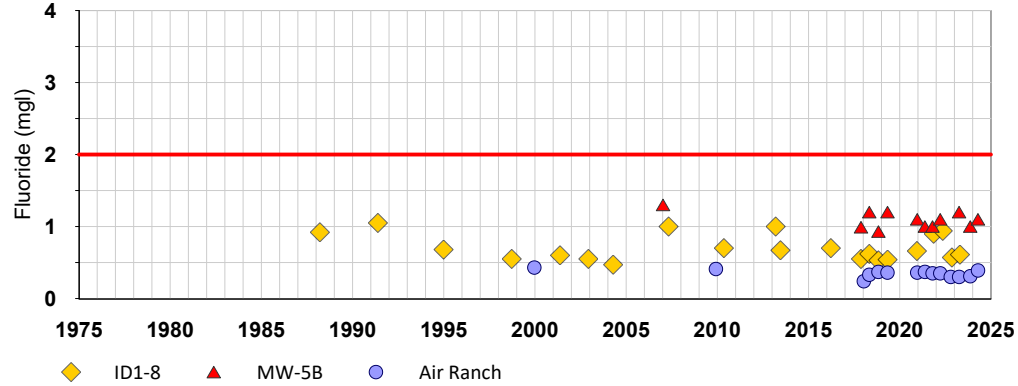


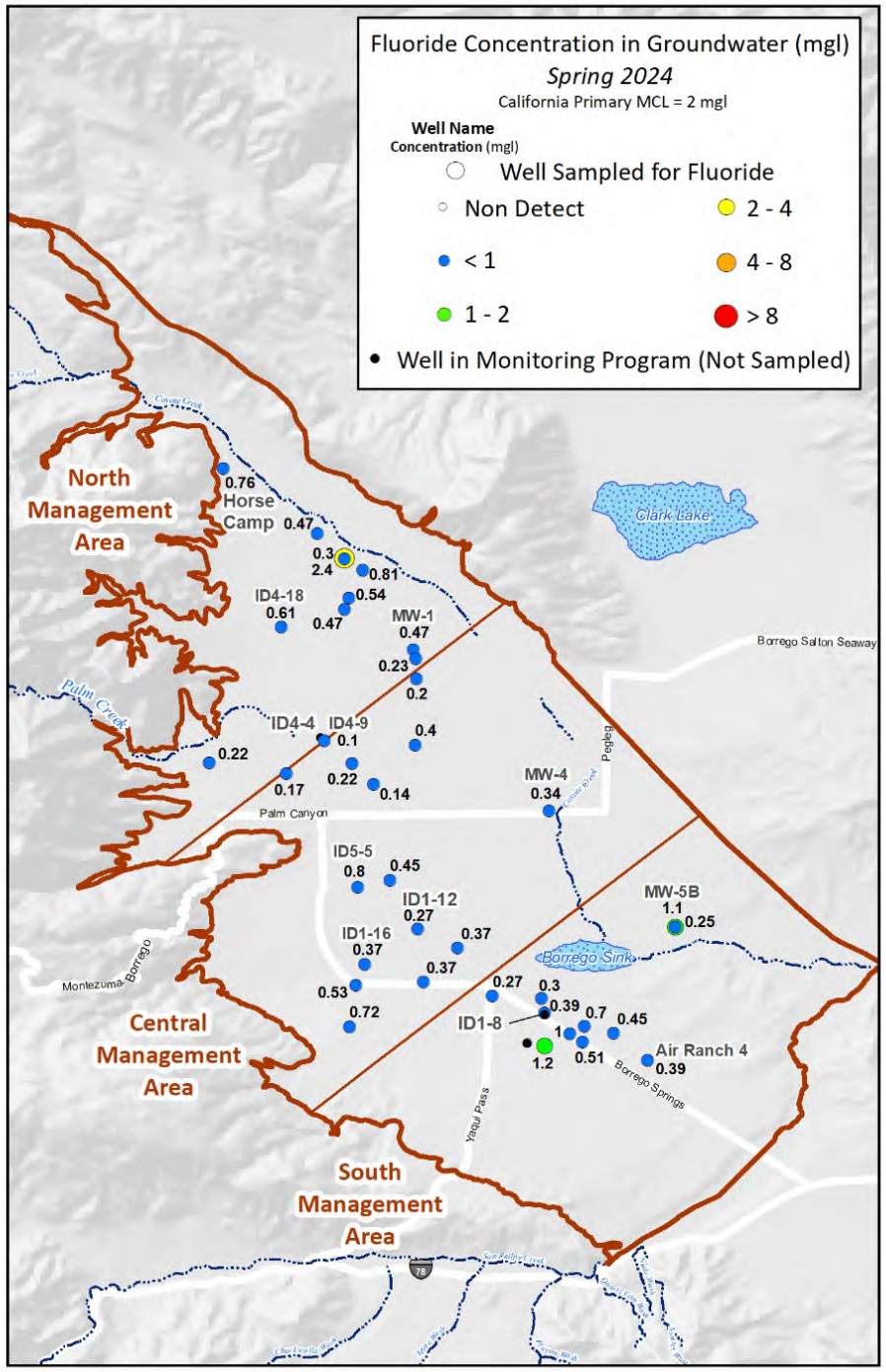
Note: ID4-9 has replaced ID4-4

Central Management Area



South Management Area





Wells by Principal Aquifer

- △ Upper
- ◊ Lower
- □ Upper and Middle
- ◇ Upper, Middle, and Lower
- ○ Middle and Lower

Maximum Contaminant Level

- Primary MCL

WEST YOST
Water. Engineered.

Author: CK
Date: 20240603
File: Fluoride

Figure 9

Fluoride in Groundwater

Table 1. Groundwater Level and Quality Monitoring Network and Wells Monitored in Spring 2024

Local Well Name[1]	State Well ID	Well Use	Groundwater Monitoring Network				Comments
			Water Level		Water Quality		
			Method if in program[2]	Spring 2024	Well in program?	Spring 2024	
North Management Area							
ID4-18*	010S006E18J001S	Public Supply	transducer	x	yes	x	
ID4-3*	010S006E18R001S	Observation	manual	x			
ID4-4*	010S006E29K002S	Observation	manual	x			
ID4-9	010S006E29K003S	Public Supply	transducer	x	yes	x	
MW-1*	010S006E21A002S	Observation	transducer	x	yes	x	
Evans	010S006E21E001S	Observation	manual	x			
Horse Camp	009S006E31E003S	Other	manual	x	yes	x	
Fortiner #1*	010S006E09N001S	Domestic	manual	x	yes	x	
Auxiliary Well 3	010S005E25R002S	Other	transducer	x			
Auxiliary Well 2	010S005E25R001S	Other	manual	x	yes	x	
T2 Farms	010S006E09C001S	Irrigation			yes	x	
MW-6S	010S06E08A003S	Observation	manual	x	yes	x	
MW-6D	010S06E08A002S	Observation	manual	x	yes	x	
NMA-1	Private	Other			no	x	*Well being considered for inclusion in monitoring program.*
NMA-2	Private	Other	manual	x			*Well being considered for inclusion in monitoring program.*
NMA-3	Private	Domestic	manual	x			*Well being considered for inclusion in monitoring program.*
NMA-4	Private	Irrigation			no	x	*Well being considered for inclusion in monitoring program.*
NMA-5	Private	Irrigation	manual	x			*Well being considered for inclusion in monitoring program.*
NMA-6	Private	Irrigation			no	x	*Well being considered for inclusion in monitoring program.*
Central Management Area							
Anzio/Yaqui Pass	011S006E22E001S	Observation	manual	x			
BSR Well 6	011S006E09B002S	Irrigation	manual	x	yes	x	
Cameron 2	011S006E04F001S	Observation	manual	x			
County Yard	011S006E15G001S	Industrial	manual	x	yes	x	
ID1-10	011S006E22D001S	Public Supply	transducer	x	yes	x	
ID1-12*	011S006E16A002S	Public Supply	transducer	x	yes	x	
ID1-16*	011S006E16N001S	Public Supply	transducer	x	yes	x	
ID4-1*	010S006E32R001S	Observation	manual	x			
ID4-10	011S006E18L001S	Observation	manual	x			
ID4-11*	010S006E32D001S	Public Supply	transducer	x	yes	x	
ID4-2	011S006E07K003S	Observation	manual	x			
ID4-5	010S006E33Q001S	Observation	manual	x			
ID5-5*	011S006E09E001S	Public Supply	transducer	x	yes	x	
MW-4	010S006E35Q001S	Observation	manual	x	yes	x	
Paddock	011S006E22B001S	Observation	manual	x			
Palleson	010S006E33J001S	Observation	manual	x			
Wilcox	011S006E20A001S	Public Supply	manual	x	yes	x	
Hanna (Flowers)	010S006E14G001S	Observation	transducer	x			
Terry Well	011S006E20R001S	Irrigation	manual	x	yes	x	
Airport 2*	010S006E35N001S	Observation	Destroyed				*Unable to measure GWL since Fall 2023 due to collapsed well casing.*
CMA-1	Private	Irrigation			no	x	*Well being considered for inclusion in monitoring program.*
CMA-2	Private	Irrigation			no	x	*Well being considered for inclusion in monitoring program.*
CMA-3	Private	Irrigation	manual	x			*Well being considered for inclusion in monitoring program.*
CMA-4	Private	Recreation			no	x	*Well being considered for inclusion in monitoring program.*
CMA-5	Private	Recreation			no	x	*Well being considered for inclusion in monitoring program.*
South Management Area							
Air Ranch Well 4*	011S007E30L001S	Public Supply	manual	x	yes	x	
Army Well	011S006E34A001S	Observation	manual	x			
Hayden (32Q1)	011S007E32Q001S	Observation	manual	x			
ID1-8	011S006E23J001S	Public Supply	manual	x	yes		*Unable to sample for GWQ in Fall 2023 due to the well pump being decommission by BWD.*
JC Well	011S006E24Q001S	Observation	transducer	x			
La Casa	011S006E23E001S	Irrigation	manual	x	yes	x	
MW-3*	011S006E23J002S	Observation	transducer	x	yes	x	
MW-5A*	011S007E07R001S	Observation	transducer	x	yes	x	
MW-5B*	011S007E07R002S	Observation	manual	x	yes	x	
RH-1 (ID1-1)*	011S006E25A001S	Recreation	transducer	x	yes	x	
RH-2 (ID1-2)	011S006E25C001S	Recreation	transducer	x	yes	x	
RH-3	011S006E25C002S	Recreation	transducer	x	yes	x	
RH-4	011S006E24Q002S	Recreation	transducer	x	yes	x	*Unable to download transducer in Spring 2024 due to technical issues. Transducer was replaced and a manual GWL was measured.*
RH-5	011S006E26B001S	Recreation	transducer	x	yes		*Unable to be sampled in Spring 2024 due to pump maintenance.*
RH-6	011S006E26H001S	Recreation	transducer	x	yes	x	
WWTP	011S006E23H001S	Observation	transducer	x	yes	x	
Bing Crosby Well	011S007E20P001S	Observation	manual	x			
Outside Borrego Springs Subbasin							
State Well	012S007E03L001S	Observation	manual	x			
Nel Well	012S007E04R001S	Observation	manual				*Unable to measure GWL in Spring 2024 due to a beehive in well head.*

Wells not included in the groundwater level or groundwater quality monitoring program are greyed out.
*Representative Monitoring Well with defined Minimum Thresholds and Measurable Objectives, as identified in Table 3-4 and Table 3-5 of the GMP
(1) Private wells with data confidentiality agreements are denoted by aliases "NMA-#" or "CMA-#" based on their relative location in the Management Area.
(2) Wells denoted with "transducer" have a pressure transducer installed that continuously records water level measurements on a high frequency interval (15-minutes to 1 hour).

Table 2. Current Groundwater Elevations at Representative Monitoring Wells Compared to Miniumum Thresholds

Local Well Name	State Well ID	Spring 2024 Groundwater Elevation[(a)] (ft-msl) *a*	Minimum Threshold[(b)] (ft-msl) *b*	Spring 2024 Groundwater Elevation minus Minimum Threshold (ft) *c = a-b*
North Management Area				
MW-1	010S006E21A002S	376.68	336	40.9
ID4-3	010S006E18R001S	375.25	336	39.3
Fortiner	010S006E09N001S	377.32	331	46.5
ID4-18	010S006E18J001S	371.36	330	41.0
ID4-4	010S006E29K002S	364.28	*128*	236.7
Central Management Area				
ID4-1	010S006E32R001S	389.43	359	30.8
Airport 2	010S006E35N001S	*401.73*	381	21.2
ID1-16	011S006E16N001S	385.55	355	30.1
ID4-11	010S006E32D001S	374.54	*164*	210.8
ID1-12	011S006E16A002S	384.16	*285*	99.5
ID5-5	011S006E09E001S	385.96	*176*	209.6
South Management Area				
MW-5A	011S007E07R001S	407.54	396	11.6
MW-5B	011S007E07R002S	406.48	395	11.7
MW-3	011S006E23J002S	447.79	438	10.1
Air Ranch	011S007E30L001S	471.10	462	9.3
RH-1	011S006E25A001S	467.18	459	8.3

(a) If a water level was not measured in Spring 2024, an "estimated static" groundwater elevation was selected based on recent trends in groundwater elevation at the well and nearby wells, and knowledge of the influence of nearby pumping. Estimated values are shown in *blue italic font* . In Spring 2024, a groundwater level could not be measured at the Airport 2 well; the well casing collapsed prior to the Fall 2023 Semi-Annual Monitoring Event.

(b) *Italic values* are Minimum Thresholds established based on the top of the well screen. All other Minimum Thresholds are based on model results from the Borrego Valley Hydrologic Model (BVHM). All Minimum Thresholds in the GMP have been converted to feet above mean sea level.

Table 3. Groundwater Level Trends at Representative Monitoring Wells
Fall 2019 to Spring 2024

Local Well Name	State Well ID	Fall 2019 Groundwater Elevation[a,b] (ft-msl)	Spring 2024 Groundwater Elevation[c] (ft-msl)	Change in Groundwater Elevation since Fall 2019 (ft)	Rate of Change Groundwater Elevation since Fall 2019 (ft/yr)	Historical Rate of Change in Groundwater Elevation[d] (ft/yr)
		a	*b*	*c = b-a*	*d = c/(2024 - 2019)*	
North Management Area						
MW-1	010S006E21A002S	374.76	376.68	1.9	0.4	-2.14
ID4-3	010S006E18R001S	377.96	375.25	-2.7	-0.5	-2.09
Fortiner	010S006E09N001S	*376.82*	377.32	0.5	0.1	-2.48
ID4-18	010S006E18J001S	*374.36*	371.36	-3.0	-0.6	-2.31
ID4-4	010S006E29K002S	*375.06*	364.28	-10.8	-2.2	-2.73
Central Management Area						
ID4-1	010S006E32R001S	391.66	389.43	-2.2	-0.4	-1.39
Airport 2	010S006E35N001S	405.60	*401.73*	-3.9	-0.8	-1.67
ID1-16	011S006E16N001S	*388.42*	385.55	-2.9	-0.6	-0.95
ID4-11	010S006E32D001S	*386.44*	374.54	-11.9	-2.4	-2.29
ID1-12	011S006E16A002S	*385.94*	384.16	-1.8	-0.4	-1.51
ID5-5	011S006E09E001S	387.64	385.96	-1.7	-0.3	-0.85
South Management Area						
MW-5A	011S007E07R001S	409.92	407.54	-2.4	-0.5	-0.74
MW-5B	011S007E07R002S	408.80	406.48	-2.3	-0.5	-0.74
MW-3	011S006E23J002S	451.68	447.79	-3.9	-0.8	-5.84
Air Ranch	011S007E30L001S	470.85	471.10	0.3	0.1	-0.5
RH-1	011S006E25A001S	467.87	467.18	-0.7	-0.1	-0.94

(a) Fall 2019 is the start of Physical Solution Implementation Period.

(b) If a Fall 2019 water level was not measured, an "estimated static" groundwater elevation was selected based on recent trends in groundwater elevation at the well and nearby wells, and knowledge of the influence of nearby pumping. Estimated values are shown in *blue italic font* .

(c) If a water level was not measured in Spring 2024, an "estimated static" groundwater elevation was selected based on recent trends in groundwater elevation at the well and nearby wells, and knowledge of the influence of nearby pumping. Estimated values are shown in *blue italic font* . In Spring 2024, a groundwater level could not be measured at the Airport 2 well; the well casing collapsed prior to the Fall 2023 Semi-Annual Monitoring Event.

(d) Historical rate of change in groundwater level is based on pre-fall 2018 groundwater levels as reported in the GMP (Dudek, 2020).

Table 4. Water Quality Standard Exceedance Report
Spring 2024

Owner	Well Name	State Well ID	Well Use	Analyte (unit)	Date	Result	US EPA Primary MCL[1]	US EPA Secondary MCL[2]	California Primary MCL[3]	California Secondary MCL[4]
Borrego Air Ranch	Air Ranch Well 4	011S007E30L001S	Public Supply	TDS (mg/L)	4/16/2024	560		500		500-1,000
Borrego Water District	ID4-18	010S006E18J001S	Public Supply	Sulfate (mg/L)	4/25/2024	270		250		250
				TDS (mg/L)	4/25/2024	630		500		500-1,000
	MW-1	010S006E21A002S	Observation	Sulfate (mg/L)	4/16/2024	280		250		250
				TDS (mg/L)	4/16/2024	530		500		500-1,000
	MW-4	010S006E35Q001S	Observation	TDS (mg/L)	4/16/2024	520		500		500-1,000
	MW-5A	011S007E07R001S	Observation	Chloride (mg/L)	4/15/2024	390		250		250-500
				Sulfate (mg/L)	4/15/2024	1700		250		250
				TDS (mg/L)	4/15/2024	3200		500		500-1,000
	MW-5B	011S007E07R002S	Observation	Sulfate (mg/L)	4/15/2024	660		250		250
				TDS (mg/L)	4/15/2024	1300		500		500-1,000
	WWTP	011S006E23H001S	Observation	TDS (mg/L)	4/15/2024	580		500		500-1,000
	MW-6S	010S06E08A002S	Observation	Sulfate (mg/L)	4/16/2024	400		250		250
				TDS (mg/L)	4/16/2024	880		500		500-1,000
	MW-6D	010S06E08A003S	Observation	Fluoride (mg/L)	4/16/2024	2.4		2	2	
				TDS (mg/L)	4/16/2024	580		500		500-1,000
CWC Casa del Zorro LLC	La Casa	011S006E23E001S	Public Supply	TDS (mg/L)	4/18/2024	560		500		500-1,000
Private	NMA-1	Private	Irrigation	Sulfate (mg/L)	4/17/2024	430		250		250
				TDS (mg/L)	4/17/2024	970		500		500-1,000
	NMA-4	Private	Irrigation	Nitrate-Nitrogen (mg/L)	4/17/2024	16	10		10	
				Sulfate (mg/L)	4/17/2024	390		250		250
				TDS (mg/L)	4/17/2024	930		500		500-1,000
	NMA-6	Private	Irrigation	Nitrate-Nitrogen (mg/L)	4/17/2024	86	10		10	
				Sulfate (mg/L)	4/17/2024	810		250		250
				TDS (mg/L)	4/17/2024	1900		500		500-1,000
	Fortiner	010S006E09N001S	Other	TDS (mg/L)	4/14/2024	1100		500		500-1,000
				Nitrate-Nitrogen (mg/L)	4/14/2024	25	10		10	
				Sulfate (mg/L)	4/14/2024	480		250		250
	CMA-1	Private	Irrigation	Nitrate-Nitrogen (mg/L)	4/17/2024	61	10		10	
				Sulfate (mg/L)	4/17/2024	820		250		250
				TDS (mg/L)	4/17/2024	1900		500		500-1,000
	CMA-2	Private	Irrigation	Sulfate (mg/L)	4/16/2024	340		250		250
				TDS (mg/L)	4/16/2024	690		500		500-1,000
	CMA-4	Private	Irrigation	Nitrate-Nitrogen (mg/L)	4/16/2024	13	10		10	
	CMA-5	Private	Irrigation	Nitrate-Nitrogen (mg/L)	4/16/2024	40	10		10	
				TDS (mg/L)	4/16/2024	910		500		500-1,000
State of California, Department of Parks and Recreation	Horse Camp	009S006E31E003S	Other	Sulfate (mg/L)	4/18/2024	300		250		250
				TDS (mg/L)	4/18/2024	680		500		500-1,000
	Auxiliary 2	010S005E25R001S	Other	TDS (mg/L)	4/18/2024	510		500		500-1,000
T2 Borrego LLC (Rams Hill)	RH-1	011S006E25A001S	Irrigation	Sulfate (mg/L)	4/17/2024	480		250		250
				TDS (mg/L)	4/17/2024	1100		500		500-1,000
	RH-3	011S006E25C002S	Irrigation	Arsenic (mg/L)	4/17/2024	0.016	0.01		0.01	
	RH-4	011S006E24Q002S	Irrigation	Arsenic (mg/L)	4/17/2024	0.015	0.01		0.01	
			Irrigation	TDS (mg/L)	4/17/2024	610		500		500-1,000
	RH-6	011S006E26H001S	Irrigation	Arsenic (mg/L)	4/17/2024	0.017	0.01		0.01	
T2 Farms	T2 Farms	010S006E09C001S	Irrigation	Sulfate (mg/L)	4/17/2024	320		250		250
				TDS (mg/L)	4/17/2024	670		500		500-1,000

Note: Notification levels are health-based advisory levels established by CDPH for chemicals in drinking water that lack maximum contaminant levels (MCLs). When chemicals are found at concentrations greater than their notification levels, certain requirements and recommendations apply. State law requires timely notification of the local governing bodies by drinking water systems whenever a notification level is exceeded in a drinking water source.

1) US EPA Primary MCLs are federally enforceable limits for chemicals in drinking water and are set as close as feasible to the corresponding EPA MCLG.

2) US EPA Secondary MCLs or National Secondary Drinking Water Regulations are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

3) California Primary MCLs are set by the Department of Public Health analogous to EPA Primary MCLs. Primary MCLs are enforceable at the state level.

4) California Secondary MCLs are defined in the California Code of Regulation Title 22 and are set to based on asthetic considerations (taste, odor, color) for consumer acceptance. Some Secondary MCLs have recommended and upper limits.

5) Private wells with data confidentiality agreements are denoted by aliases "NMA-#" or "CMA-#" based on their relative location in the north and central management zones.

Table 5. Summary of Exceedances of Water Quality Standard by Standard Type and Well Type

Parameter	Standard	Standard Limit (units)	Number of Drinking Water Wells with Exceedance	Number of Non-Potable Water Wells with Exccedance[1]	Number of Observation Wells with Exceedance
TDS[2]	CA Secondary MCL – lower limit	500 mgl	3	8	5
TDS[3]	CA Secondary MCL – upper limit	1,000 mgl	0	4	2
Sulfate	CA and EPA Secondary MCL	250 mgl	1	9	4
Nitrate (as N)	CA and EPA Primary MCL	10 mgl	0	6	0
Fluoride	EPA Secondary MCL	2 mgl	0	0	1
Arsenic	CA Primary MCL	0.01 mgl	0	3	0

Notes:
mgl = milligrams per liter
(1) Non-potable wells are wells used for irrigation and/or "other" purposes. These wells are not used for drinking water (potable) supplies. Note that the Fortiner well is considered "other" because water pumped from this well is not used for potable supply, per conversation with the well owner on October 12, 2023.
(2) Wells shown exceeding the CA Secondary MCL – lower limit are wells with TDS results greater than 500 mgl, but less than 1,000 mgl (less than the CA Secondary MCL – upper limit).
(3) Wells shown exceeding the CA Secondary MCL – upper limit are wells with TDS results greater than 1,000 mgl. This row does not include wells that exceeded the CA Secondary MCL – lower limit.