Draft: Groundwater Assistance Program Annual Needs Assessment 2020

Prepared for:

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December 2020

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EXECUTIVE SUMMARY

This report comprises the Post Oak Savannah Groundwater Conservation District (POSGCD) Groundwater Assistance Program (GWAP) Annual Needs Assessment for 2020, hereafter referred to in this document as GANA. The objective of the GANA is to identify eligible wells where water levels are likely to decline below the elevation of the pump setting as a result of regional groundwater production in GMA 12 within the next 10 years. To be eligible for funding under the GWAP, a well must be: 1) either a low-capacity permitted well or an exempt well used for domestic and/or livestock use, and, 2) completed in any aquifer in the District other than the Trinity Aquifer, Yegua-Jackson Aquifer and river alluvial or terraced formations.

A well is designated as a high-priority well if its model predicted well water level in 2029 is below the elevation of its pump setting recorded in the POSGCD database. The simulated predictive water levels were generated using the updated GMA 12 groundwater availability model (GAM) and a modified GMA-12 pumping scenario based upon Pumping Scenario 7 (PS-7). The modified simulation is a best estimate of pumping both within POSGCD and in the remainder of GMA-12. The simulation is termed PS-7a.

A total of 41 wells were identified as high-priority wells. Of the 41 wells, 36 are completed in the Carrizo Aquifer with the remaining 5 in the Calvert Bluff (n=3), Queen City (n=1), and Simsboro (n=1). Most high-priority wells are a result of the initiation of pumping at Vista Ridge. A comparison of drawdown from 2019 to 2022 as compared to 2019 to 2029 shows the drawdown cone sets up quickly. Seventy-two percent of the Carrizo wells that would become high-priority wells by 2029 will have already met the criteria by 2022. Because most eligible wells do not have pump elevation data in the POSGCD well database, we also used inference and the statistics underlying the high priority wells to identify wells that are likely to have been classified as been high priority wells if pump elevation data were available. These wells are termed moderate priority wells. A total of 56 moderate priority wells were identified. Out of these 56 wells, 33 wells and 22 wells are likely to require corrective action because of low water levels by 2029 and 2022, respectively.

The assessment of high priority and moderate priority wells is necessarily based on predictive groundwater modeling which assumes that the modeling has low predictive uncertainty. The modeling relies on assumptions regarding well data, future pumping scenarios and the accuracy of historical pumping values. Since these assumptions may not always be valid, some wells that are designated priority wells may not require assistance within the next 10 years or may not actually require assistance at all. Therefore, POSGCD's Water Resource Specialist should verify the eligibility and review the well construction of the 41 high-priority wells and moderate-priority wells. We also identified 33 wells where the modeling predicted that the 2019 water level was less than 15 feet about the pump. These wells were termed wells of concern and we would also recommend that the POSGCD Water Resource Specialist investigate their water level condition. For all these wells, it would be useful to measure water levels at the wells to check them versus modeled results.

Study Limitations

The findings contained in this report represent INTERA's professional opinion arrived at in accordance with applicable professional standards and based upon analysis of information available at the time the report was produced. The report was prepared at the request of the Post Oak Savannah Groundwater Conservation District to support on-going assessment of the District's aquifers, groundwater resources, and management policies. This report is a technical analysis and may or may not be partially or wholly consistent with the POSGCD Board's policies or current thinking. Groundwater management consistent with Chapter 36 of the Water Code is an adaptive process based upon best available science. Therefore, updates and changes to the report findings may be appropriate as the best available science evolves

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ACRONYMS AND ABBREVIATIONS

AF	acre-feet
AFY	acre-feet per year
BVGCD	Brazos Valley Groundwater Conservation District
DEM	Digital Elevation Model
DFCs	Desired Future Conditions
ft	feet
GAM	groundwater availability models
GANA	Groundwater Assistance Program Annual Needs Assessment for 2020
GMA	Groundwater Management Area
gpm	gallons per minute
GWAP	Groundwater Assistance Program
ID	identification
NED	National Elevation Dataset
LPGCD	Lost Pines Groundwater Conservation District
POSGCD	Post Oak Savannah Groundwater Conservation District
PS	Pumping Scenario
TWDB	Texas Water Development Board

1.0 INTRODUCTION

This report comprises the Post Oak Savannah Groundwater Conservation District (POSGCD, or "District") Groundwater Assistance Program (GWAP) Annual Needs Assessment for 2020, referred to herein as the GANA. According to the POSGCD GWAP documentation (POSGCD, 2020), the GANA:

> *"Shall identify high-priority wells that are projected to experience water level declines below the pump within the next 10 years. The projections will be based on an integration of two sources of information. One source will be water level predictions from the GAM. The other source will be adjustments to GAM model predictions based on potential biases in the GAM simulations."*

This report documents the process used to identify high priority wells and provides a discussion of the tools and assumptions used to make this assessment as well as prioritize the wells based upon their need for assistance over the next 10 years. Finally, the report reviews GANA findings and makes recommendations for improving both the GWAP and the GANA to achieve District goals.

1.1 GWAP Background

The GWAP was created to assist owners of exempted and low-capacity permitted wells (typically domestic & livestock) whose water levels are projected to decline below the pump from regional groundwater production in Groundwater Management Area (GMA) 12 over the course of the next decade. The GWAP is a proactive program meant to identify high-priority wells in the District projected to experience water level declines below their pump during typical operations from groundwater production in the District and GMA 12. A second objective is to provide technical and/or financial assistance to well owners to help prevent the loss of water supply in high-priority wells. While meant to be proactive, assistance under GWAP may include temporarily restoring a water supply to those well owners should a situation arise where the water level in a well has dropped below the pump before corrective action has taken place.

The following sections describe the methodology used to identify priority wells that should be investigated by POSGCD. The District Water Resource Management Specialist has the primary responsibility of recommending appropriate actions to be taken.

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2.0 DATA SOURCES SUPPORTING THE ASSESSMENT

There are several types of data required to perform the GANA. These data include information regarding exempt and permitted POSGCD wells, monitoring well data from the POSGCD Monitoring Well Network, and future predicted aquifer water levels using the groundwater availability models (GAMs) used by the POSGCD to simulate Desired Future Conditions (DFCs) in the relevant POSGCD aquifers. Each of these data sources will be described in the following subsections of this report.

2.1 Eligible Wells

According to the POSGCD GWAP documentation (POSGCD, 2020), to be eligible for assistance in the GWAP, a well must meet the following criteria:

1. Located in Milam or Burleson counties
2. Functional and registered with the District
3. Accessible for monitoring water levels by POSGCD
4. Owner must agree to allow monitoring by POSGCD
5. Either a low-capacity permitted well that produces less than 50 gallons per minute (gpm) OR an exempt well used for domestic and/or livestock use as defined in the District's Rules
6. Completed in any aquifer in the District other than the Trinity Aquifer, Yegua-Jackson Aquifer and river alluvial or terraced formations
7. May not be covered by a mitigation agreement included in a permit issued by the District or required by the State of Texas

POSGCD maintains an online database of all wells registered in the District (https://posgcd.halff.com). The HALFF database was used to help identify wells eligible for assistance. Well information needed to determine wells potentially eligible includes whether they are exempt or non-exempt (permitted) status and, if they are permitted, whether they are incapable of producing greater than 50 gpm. Other important well attributes required are what aquifer the well is completed in and well completion details, in particular the pump depth. **Table 1** provides the total number of exempt wells in the POSGCD HALFF database completed in GWAP-eligible aquifers, along with an accounting of how many of those wells have pump depth in the HALFF database. **Appendix A** provides maps of the locations of the exempt wells that are currently registered by POSGCD in the aquifers relevant to this analysis. **Figure 1** shows the map of exempt well locations for the Carrizo Aquifer provided in Appendix A.

Table 1 All Exempt Wells in POSGCD in Eligible Aquifers

Aquifer	Has Pump Depth Information	No Pump Information	Total Eligible Exempt Wells
Sparta	114	822	936
Queen City	125	711	836
Carrizo	75	203	278
Calvert Bluff	150	374	524
Simsboro	49	316	365
Hooper	140	521	661
TOTAL	653	2,947	3,600

For this report, a well is considered a low-capacity, permitted well (eligibility requirement #5) if the maximum production pumping capacity of the permitted well in the HALFF database is 50 gpm or less and the well is completed in an eligible aquifer (requirement #6). If the maximum production capacity of the well is not listed in the database, a well would also be included if the average annual permitted production is less than 81 acre-feet, which is equivalent to pumping continuously at a rate of 50 gpm for an entire year. **Table 2** provides the total number of permitted wells that meet requirements #5 and #6, along with an accounting of how many of those wells have pump depth in the HALFF database. **Table 3** provides the total number of exempt and permitted wells eligible for the GWAP and summarized by aquifer. **Appendix B** shows the locations of the low-capacity permitted wells that are currently registered by POSGCD. **Figure 2** shows the map of low-capacity permitted well locations for the Carrizo Aquifer provided in Appendix B.

Table 2 Permitted wells in POSGCD with an average annual permitted production of 50 gallons per minute or less in eligible aquifers

Aquifer	Has Pump Depth Information	No Pump Information	Total Eligible Exempt Wells
Sparta	38	0	38
Queen City	56	6	62
Carrizo	44	3	47
Calvert Bluff	132	14	146
Simsboro	42	4	46
Hooper	132	13	145
TOTAL	444	40	484

Table 3 Number of exempt and permitted wells eligible for the GWAP by aquifer

Aquifer	Total Eligible Exempt Wells	Total Eligible Permitted Wells	Total Eligible Wells
Sparta	936	38	974
Queen City	836	62	898
Carrizo	278	47	325
Calvert Bluff	524	146	670
Simsboro	365	46	411
Hooper	661	145	806
TOTAL	3,600	484	4,084

There are a total of 4,084 eligible wells in the POSGCD HALFF database. Of those, 3,600 are exempt wells and 484 are permitted wells meeting the capacity requirement for eligibility. The depth to the well pump is only known for 18% of the exempt wells. The depth to the well pump is known for 92% of the low-capacity permitted wells.

As will be discussed, if an eligible well is found to be a high priority well, the POSGCD will attempt to characterize the well completion details through cooperation with the well owner to make it eligible for corrective action. Throughout the analysis, individual wells will be referenced by their POSGCD

identification (ID). Any well owner can obtain the POSGCD ID for a well by contacting the POSGCD office in Milano, Texas.

2.2 Monitored Groundwater Water Levels

The POSGCD network of groundwater monitoring is an essential part of the GANA because it provides actual data by which to check model reliability. The POSGCD network of groundwater monitoring wells is continually being expanded to include additional wells. At the time this document was prepared, the POSGCD Monitoring Well network consists of the 256 wells shown in **Figure 3. Appendix C** provides information for the 256 wells in Figure 3, including their location, well depth, screened interval, and aquifer assignment. INTERA (2018) provides guidelines for the collection and analysis of monitoring data. The current analysis considers all water level measurements recorded prior to Summer 2020.

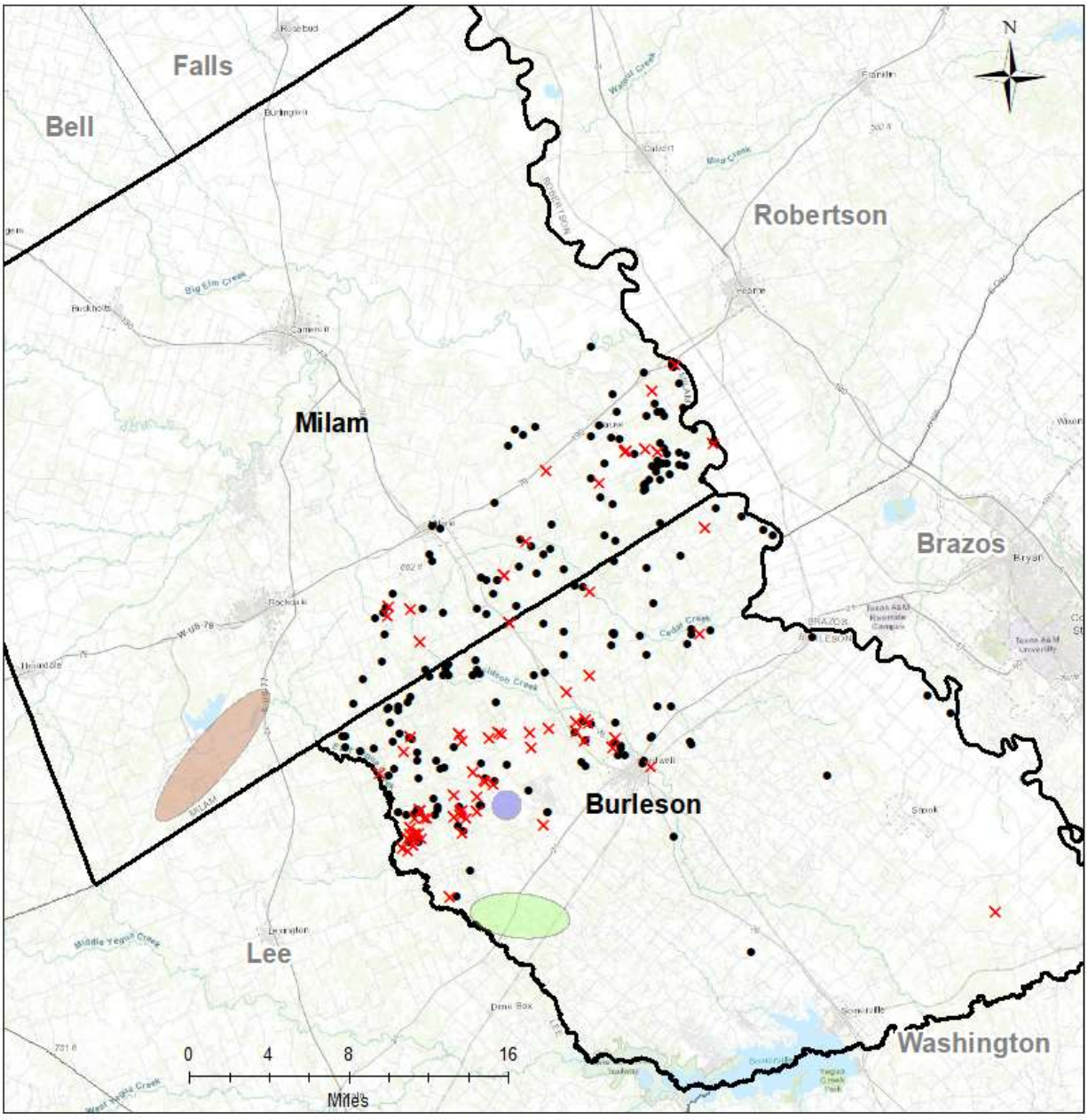

Figure 1 Locations of eligible exempt wells completed in the Carrizo Aquifer

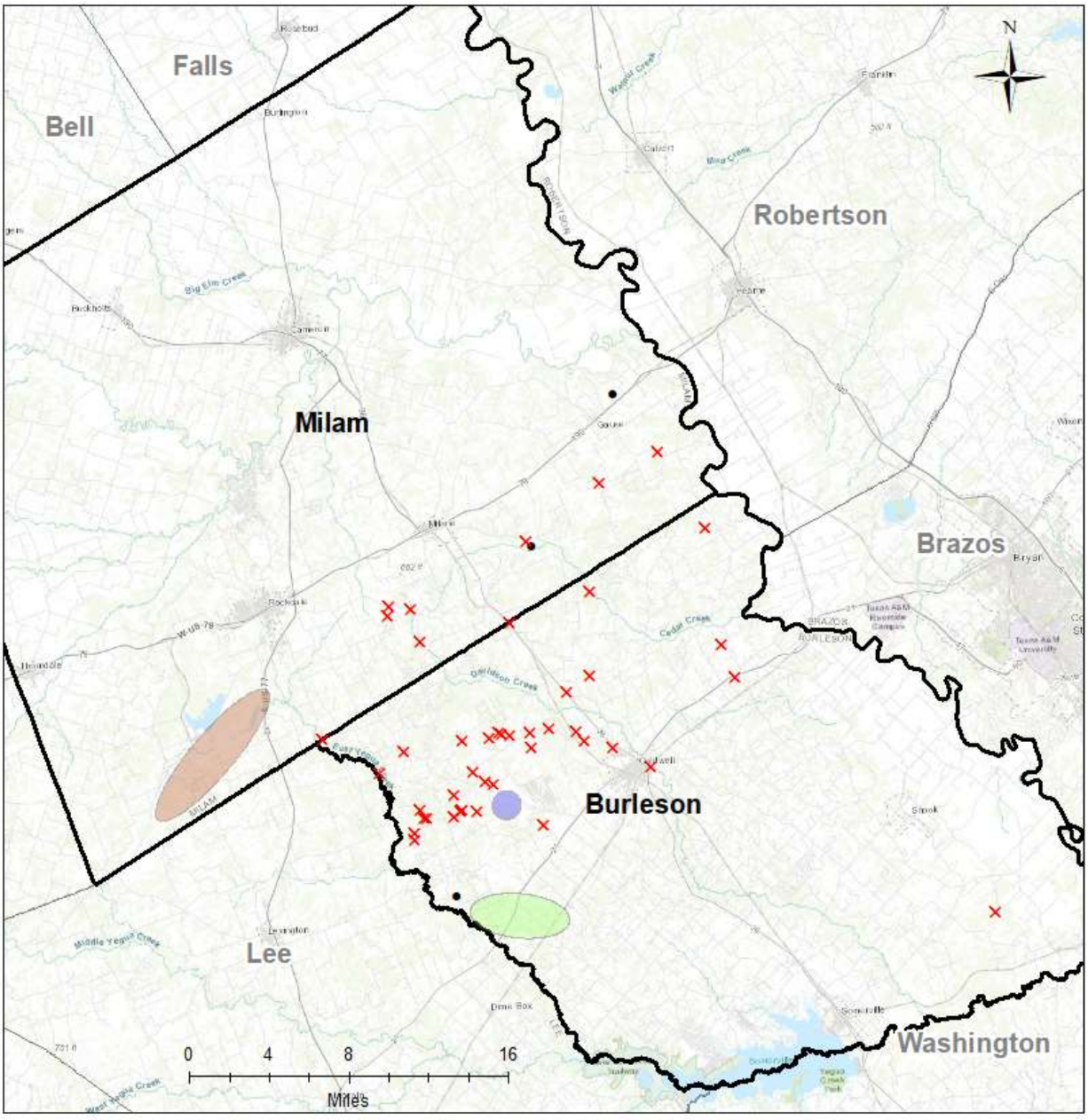

Figure 2 Locations of eligible low-capacity permitted wells completed in the Carrizo Aquifer

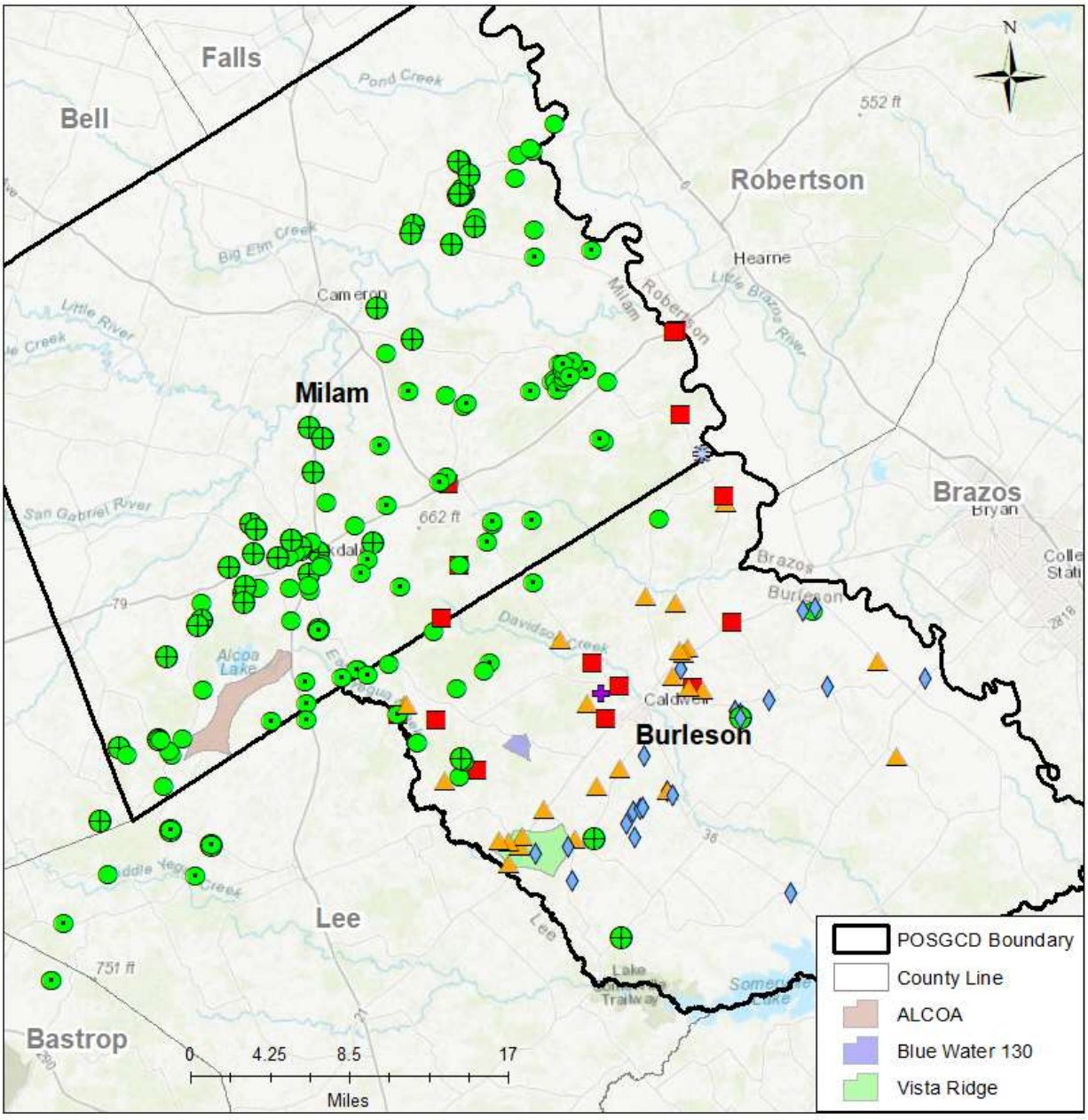

Figure 3 Monitoring wells in POSGCD Groundwater Monitoring Network

2.3 Modeled Groundwater Water Levels

The POSGCD has registered wells in all the GWAP-eligible aquifers: Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and the Hooper. The Carrizo, Calvert Bluff, Simsboro and Hooper aquifers are collectively referred to as the Carrizo-Wilcox Aquifer in Texas, but the individual members are physically distinct and have different hydrogeologic properties and are managed separately in GMA 12.

As part of the regional planning process in GMA 12, POSGCD uses the updated Texas Water Development Board (TWDB) Central Queen City, Sparta and Carrizo-Wilcox GAM to simulate changes in water levels in response to future pumping. The updated Central Queen City, Sparta and Carrizo-Wilcox GAM is accepted by the TWDB as the best available science for the region (Young and others, 2018). In 2020, the GMA 12 consultants agreed to incorporate new aquifer test data in the Simsboro in the vicinity of the Vista Ridge Project to improve model parameters in that area. The revised GAM was documented (Young and others, 2020), reviewed by the TWDB, and has been developed with stakeholder review and comment. The 2020 updated GAM is considered the best available science for evaluating changes in future water levels in the POSGCD in response to pumping (**Table 4**).

Table 4 Groundwater Availability Models used by POSGCD to simulate impacts of pumping on water levels as part of the regional planning process

Groundwater Availability Model	Aquifers	Reference
Central Sparta, Queen City, and Carrizo-Wilcox Aquifers	Sparta, Queen City, Calvert Bluff, Simsboro, Hooper	Young and others (2018)
GMA-12 Update to the Central Sparta, Queen City, and Carrizo-Wilcox Aquifers	Sparta, Queen City, Calvert Bluff, Simsboro, Hooper	Young and others (2020)

The POSGCD GWAP documentation (POSGCD, 2020) states that GAMs will be used to perform GANA annual assessments and that the GAM simulations will include the most recent information on projected pumping in GMA 12. For this study, the projected pumping is represented by a modified version of GMA 12 pumping scenario seven (PS-7). The well file for PS-7 was developed by the GMA 12 consultants in Fall 2019 to represent a future pumping scenario where the amount of permitted pumping in GMA 12 was fully utilized in 2070. **Figure 4** shows a time series of the GAM pumping rates by aquifer in PS-7 in the POSGCD. Because water levels in POSGCD are also affected by pumping in adjoining counties, **Figure 5** and **Figure 6** provide a similar time series plots of GAM pumping rates by aquifer in PS-7 in Lost Pines Groundwater Conservation District (LPGCD) and Brazos Valley Groundwater Conservation District (BVGCD), respectively.

For this study, the pumping rates in PS-7 were used except that the pumping rates in the Simsboro Aquifer were decreased in LPGCD from 125,967 AF to 74,457 acre-feet (AF). The modified pumping scenario is referred to as PS-7a. The Simsboro pumping was reduced in PS-7 to create PS-7a by omitting all pumping associated with the Forestar permits and 50% of the pumping associated with the Recharge permits. These modifications were made because neither Forestar nor Recharge have neither contracts in place to sell groundwater. **Figure 7** shows the time series plot of LPGCD pumping by aquifer for PS-7a.

Table 5 lists the pumping rates in POSCD by aquifer included in PS-7a. The greatest increase in pumping rates occurs in the Carrizo and Simsboro aquifers from 2019 to 2020. The pumping in the Carrizo Aquifer increases from 2,157 AF in 2019 to 17,048 AF in 2020. The pumping in the Simsboro Aquifer increases from 5,221 AF in 2019 to 38,346 AF in 2020. The large increases in both aquifers are associated with the Vista Ridge permit beginning their pumping of groundwater in 2020 for delivery to the San Antonio Water System (SAWS).

The water levels for wells in the Sparta, Queen City, and Carrizo-Wilcox aquifers were simulated using the recently revised Central Sparta, Queen City and Carrizo-Wilcox Aquifer GAM (Young and others, 2020) and the GMA 12 well file for PS-7a.

Table 5 Pumping rates in POSGCD aquifers f for PS-7a

Aquifer	Pumping Rate (acre-feet per year) for PS-7a						
	2019	2020	2022	2026	2029	2039	2070
Sparta	1,224	1,237	1,264	1,317	1,358	1,498	1,983
Queen City	506	513	528	559	583	672	1,045
Carrizo	2,157	17,048	17,091	17,177	17,242	17,463	18,206
Calvert Bluff	2,150	2,180	2,241	2,368	2,467	3,265	4,761
Simsboro	5,221	38,346	40,803	42,926	46,020	82,113	88,259
Hooper	1,785	1,806	1,849	1,937	2,004	2,240	3,126
Total	13,044	61,131	63,777	66,284	69,674	107,251	117,381

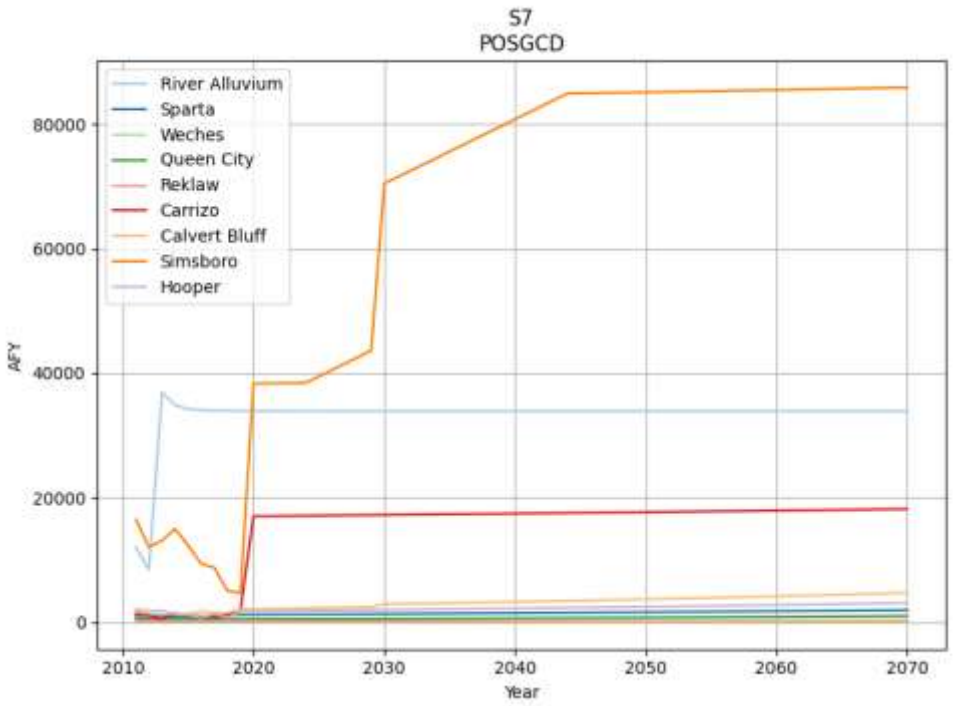

Figure 4 POSGCD pumping rates from the year 2011 to 2070 used in GMA-12 Pumping Scenario 7

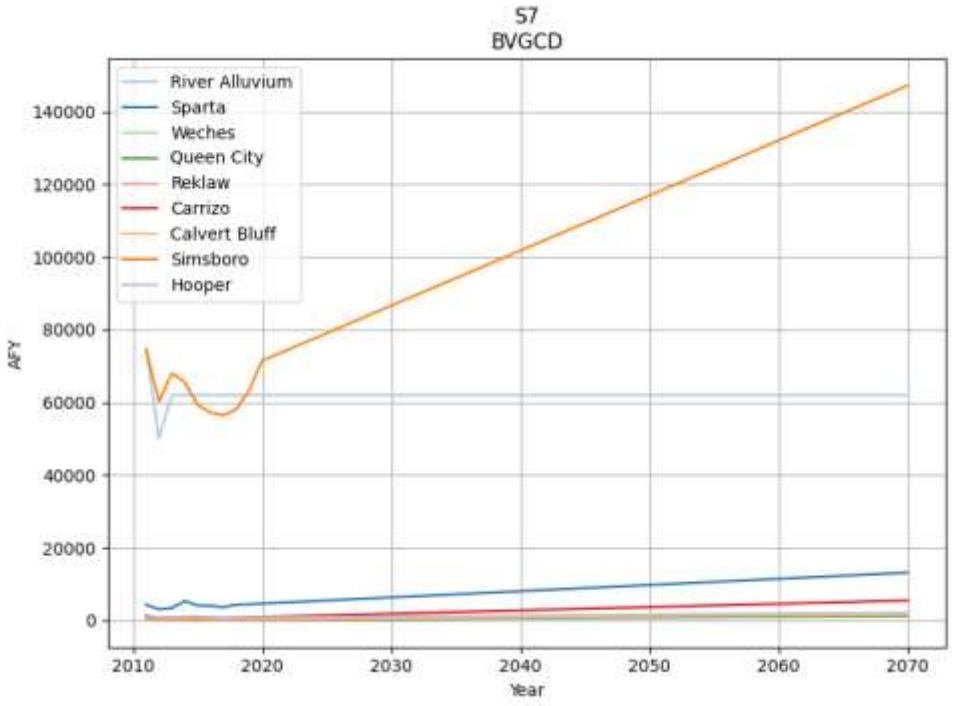

Figure 5 LPGCD pumping rates from the year 2011 to 2070 used in GMA-12 Pumping Scenario 7

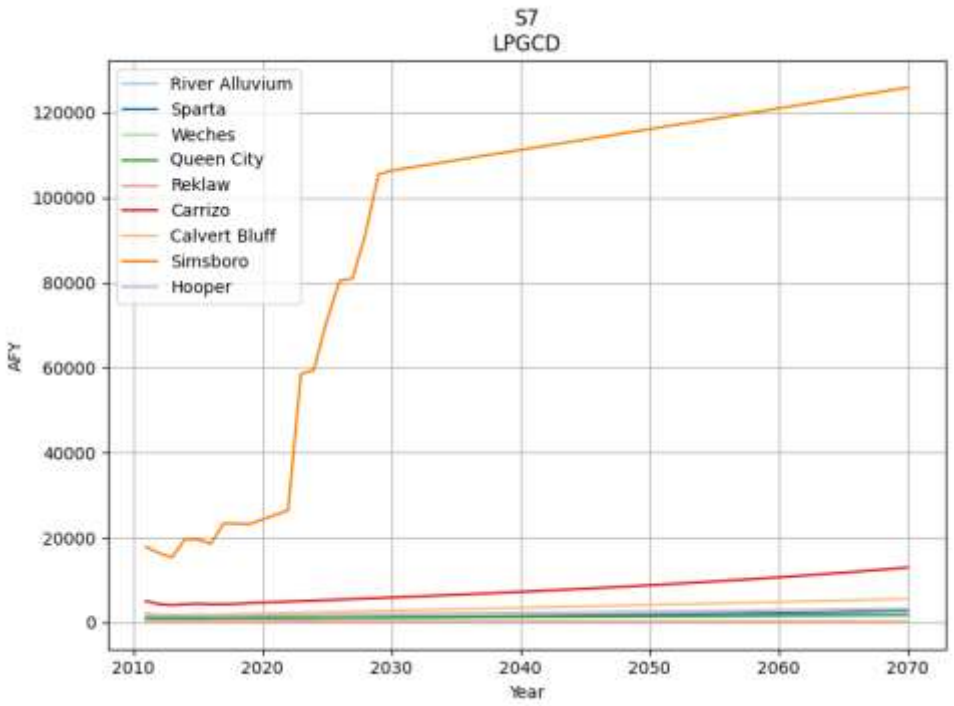

Figure 6 BVGCD pumping rates from the year 2011 to 2070 used in GMA-12 Pumping Scenario 7

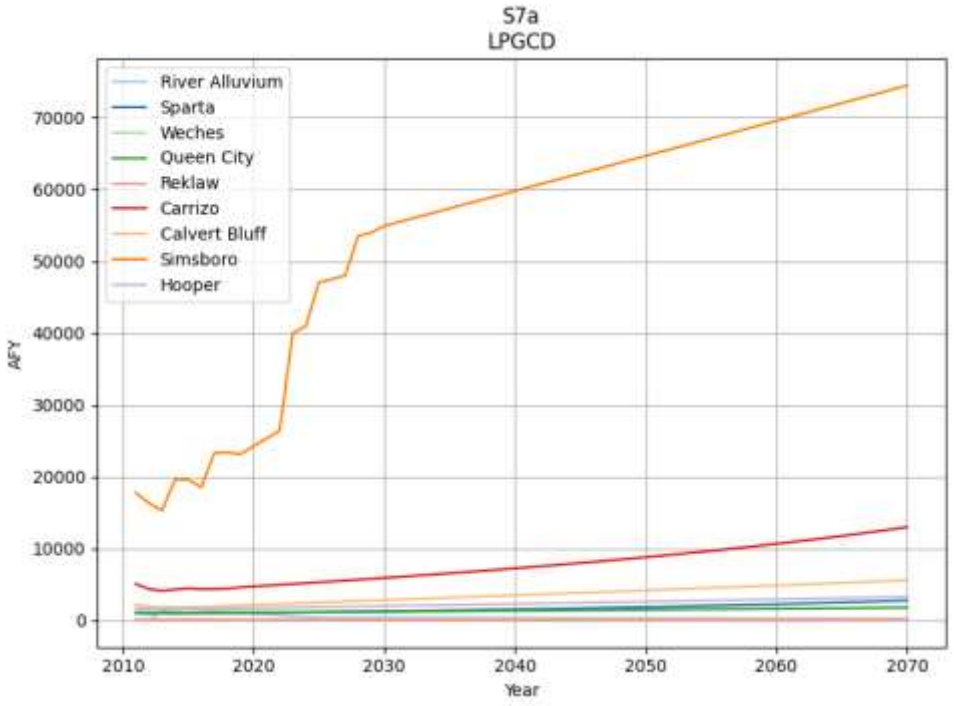

Figure 7 LPGCD pumping rates from the year 2011 to 2070 used in GMA-12 Pumping Scenario 7a

3.0 GWAP ASSESSMENT

3.1 Priority Assessment Methodology

The primary issue of concern for the GWAP assessment is whether the water level at an eligible groundwater well will drop below the elevation of that well's pump setting. Specifically, the GWAP defines high-priority wells as wells where the water level is projected to fall below the pump elevation within 10 years. The relevant time frame of interest in this year's assessment for high-priority wells is a 10-year period from December 2019 to December 2029. The purpose of this document is to define those high-priority wells so that POSGCD staff can perform the necessary due diligence required to investigate whether corrective actions are needed.

This assessment uses the predicted water levels from the PS-7a GAM simulation introduced in Section 2.3. PS-7a is considered the best current estimate of future pumping in GMA 12 for assessing regional water level declines and their local impacts on the operation of wells. In addition to predicted water levels, the GANA must either know, or assume, the elevation of a well's pump. The pump elevation for each well is determined by subtracting the reported pump depth from the surface elevation, which is established from the 10-meter resolution National Elevation Dataset (NED) Digital Elevation Model (DEM). Because wells require some available drawdown to produce water and because of inaccuracies in estimating ground surface elevation at the well, we have assumed that, if the projected water level in an eligible well is within 15 feet of the elevation of the pump, that pump is considered dry and that well classifies as a high priority well.

Because the majority eligible wells do not have pump information on record in the POSGCD database, a second analysis was performed to identify wells that are of interest even though pump elevation is unknown. One reason for conducting the second analysis is to estimate how many of the wells with no pump depth may potentially need corrective action. This information can inform program budgets considered by the District in the future.

3.2 Results

3.2.1 Simulated Drawdown in Relevant Aquifers

To help identify high-priority wells and the time frame these wells may need corrective action, we have analyzed drawdown over two different time periods. The first is a three-year period from 2019 through 2022. The second is a ten-year period from 2019 through 2029. The ten-year period is the time frame recognized in the GWAP for identifying high-priority wells. The reason we also looked at a three-year period is because we noticed that the drawdown cones propagated quickly and that it may be important to prioritize the sequence in which the well investigations are conducted.

Figure 8 through **Figure 13** show the drawdown that occurs between 2019 and 2022 and 2019 and 2029 as simulated by the Central Sparta/Queen City/Carrizo-Wilcox GAM based on pumping in Run PS-7a for all qualifying aquifers. These figures identify which wells have pump information in the POSGCD database and which ones do not. For those eligible wells that have pump information, the figures identify if the predicted water level at the well is greater than or less than 15 feet above the pump at the

period of interest (2022 or 2029). The figures also identify wells where the simulated water level in 2019 is less than 15 feet above the pump elevation. Wells that have water levels below the pump in 2019 are not necessarily considered as high-priority wells because, if both the pump data and the simulated water levels were correct, the well would have stopped operating properly in 2019 and the well owner would have reported the problem to POSGCD or have lowered the pump. For this report, wells with water wells less than 15 feet above the pump elevation in 2019 are considered wells of concern.

Several key observations are organized by aquifer below.

- Sparta Aquifer - Figure 8 shows the drawdown contours for Sparta Aquifer from 2019 through 2022 and for 2019 through 2029. Drawdowns are relatively small (less than 10 feet) in the Sparta and are isolated to Burleson County, where the Sparta Aquifer outcrops. Four wells have well levels below the pump elevation in 2019. No high-priority wells are identified in either 2022 or 2029.
- Queen City Aquifer - Figure 9 shows the drawdown contours for Queen City Aquifer from 2019 through 2022 and for 2019 through 2029. Again, because the Queen City Aquifer outcrops in southernmost Milam and northernmost Burleson County, drawdown is limited primarily to Burleson County. Again, drawdowns are minimal (between 0 and 10 feet) and are not being caused by large non-exempt pumping. Five wells have predicted water levels below the pump elevation in 2019. One well in 2022 and 2029 has a simulated water level below the pump elevation. That well is in an area where the predicted drawdown from 2019 to 2029 is less than 5 feet.
- Carrizo Aquifer - Figure 10 shows the drawdown contours for Carrizo Aquifer from 2019 through 2022 and for 2019 through 2029. From a review of the drawdown contours in 2022 and in 2029, one can see that the impact of Vista Ridge pumping on regional water levels is predicted to occur relatively quickly. It is expected that the drawdown cones associated with Vista Ridge will come into a quasi-equilibrium by 2029, and the identification of new high priority wells should fall off after 2029 barring additional projects not modeled in PS-7a. The largest drawdown occurs in the vicinity of the Vista Ridge well field and the drawdown values decrease radially outward from there towards Robertson and Brazos counties. By 2029 the drawdowns are between 340 and 240 feet (ft) in the Vista Ridge wellfield, are generally less than 10 ft in northeast Milam County, and are generally less than 70 ft along the county line with Brazos County. Five wells have well levels below the pump elevation in 2019. Twenty-six and 36 high-priority wells are identified in 2022 and in 2029, respectively. The majority of high-priority wells are located within a radial distance of 8 miles from the Vista Ridge well field.
- Calvert Bluff Aquifer- Figure 11 shows drawdown contours for the Calvert Bluff Aquifer from 2019 through 2022 and for 2019 through 2029. The drawdown contours exhibit a similar pattern to those for the Carrizo Aquifer, but the drawdowns are less. The drawdowns are about 140 ft or less near the Vista Ridge wellfield, are generally less than 10 feet in northeast Milam County, and are generally from 40 to 70 ft along the county line with Brazos County. Ten wells have predicted water levels below the pump elevation in 2019. No high-priority wells are identified in 2022 and three high-priority wells are identified in 2029.
- Simsboro Aquifer - Figure 12 shows drawdown contours for Simsboro Aquifer from 2019 through 2022 and for 2019 through 2029. The drawdowns contours are about 290 ft or less in the Vista Ridge wellfield, are less than 30 ft across the outcrop in Milam County, and are about 140 ft or less along the county line with Brazos County. Ten wells have well levels below the pump elevation in 2019. No high-priority wells are identified in 2022 and one high-priority well is identified in 2029.

- Hooper Aquifer - Figure 13 shows drawdown contours for the Hooper Aquifer from 2019 through 2022 and for 2019 through 2029. In the Hooper Aquifer, the drawdowns are greatest several miles north of the Vista Ridge well field, where they are about 100 ft. Across most of the outcrop for the Hooper Aquifer in Milam County, the drawdowns are less than 10 ft and, along the county line with Brazos County, the drawdowns range between 60 ft to less than 10 ft in the outcrop in Milam County. Six wells have well levels below the pump elevation in 2019. No high-priority wells are identified in either 2022 or 2029.

Appendix D lists the 41 wells identified as high-priority wells and the 33 wells of concern that have simulated water levels in 2019 that are less than 15 feet above the pump elevation.

Appendix E shows the hydrographs of the simulated water levels for high-priority wells. **Appendix F** shows the hydrographs of the simulated water levels for the wells of concern. Each figure shows the simulated water level in the well from 2000 to 2032 and includes markers for the land surface, measured water levels, the pump location, the top of well screen, and the bottom of the well. The title of the figure indicates the aquifer intersected by the well screen, whether it is an exempt or permitted low capacity well, and if the well is in the POSGCD monitoring well network.

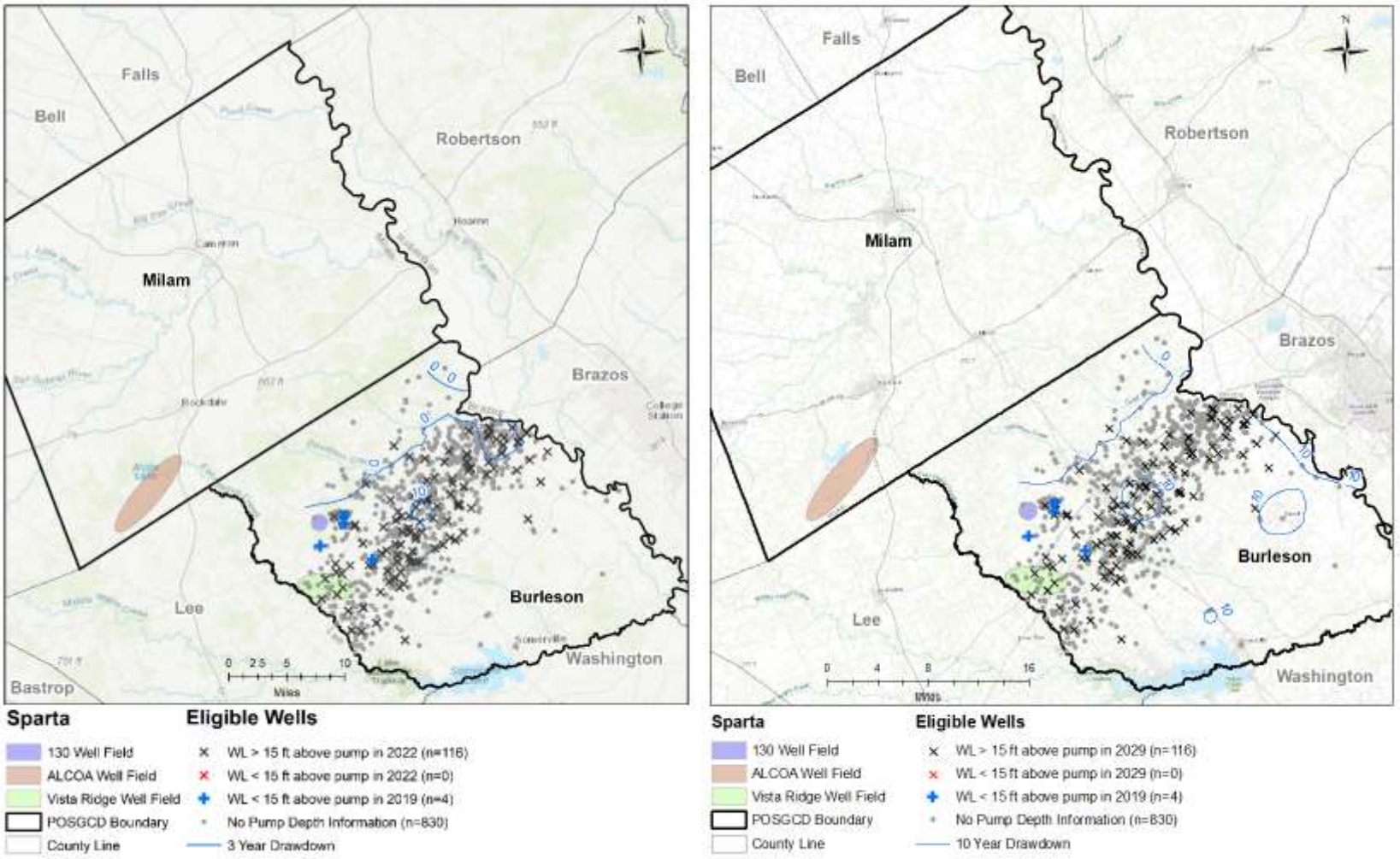

Figure 8 Contours of simulated drawdown from 2019 to 2022 and 2019 to 2029 in the Sparta Aquifer

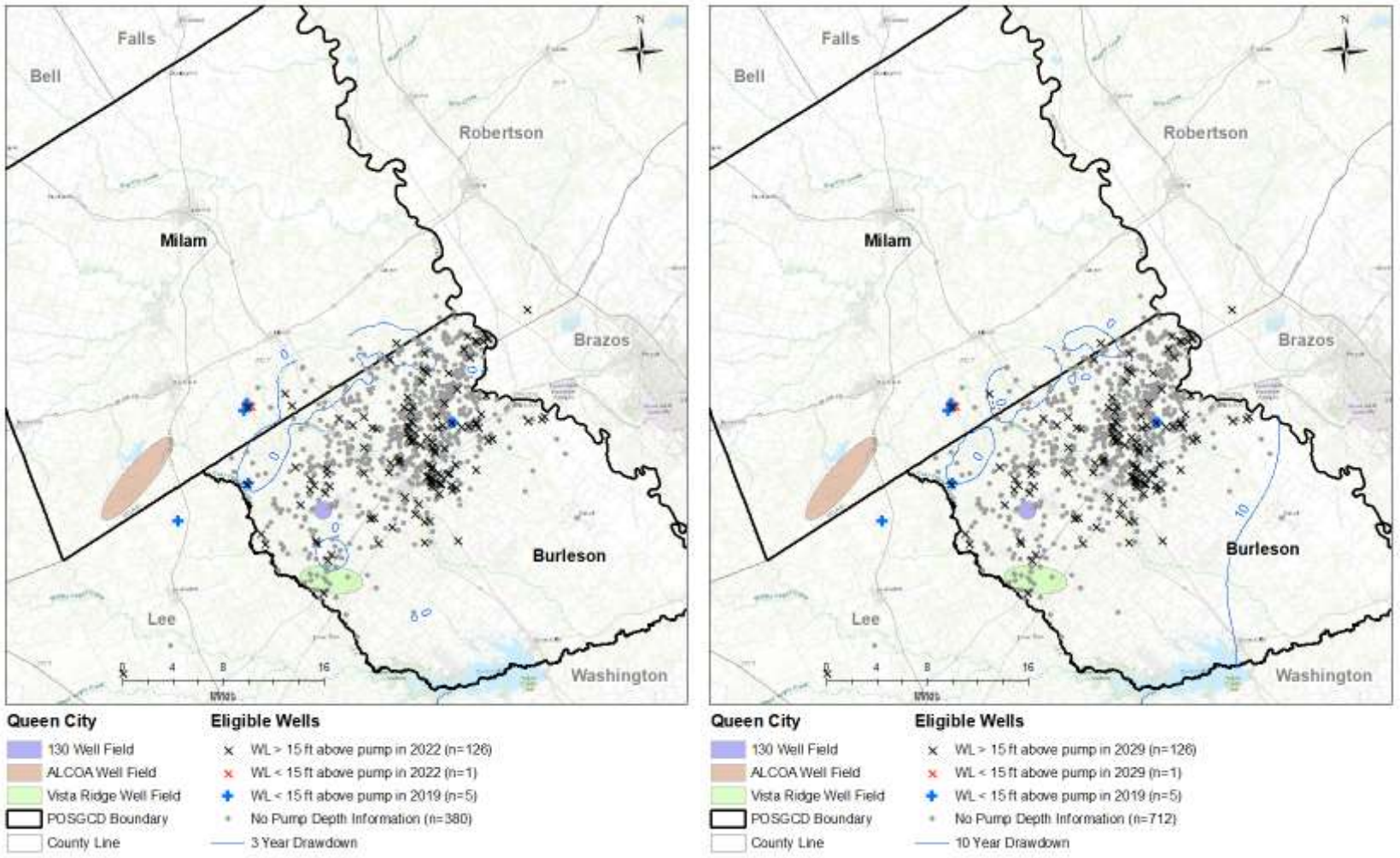

Figure 9 Contours of simulated drawdown from 2019 to 2022 and 2019 to 2029 in the Queen City Aquifer

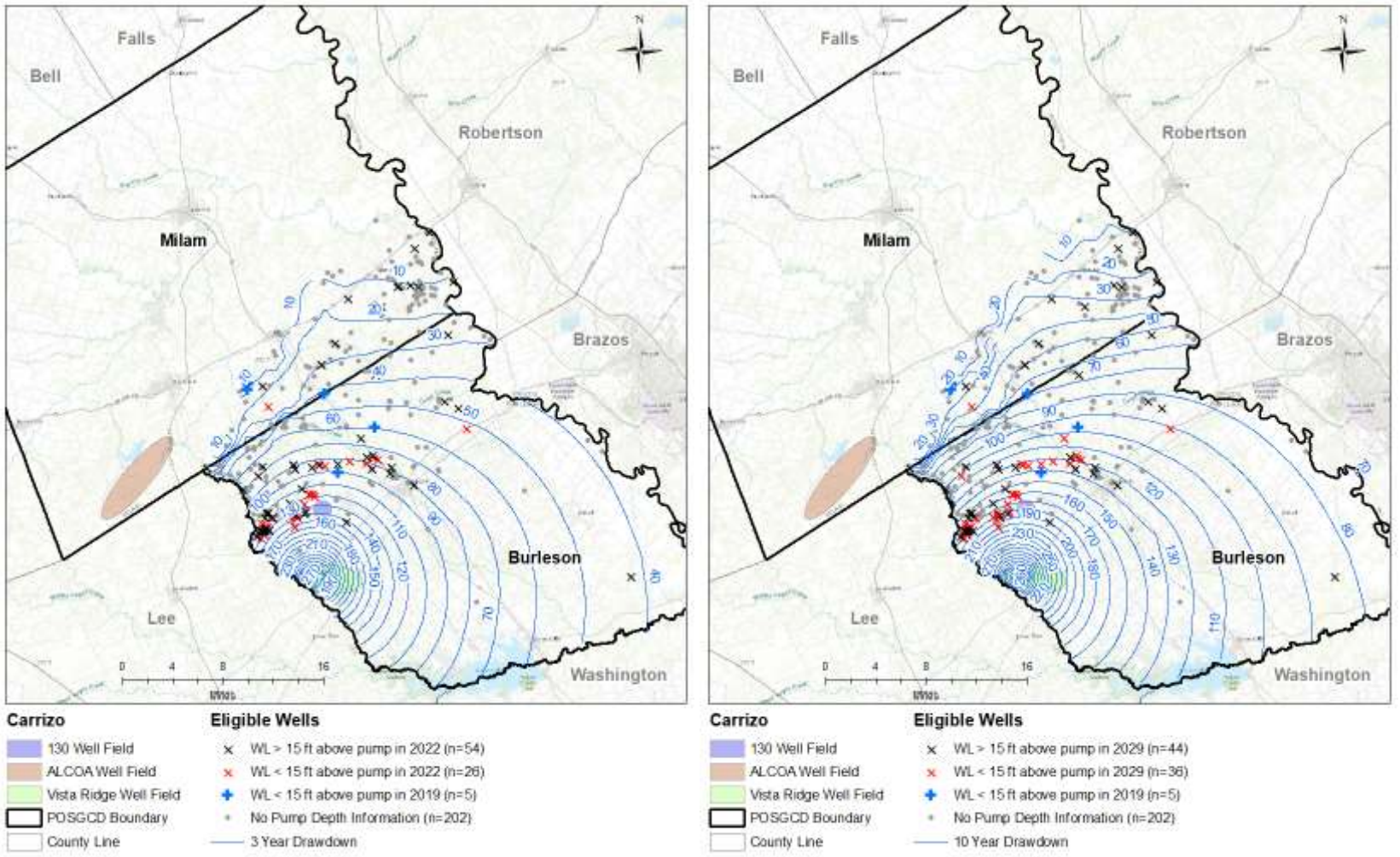

Figure 10 Contours of simulated drawdown from 2019 to 2022 and 2019 to 2029 in the Carrizo Aquifer

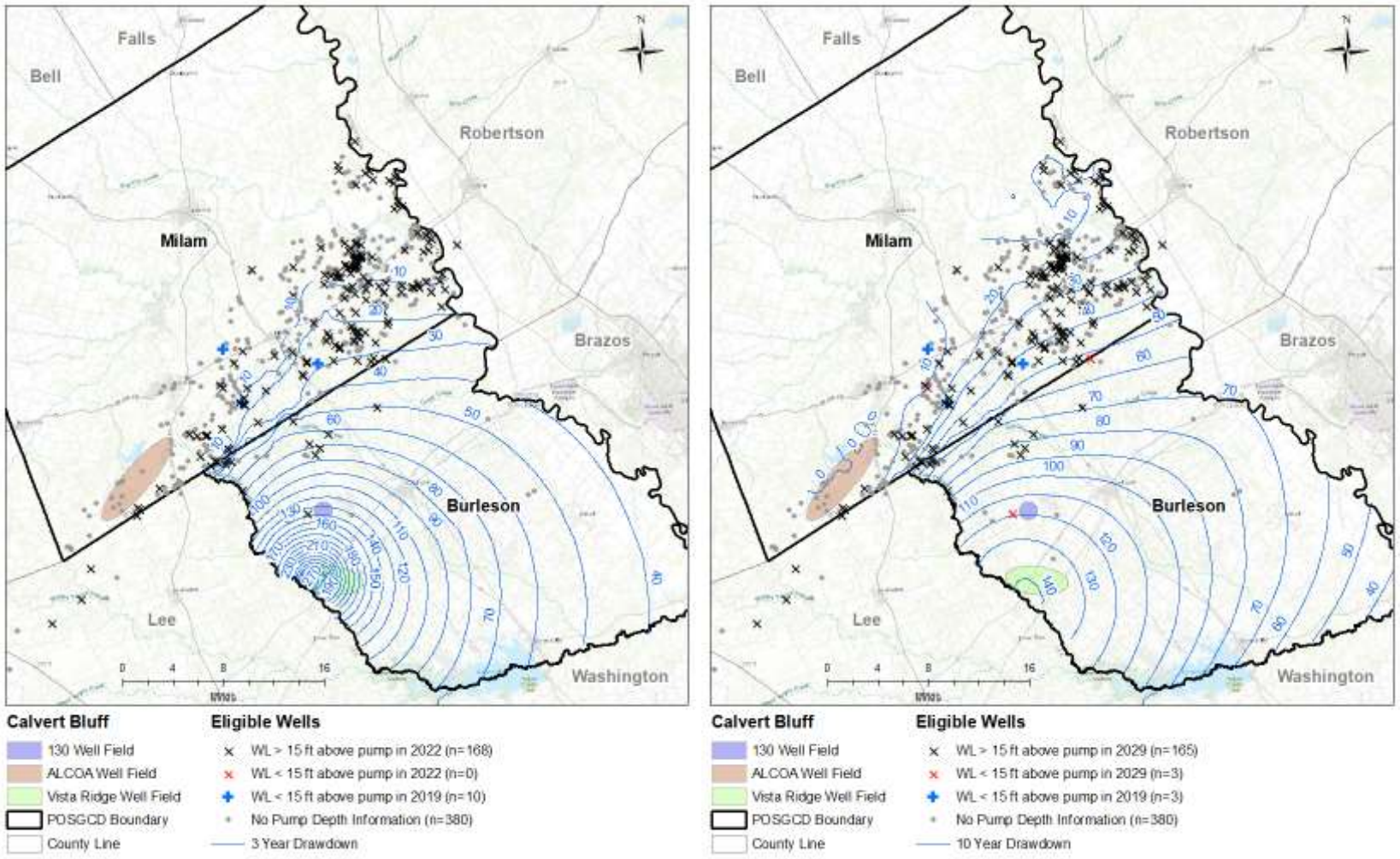

Figure 11 Contours of simulated drawdown from 2019 to 2022 and 2019 to 2029 in the Calvert Bluff Aquifer

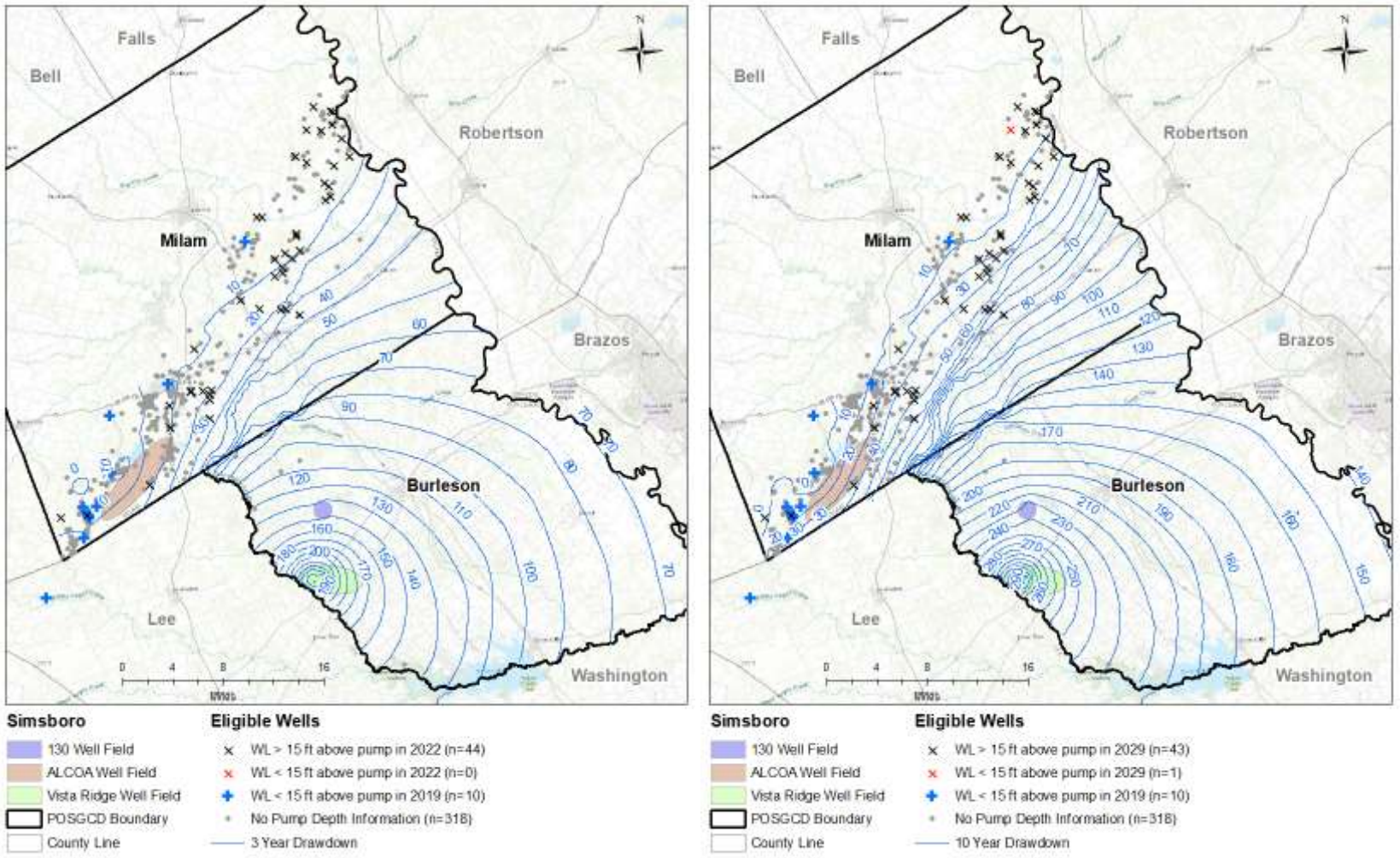

Figure 12 Contours of simulated drawdown from 2019 to 2022 and 2019 to 2029 in the Simsboro Aquifer

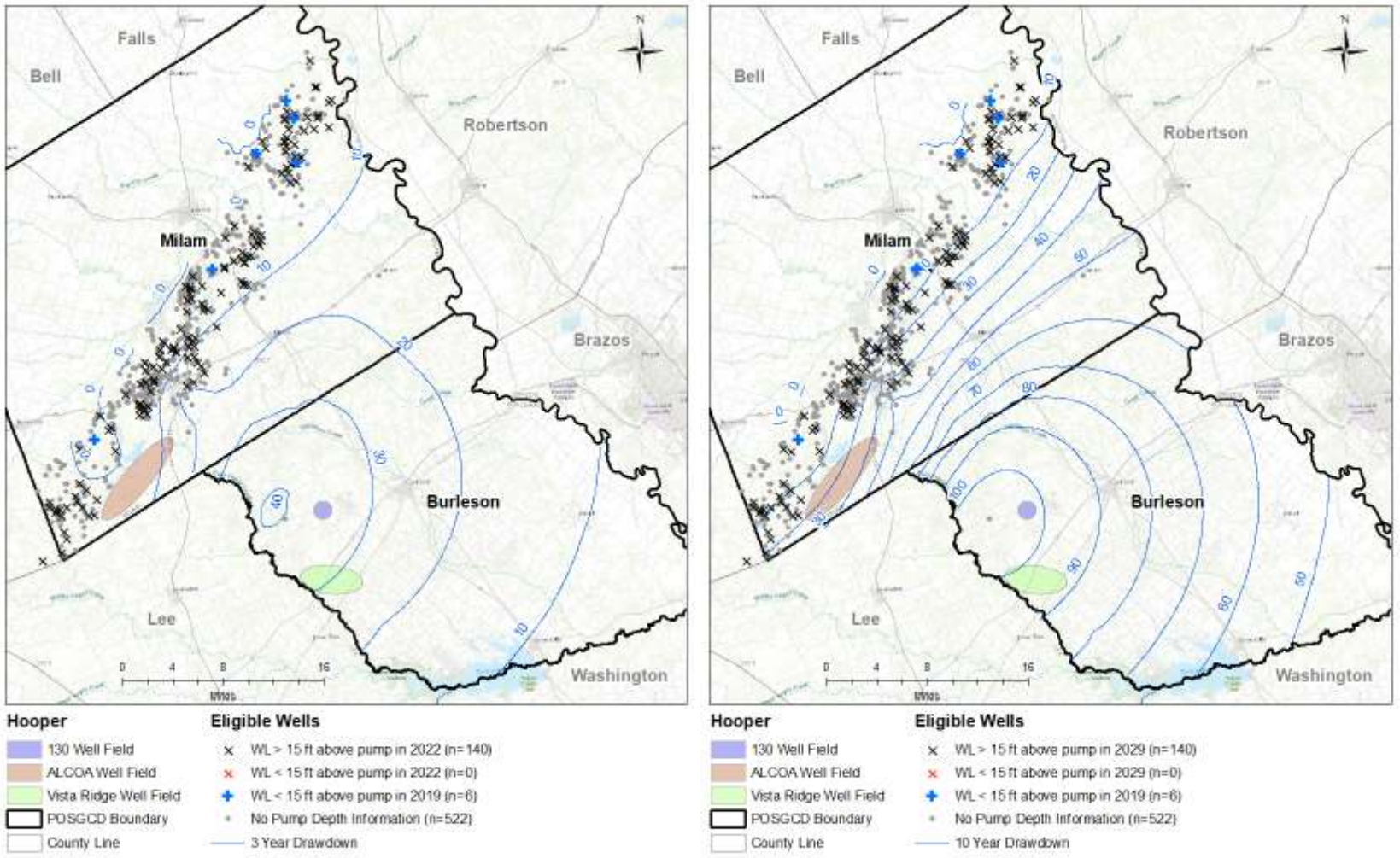

Figure 13 Contours of simulated drawdown from 2019 to 2022 and 2019 to 2029 in the Hooper Aquifer

3.2.2 High Priority Wells Based Upon Known Pump Elevations

Changes in water levels from 2019 to 2022 and from 2019 to 2029 were simulated for 675 eligible wells (either exempt of low-capacity permitted wells) that have pump information in the POSGCD well database. A well is considered a high-priority well if the following two conditions are met: (1) the simulated water level is greater than 15 ft above the pump elevation in 2019, and (2) the simulated water level is less than 15 ft above the pump elevation in 2029. The information provided in Figures 9 through 14 shows the location of 41 eligible wells that are classified as high-priority wells.

Table 6 provides general information about the difference in elevation between the simulated water levels and the pump location for the years 2022 and 2029 by aquifer for the 41 wells identified as high priority. Out of the 41 wells, 36 are completed in the Carrizo Aquifer with the remaining 5 in the Calvert Bluff (n=3), Queen City (n=1), and Simsboro (n=1). Table 6 shows the same statistics for the elevation difference between the simulated water level and the pump elevation for 2019 and 2022. What is significant regarding the two sets of statistics is that 72% of the Carrizo wells that would become high-priority wells by 2029 have already met the criteria by 2022.

Table 6 Simulated water level elevation relative to pump elevation in eligible wells for the administrative period (2019 through 2029) and for the time period from 2019 through 2022.

Aquifer	Eligible Wells w/Pump Info	Year	Simulated Water Level Elevation Relative to Pump Elevation									
			<15 ft above pump	<10 ft above pump	<5 ft above pump	< 2 ft above pump	> 2 ft below pump	> 5 ft below pump	>20 ft below pump	>25 ft below pump	>50 ft below pump	> 100 ft below pump
Sparta	116	2022	0	0	0	0	0	0	0	0	0	0
		2029	0	0	1	0	0	0	0	0	0	0
Queen City	127	2022	1	1	0	1	0	0	0	0	0	0
		2029	1	2	1	2	1	1	0	0	0	0
Carrizo	80	2022	26	22	22	20	19	16	16	11	8	0
		2029	36	36	35	31	31	30	28	24	13	3
Calvert Bluff	168	2022	0	1	1	1	1	2	1	0	0	0
		2029	3	4	2	2	2	2	1	1	0	0
Simsboro	44	2022	0	0	0	1	1	0	1	0	0	0
		2029	1	0	0	1	2	1	4	4	0	0
Hooper	140	2022	0	1	0	0	0	0	0	0	0	0
		2029	0	2	0	0	0	0	0	0	0	0

3.2.3 Treatment of Wells without Pump Information in the Carrizo

Based on the review of the well data in Figures 8 through 13, there are a significant number of Carrizo wells located near the high-priority wells that may have been identified as high-priority wells if their pump elevation were known. To provide an estimate of how many wells could fall in this category, we develop a three-step process that consists of the following:

Step 1 - Select the drawdown value that encompasses most of the high-priority wells in the Carrizo aquifer. From a review of Figure 10 we determined that the 100 ft drawdown contour encompasses most high-priority wells in the Carrizo aquifer that are located near the Vista Ridge well field (see **Figure 14**).

Step 2 - Calculate the percentage of the wells with pump information that have drawdowns greater than 100 ft that are high-priority wells. This percentage is 59%, which is determined using the information in **Table 7**.

Step 3 - Identify the number of Carrizo wells without pumping information in Figure 10 (or Figure 14) that have greater than 100 feet of drawdown. This number is 56 wells (see Table 7). To estimate the number of additional potential high-priority wells could have been identified if all the Carrizo wells had pump elevation data, we multiply 56 wells by 59% to get 33 wells (see Table 7).

These additional 56 wells estimated in Step 3 above are designated as moderate-priority wells. Thirty-three (33) out of the 56 wells are estimated to potentially have problems with low water levels before 2029. **Appendix G** lists the 56 moderate-priority wells, and **Appendix H** provides hydrographs for these moderate-priority wells. The number of the 56 moderate-priority wells that may need correction actions before 2022 is estimated to be 22. The number 22 was estimated by applying the three-step process to the information in **Table 8** and depicted in **Figure 15** below. For 2022 the drawdown contour that encompassed the majority of the high priority wells with pump elevations was 70 feet of drawdown.

Table 7 Estimate of Number of Moderate-Priority Wells in 2029 based on an Analysis of the Location of High-Priority Wells

Number of Wells Encircled by the 100 ft Drawdown Contour in 2029*				
(a) Wells with Pump Information	(b) Number of High Priority Well	(c) Percent of Wells with Pump Information that are High-Priority Wells	(d) Number of Wells with No Pump Information	(e) Number of wells in Column (d) that are moderate-risk wells based on the percentage in Column (c)
58	34	59%	56	33

*tabulated values are based on information shown in Figure 16

Table 8 Estimate of Number of Moderate-Priority Wells in 2022 based on an Analysis of the Location of High-Priority Wells

Number of Wells Encircled by the 70 ft Drawdown Contour in 2022*				
(a) Wells with Pump Information	(b) Number of High Priority Well	(c) Percent of Wells with Pump Information that are High-Priority Wells	(d) Number of Wells with No Pump Information	(e) Number of wells in Column (d) that are moderate-risk wells based on the percentage in Column (c)
55	24	44%	51	22

*tabulated values are based on information shown in Figure 17

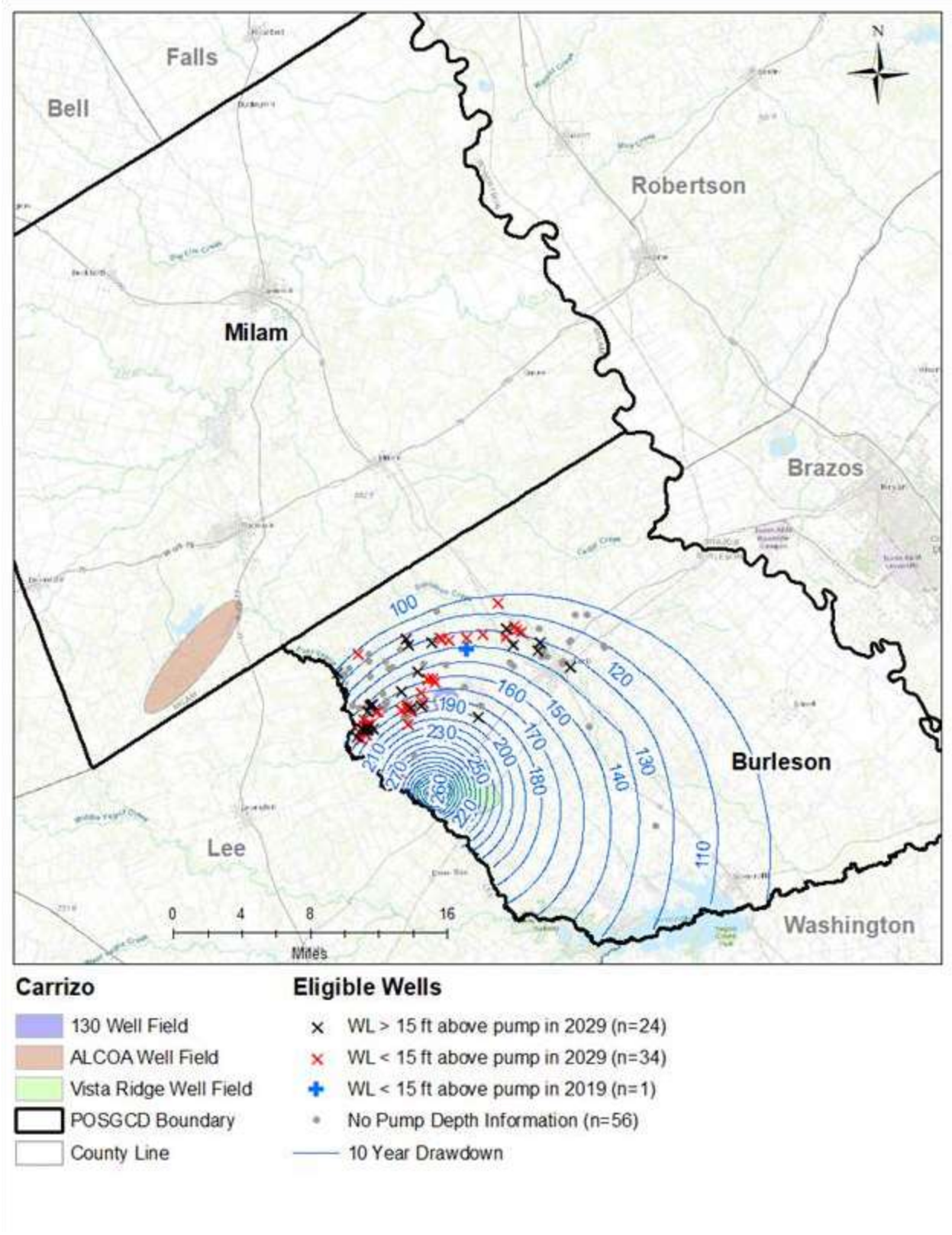

Figure 14 Drawdown in the Carrizo Aquifer greater than 100 feet from 2019 to 2029 and predicted water level relative to known pump settings based on information in the POSGCD well database

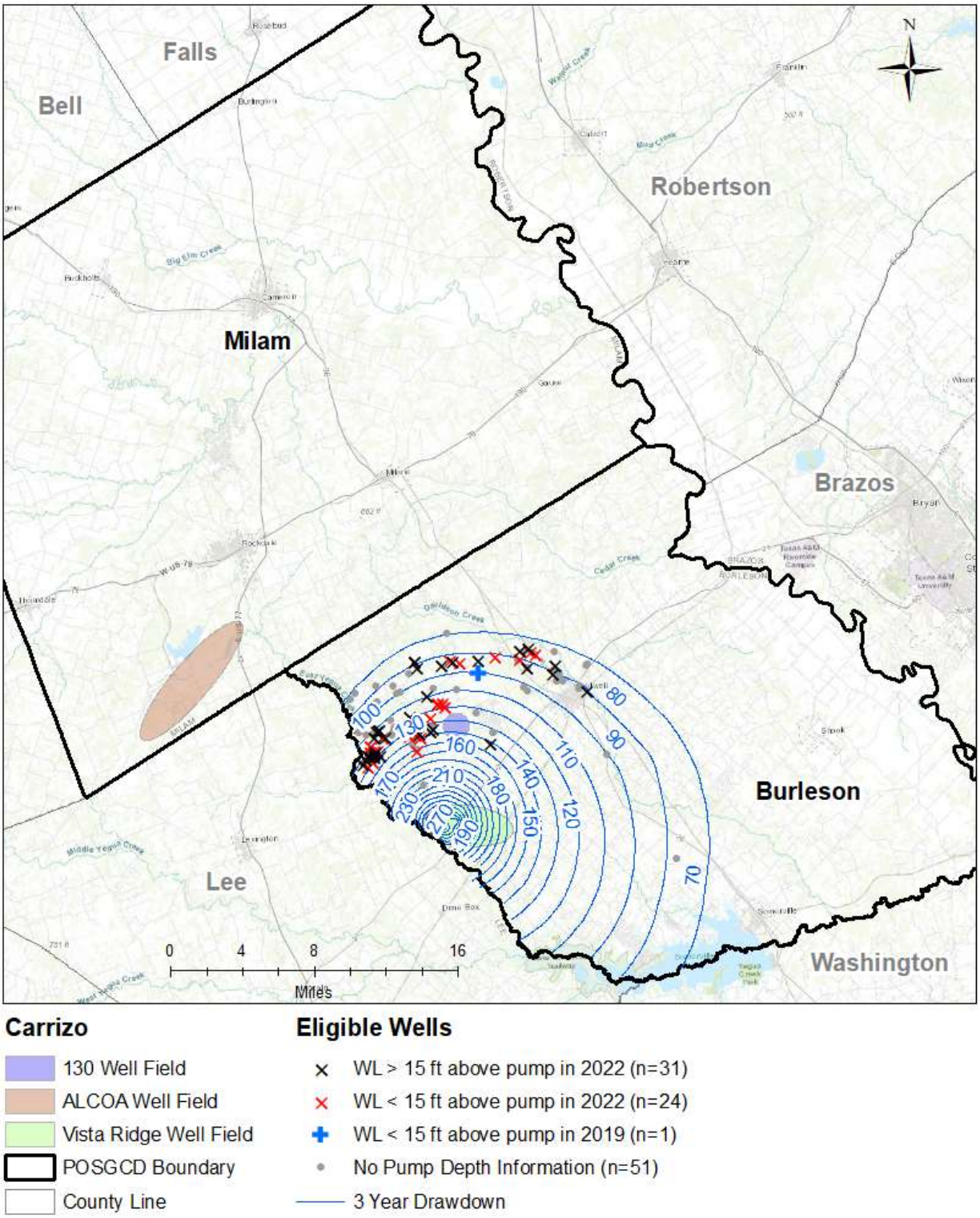

Figure 15 Drawdown in the Carrizo Aquifer greater than 70 feet from 2019 to 2022 and predicted water level relative to known pump settings based on information in the POSGCD well database

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4.0 SUMMARY OF ANALYSES AND RECOMMENDATIONS

The GWAP assists well-owners with exempt and permitted low-capacity wells (typically domestic & livestock) whose water levels decline below the pump setting as a result of regional groundwater production in GMA 12. The report identifies priority wells that are likely to have water levels drop below the pump in or before 2029. The priority classification of a wells is based on whether the pump elevation of the well is known. For wells with pump information, a well is designated as a high-priority well if the following two conditions are met: (1) its simulated water level in 2019 is greater than 15 ft above the pump elevation, and (2) its simulated water level in 2029 is less than 15 ft above the elevation of its pump elevation. For wells without pump information, the well is designated as a moderate-priority well if there is sufficient cause to believe that the well would be classified as a high-priority well if the pump information were available.

The future water levels are generated from GAM simulations and estimates of a future pumping. The incorporation of multiple sources of data and multiple analysis includes several assumptions that introduces error and uncertainty into each well evaluation. Because our analyses are predictive and therefore not certain, some wells that are designated as a priority wells that may not require assistance within the next 10 years or may not actually require assistance at all in the future.

4.1 Summary of Analyses

This section summarizes the key analysis performed and documented in this report.

- The Central Sparta/Queen City/Carrizo-Wilcox Aquifer GAM (Young and others, 2020) was used to simulate water levels in POSGCD and surrounding counties based on a modification GMA-12 model simulation PS-7. PS-7 was developed by the GMA 12 consultants to represent a pumping scenario where permitted pumping in GMA 12 was fully utilized in 2070. The modified pumping scenario used herein is referred to as PS-7a. PS-7a has less pumping in the Simsboro Aquifer in the LPGCD than does PS-7. From 2018 to 2028, PS-7a presumes that the Vista Ridge well field is pumping at its full permitted amount of 15,000 acre-feet per year (AFY) in the Carrizo Aquifer and 30,992 AFY in the Simsboro Aquifer from fall 2020 to 2050. Based on PS-7a, the following general trends in drawdown were simulated for the period 2019 to 2029:
  - Across most of the Sparta and Queen City aquifers, the drawdown is less than 10 ft
  - In the Carrizo Aquifer, drawdown in the vicinity of the Vista Ridge well field is greater than 250 ft and decreases radially outward from the well field to about 70 ft at the Brazos County line and to 20 ft in the outcrop in Milam County
  - In the Calvert Bluff Aquifer, drawdown in the vicinity of the Vista Ridge well field is greater than 180 ft and decreases radially outward from the well field to about 40 ft at the Brazos County line and to 10 ft in the outcrop in Milam County
  - In the Simsboro Aquifer, drawdown in the vicinity of the Vista Ridge well field is greater than 170 ft and decreases radially outward from the well field to about 70 ft at the Brazos County line and to 10 ft in the outcrop in Milam County
  - In the Hooper Aquifer, maximum drawdown is centered approximately five miles north of the Vista Ridge well field and is as high as 100 ft. Across most of the outcrop for the Hooper Aquifer in Milam County, the drawdowns are less than 10 ft and, along the county line with Brazos County, the drawdowns range between 60 ft to less than 10 ft in the outcrop in Milam County.

- For all eligible wells in the with information about the pump settings, a comparison was made between the simulated water level in the well and the elevation of the pump to determine the likelihood of whether there would be sufficient water for pumping the well for the next ten years. A well was classified as a high priority well if the following two conditions are met: (1) its simulated water level in 2019 is greater than 15 ft above the pump elevation, and (2) its simulated water level in 2029 is less than 15 ft above the elevation of its pump elevation. A total of 41 wells were classified as high-priority wells. Out of the 41 wells, 36 are completed in the Carrizo Aquifer with the remaining 5 in the Calvert Bluff (n=3), Queen City (n=1) and Simsboro (n=1). Seventy-two percent (72%) of the Carrizo wells that would become high-priority wells by 2029 have met the criteria by 2022.
- For eligible wells without information about the pump settings, select wells were classified as moderate-priority well if there is sufficient cause to believe that the well would be classified as a high-priority well if the pump information were available. The identification of moderate-priority wells was based on estimated drawdown at the well in 2029. Fifty-six (56) wells were classified as moderate-priority wells. Thirty-three (33) out of the 56 wells are estimated to have problems with low water levels before the end of 2029. Of those thirty-three, twenty-two (22) wells may need corrective actions before 2022.
- Hydrographs of simulated water levels from 2000 to 2032 were created for the 41 high-priority wells, 56 moderate-priority wells, and 33 wells of concern. Wells are classified as wells of concern if their simulated water levels in 2019 is less than 15 ft above their pump setting.

4.2 Recommendations

Based on the data, data analysis, and findings presented in the report, the following actions are recommended:

- POSGCD's Water Resource Specialist should verify the eligibility and review the well construction, the 41 high-priority wells, 56 moderate-priority wells, and 33 wells of concern and then consider measuring water levels at these wells to check the accuracy of the simulated water levels.
- Water levels should be measured at each high priority Carrizo well (or at nearby wells) at least once every four months and the elevation of the pump setting should be verified
- The Sparta/Queen City/Carrizo-Wilcox GAM should be continually updated using monitoring data so that it will be better suited for predicting the drawdown impacts that will be caused by the pumping of more than 50,000 AFY associated with the Vista Ridge Project.
- A methodology should be developed for using measured water level data to help adjust for biases and error in the simulated water levels.
- POSGCD should develop a practice for checking and quantifying the accuracy of reported pumping for non-exempt permits.

5.0 REFERENCES

INTERA, 2018. Post Oak Savannah Guidance Document or Evaluating Compliance with Desired Future Conditions and Protective Drawdown Limits version 2, prepared for Post Oak Savannah Groundwater Conservation District, Milano, Texas. August, 2018

Post Oak Savannah Groundwater Conservation District (POSGCD), 2020. Draft; Post Oak Savannah Groundwater Conservation District Groundwater Well Assistance Program (GWAP).

Young, S., Jigmond, M., Jones, T., and Ewing. T. 2018. Groundwater Availability Model for Central Portion of the Sparta, Queen City, and Carrizo-Wilcox Aquifer, prepared for the TWDB, unnumbered report, September 2018

Young, S., Kushnereit, R. Donnelly, A., Seifert, J., and Deed, N. 2020. GMA 12 Update to the Groundwater Availability Model for the Central Portion of the Sparta, Queen City, and Carrizo-Wilcox Aquifers: Update to Improve Representative of the Transmissive Properties of the Simsboro Aquifer in the Vicinity of the Vista Ridge Well Field, Prepared for GMA 12, November 2020.

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APPENDIX A

LOCATION OF EXEMPT WELLS BY AQUIFER

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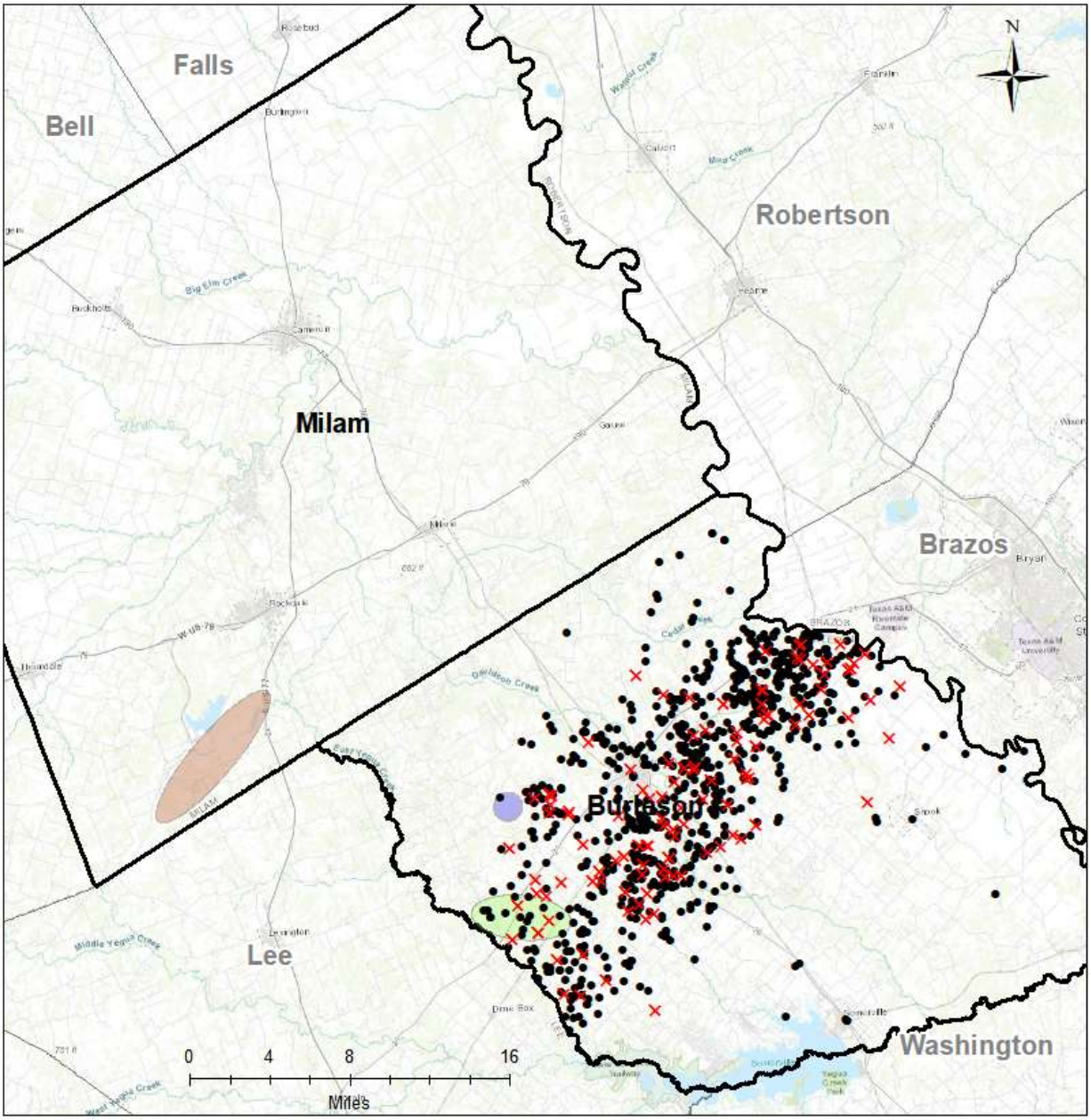

Sparta

- POSGCD Boundary
- County Line
- 130 Well Field
- ALCOA Well Field
- Vista Ridge Well Field
- × Exempt with Pump Depth (n=114)
- • Exempt without Pump Depth (n=822)

Figure A-1 Location of eligible exempt wells in the Sparta Aquifer

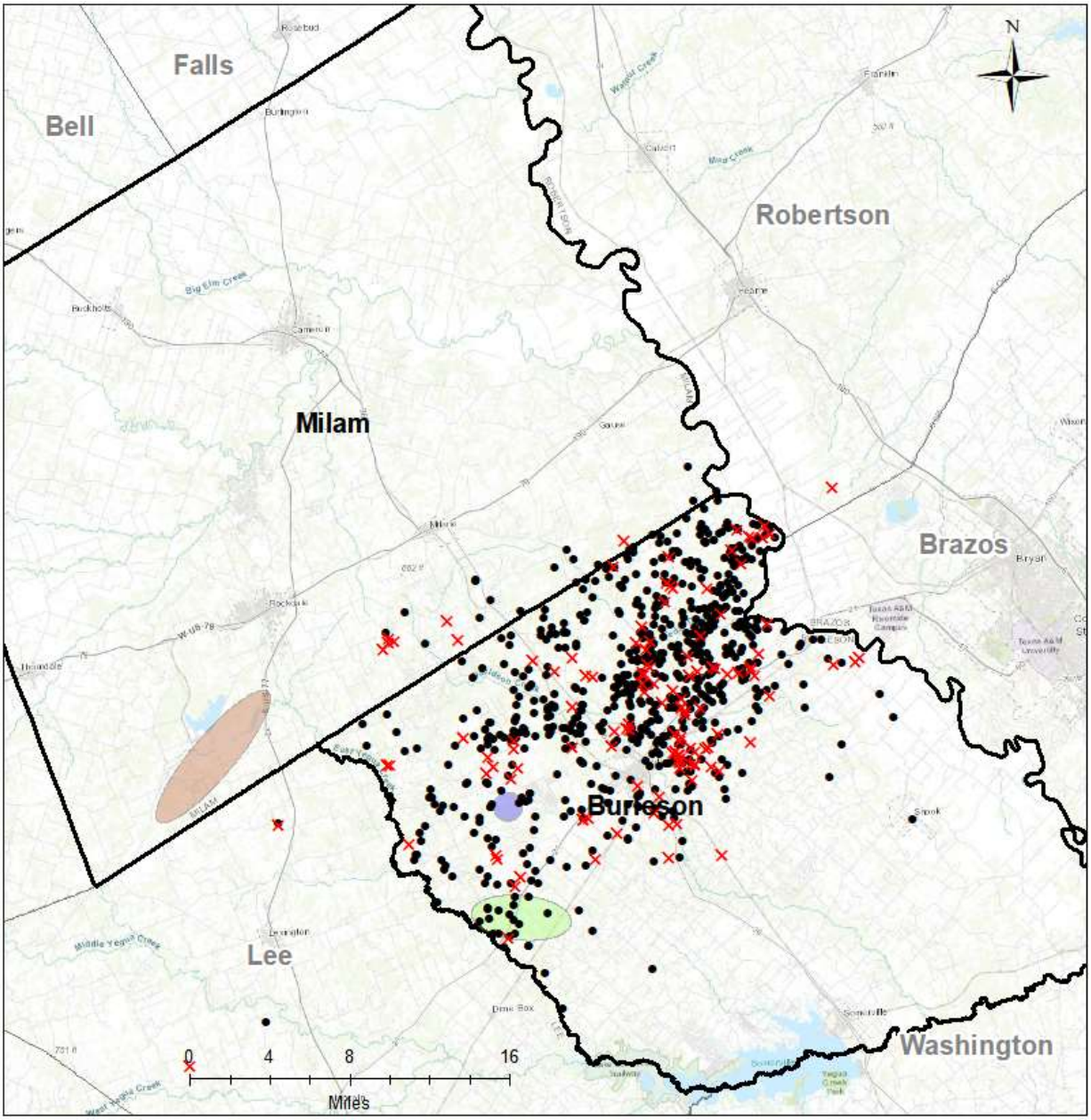

Figure A-2 Location of eligible exempt wells in the Queen City Aquifer

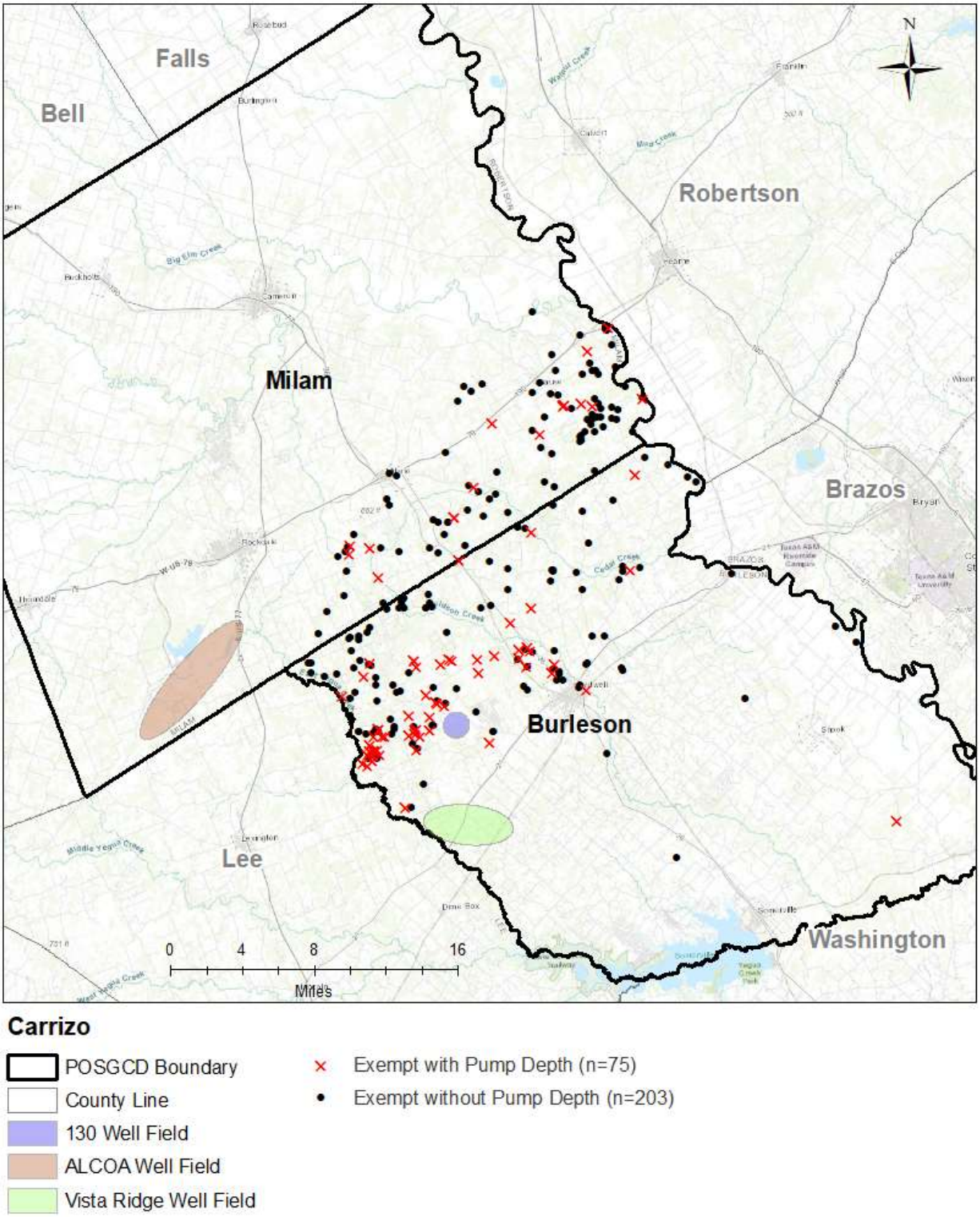

Figure A-3 Location of eligible exempt wells in the Carrizo Aquifer

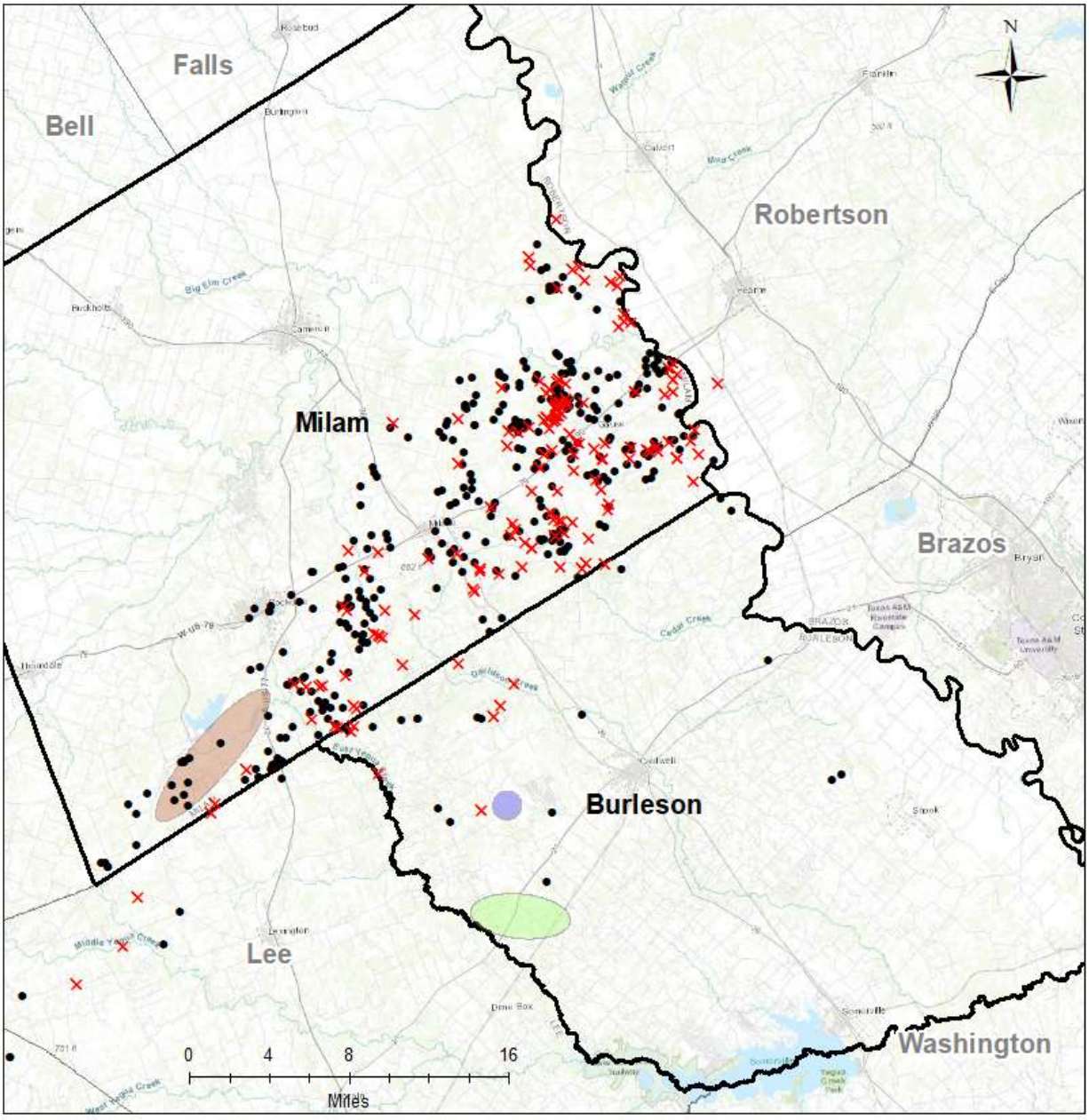

Figure A-4 Location of eligible exempt wells in the Calvert Bluff Aquifer

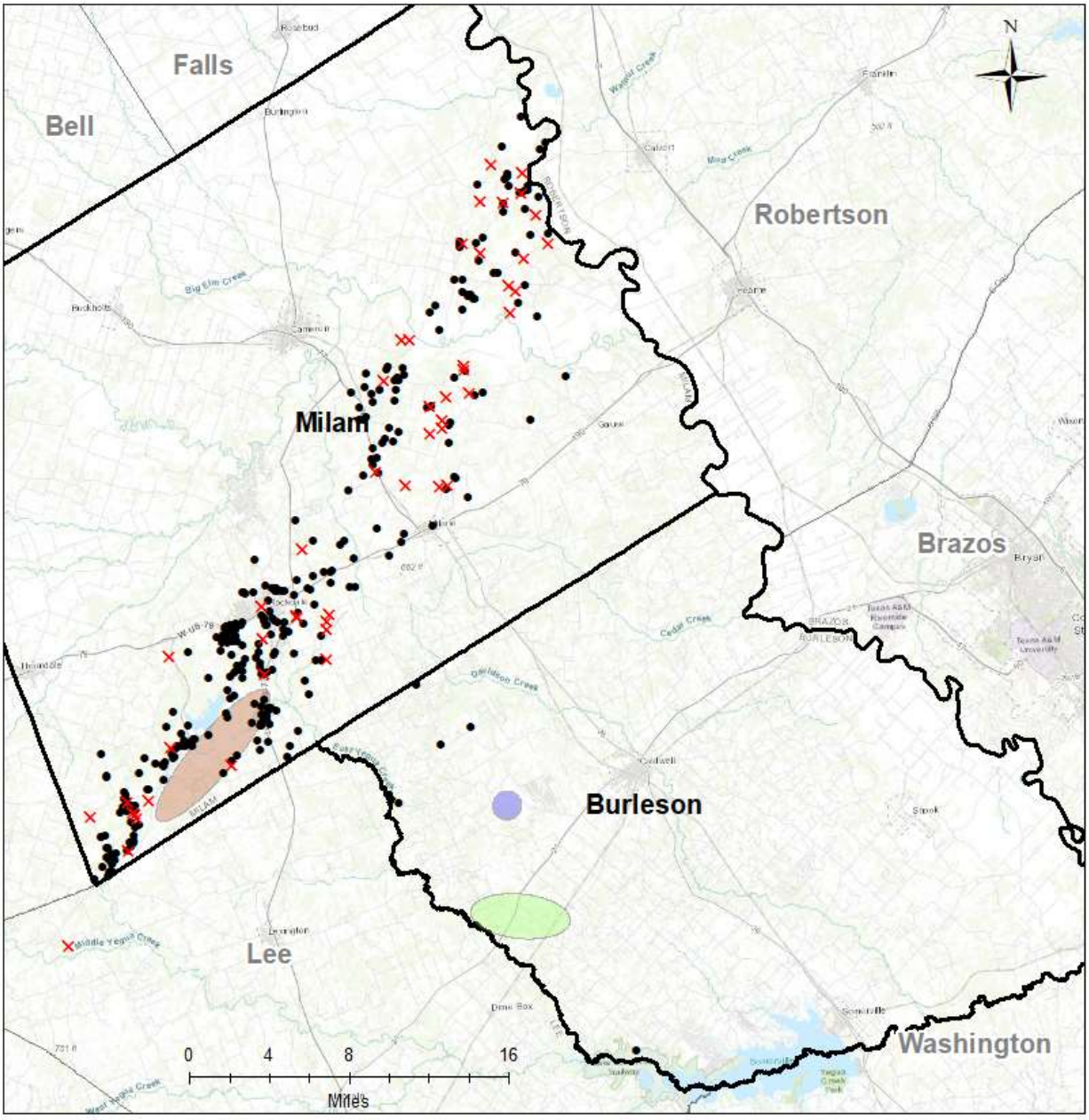

Figure A-5 Location of eligible exempt wells in the Simsboro Aquifer

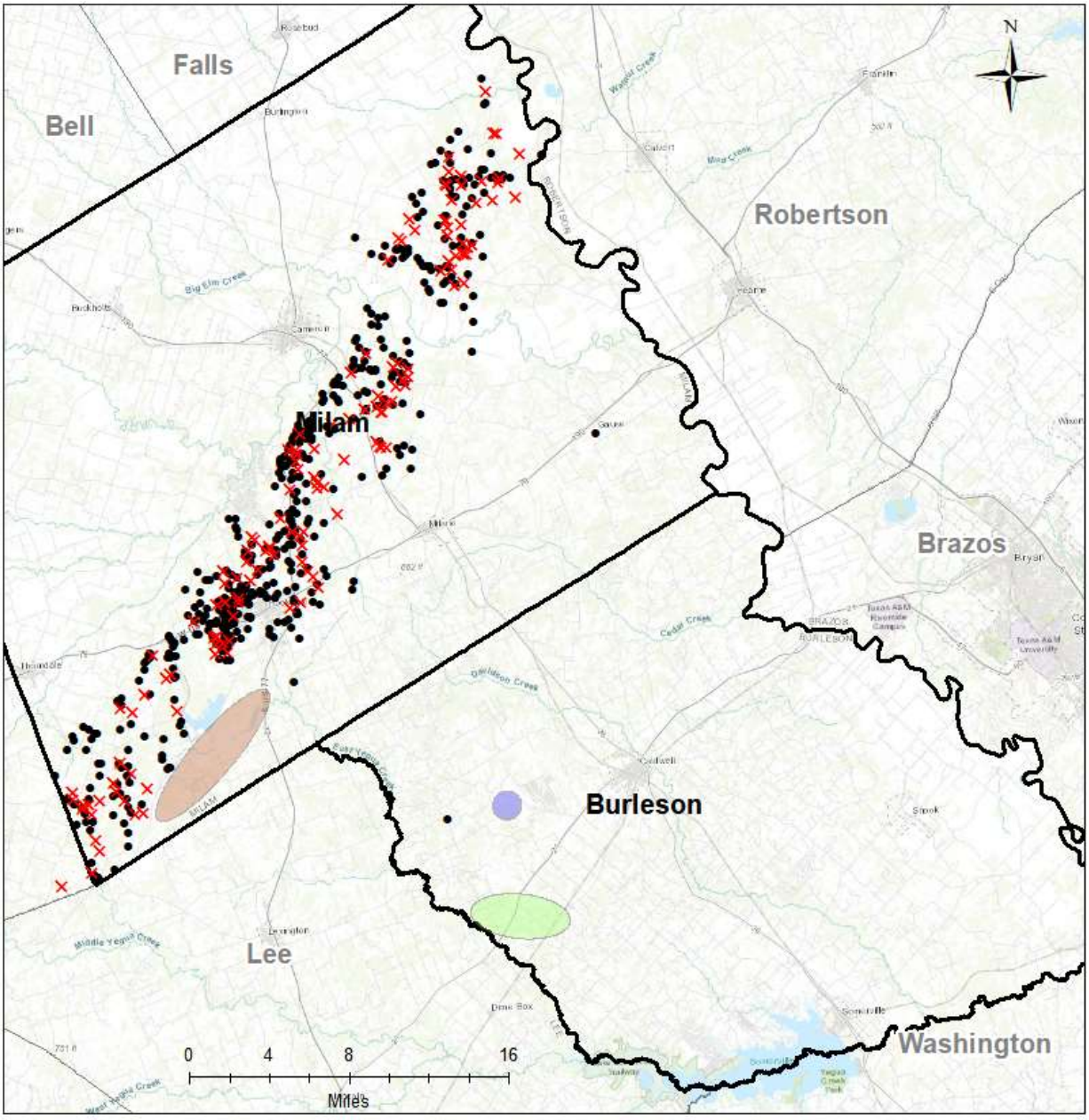

Figure A-6 Location of eligible exempt wells in the Hooper Aquifer

APPENDIX B

LOCATION OF LOW-CAPACITY PERMITTED WELLS BY AQUIFER

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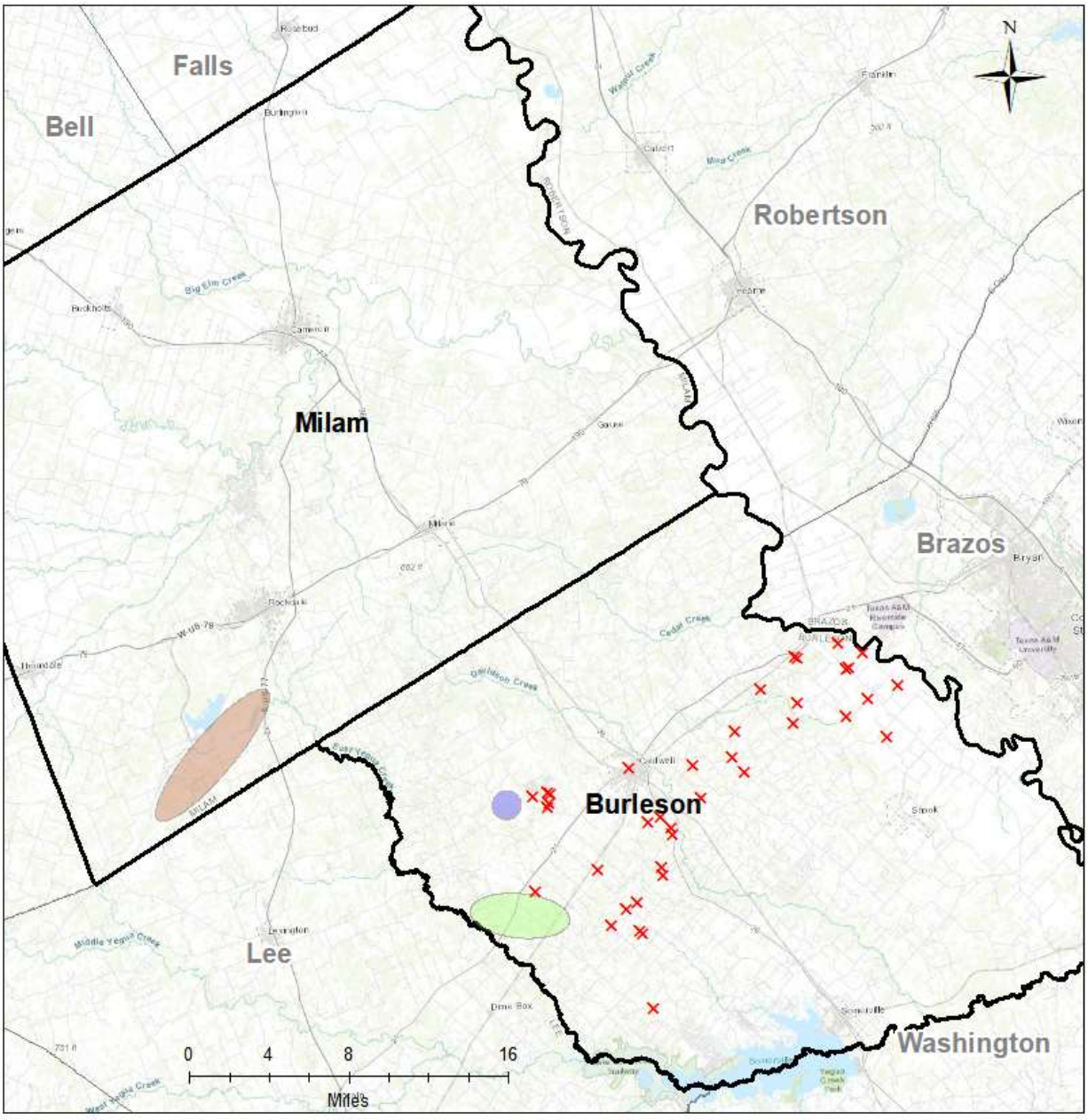


Figure B-1 Location of eligible low-capacity permitted wells in the Sparta Aquifer

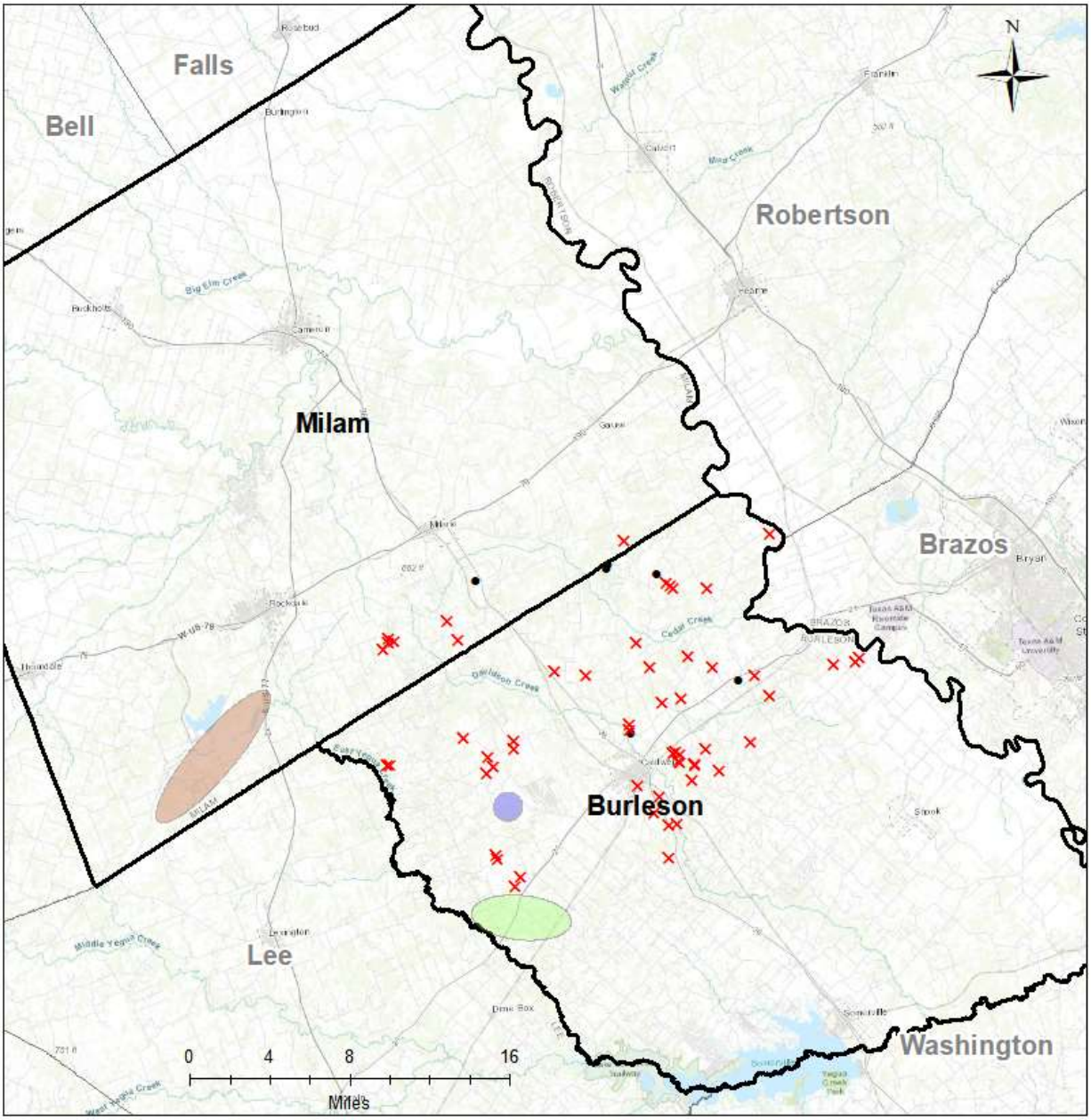


Figure B-2 Location of eligible low-capacity permitted wells in the Queen City Aquifer

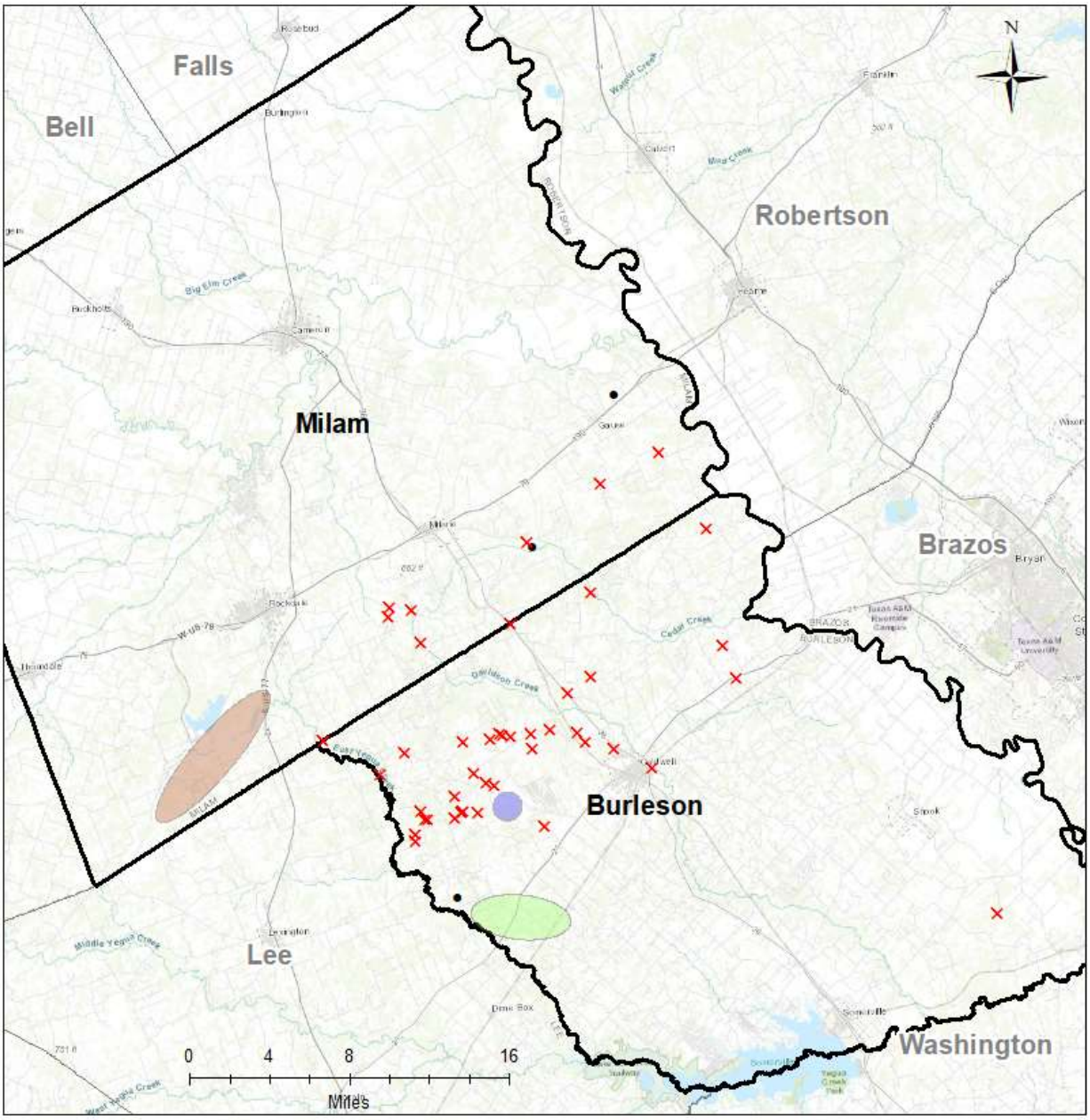


Figure B-3 Location of eligible low-capacity permitted wells in the Carrizo Aquifer

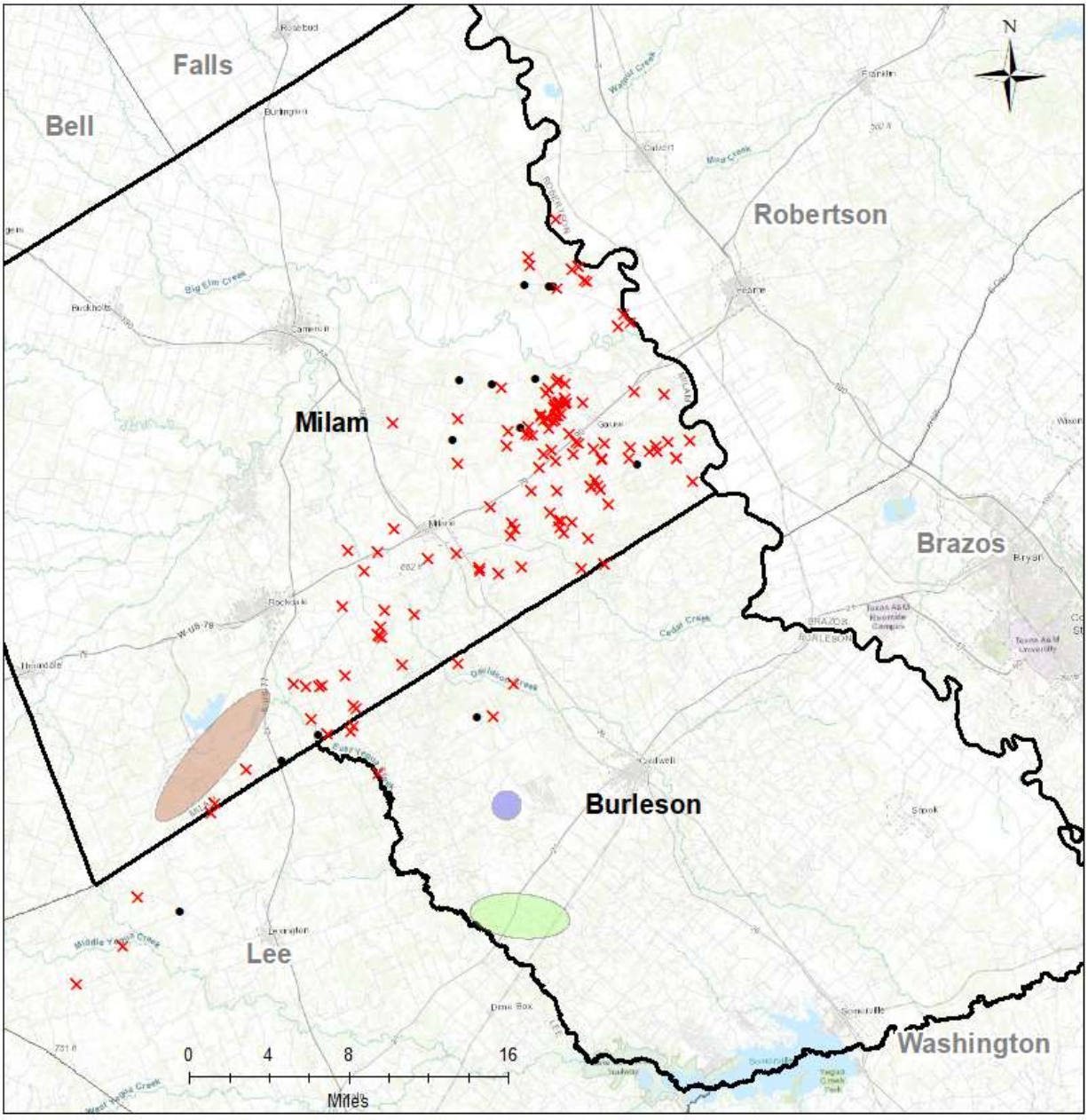


Figure B-4 Location of eligible low-capacity permitted wells in the Calvert Bluff Aquifer

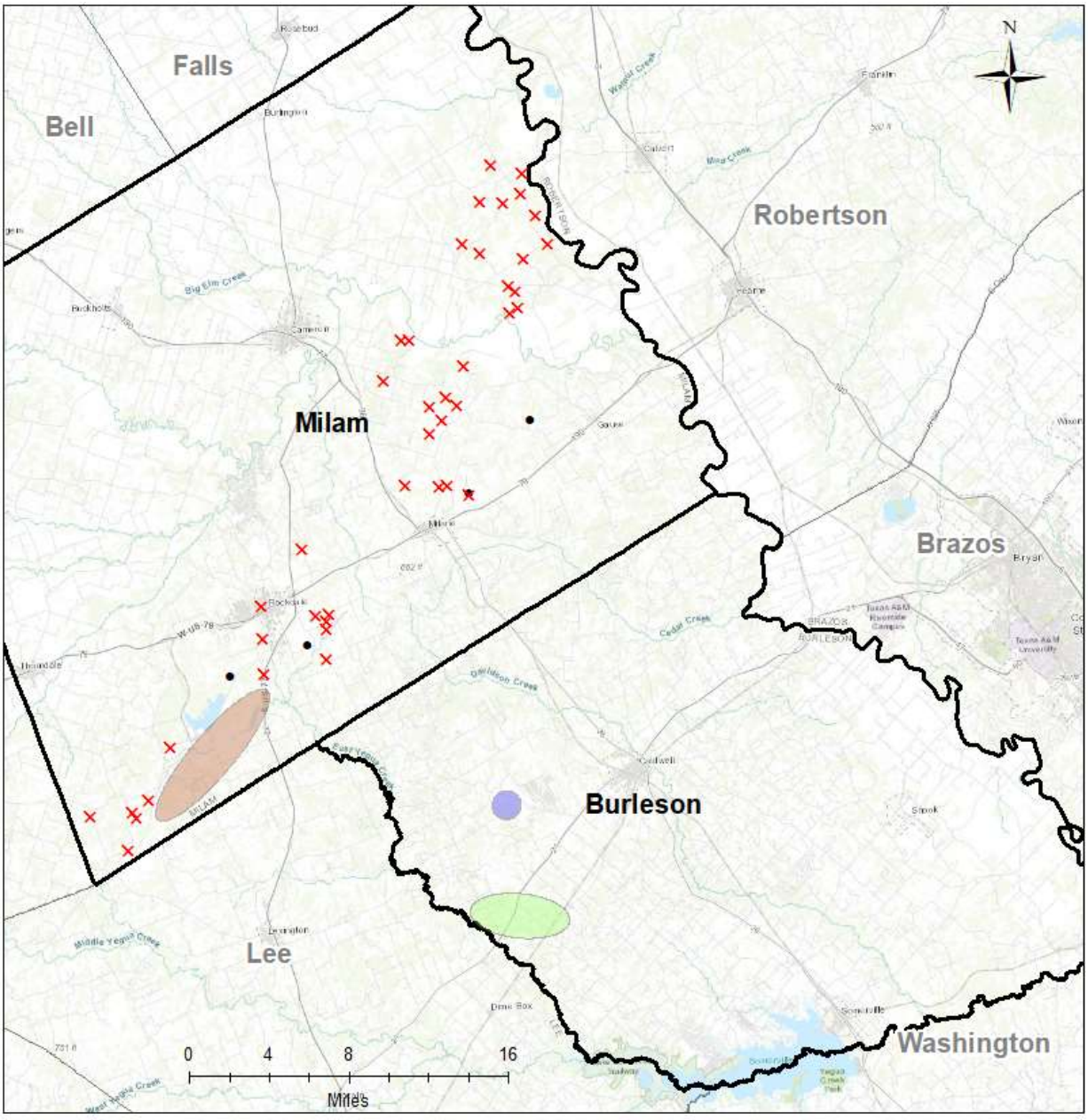
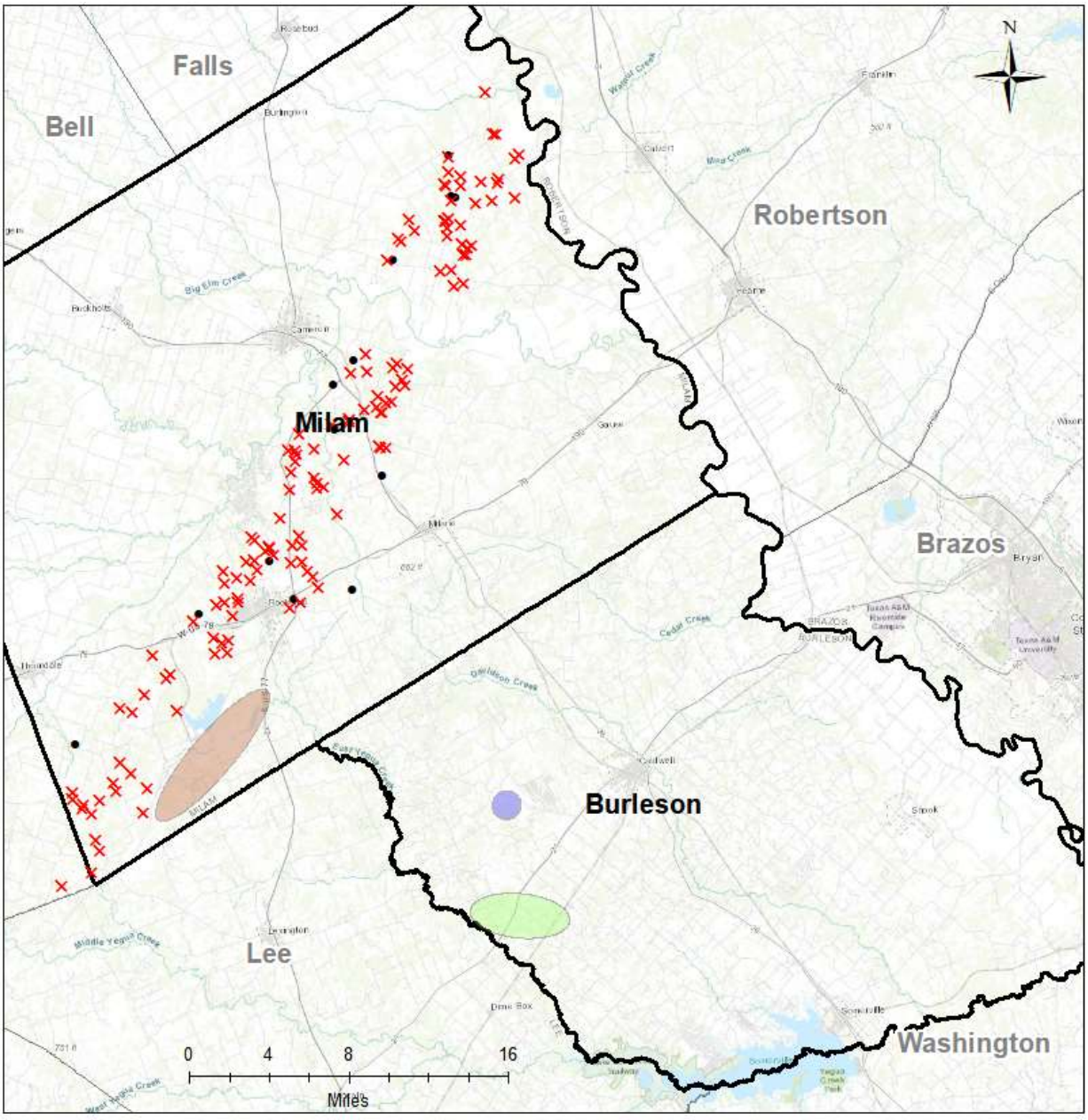


Figure B-5 Location of eligible low-capacity permitted wells in the Simsboro Aquifer



Hooper

- POSGCD Boundary
- County Line
- 130 Well Field
- ALCOA Well Field
- Vista Ridge Well Field
- × Low Capacity with Pump Depth (n=132)
- • Low Capacity without Pump Depth (n=13)

Figure B-6 Location of eligible low-capacity permitted wells in the Hooper Aquifer

APPENDIX C

Listing of Wells in POSGCD Groundwater Monitoring Network

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POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screen Interval	Pump Depth	POSGCD Aquifer	Shallow
PO-000020	5917505	30.6811103	-96.94801209	427.308	431.832	4.524	540	498-540	--	Simsboro	--
PO-000025	5917409	30.66846549	-96.98688055	515.501	505.61	9.891	391	226-290, 320-390	--	Simsboro	Shallow
PO-000026	5917103	30.7237968	-96.982987	456.965	458.03	1.065	410	115-410	--	Hooper	--
PO-000053	5909901	30.78411818	-96.89550211	428.028	434.364	6.336	169	109-169	--	Simsboro	Shallow
PO-000059	5911402	30.79711641	-96.7347425	425.963	427.216	1.253	323	307-323	--	Calvert Bluff	Shallow
PO-000073	5910907	30.78088686	-96.78499858	378.048	382.974	4.926	440	410-430	--	Calvert Bluff	--
PO-000077	5919103	30.740555	-96.720832	431.51	432.558	1.048	522	507-522	--	Carrizo	--
PO-000084	5919302	30.72825799	-96.63228299	338.475	341.389	2.914	45	--	--	Queen City	Shallow
PO-000099	5925508	30.56916877	-96.94772282	407.547	410.679	3.132	520	480-520	--	Carrizo	--
PO-000107	5925102	30.60092771	-96.98245292	418.686	412.085	6.601	860	767-782	--	Simsboro	--
PO-000115	5917715	30.64478641	-96.98975007	464.906	467.225	2.319	152	--	--	Simsboro	Shallow
PO-000118	5917705	30.65152103	-96.97810827	490.519	490.466	0.053	326	286-326	--	Simsboro	Shallow
PO-000121	5917714	30.6636122	-96.99586304	470.619	475.06	4.441	380	238-370	--	Hooper	Shallow
PO-000138	5917713	30.66643768	-96.99596907	483.42	486.426	3.006	408	226-346, 356-408	--	Simsboro	--
PO-000170	5824914	30.65853727	-97.01660555	493.854	494.692	0.838	295	153-233	189	Hooper	Shallow
PO-000186	5909701	30.75880377	-96.98529215	418.242	419.696	1.454	218	182-207	--	Hooper	Shallow
PO-000221	5909605	30.82440777	-96.88975952	421.249	424.626	3.377	503	340-500	--	Hooper	--
PO-000223	5902706	30.8975886	-96.85197846	358.439	359.155	0.716	313	235-250, 256-298	--	Hooper	Shallow
PO-000234	5902309	30.98815237	-96.75756383	298.856	296.725	2.131	499	165-417	--	Simsboro	--
PO-000236	5902307	30.96416896	-96.7906947	415.891	416.976	1.085	450	410-450	--	Simsboro	--
PO-000256	5902901	30.88488941	-96.77826311	368.456	370.326	1.87	318	284-308	--	Calvert Bluff	Shallow
PO-000268	5832101	30.62341574	-97.08796275	476.908	473.52	3.388	60	40-60	43	Simsboro	Shallow
PO-000308	5927716	30.537221	-96.741666	451.13	451.132	0.002	400	--	--	Queen City	Shallow
PO-000341	5927606	30.57822262	-96.65056693	393.771	393.711	0.06	820	558-820	--	Queen City	--
PO-000433	5920410	30.69556044	-96.61439123	298.204	298.742	0.538	920	688-710, 794-815	--	Carrizo	--
PO-000434	5920409	30.689721	-96.611388	299.31	299.278	0.032	230	188-230	--	Queen City	Shallow
PO-000457	5919502	30.67928615	-96.67380053	462.638	461.563	1.075	2018	1831-1959	--	Simsboro	--
PO-000495	5926906	30.50112744	-96.76791668	423.753	424.504	0.751	1197	1097-1197	--	Calvert Bluff	--
PO-000518	5927204	30.61904658	-96.68645721	306.812	314.183	7.371	205	163-205	100	Queen City	Shallow
PO-000579	5937611	30.43212734	-96.39778118	234.144	233.345	0.799	240	177-240	--	Yegua - Jackson	Shallow
PO-000596	5937329	30.48861	-96.375554	214.69	214.695	0.005	58	--	--	Brazos River Alluvium	Shallow
PO-000618	5937109	30.45982399	-96.47012063	249.102	249.626	0.524	266	109-266	84	Yegua - Jackson	Shallow
PO-000638	5937101	30.48886448	-96.46550691	235.872	239.147	3.275	1620	--	--	Sparta	--
PO-000661	5936802	30.38674978	-96.56455927	347.731	342.314	5.417	1609	1513-1573	--	Sparta	--

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screen Interval	Pump Depth	POSGCD Aquifer	Shallow
PO-000691	5938709	30.39502546	-96.34557306	266.279	270.12	3.841	513	468-502	--	Yegua - Jackson	--
PO-000698	5943608	30.31062338	-96.64638318	277.143	278.952	1.809	533	494-533	--	Yegua - Jackson	--
PO-000787	5938701	30.4116894	-96.35791463	204.723	205.066	0.343	56	--	--	Brazos River Alluvium	Shallow
PO-000791	5935208	30.49635571	-96.69195508	374.013	379.331	5.318	364	322-364	--	Sparta	Shallow
PO-000859	5929456	30.54365367	-96.49377707	229.218	230.888	1.67	60	--	--	Brazos River Alluvium	Shallow
PO-000860	5929457	30.54453934	-96.49204734	229.531	230.914	1.383	60	--	--	Brazos River Alluvium	Shallow
PO-000877	5928619	30.54532928	-96.52552358	264.757	266.969	2.212	780	685-700, 719-765	--	Sparta	--
PO-000894	5928601	30.57919226	-96.54036821	241.137	240.129	1.008	58	--	--	Brazos River Alluvium	Shallow
PO-000895	5928702	30.52905165	-96.60856964	343.087	342.432	0.655	498	456-498	--	Sparta	--
PO-000943	5934106	30.48849661	-96.84368613	442.845	439.386	3.459	840	800-840	228	Carrizo	--
PO-001023	5929537	30.54909098	-96.43687671	222.979	224.541	1.562	1090	1048-1090	--	Sparta	--
PO-001061	5934608	30.4560173	-96.78358516	425.981	427.4	1.419	814	740-800	--	Queen City	--
PO-001062	5918101	30.71607715	-96.86334496	565.668	566.532	0.864	790	689-770	--	Simsboro	--
PO-001063	5918104	30.71276886	-96.86996867	556.675	561.286	4.611	800	650-780	--	Calvert Bluff	--
PO-001064	5918908	30.63225934	-96.78773986	511.279	517.433	6.154	1687	1490-1534, 1564-1620	--	Simsboro	--
PO-001066	5918705	30.64805722	-96.85462057	574.698	580.741	6.043	800	540-645	--	Carrizo	--
PO-001082	5911703	30.78715248	-96.71687239	361.023	367.572	6.549	992	889-980	--	Simsboro	--
PO-001110	5824611	30.6712932	-97.00403669	494.616	492.393	2.223	485	190-283, 343-383, 403-423, 463-483	--	Hooper	--
PO-001111	5917803	30.6431789	-96.92654485	486.947	487.392	0.445	1000	760-797, 800-837, 839-876, 879-916, 918-955, 957-994	--	Simsboro	--
PO-001112	5917606	30.6913108	-96.89993447	507.334	505.795	1.539	598	551-596	--	Calvert Bluff	--
PO-001117	5917712	30.6312	-96.9901	460.34	459.774	0.566	475	270-450, 460-475	--	Simsboro	--
PO-001118	5917711	30.63488907	-96.99095016	467.194	462.619	4.575	463	250-300, 345-443, 453-463	--	Simsboro	--
PO-001120	5928105	30.59691916	-96.60978524	350.212	351.665	1.453	1252	1104-1236	124	Carrizo	--
PO-001166	5929410	30.55802069	-96.46997458	225.512	225.507	0.005	71	--	--	Brazos River Alluvium	Shallow
PO-001197	5934107	30.48113821	-96.87211655	443.601	440.719	2.882	370	150-170, 240-260, 340-360	--	Queen City	Shallow
PO-001343	0	30.80174829	-96.75859029	431.871	422.34	9.531	455	430-450	--	Calvert Bluff	--
PO-001390	0	30.57157727	-96.82933259	515.041	518.634	3.593	1120	980-1110	--	Calvert Bluff	--
PO-001450	5832304	30.60845841	-97.00739347	433.638	435.199	1.561	271	250-270	200	Simsboro	Shallow
PO-001486	0	30.66071898	-97.0025699	458.014	456.913	1.101	182	162-182	--	Simsboro	Shallow
PO-001505	5831905	30.50795447	-97.15797955	552.868	544.534	8.334	120	110-120	115	Simsboro	Shallow
PO-001573	5934601	30.43272328	-96.75707861	380.725	384.636	3.911	784	734-774	--	Queen City	--
PO-001575	5927718	30.52536285	-96.72704397	450.56	449.804	0.756	1300	1252-1277	--	Carrizo	--

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screen Interval	Pump Depth	POSGCD Aquifer	Shallow
PO-001628	0	30.79047875	-96.75281324	454.636	449.345	5.291	446	427-442	--	Calvert Bluff	--
PO-001786	0	30.79870716	-96.7463505	418.729	414.733	3.996	436	406-426	260	Calvert Bluff	--
PO-001789	5911403	30.79845783	-96.74891122	451.931	437.012	14.919	515	487-507	--	Calvert Bluff	--
PO-001883	5832704	30.5065255	-97.11855729	479.789	482.36	2.571	180	160-180	100	Simsboro	Shallow
PO-001947	0	30.66202338	-97.03911788	492.404	497.586	5.182	360	340-360	240	Hooper	Shallow
PO-001983	0	30.61075761	-97.08670018	535.539	533.684	1.855	490	450-470	252	Hooper	--
PO-002014	5839303	30.48294217	-97.12593551	480.308	476.626	3.682	182	162-182	100	Simsboro	Shallow
PO-002061	0	30.91047507	-96.83047024	354.252	355.169	0.917	360	330-350	140	Hooper	Shallow
PO-002152	5925409	30.56093711	-96.99519457	465.164	467.125	1.961	480	450-470	--	Calvert Bluff	--
PO-002153	5925410	30.54361054	-96.99507706	447.364	443.273	4.091	690	670-690	--	Calvert Bluff	--
PO-002173	5925103	30.60089424	-96.9825538	418.574	411.718	6.856	420	400-420	140	Calvert Bluff	--
PO-002191	5917716	30.64475029	-96.98945856	463.652	464.796	1.144	520	470-490	--	Hooper	--
PO-002204	5917717	30.66097967	-96.98058089	487.323	491.698	4.375	750	720-750	--	Hooper	--
PO-002205	0	30.6577008	-97.00827856	455.384	455.788	0.404	130	110-130	100	Simsboro	Shallow
PO-002217	0	30.66723762	-96.9307966	472.543	470.923	1.62	938	918-938	--	Hooper	--
PO-002355	0	30.74253616	-96.72344884	384.03	386.644	2.614	514	--	160	Calvert Bluff	--
PO-002423	5902904	30.90595341	-96.77807363	405.931	400.524	5.407	240	180-220	180	Simsboro	Shallow
PO-002537	0	30.6371549	-97.04740544	541.324	531.893	9.431	510	460-500	260	Hooper	--
PO-002538	5824915	30.63410247	-97.00839222	456.389	463.724	7.335	188	163-183	180	Simsboro	Shallow
PO-002556	0	30.63144405	-97.0480537	526.684	522.347	4.337	431	400-420	300	Hooper	--
PO-002659	0	30.793544	-96.753895	483.92	481.707	2.213	470	430-450	--	Calvert Bluff	--
PO-003129	0	30.52683231	-96.60392044	380.379	374.179	6.2	650	610-650	160	Sparta	--
PO-003430	0	30.5280792	-96.87956221	357.715	358.792	1.077	360	320-360	--	Carrizo	Shallow
PO-004459	0	30.5065826	-96.87711206	407.935	396.853	11.082	400	360-400	--	Yegua - Jackson	Shallow
PO-004968	0	30.56385169	-96.76487577	454.542	452.254	2.288	160	130-150	--	Queen City	Shallow
PO-005109	0	30.54743769	-96.64794343	416.594	421.727	5.133	1235	1151-1235	--	Carrizo	--
PO-005486	0	30.587439	-96.764618	431.22	430.903	0.317	199	179-199	--	Queen City	Shallow
PO-005899	0	30.42310911	-96.79280477	364.992	369.255	4.263	300	260-300	--	Sparta	Shallow
PO-006090	0	30.55721	-96.663818	400.02	400.924	0.904	620	580-620	168	Queen City	--
PO-006145	5927611	30.545711	-96.637995	397.32	397.501	0.181	770	650-750	240	Queen City	--
PO-006153	0	30.54768768	-96.65041623	418.02	422.478	4.458	620	580-620	231	Queen City	--
PO-006243	5925502	30.56444895	-96.93862984	420.884	424.189	3.305	614	593-614	--	Calvert Bluff	--
PO-006305	5832908	30.53126591	-97.02675593	434.243	438.864	4.621	344	324-344	--	Calvert Bluff	Shallow
PO-006330	0	30.79857327	-96.75464201	446.688	441.564	5.124	410	384-404	260	Calvert Bluff	--

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screen Interval	Pump Depth	POSGCD Aquifer	Shallow
PO-006483	0	30.44417714	-96.709519	335.265	334.959	0.306	484	424-464	160	Sparta	--
PO-006586	5927309	30.613416	-96.660202	379.83	382.172	2.342	260	240-260	--	Queen City	Shallow
PO-006621	5926402	30.55262796	-96.8605715	490.37	487.374	2.996	2020	1580-1780	--	Simsboro	--
PO-006910	5926403	30.56483198	-96.83474728	496.075	495.585	0.49	2200	1750-1950, 2060-2090	--	Simsboro	--
PO-007085	0	30.79218027	-96.74981097	460.007	452.566	7.441	520	490-510	320	Calvert Bluff	--
PO-007117	0	30.607372	-97.090487	540	554.994	14.994	412	372-392	200	Hooper	Shallow
PO-007183	0	30.48654469	-96.71456578	336.207	340.676	4.469	570	480-560	200	Queen City	--
PO-007197	0	30.473	-96.7359	369.77	369.453	0.317	780	--	--	Queen City	--
PO-007242	0	30.6537196	-96.93648193	510.724	512.115	1.391	562	542-562	160	Calvert Bluff	--
PO-007283	0	30.96100958	-96.84263146	408.979	409.947	0.968	235	196-235	180	Hooper	Shallow
PO-007285	0	30.53384685	-96.91312658	369.728	362.245	7.483	460	400-440	160	Carrizo	--
PO-007363	5832404	30.55655401	-97.08849344	493.539	494.191	0.652	174	154-174	108	Simsboro	Shallow
PO-007364	5824612	30.6845564	-97.04007764	433.131	432.264	0.867	180	160-180	160	Hooper	Shallow
PO-007390	0	30.46822145	-96.67232015	354.476	360.85	6.374	420	400-420	100	Sparta	--
PO-007506	5824610	30.67155883	-97.00396812	493.351	491.382	1.969	392	165-193, 196-259, 339-390	--	Hooper	Shallow
PO-007585	0	30.45532459	-96.69666947	393.668	395.531	1.863	533	433-533	--	Sparta	--
PO-007586	0	30.45605977	-96.69486194	375.487	376.442	0.955	415	373-415	147	Sparta	--
PO-007587	0	30.43318291	-96.70228866	332.549	333.502	0.953	550	450-530	--	Sparta	--
PO-007601	0	30.52411794	-96.60192667	368.232	368.909	0.677	895	855-895	200	Sparta	--
PO-007603	5928701	30.52287855	-96.60332415	359.315	360.068	0.753	553	328-553	126	Yegua - Jackson	--
PO-007614	0	30.79943894	-96.75191642	432.435	423.01	9.425	460	435-455	240	Calvert Bluff	--
PO-007773	5910910	30.78752261	-96.76500977	436.368	431.83	4.538	430	405-424	280	Calvert Bluff	--
PO-007774	5910705	30.77987709	-96.86240901	437.87	441.06	3.19	560	493-535	240	Simsboro	--
PO-007793	5925103	30.60088	-96.98249	412.08	412.085	0.005	420	400-420	--	Calvert Bluff	--
PO-007838	0	30.58309908	-97.11968354	550.963	553.678	2.715	194	144-184	135	Hooper	Shallow
PO-007965	5929408	30.56376009	-96.47961101	227.533	230.676	3.143	1200	--	--	Queen City	--
PO-007998	5910908	30.78991883	-96.76307538	502.396	494.196	8.2	460	435-455	360	Calvert Bluff	--
PO-008037	0	30.8000214	-96.74501244	405.205	401.657	3.548	430	405-425	260	Calvert Bluff	--
PO-008038	0	30.44468162	-96.6559384	289.594	294.09	4.496	145	124-145	--	Yegua - Jackson	Shallow
PO-008073	0	30.54541867	-96.72901361	391.56	391.048	0.512	1001	796-976	220	Carrizo	--
PO-008095	0	30.63275314	-96.90704404	498.545	498.371	0.174	433	408-428	220	Calvert Bluff	--
PO-008096	5831906	30.51927512	-97.12854274	544.096	549.688	5.592	547	522-542	240	Hooper	--
PO-008149	0	30.66494625	-96.8281506	498.43	504.489	6.059	770	739-759	260	Calvert Bluff	--
PO-008151	5917804	30.64344788	-96.94294449	475.097	477.829	2.732	385	--	--	Calvert Bluff	Shallow

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screen Interval	Pump Depth	POSGCD Aquifer	Shallow
PO-008153	0	30.78811304	-96.76189723	497.618	495.68	1.938	454	429-449	320	Calvert Bluff	--
PO-008172	5831904	30.51382987	-97.16451247	577.707	579.212	1.505	370	330-370	140	Hooper	Shallow
PO-008213	0	30.35473571	-96.717394	322.329	323.573	1.244	440	180-200, 340-360, 420-440	--	Yegua - Jackson	--
PO-008239	5928804	30.53670658	-96.57830121	300.176	301.686	1.51	460	418-460	--	Sparta	--
PO-008245	0	30.80273828	-96.74626747	417.592	416.797	0.795	397	370-390	260	Calvert Bluff	Shallow
PO-008274	5902311	30.96748977	-96.77722287	369.175	372.342	3.167	445	424-444	220	Hooper	--
PO-008276	0	30.80989974	-96.75933791	383.962	373.853	10.109	450	426-446	--	Calvert Bluff	--
PO-008281	0	30.7863761	-96.75711104	470.772	462.331	8.441	420	395-415	360	Calvert Bluff	--
PO-008388	5943104	30.35524849	-96.71727112	323.408	324.384	0.976	3988	3600-3800	--	Simsboro	--
PO-008415	5929433	30.54465496	-96.4987259	231.407	233.582	2.175	59	--	--	Brazos River Alluvium	Shallow
PO-008420	0	30.33944067	-96.53676064	249.869	252.981	3.112	197	157-197	147	Yegua - Jackson	Shallow
PO-008449	5943312	30.339005	-96.66233353	324.796	326.642	1.846	362	269-340	--	Yegua - Jackson	Shallow
PO-008451	5925408	30.56314038	-96.96224882	380.984	381.934	0.95	690	300-380, 620-680	273	Calvert Bluff	--
PO-008456	5936210	30.47889446	-96.55313236	361.665	359.654	2.011	1070	896-955, 983-1017	--	Sparta	--
PO-008658	5910706	30.77321676	-96.84292261	449.799	448.354	1.445	528	508-528	--	Simsboro	--
PO-008678	5943305	30.34643961	-96.65393701	284.479	282.378	2.101	367	258-367	--	Yegua - Jackson	Shallow
PO-008680	5943304	30.34373486	-96.65698492	306.042	294.498	11.544	370	280-370	--	Yegua - Jackson	Shallow
PO-008767	5934108	30.4835624	-96.86044968	410.718	409.332	1.386	2230	1800-2100	--	Simsboro	--
PO-008772	0	30.9368957	-96.84052084	364.368	362.401	1.967	120	60-120	112	Hooper	Shallow
PO-008795	0	30.93485908	-96.84278113	376.06	377.945	1.885	279	256-279	200	Hooper	Shallow
PO-008802	0	30.57455659	-96.65418334	413.03	415.799	2.769	700	600-700	240	Queen City	--
PO-008823	0	30.762068	-96.741154	391.73	391.732	0.002	570	485-505	--	Calvert Bluff	--
PO-008840	0	30.78123985	-96.76078679	485.178	484.015	1.163	420	400-420	340	Calvert Bluff	--
PO-008845	0	30.57677896	-96.65771242	427.318	428.79	1.472	700	660-700	240	Queen City	--
PO-008865	0	30.651916	-97.06174816	412.353	413.754	1.401	160	120-140	--	Hooper	Shallow
PO-008907	0	30.46804499	-96.67236818	355.633	361.909	6.276	900	879-900	400	Queen City	--
PO-008935	5901904	30.91313029	-96.88624359	388.828	389.966	1.138	80	64-74	--	Hooper	Shallow
PO-008945	0	30.78756573	-96.75467498	460.897	461.553	0.656	465	440-460	300	Calvert Bluff	--
PO-008959	5918602	30.6814902	-96.78681859	437.941	441.481	3.54	810	790-810	260	Calvert Bluff	--
PO-008971	0	30.53393966	-96.91331094	362.038	363.245	1.207	840	820-840	200	Calvert Bluff	--
PO-009064	5928343	30.60381256	-96.53629301	241.712	241.487	0.225	3255	2400-2410, 2750-2760	--	Simsboro	--
PO-009094	0	30.93934091	-96.84131325	377.808	377.653	0.155	315	200-300	189	Hooper	Shallow
PO-009095	5910707	30.77133463	-96.84647456	422.591	420.83	1.761	580	550-570	--	Simsboro	--
PO-009101	0	30.45299833	-96.70392637	360.572	361.653	1.081	440	420-440	--	Sparta	--

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screen Interval	Pump Depth	POSGCD Aquifer	Shallow
PO-009104	5928342	30.60673158	-96.53418171	243.704	242.985	0.719	380	340-380	260	Sparta	Shallow
PO-009157	5936809	30.3919197	-96.55626212	299.429	291.943	7.486	740	520-580	200	Yegua - Jackson	--
PO-009162	0	30.93488714	-96.84477648	401.232	401.277	0.045	303	245-265	168	Hooper	Shallow
PO-009166	5918108	30.71145338	-96.86251633	505.76	504.566	1.194	1240	1178-1220	--	Simsboro	--
PO-009167	5918109	30.71146979	-96.86247024	505.277	504.566	0.711	140	90-130	--	Carrizo	Shallow
PO-009189	0	30.49561012	-96.85483434	461.677	459.49	2.187	1078	1008-1029, 1033-1054, 1057-1078	--	Calvert Bluff	--
PO-009215	5925904	30.51114358	-96.89717521	389.807	387.657	2.15	2724	1560-1570, 2100-2110, 2130-2140	--	Simsboro	--
PO-009230	5925302	30.59706764	-96.87960537	525.711	528.102	2.391	2491	1590-1600, 1710-1720	--	Simsboro	--
PO-009327	5901905	30.90657809	-96.88883699	364.538	366.963	2.425	140	120-140	--	Hooper	Shallow
PO-009346	5925905	30.54054845	-96.90712752	392.878	393.307	0.429	80	50-70	60	Queen City	Shallow
PO-009372	5925906	30.54111022	-96.90482822	418.296	422.425	4.129	120	80-100	65	Queen City	Shallow
PO-009387	0	30.60444549	-96.70974987	364.192	362.041	2.151	580	490-570	--	Reklaw	--
PO-009404	0	30.46508436	-96.66799149	313.119	315.712	2.593	520	480-520	--	Sparta	--
PO-009431	0	30.56948411	-96.73764602	384.484	382.705	1.779	820	790-810	200	Carrizo	--
PO-009445	5934609	30.4277598	-96.762799	361.581	361.25	0.331	500	280-320, 365-395	--	Sparta	Shallow
PO-009446	5925511	30.57237672	-96.92067218	417.45	422.454	5.004	2350	1620-1630, 1706-1716, 1870-1880	--	Simsboro	--
PO-009448	0	30.433528	-96.739328	0	431.142	431.142	--	--	--	No Assignment	--
PO-009453	0	30.62406596	-97.04865448	502.08	493.534	8.546	440	415-435	260	Hooper	--
PO-009467	0	30.80173495	-96.75484591	440.975	435.43	5.545	290	180-260	--	Calvert Bluff	Shallow
PO-009468	0	30.76017082	-96.65146466	327.951	329.06	1.109	470	360-440	--	Carrizo	--
PO-009475	0	30.60693173	-96.87125141	504.033	505.375	1.342	685	550-560, 600-610	--	Carrizo	--
PO-009477	0	30.40075156	-96.76052156	354.875	360.358	5.483	520	424-520	--	Sparta	--
PO-009478	0	30.523029	-96.604352	365	363.351	1.649	--	--	--	No Assignment	--
PO-009480	5831907	30.51973958	-97.12876525	545.178	551.905	6.727	235	205-235	--	Simsboro	Shallow
PO-009486	0	30.52303385	-96.60432163	363.242	363.338	0.096	630	610-630	300	Sparta	--
PO-009487	0	30.68111475	-97.03538502	473.555	471.89	1.665	151	135-151	--	Hooper	Shallow
PO-009493	0	30.82537242	-96.6521174	288.852	294.954	6.102	270	180-260	165	Carrizo	Shallow
PO-009495	0	30.6493727	-96.97902725	477.144	476.504	0.64	320	280-320	200	Simsboro	Shallow
PO-009497	0	30.917406	-96.830408	382	378.963	3.037	142	115-135	128	Simsboro	Shallow
PO-009540	0	30.79590053	-96.75550042	482.22	463.585	18.635	440	415-435	360	Calvert Bluff	--
PO-009545	0	30.81370459	-96.91570143	441.741	441.876	0.135	180	140-160	--	Simsboro	Shallow

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screen Interval	Pump Depth	POSGCD Aquifer	Shallow
PO-009551	0	30.74218341	-96.92213803	411.148	411.571	0.423	220	160-180	--	Calvert Bluff	Shallow
PO-009552	0	30.79038147	-96.75469029	456.039	459.938	3.899	460	435-455	380	Calvert Bluff	--
PO-009553	0	30.74972819	-96.97403359	436.598	438.727	2.129	230	198-218	--	Hooper	Shallow
PO-009555	0	30.74970036	-96.97402754	436.671	438.334	1.663	118	90-110	--	Hooper	Shallow
PO-009556	0	30.96154625	-96.84377936	407.221	405.029	2.192	128	81-120	80	Hooper	Shallow
PO-009559	0	30.679167	-96.822778	464	465.139	1.139	700	670-690	280	Calvert Bluff	--
PO-009588	0	30.333743	-97.230485	499	554.852	55.852	500	459-479	--	Simsboro	--
PO-009597	0	30.41487714	-97.17859953	443.044	442.531	0.513	136	104-134	80	Simsboro	Shallow
PO-009599	0	30.436259	-97.08414	402.1	461.066	58.966	--	--	--	No Assignment	--
PO-009601	0	30.43622539	-97.0841041	463.273	461.066	2.207	544	474-534	--	Simsboro	--
PO-009602	0	30.448608	-97.119628	438	447.191	9.191	438	--	--	Simsboro	--
PO-009604	0	30.681111	-96.822778	446	450.76	4.76	680	657-677	240	Calvert Bluff	--
PO-009606	0	30.44849867	-97.119669	446.748	447.365	0.617	255	235-255	100	Simsboro	Shallow
PO-009651	0	30.34349088	-96.53796675	249.431	249.987	0.556	850	380-420, 500-540, 580-620, 720-760	357	Yegua - Jackson	--
PO-009706	0	30.63488005	-96.99093861	470.817	462.619	8.198	419	265-305, 365-420	--	Simsboro	--
PO-009707	0	30.60509285	-96.54549928	235.626	235.527	0.099	870	438-522, 549-590, 632-800, 813-855	336	Queen City	--
PO-009708	0	30.42894886	-96.80690844	358.145	361.908	3.763	504	482-502	--	Queen City	--
PO-009709	0	30.43575571	-96.80409075	362.531	365.571	3.04	455	433-453	--	Queen City	--
PO-009710	0	30.41466274	-96.81686961	312.559	312.936	0.377	499	477-497	--	Queen City	--
PO-009716	5917510	30.69608317	-96.91801394	450.205	449.761	0.444	500	378-418	--	Calvert Bluff	--
PO-009745	5824916	30.63399994	-97.03610808	495.75	480.074	15.676	157	127-157	--	Simsboro	Shallow
PO-009747	0	30.333743	-97.230485	558	554.852	3.148	500	459-479	--	Simsboro	--
PO-009748	0	30.378317	-97.21891	453	438.835	14.165	300	280-300	--	Simsboro	Shallow
PO-009749	5840704	30.412727	-97.098625	462.3	401.903	60.397	454	433-454	--	Simsboro	--
PO-009751	0	30.53119917	-96.99522244	422.079	414.217	7.862	620	--	--	Calvert Bluff	--
PO-009752	0	30.79607953	-96.75313836	451.851	450.304	1.547	435	405-425	300	Calvert Bluff	--
PO-009753	5832705	30.50956802	-97.12010935	493.304	492.601	0.703	185	175-185	100	Simsboro	Shallow
PO-009754	5832706	30.51863182	-97.1082234	476.037	476.787	0.75	123	103-123	100	Calvert Bluff	Shallow
PO-009755	5917411	30.69896785	-96.9727771	430.766	430.25	0.516	113	93-113	100	Simsboro	Shallow
PO-009767	0	30.88893944	-96.72498905	356.509	353.755	2.754	685	--	270	Calvert Bluff	--
PO-009768	0	30.94695534	-96.79419959	374.35	371.929	2.421	314	284-294	168	Hooper	Shallow
PO-009769	5925512	30.5693455	-96.94911864	395.986	400.025	4.039	734	694-734	100	Calvert Bluff	--

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screen Interval	Pump Depth	POSGCD Aquifer	Shallow
PO-009770	5839510	30.45787784	-97.1831314	531.546	531.296	0.25	138	118-138	120	Simsboro	Shallow
PO-009774	0	30.43360857	-96.82499855	377.934	381.585	3.651	347	274-314	--	Queen City	Shallow
PO-009781	0	30.95040363	-96.83505186	445.436	447.037	1.601	148	120-140	--	Hooper	Shallow
PO-009790	5928702	30.529199	-96.60862	347	341.921	5.079	498	--	--	Sparta	--
PO-009806	0	30.93665456	-96.84381657	372.218	372.289	0.071	115	48-108	96.5	Hooper	Shallow
PO-009807	0	30.47797641	-96.86016383	412.912	409.886	3.026	890	660-740, 760-800, 830-870	--	Carrizo	--
PO-009808	0	30.8493318	-96.92166011	367.127	368.58	1.453	151.6	131-151.6	--	Hooper	Shallow
PO-009812	0	30.43257956	-96.53188411	293.971	295.795	1.824	260	200-240	--	Yegua - Jackson	Shallow
PO-009824	0	30.96914022	-96.78057395	377.766	377.251	0.515	460	430-450	240	Simsboro	--
PO-010881	0	30.46649005	-96.66672465	292.277	299.104	6.827	228	196-228	--	Yegua - Jackson	Shallow
PO-010899	5920409	30.68983199	-96.61143717	297.254	299.362	2.108	230	188-230	105	Queen City	Shallow
PO-010921	0	30.37629577	-96.68273318	335.201	335.965	0.764	410	340-400	--	Yegua - Jackson	Shallow
PO-010924	0	30.32978782	-96.66338856	302.092	301.611	0.481	350	--	--	Yegua - Jackson	Shallow
PO-010937	5911607	30.82377816	-96.65498277	304.332	302.02	2.312	276	--	--	Carrizo	Shallow
PO-010970	0	30.550286	-96.71384	382	382.074	0.074	990	--	--	Carrizo	--
PO-010971	0	30.43222575	-96.81585684	342.242	349.041	6.799	461	437-457	--	Queen City	--
PO-011022	0	30.44197034	-96.41051349	239.515	247.255	7.74	570	550-570	--	Yegua - Jackson	--
PO-011032	0	30.64815247	-96.85467983	575.418	580.51	5.092	1744	1462-1546, 1588-1715	486	Simsboro	--
PO-011118	0	30.49845462	-96.85679717	475.906	470.799	5.107	2742	2600-2660	--	Hooper	--
PO-011143	0	30.51850172	-97.12697858	526.735	525.886	0.849	165	125-165	120	Simsboro	Shallow
PO-011234	0	30.5631525	-96.65674943	398.956	402.117	3.161	300	210-290	--	Sparta	Shallow
PO-011279	0	30.44711105	-96.78997558	418.474	417.58	0.894	1244	944-1244	--	Carrizo	--
PO-011283	0	30.462071	-97.149871	441.29	441.302	0.012	440	409-430	--	Hooper	--
PO-011306	0	30.36621535	-96.54019526	289.425	289.084	0.341	0	--	--	Yegua - Jackson	Shallow

APPENDIX D

Listing of high-priority wells and wells of concern

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Well ID	Aquifer	Water Level is less than 15 feet above Pump in Year			High-Priority Well	Well of Concern
		2019	2022	2029		
PO-009005	Sparta	yes	no	yes	no	yes
PO-009288	Sparta	yes	yes	yes	no	yes
PO-009474	Sparta	yes	yes	yes	no	yes
PO-009558	Sparta	yes	yes	yes	no	yes
PO-006277	Queen City	yes	yes	yes	no	yes
PO-006897	Queen City	no	yes	yes	yes	no
PO-008700	Queen City	yes	yes	yes	no	yes
PO-008799	Queen City	yes	yes	yes	no	yes
PO-009033	Queen City	yes	yes	yes	no	yes
PO-009372	Queen City	yes	yes	yes	no	yes
PO-000475	Carrizo	no	no	yes	yes	no
PO-000943	Carrizo	no	yes	yes	yes	no
PO-001120	Carrizo	no	yes	yes	yes	no
PO-003444	Carrizo	no	no	yes	yes	no
PO-004976	Carrizo	no	yes	yes	yes	no
PO-005472	Carrizo	no	no	yes	yes	no
PO-006282	Carrizo	no	yes	yes	yes	no
PO-006350	Carrizo	no	yes	yes	yes	no
PO-006405	Carrizo	no	yes	yes	yes	no
PO-008053	Carrizo	no	yes	yes	yes	no
PO-008054	Carrizo	no	no	yes	yes	no
PO-008246	Carrizo	yes	yes	yes	no	yes
PO-008271	Carrizo	no	no	yes	yes	no
PO-008322	Carrizo	no	yes	yes	yes	no
PO-008326	Carrizo	no	yes	yes	yes	no
PO-008793	Carrizo	yes	yes	yes	no	yes
PO-008794	Carrizo	no	yes	yes	yes	no
PO-008797	Carrizo	yes	yes	yes	no	yes
PO-008805	Carrizo	no	no	yes	yes	no
PO-008826	Carrizo	no	yes	yes	yes	no
PO-008884	Carrizo	no	yes	yes	yes	no
PO-008913	Carrizo	no	yes	yes	yes	no
PO-008922	Carrizo	no	no	yes	yes	no
PO-008923	Carrizo	no	yes	yes	yes	no
PO-008964	Carrizo	no	no	yes	yes	no
PO-009067	Carrizo	no	yes	yes	yes	no
PO-009084	Carrizo	yes	yes	yes	no	yes
PO-009242	Carrizo	no	yes	yes	yes	no

Well ID	Aquifer	Water Level is less than 15 feet above Pump in Year			High-Priority Well	Well of Concern
		2019	2022	2029		
PO-009332	Carrizo	no	yes	yes	yes	no
PO-009431	Carrizo	no	no	yes	yes	no
PO-009526	Carrizo	no	no	yes	yes	no
PO-009570	Carrizo	no	yes	yes	yes	no
PO-009572	Carrizo	no	yes	yes	yes	no
PO-009787	Carrizo	no	yes	yes	yes	no
PO-010918	Carrizo	yes	yes	yes	no	yes
PO-010952	Carrizo	no	yes	yes	yes	no
PO-011373	Carrizo	no	yes	yes	yes	no
PO-011381	Carrizo	no	yes	yes	yes	no
PO-011383	Carrizo	no	yes	yes	yes	no
PO-011384	Carrizo	no	yes	yes	yes	no
PO-011385	Carrizo	no	yes	yes	yes	no
PO-007242	Calvert Bluff	no	no	yes	yes	no
PO-008659	Calvert Bluff	yes	yes	yes	no	yes
PO-009125	Calvert Bluff	no	no	yes	yes	no
PO-009377	Calvert Bluff	yes	yes	yes	no	yes
PO-009607	Calvert Bluff	yes	yes	yes	no	yes
PO-009724	Calvert Bluff	no	no	yes	yes	no
PO-000268	Simsboro	yes	yes	yes	no	yes
PO-001883	Simsboro	yes	yes	yes	no	yes
PO-002014	Simsboro	yes	yes	yes	no	yes
PO-002205	Simsboro	yes	yes	yes	no	yes
PO-007363	Simsboro	yes	yes	yes	no	yes
PO-007378	Simsboro	no	no	yes	yes	no
PO-007641	Simsboro	yes	yes	yes	no	yes
PO-009597	Simsboro	yes	yes	yes	no	yes
PO-009753	Simsboro	yes	yes	yes	no	yes
PO-009754	Simsboro	yes	yes	yes	no	yes
PO-011143	Simsboro	yes	yes	yes	no	yes
PO-008207	Hooper	yes	yes	yes	no	yes
PO-009241	Hooper	yes	yes	yes	no	yes
PO-009527	Hooper	yes	yes	yes	no	yes
PO-009658	Hooper	yes	yes	yes	no	yes
PO-009741	Hooper	yes	yes	yes	no	yes
PO-011076	Hooper	yes	yes	yes	no	yes

APPENDIX E

Hydrographs for High-Priority Wells

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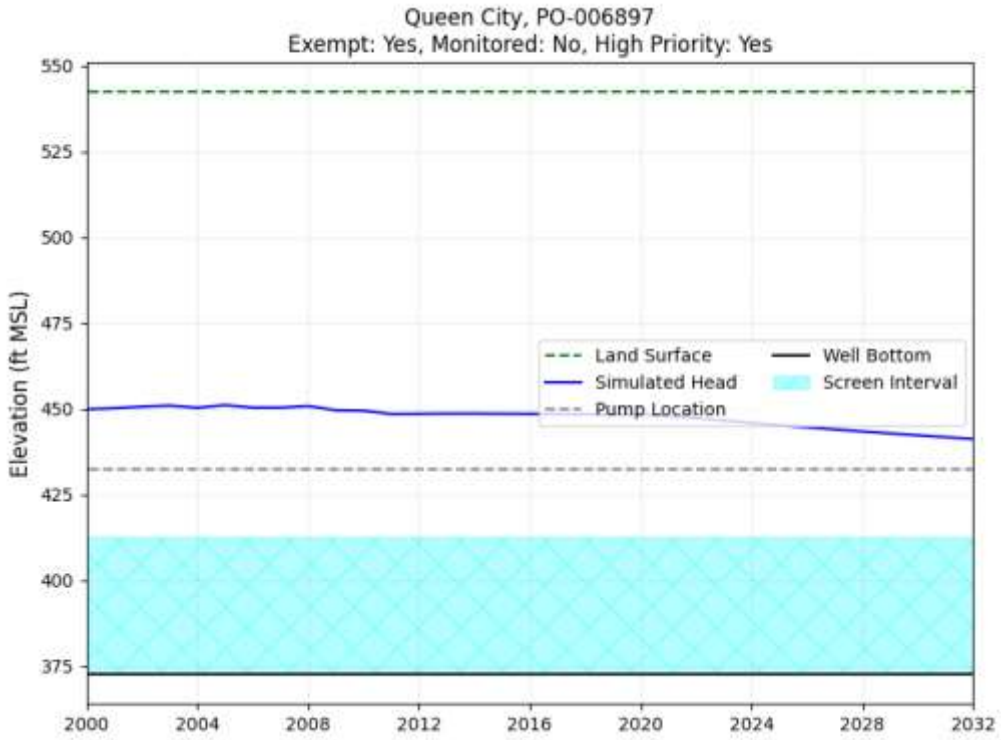


Figure E-1 Simulated water levels for high-priority well PO-006897 located in the Queen City Aquifer

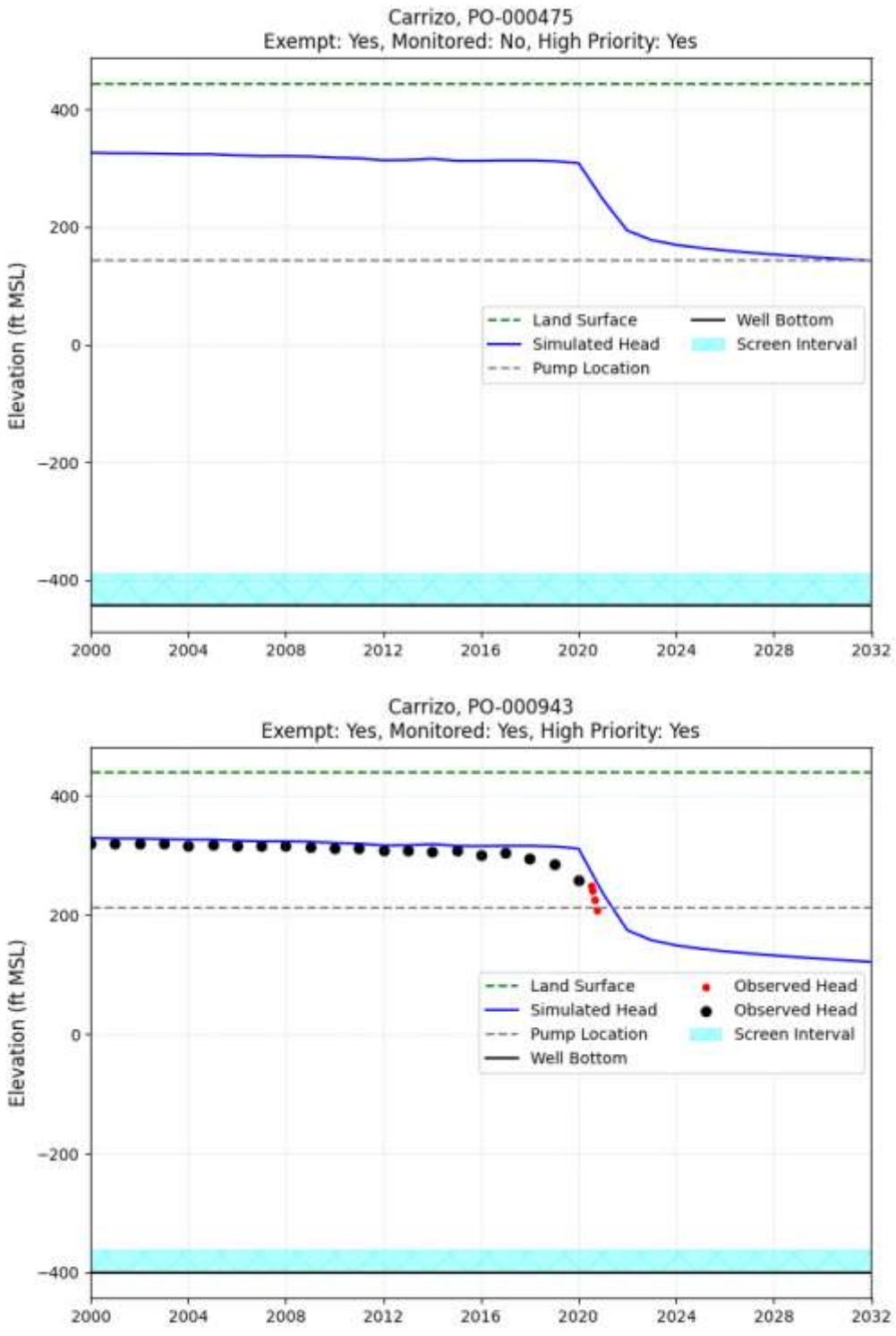


Figure E-2 Simulated water levels for high-priority wells PO-000475 and PO-000943 located in the Carrizo Aquifer

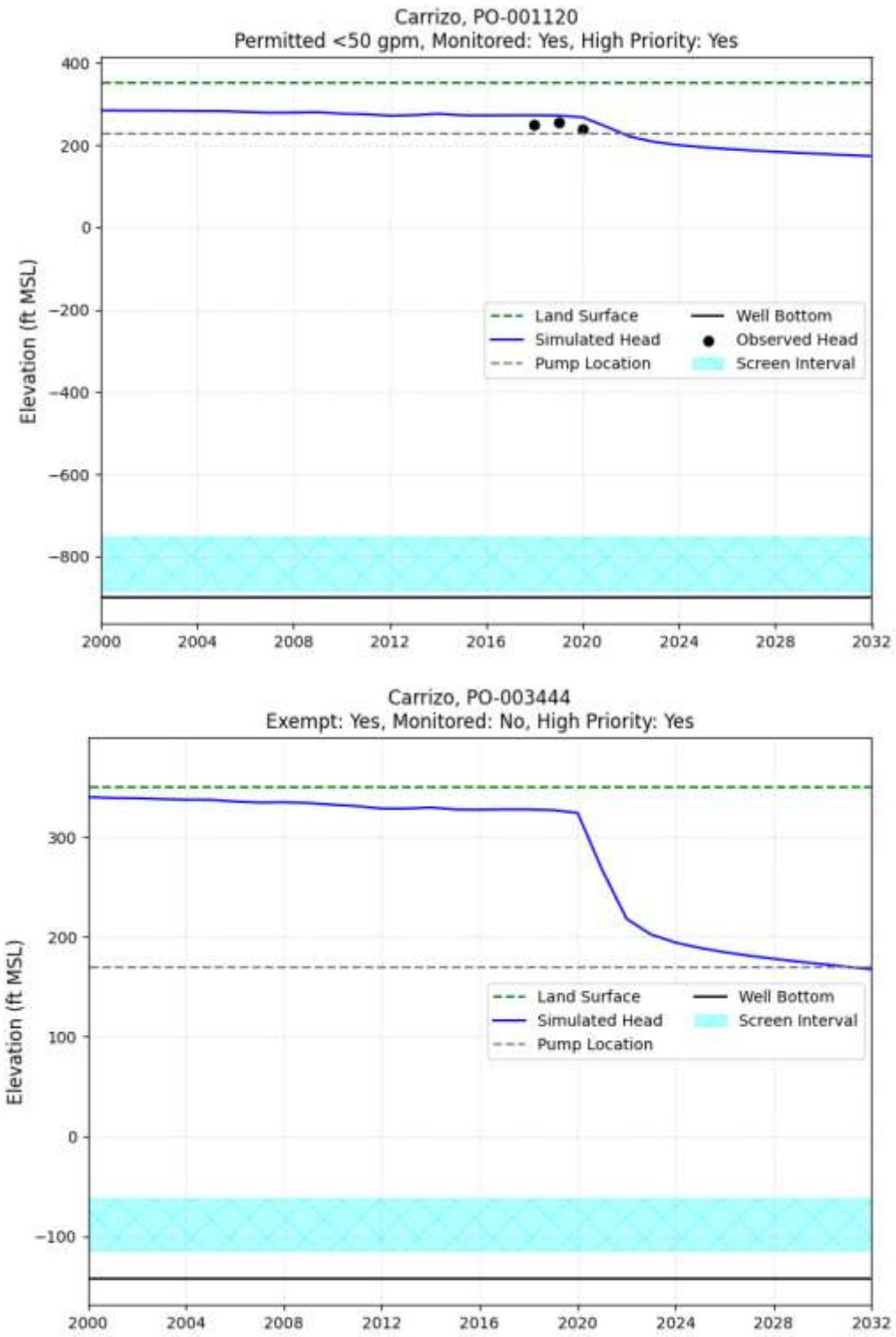


Figure E-3 Simulated water levels for high-priority wells PO-001120 and PO-003444 located in the Carrizo Aquifer

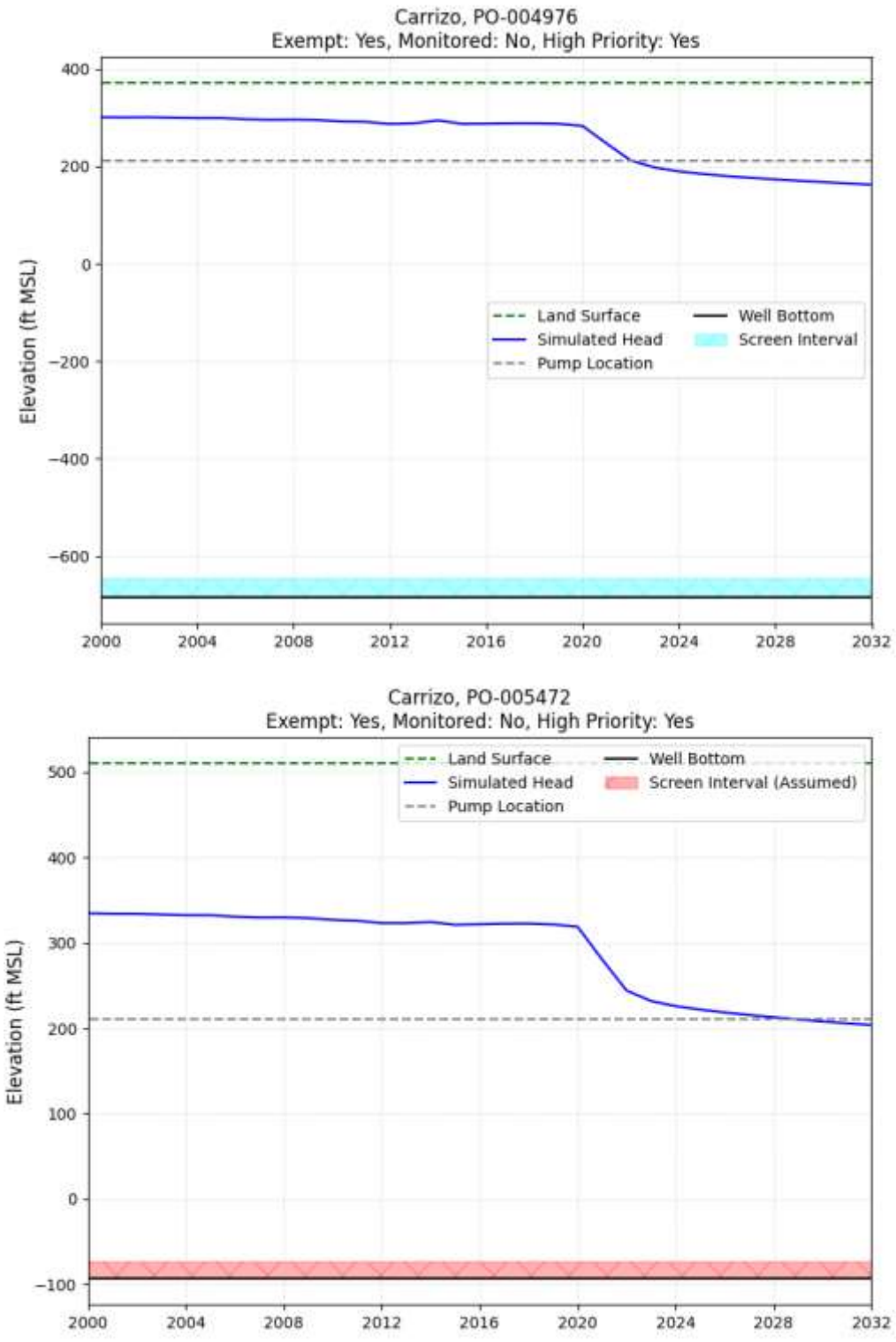


Figure E-4 Simulated water levels for high-priority wells PO-004976 and PO-005472 located in the Carrizo Aquifer

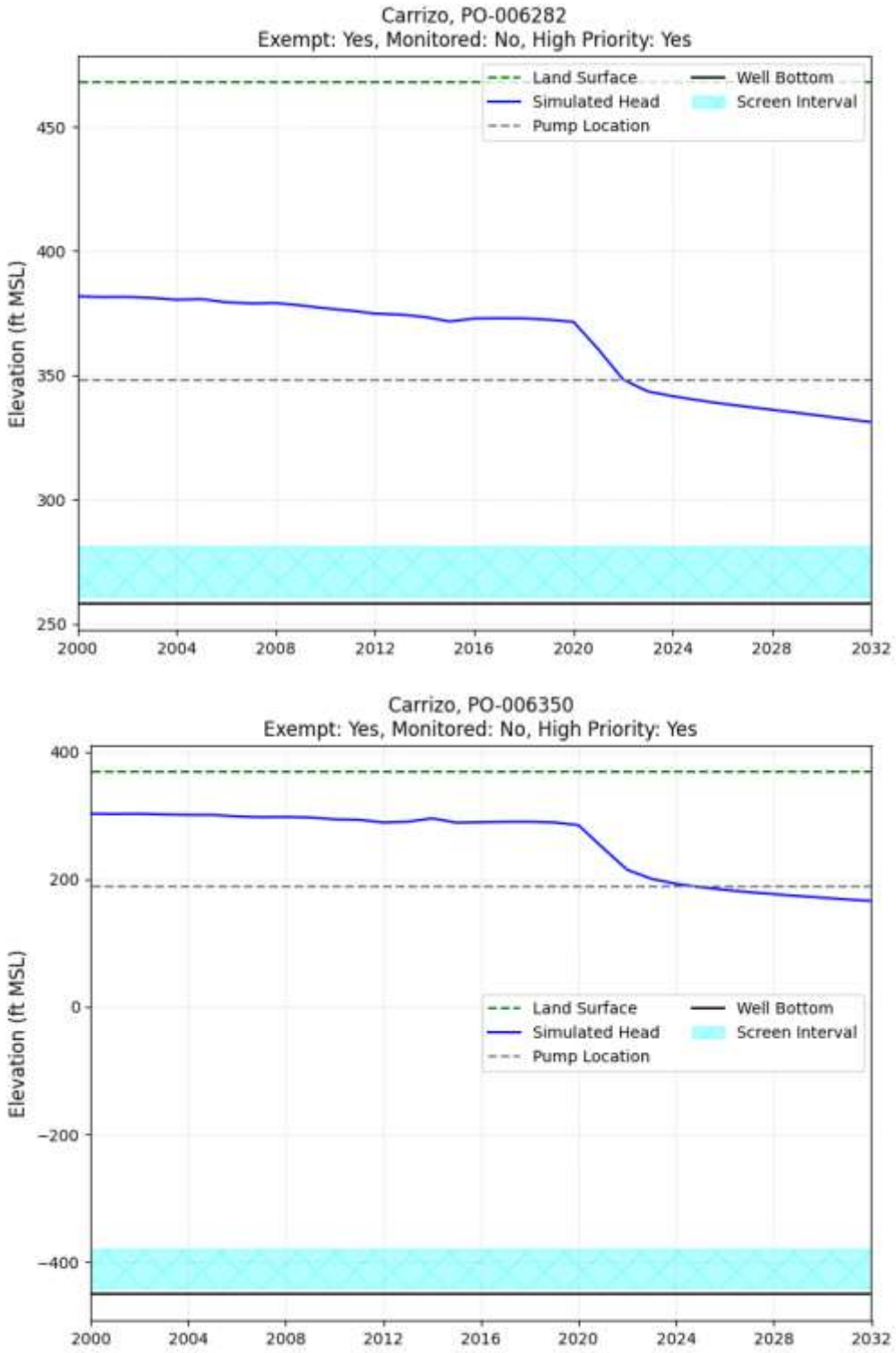


Figure E-5 Simulated water levels for high-priority wells PO-006282 and PO-006350 located in the Carrizo Aquifer

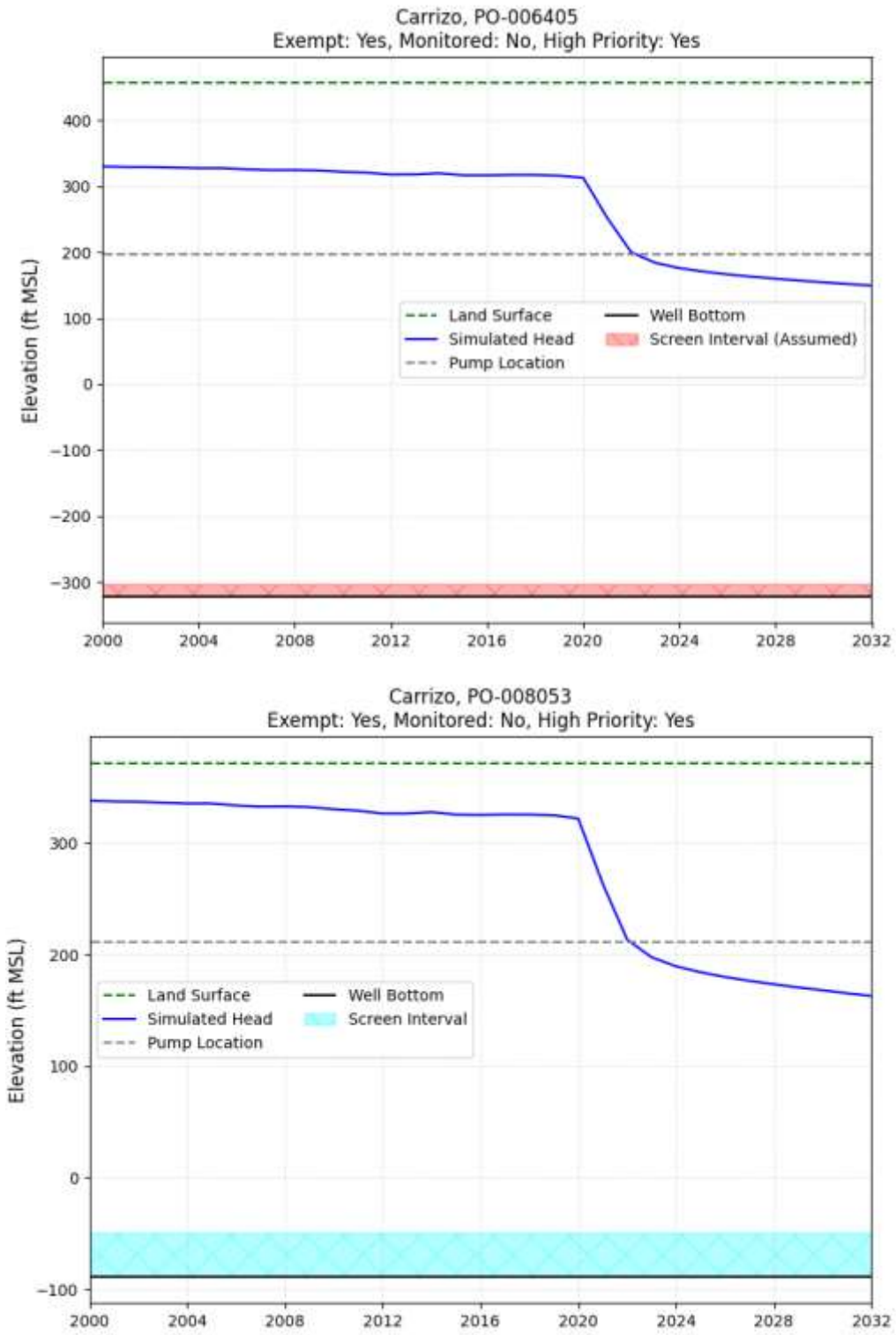


Figure E-6 Simulated water levels for high-priority wells PO-006405 and PO-008053 located in the Carrizo Aquifer

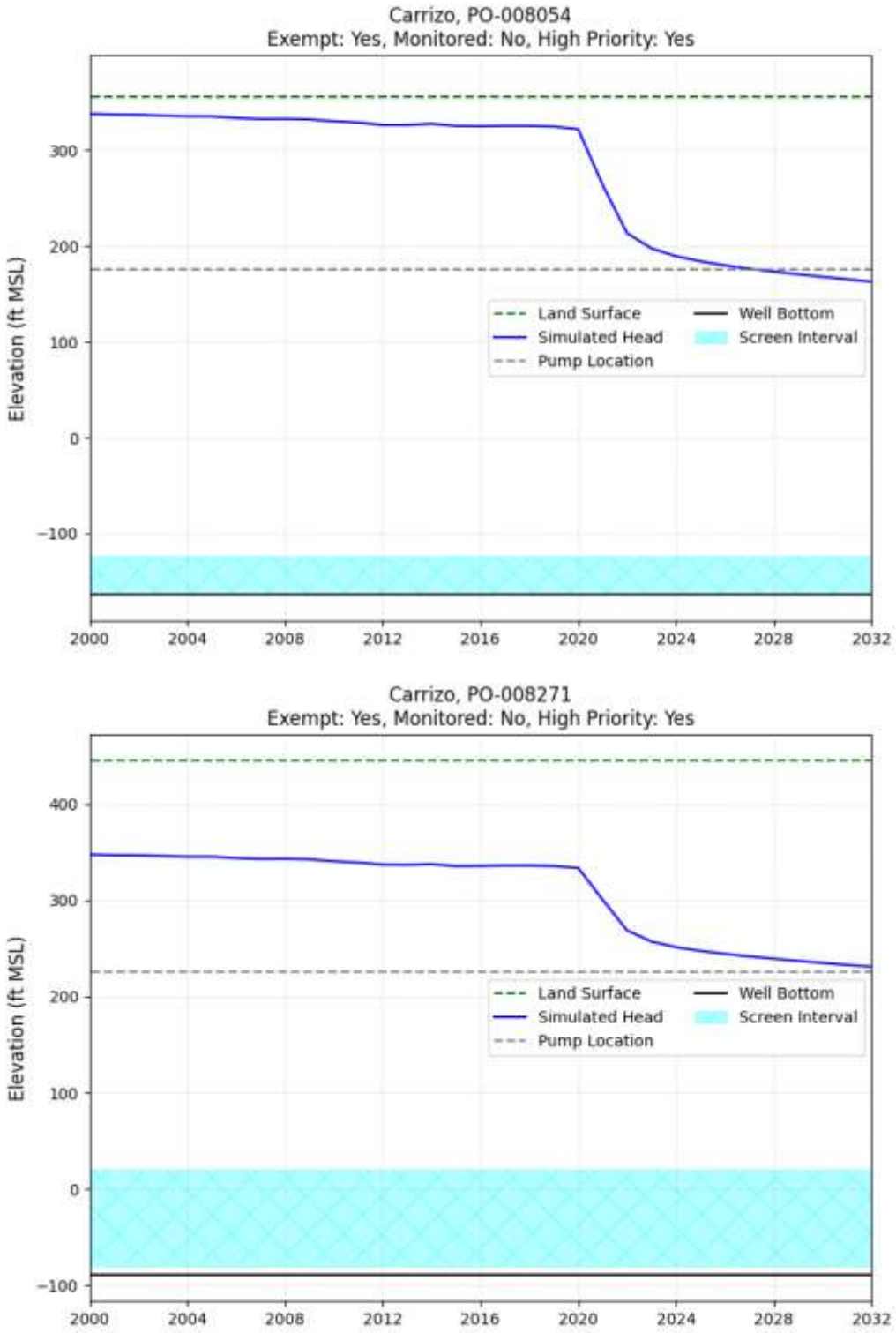


Figure E-7 Simulated water levels for high-priority wells PO-008054 and PO-008271 located in the Carrizo Aquifer

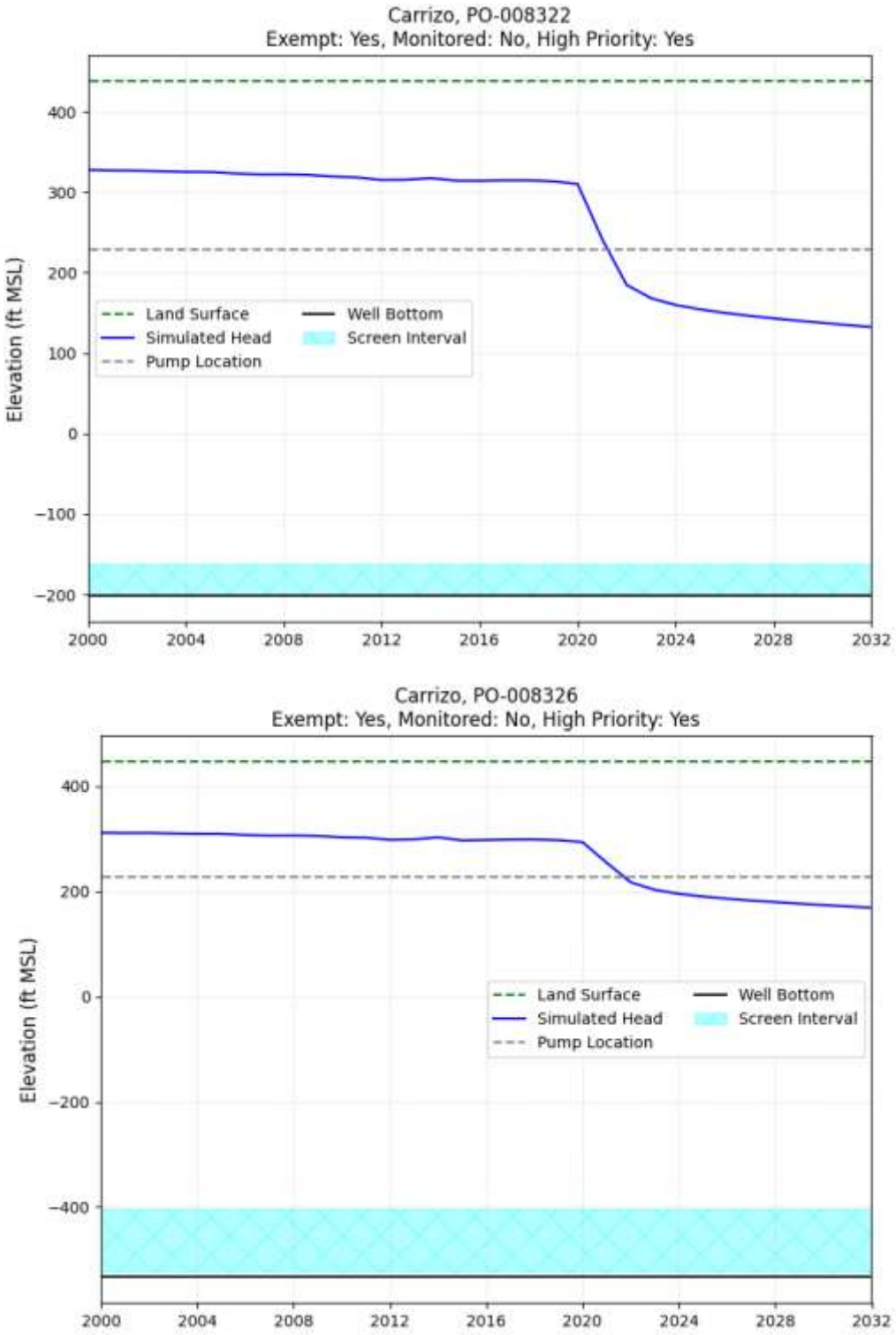


Figure E-8 Simulated water levels for high-priority wells PO-008322 and PO-008326 located in the Carrizo Aquifer

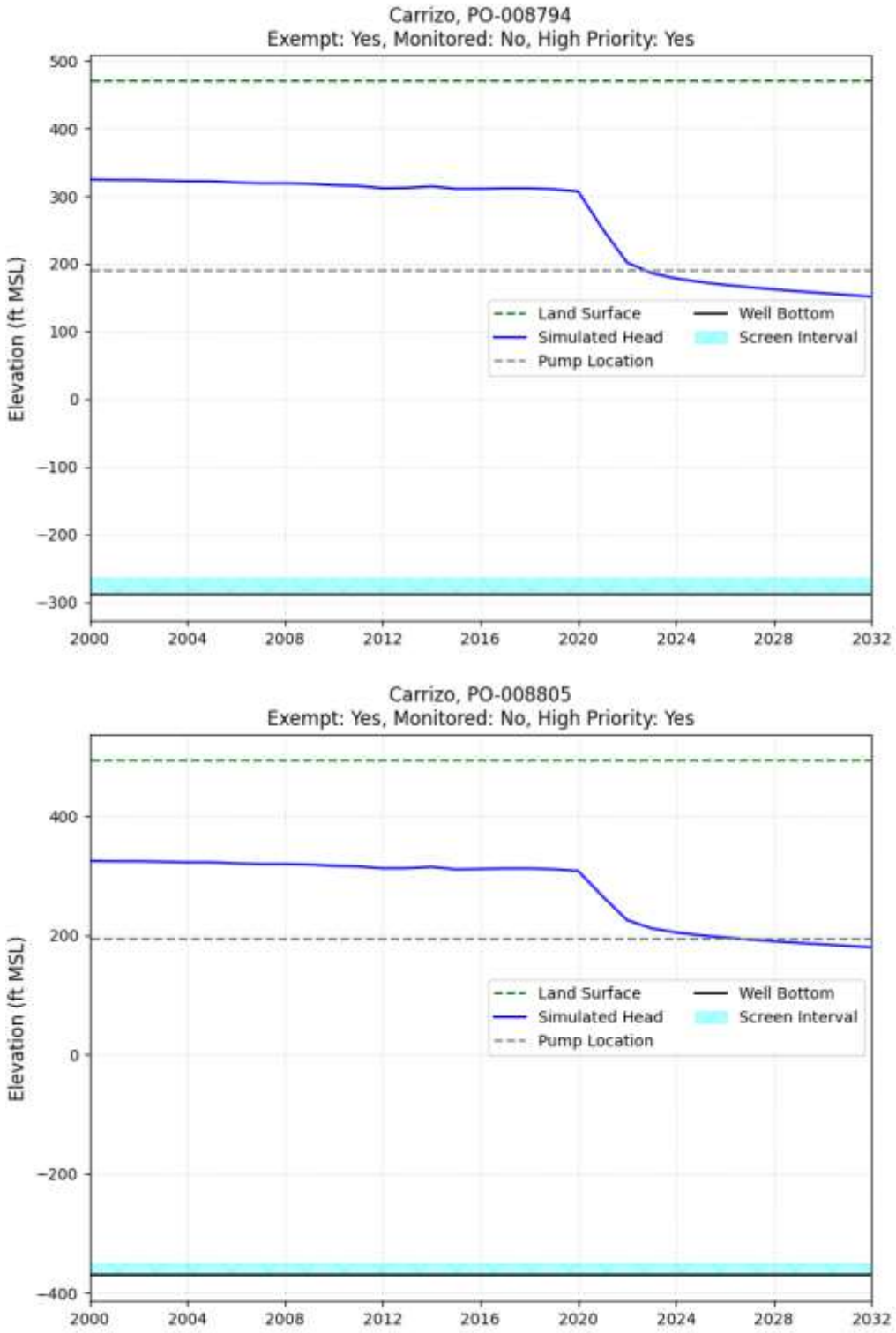


Figure E-9 Simulated water levels for high-priority wells PO-008794 and PO-008805 located in the Carrizo Aquifer

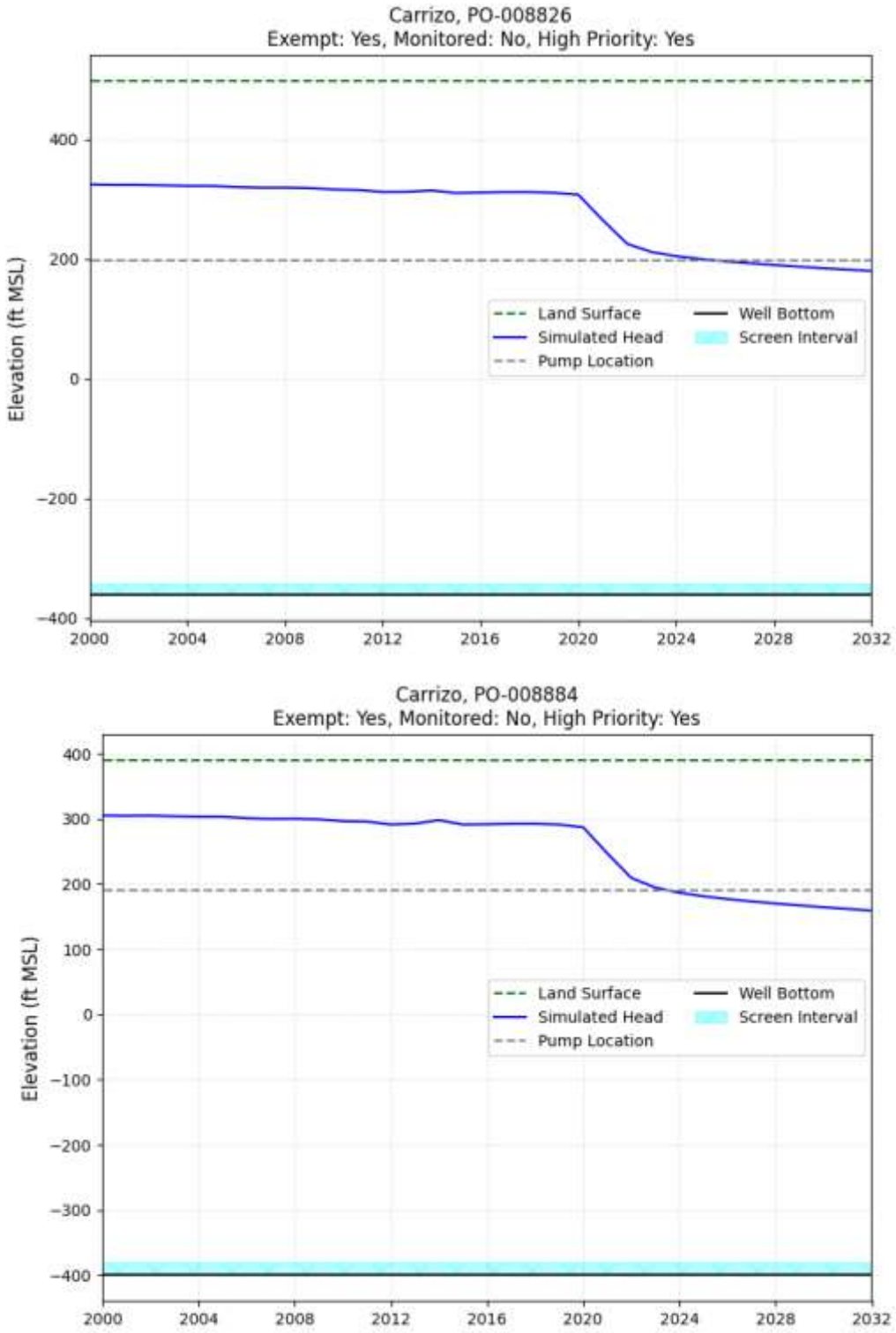


Figure E-10 Simulated water levels for high-priority wells PO-008826 and PO-008884 located in the Carrizo Aquifer

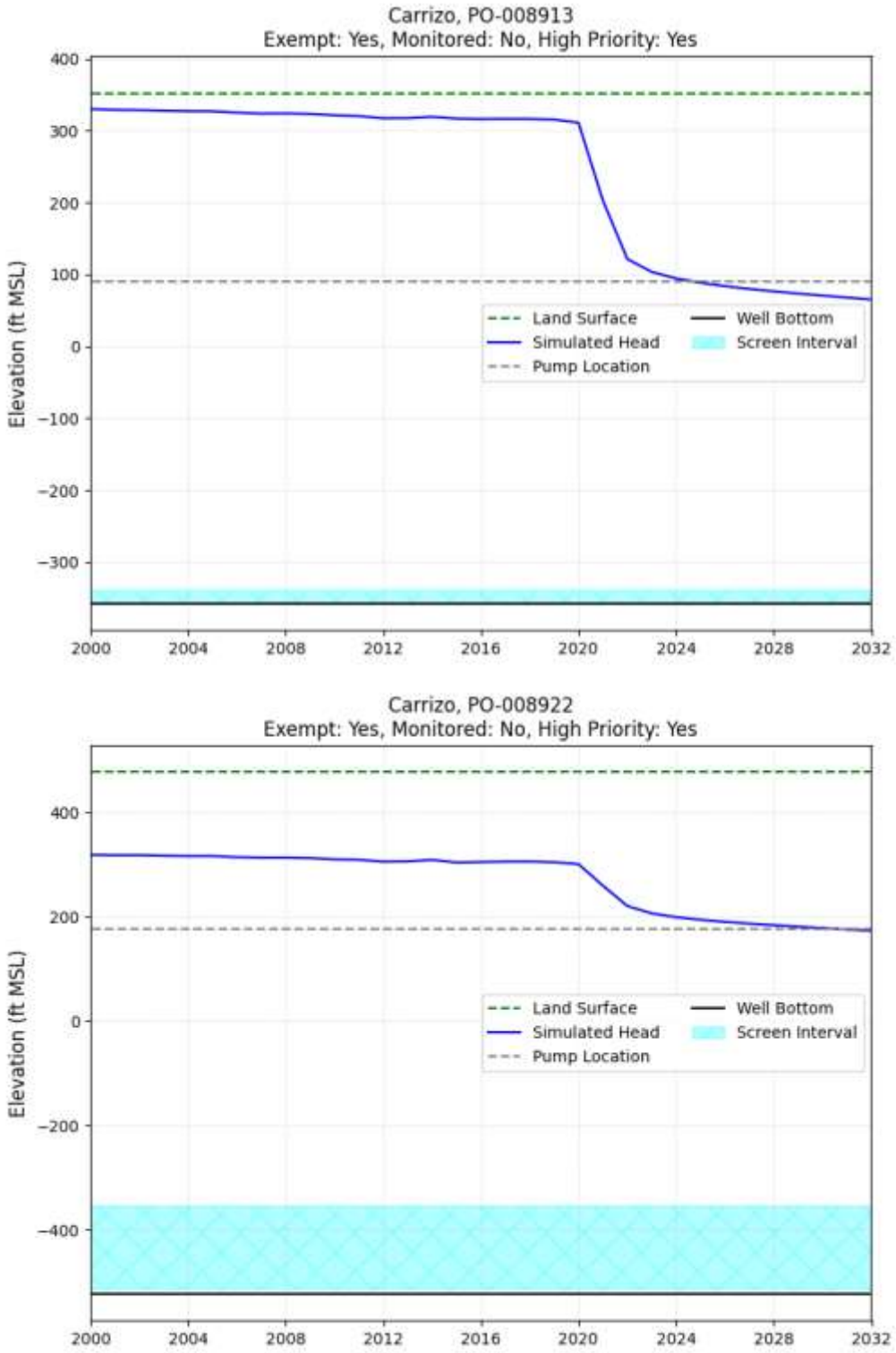


Figure E-11 Simulated water levels for high-priority wells PO-008913 and PO-008922 located in the Carrizo Aquifer

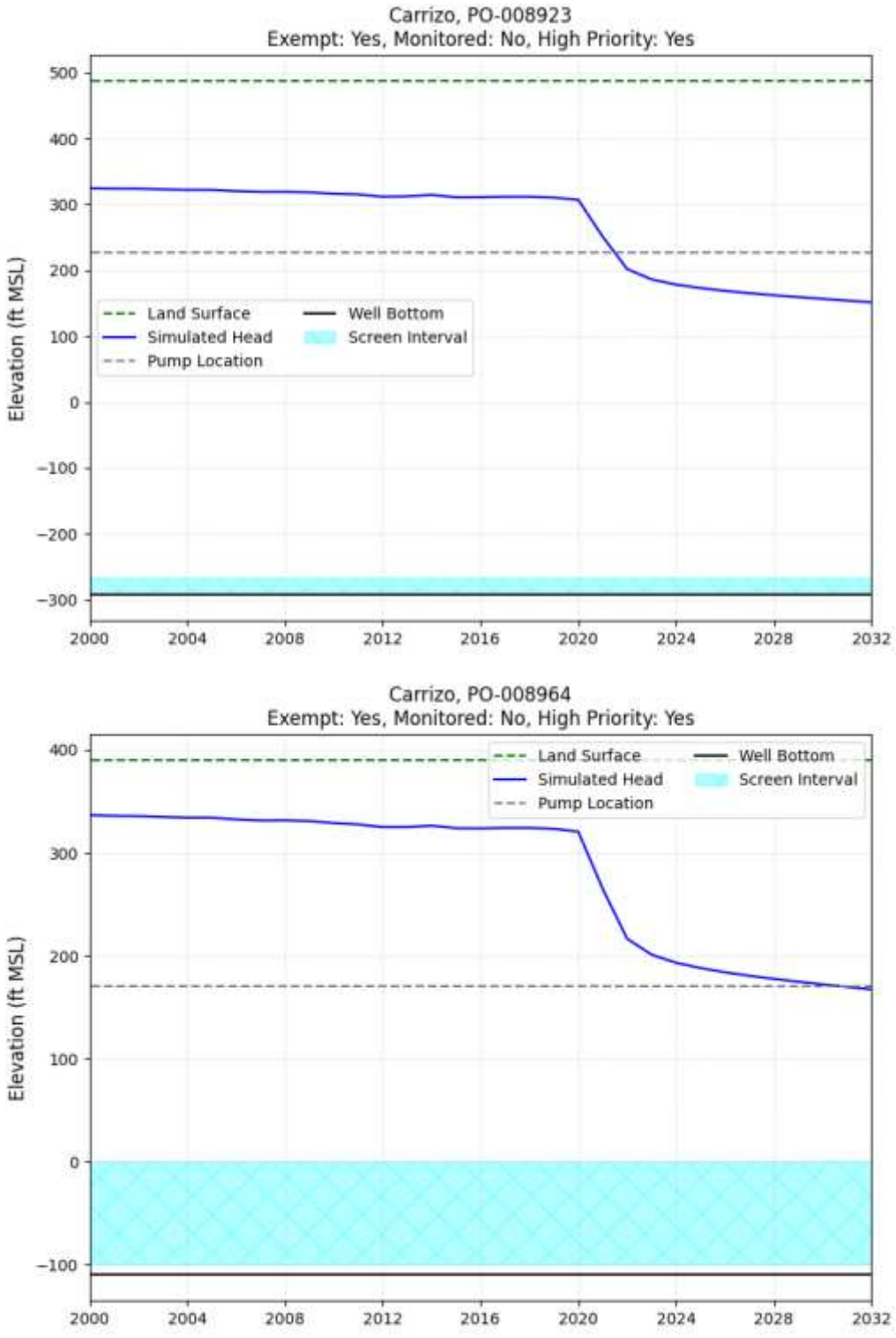


Figure E-12 Simulated water levels for high-priority wells PO-008923 and PO-008964 located in the Carrizo Aquifer

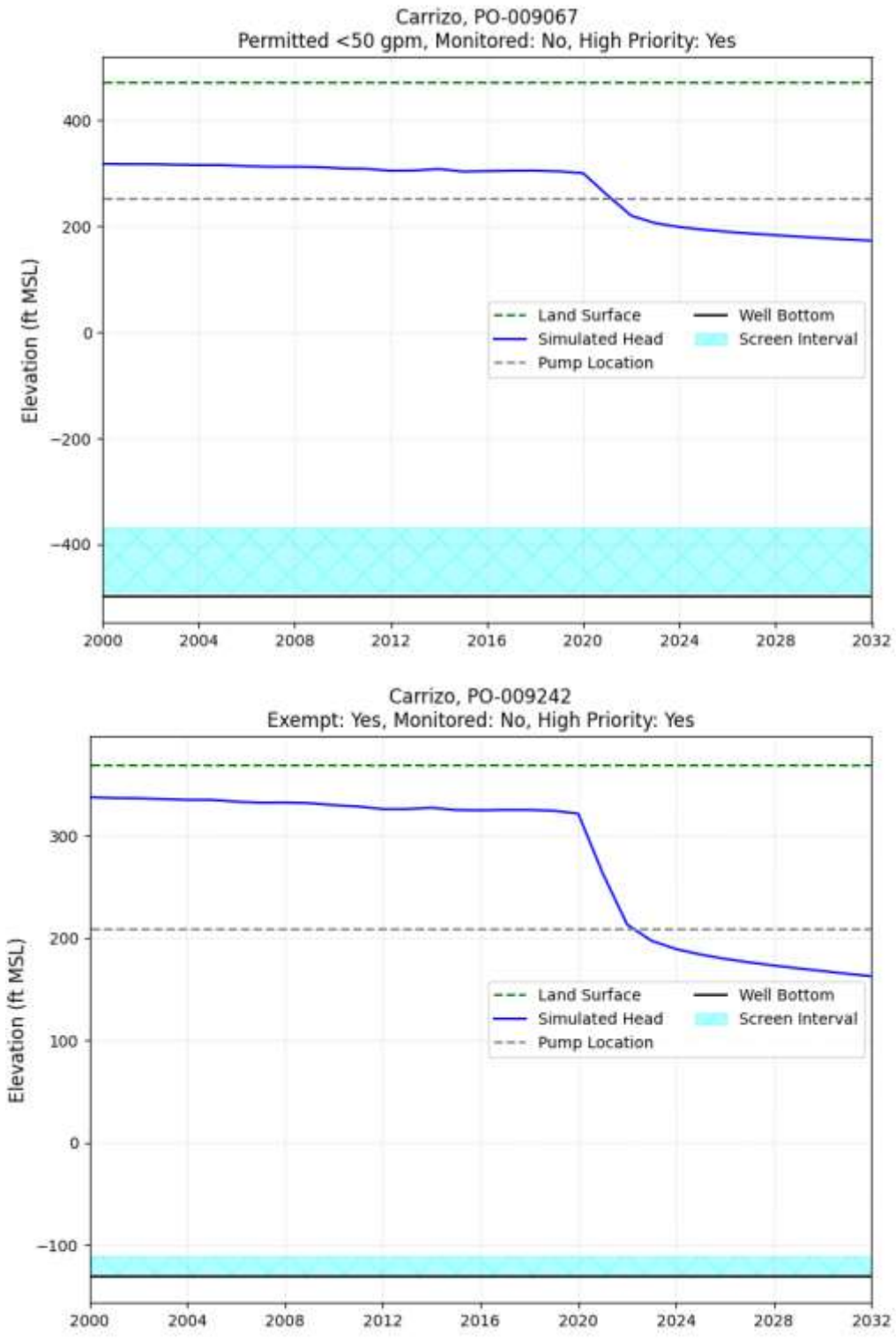


Figure E-13 Simulated water levels for high-priority wells PO-009067 and PO-009242 located in the Carrizo Aquifer

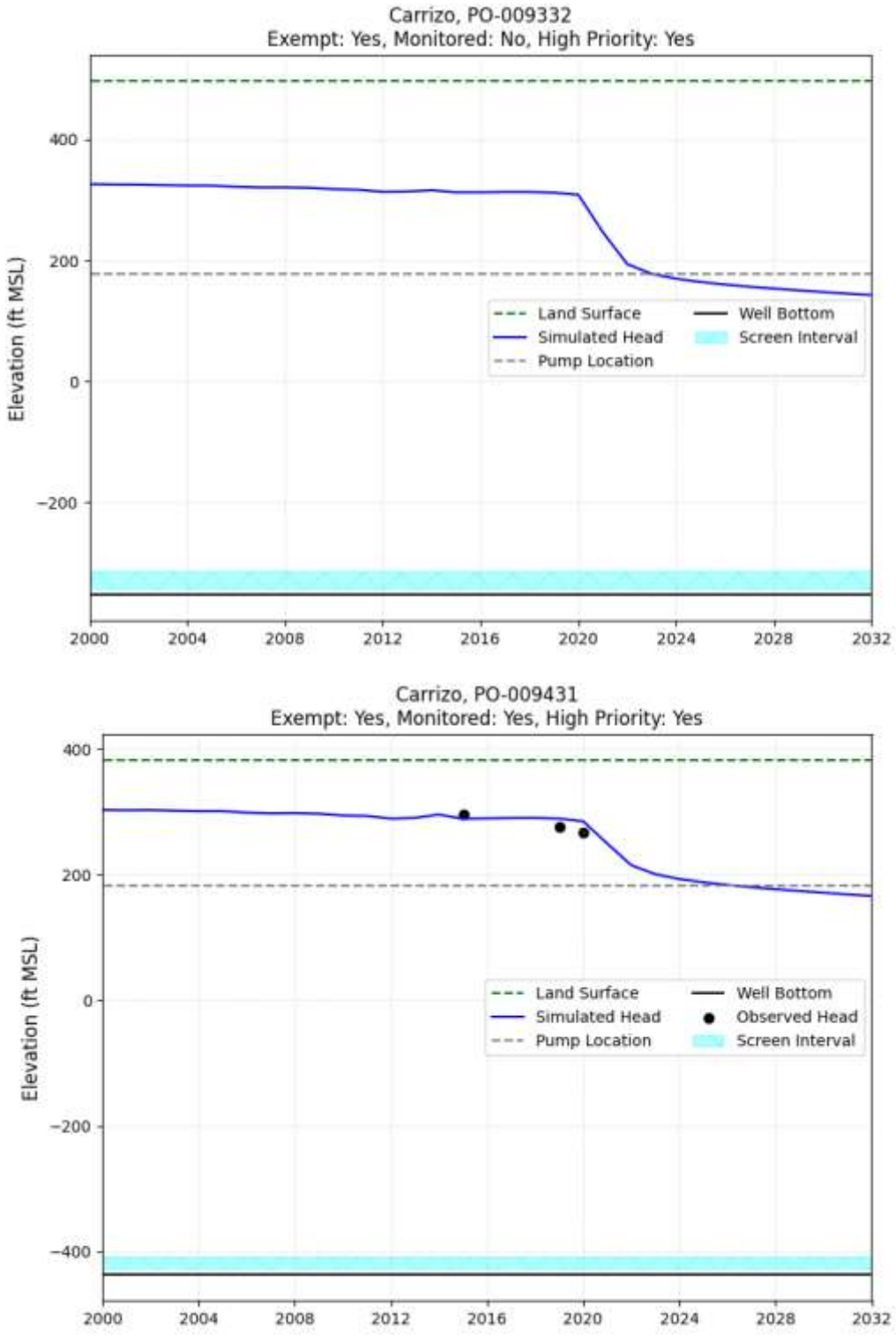


Figure E-14 Simulated water levels for high-priority wells PO-009332 and PO-009431 located in the Carrizo Aquifer

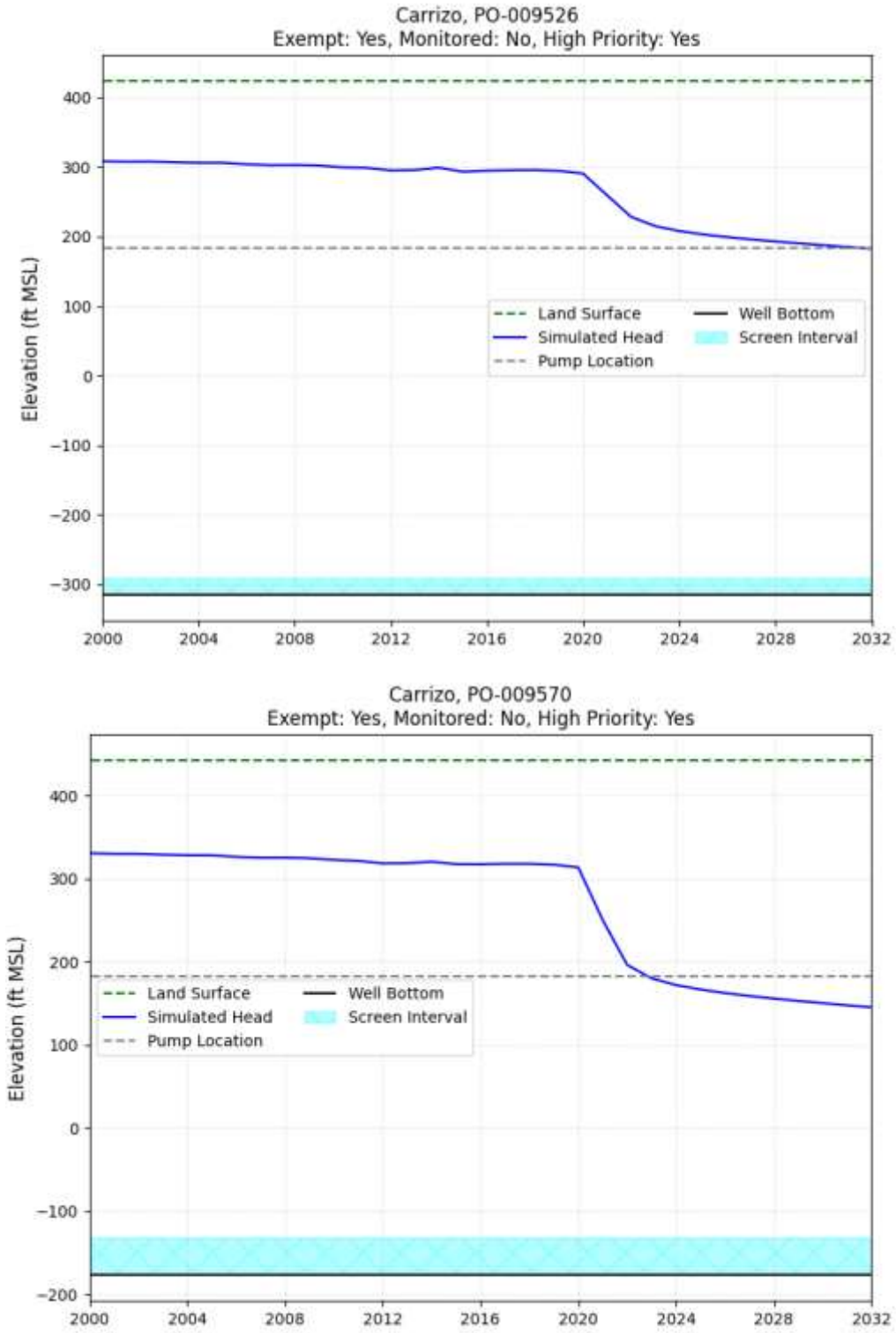


Figure E-15 Simulated water levels for high-priority wells PO-009526 and PO-009570 located in the Carrizo Aquifer

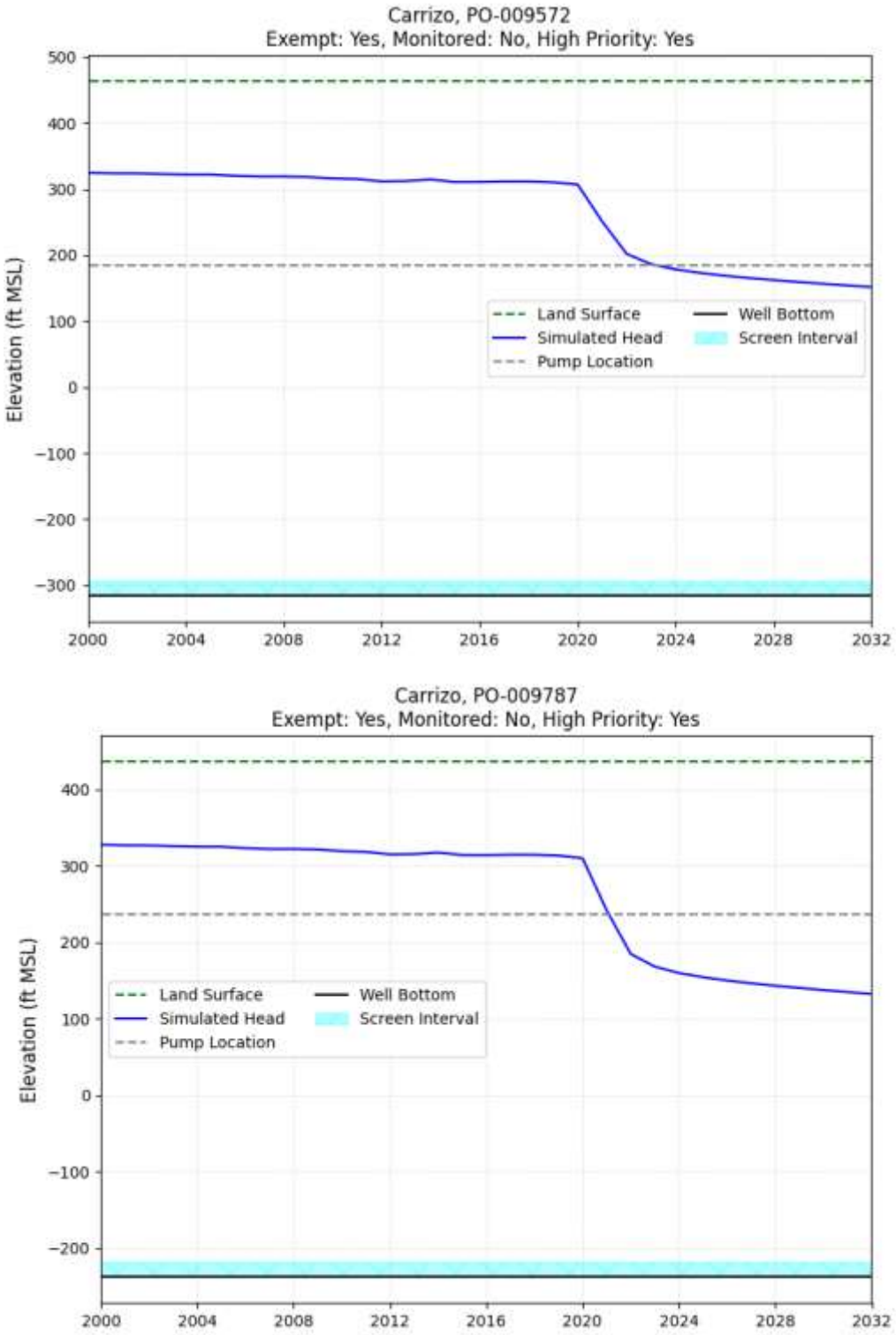


Figure E-16 Simulated water levels for high-priority wells PO-009572 and PO-009787 located in the Carrizo Aquifer

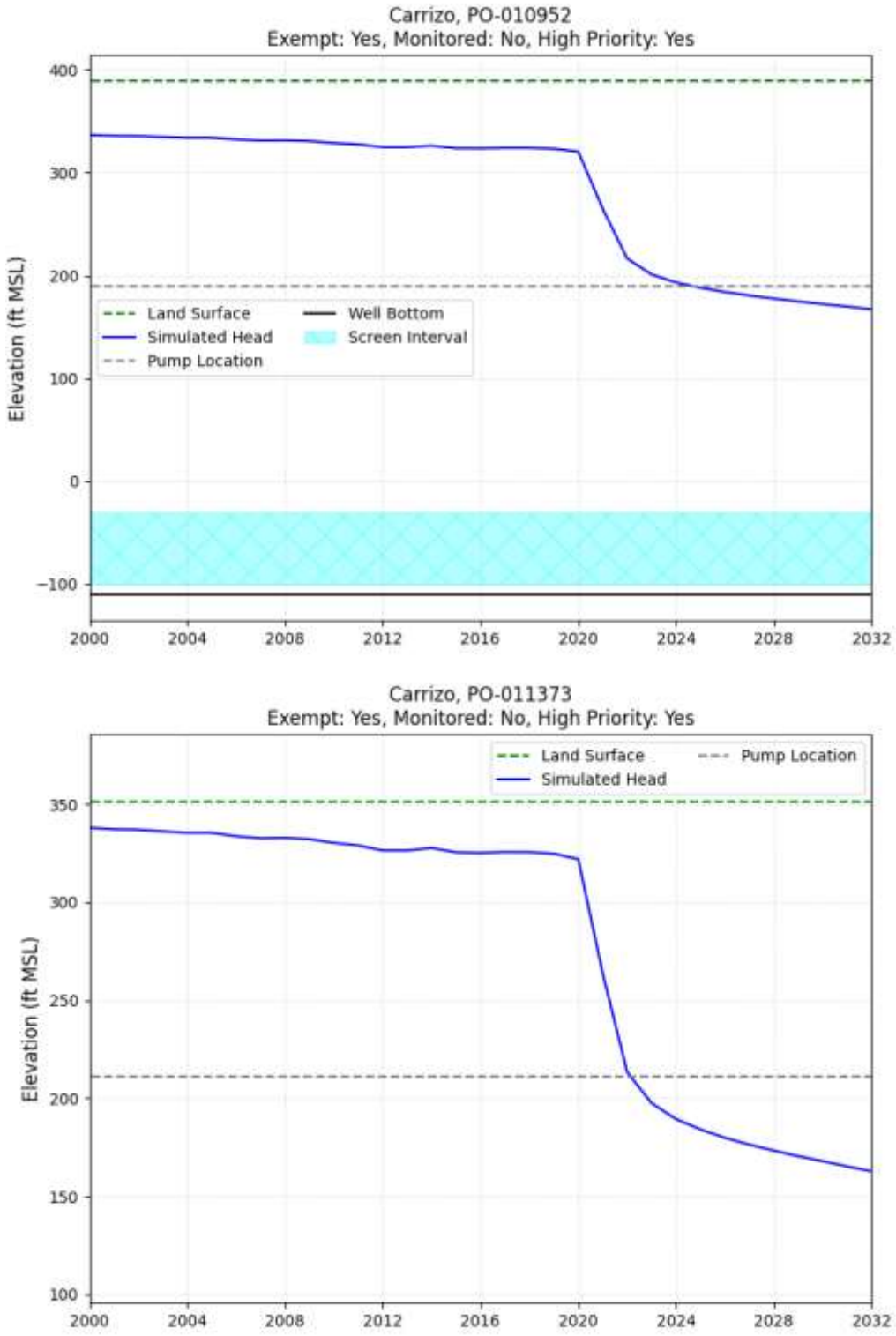


Figure E-17 Simulated water levels for high-priority wells PO-010952 and PO-011373 located in the Carrizo Aquifer

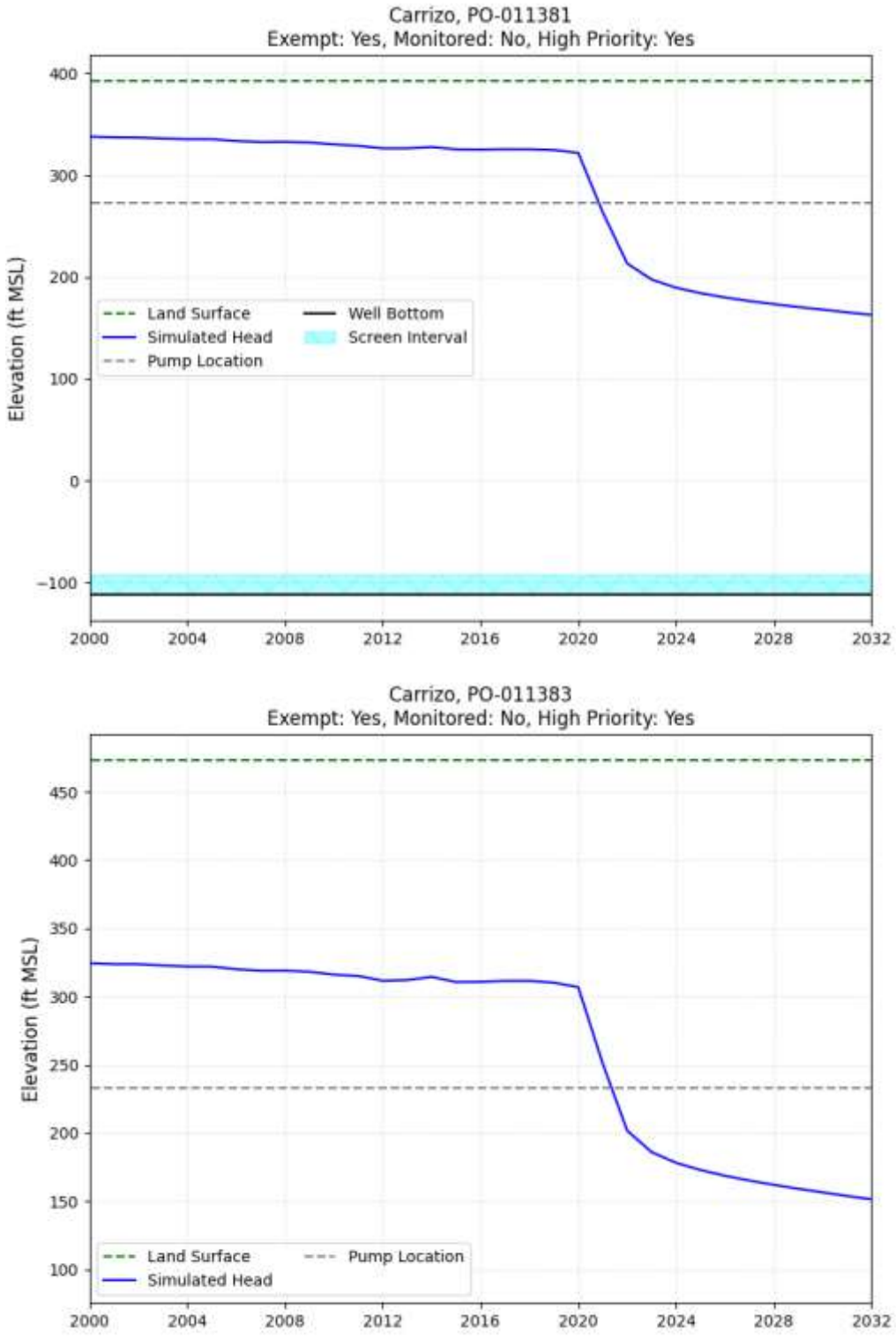


Figure E-18 Simulated water levels for high-priority wells PO-011381 and PO-011383 located in the Carrizo Aquifer

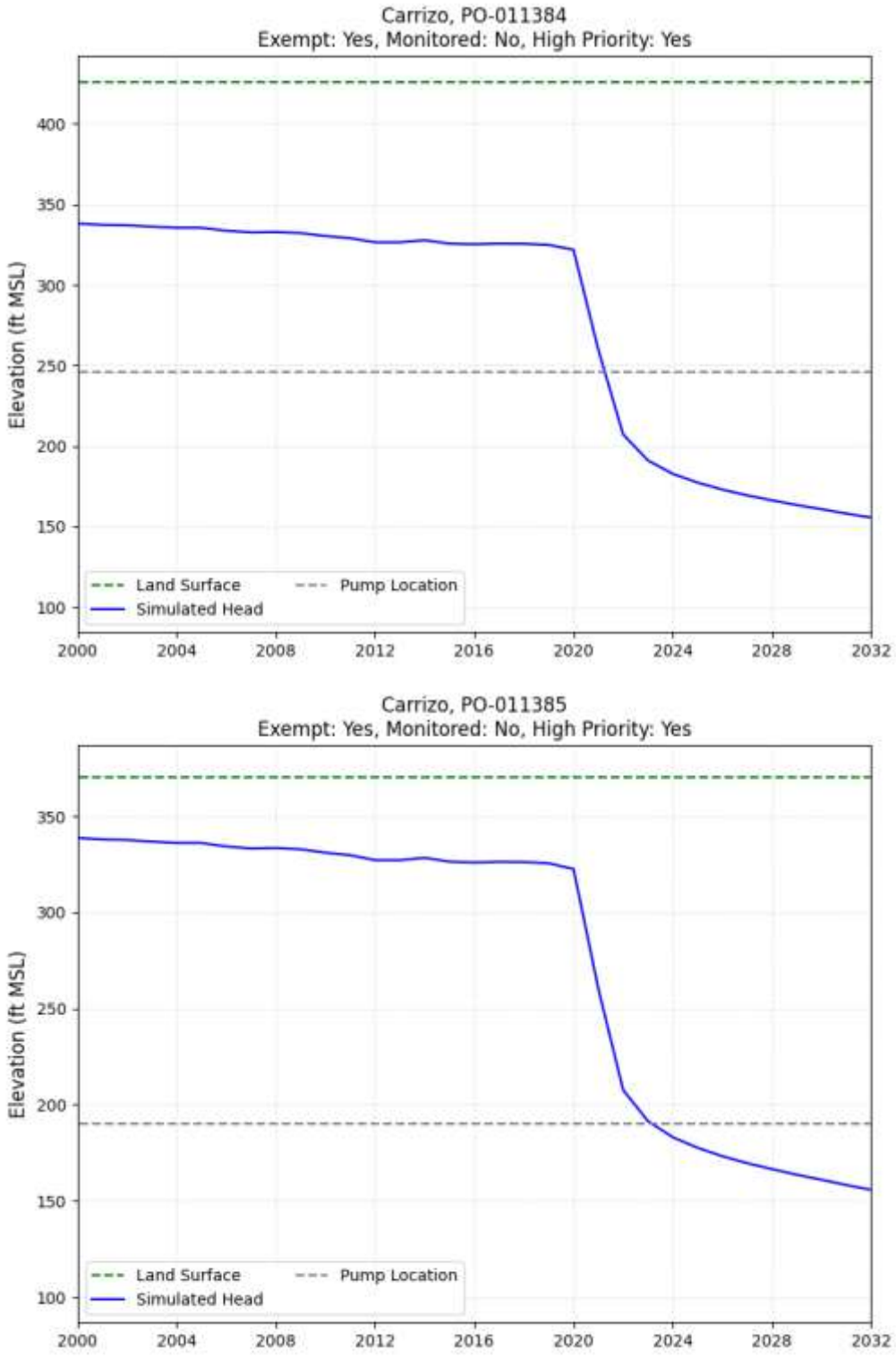
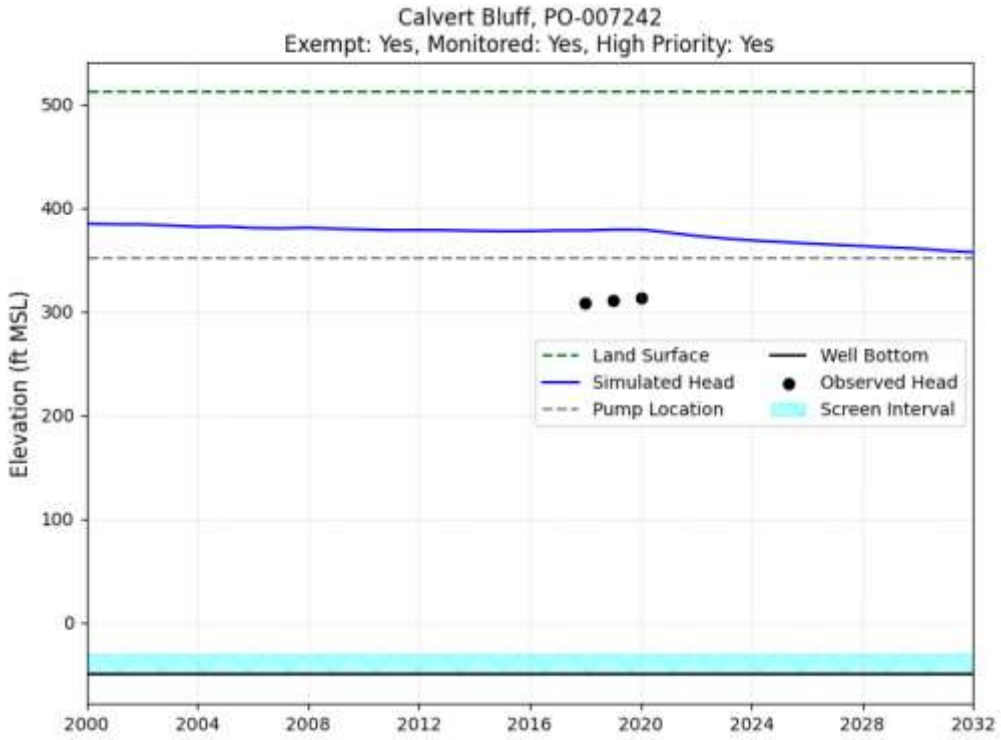


Figure E-19 Simulated water levels for high-priority wells PO-011384 and PO-011385 located in the Carrizo Aquifer



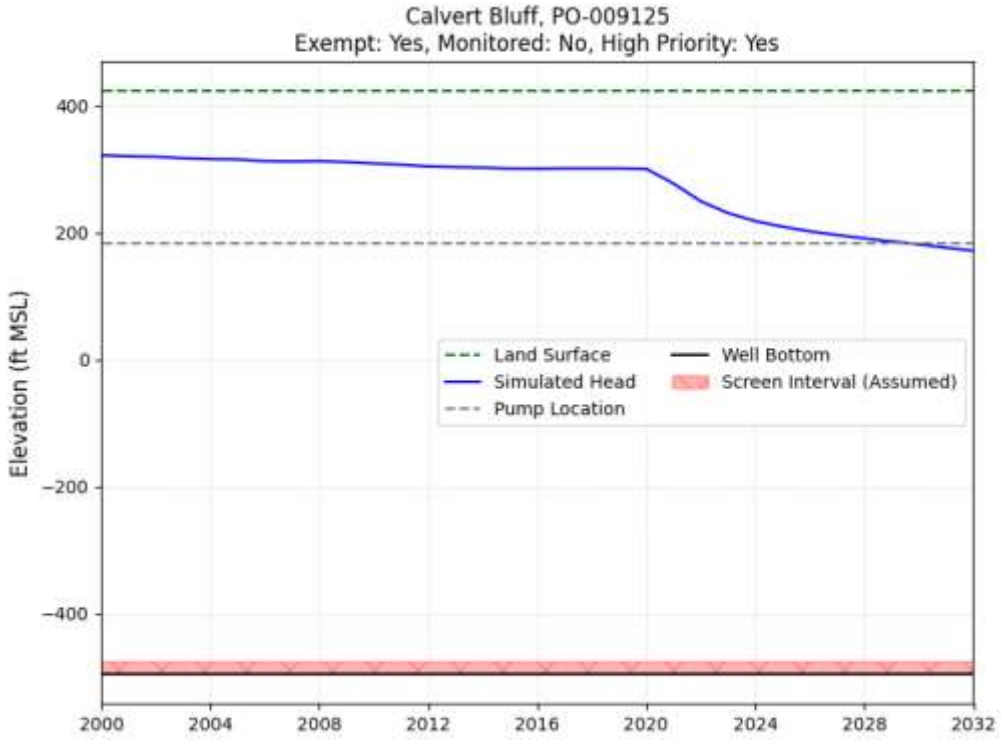


Figure E-20 Simulated water levels for high-priority wells PO-007242 and PO-009125 located in the Carrizo Aquifer

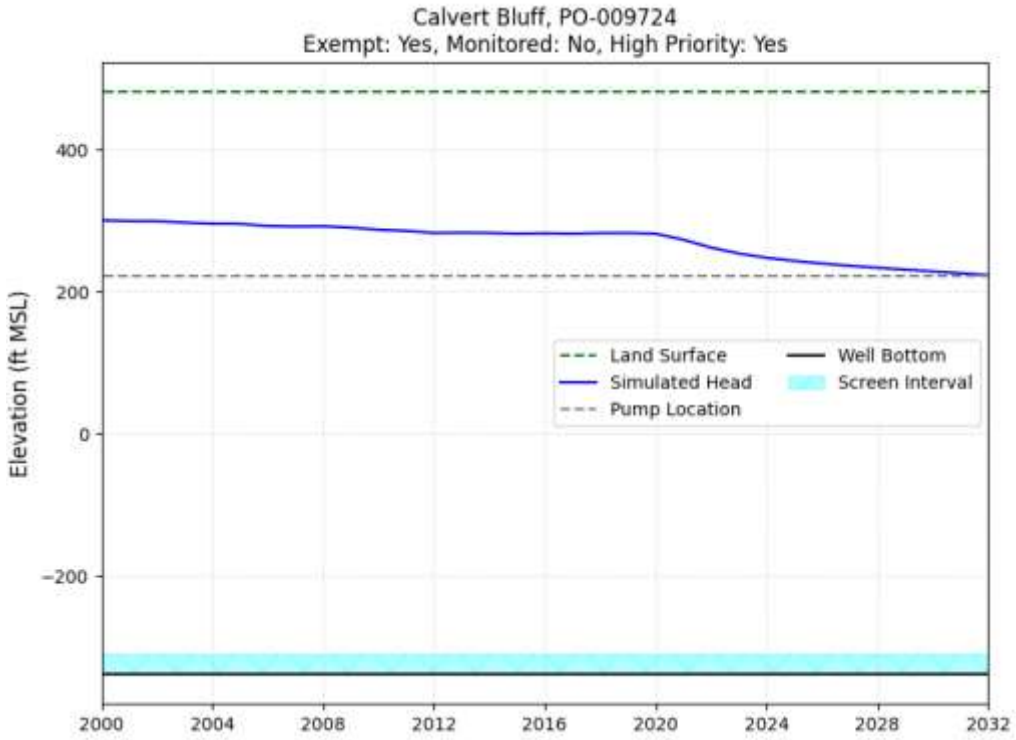


Figure E-21 Simulated water levels for high-priority well PO-009724 located in the Calvert Bluff Aquifer

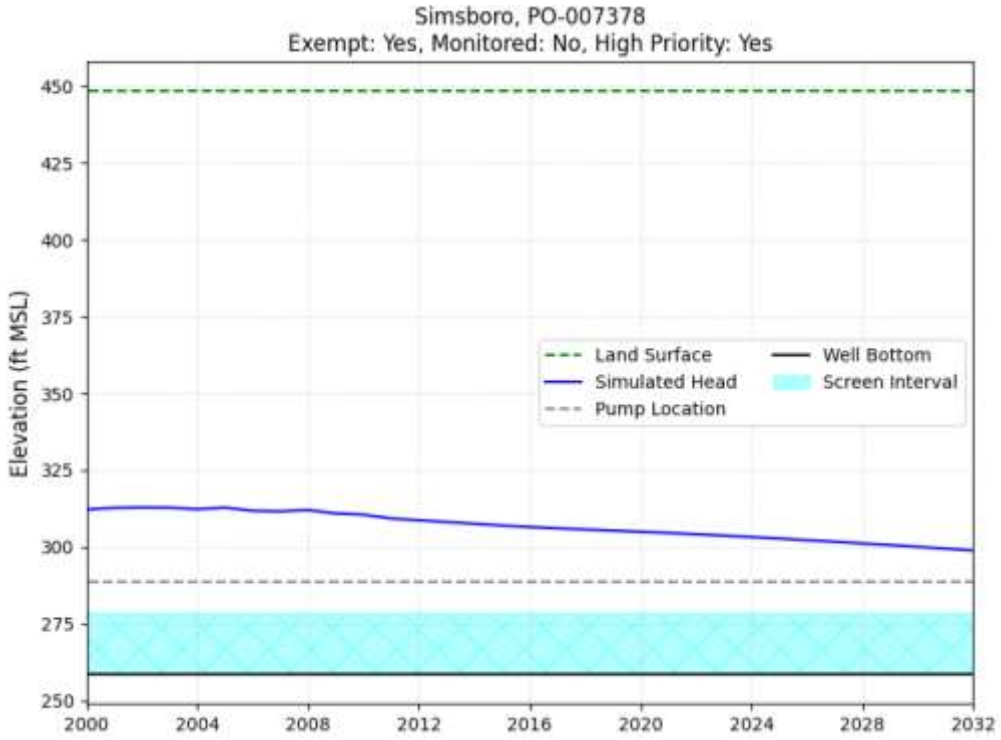


Figure E-22 Simulated water levels for high-priority well PO-007378 located in the Simsboro Aquifer

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APPENDIX F

Hydrographs for Wells of Concern

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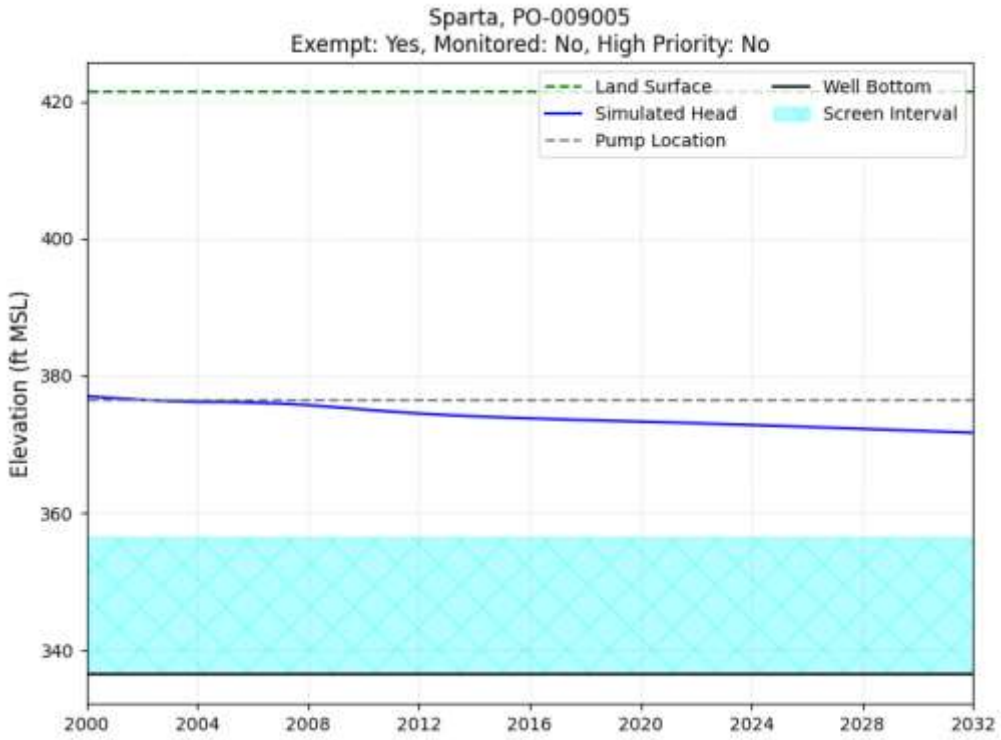

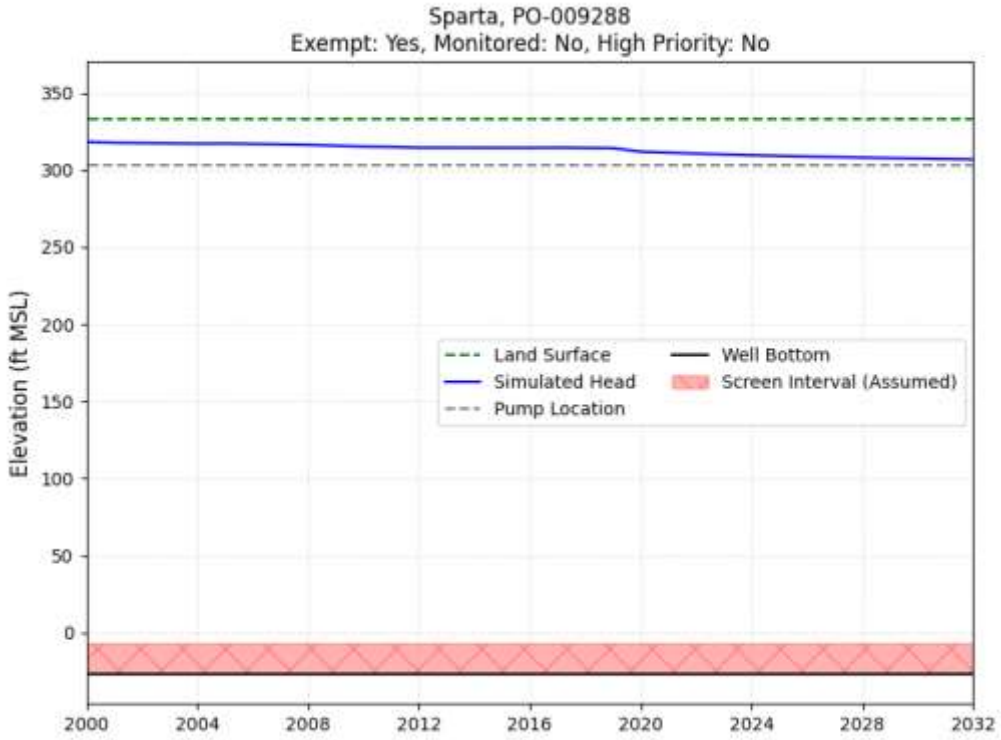

Figure F-1 Simulated water levels for wells of concern PO-009005 and PO-009288 located in the Sparta Aquifer

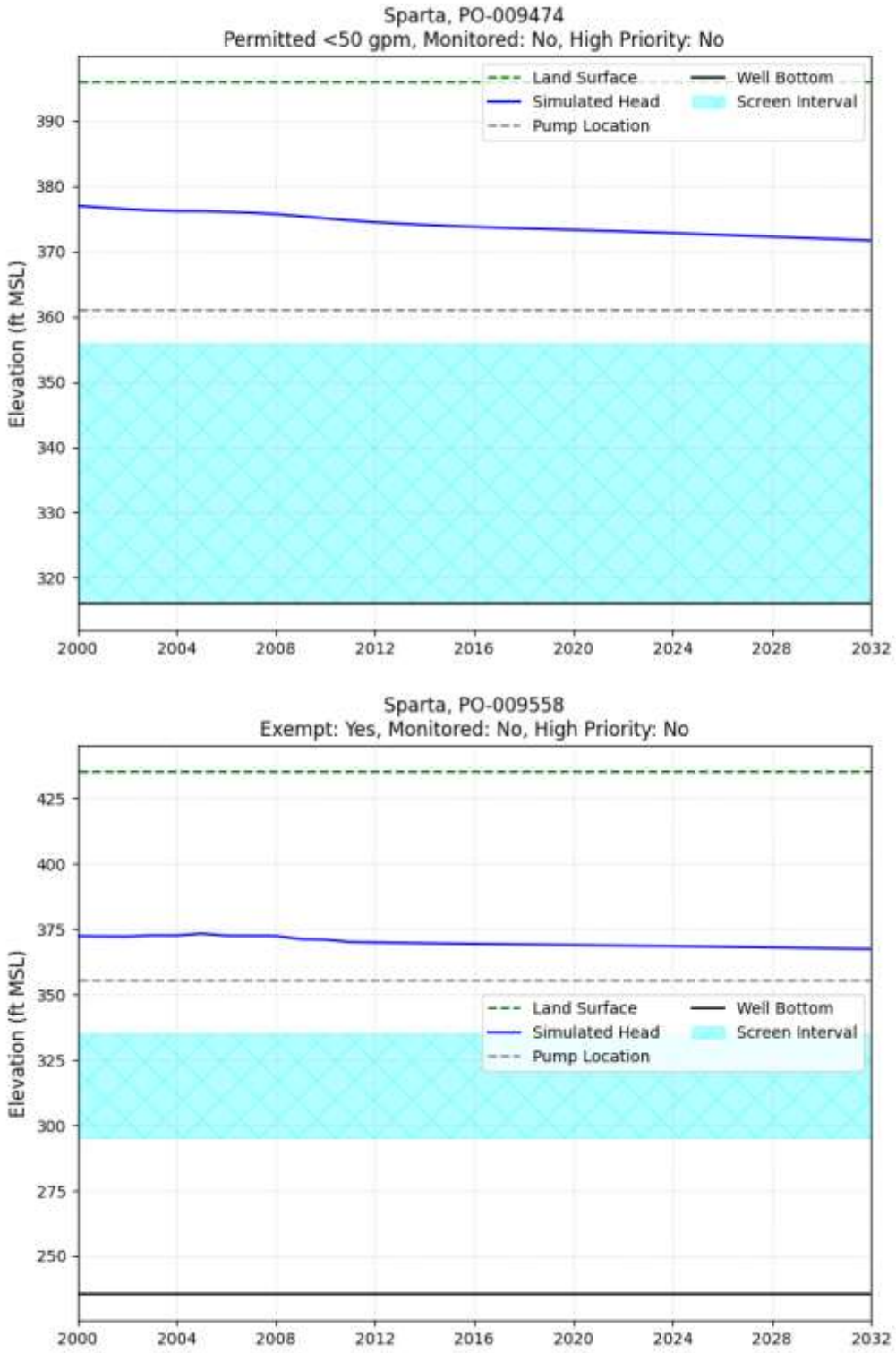

Figure F-2 Simulated water levels for wells of concern PO-009474 and PO-009558 located in the Sparta Aquifer

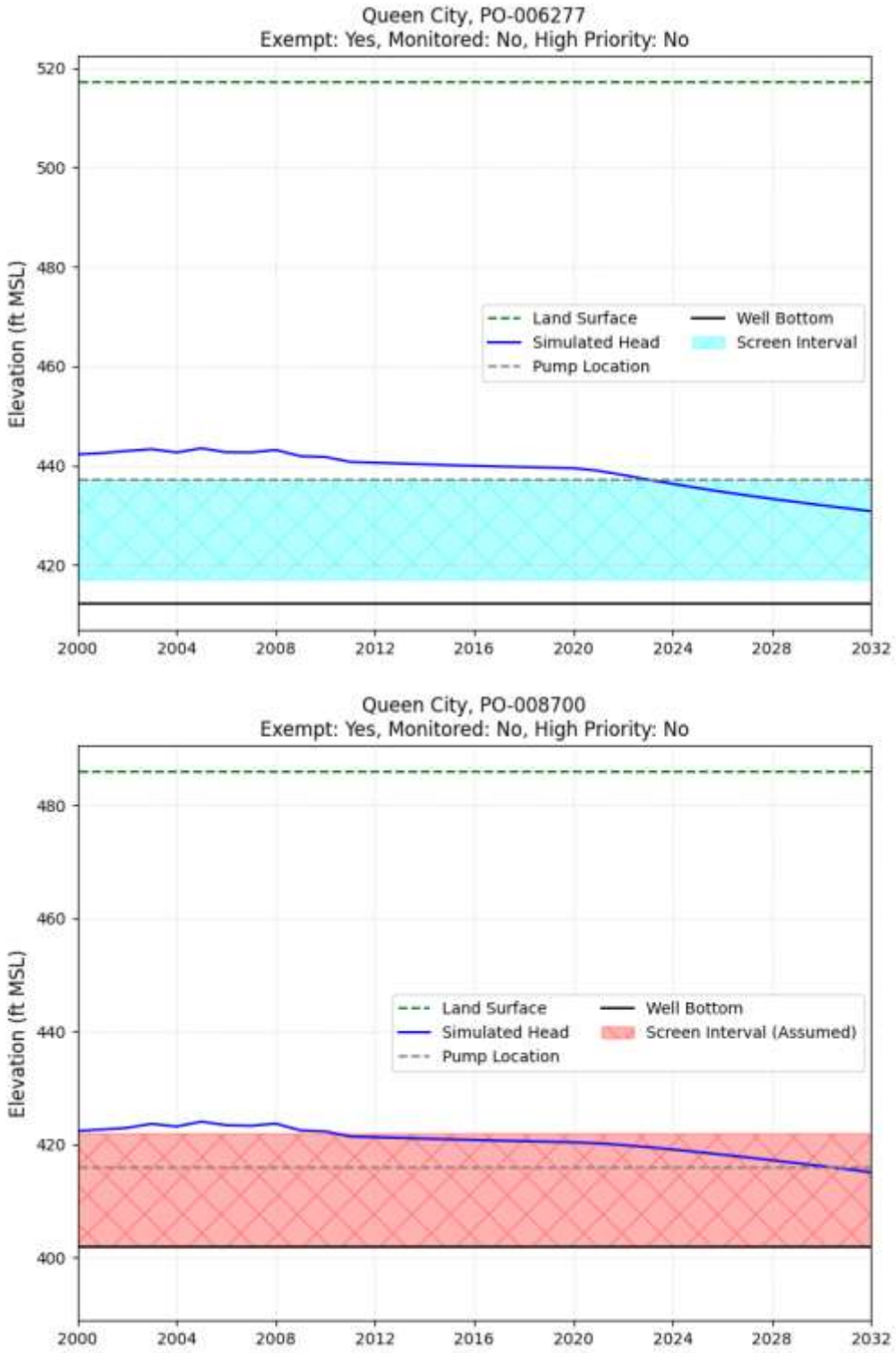

Figure F-3 Simulated water levels for wells of concern PO-006277 and PO-008700 located in the Queen City Aquifer

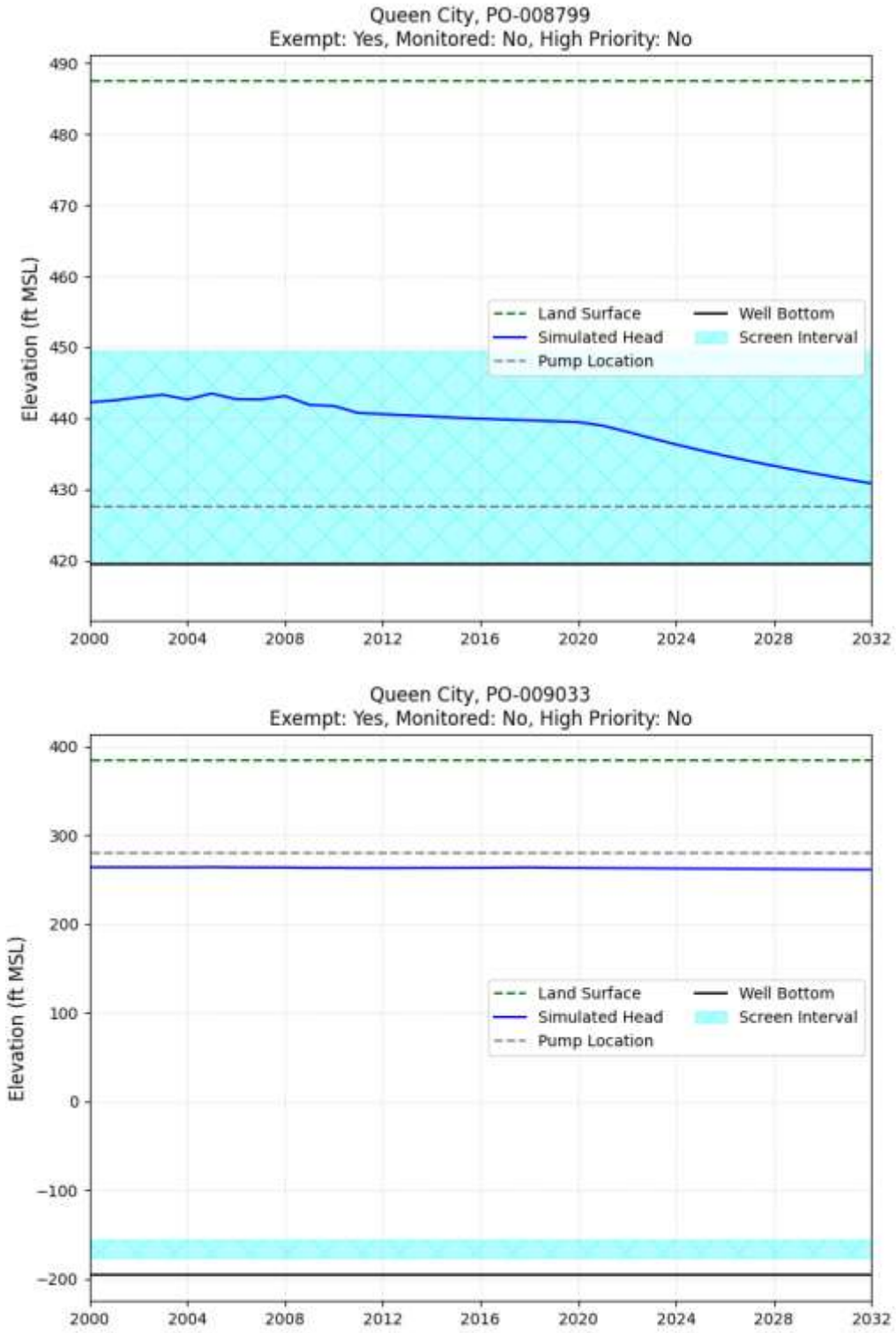

Figure F-4 Simulated water levels for wells of concern PO-008799 and PO-009033 located in the Queen City Aquifer

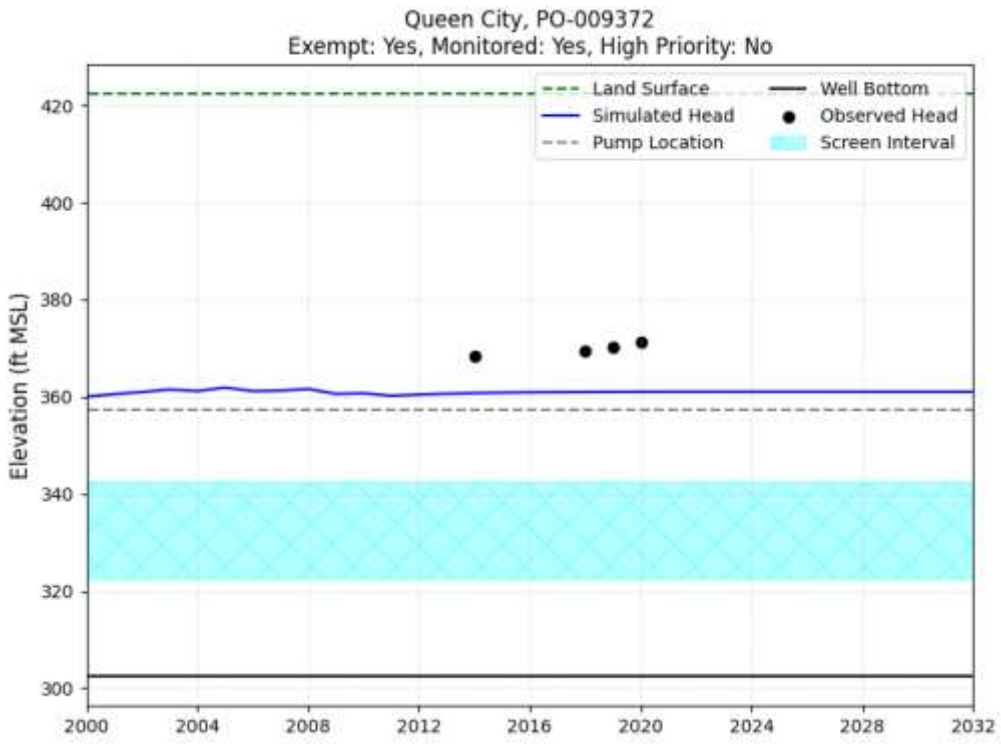

Figure F-5 Simulated water levels for well of concern PO-009372 located in the Queen City Aquifer

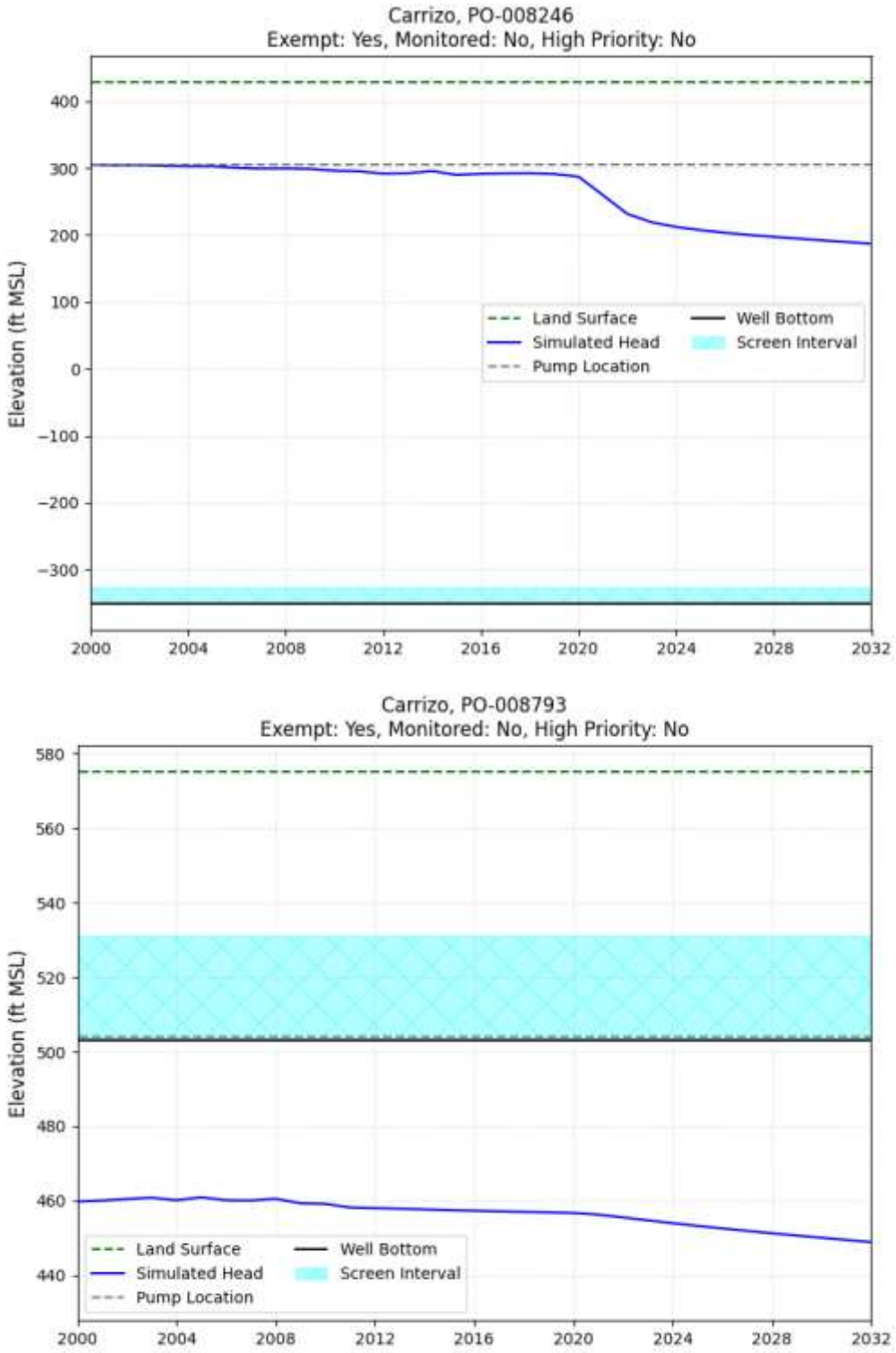

Figure F-6 Simulated water levels for wells of concern PO-008246 and PO-008793 located in the Carrizo Aquifer

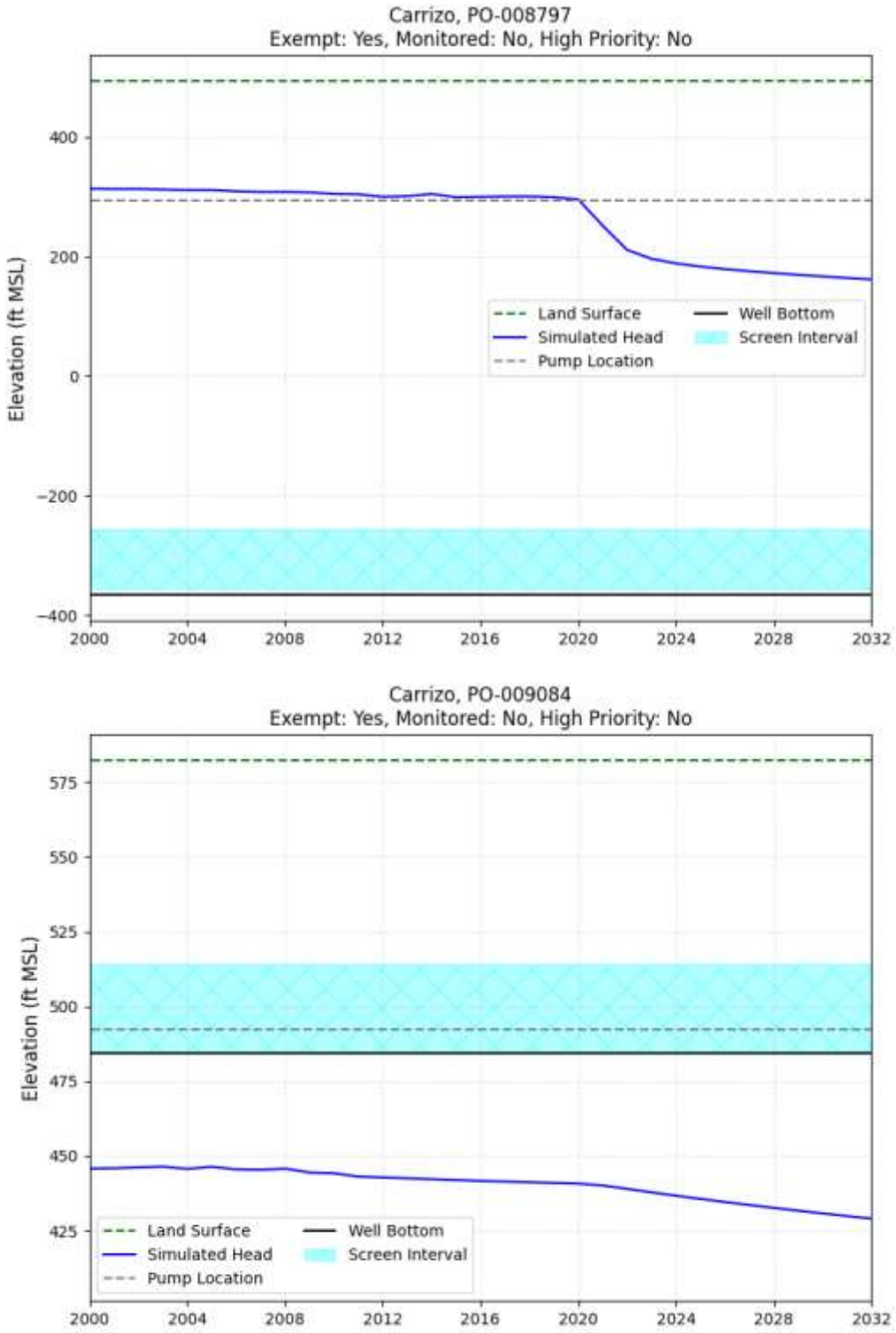

Figure F-7 Simulated water levels for wells of concern PO-008797 and PO-009084 located in the Carrizo Aquifer

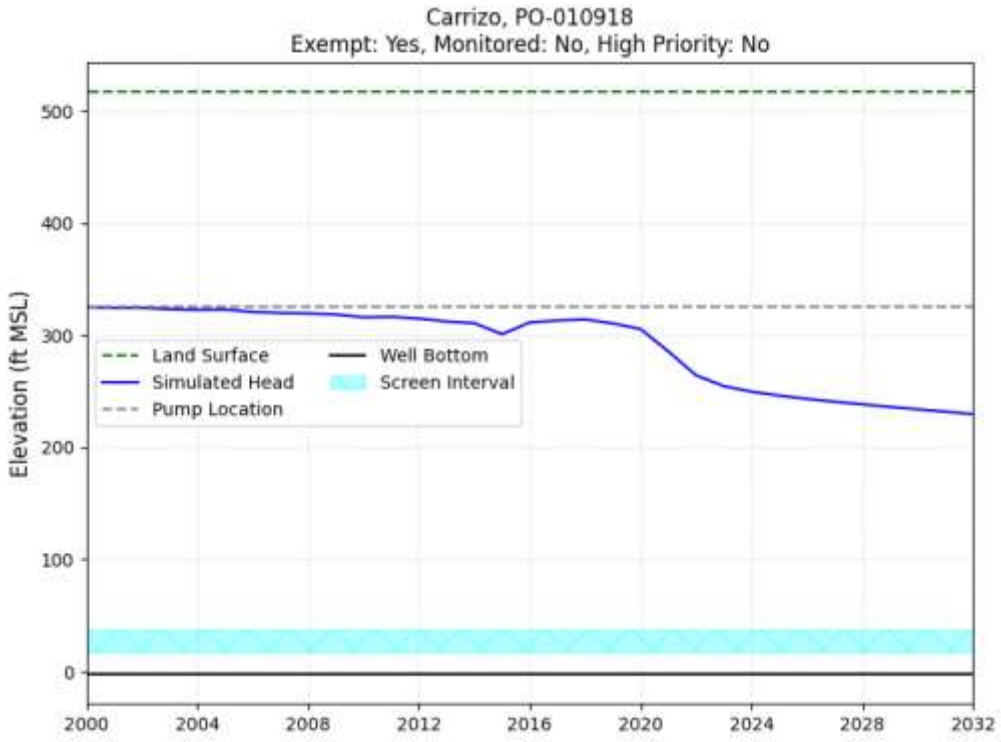

Figure F-8 Simulated water levels for well of concern PO-010918 located in the Carrizo Aquifer

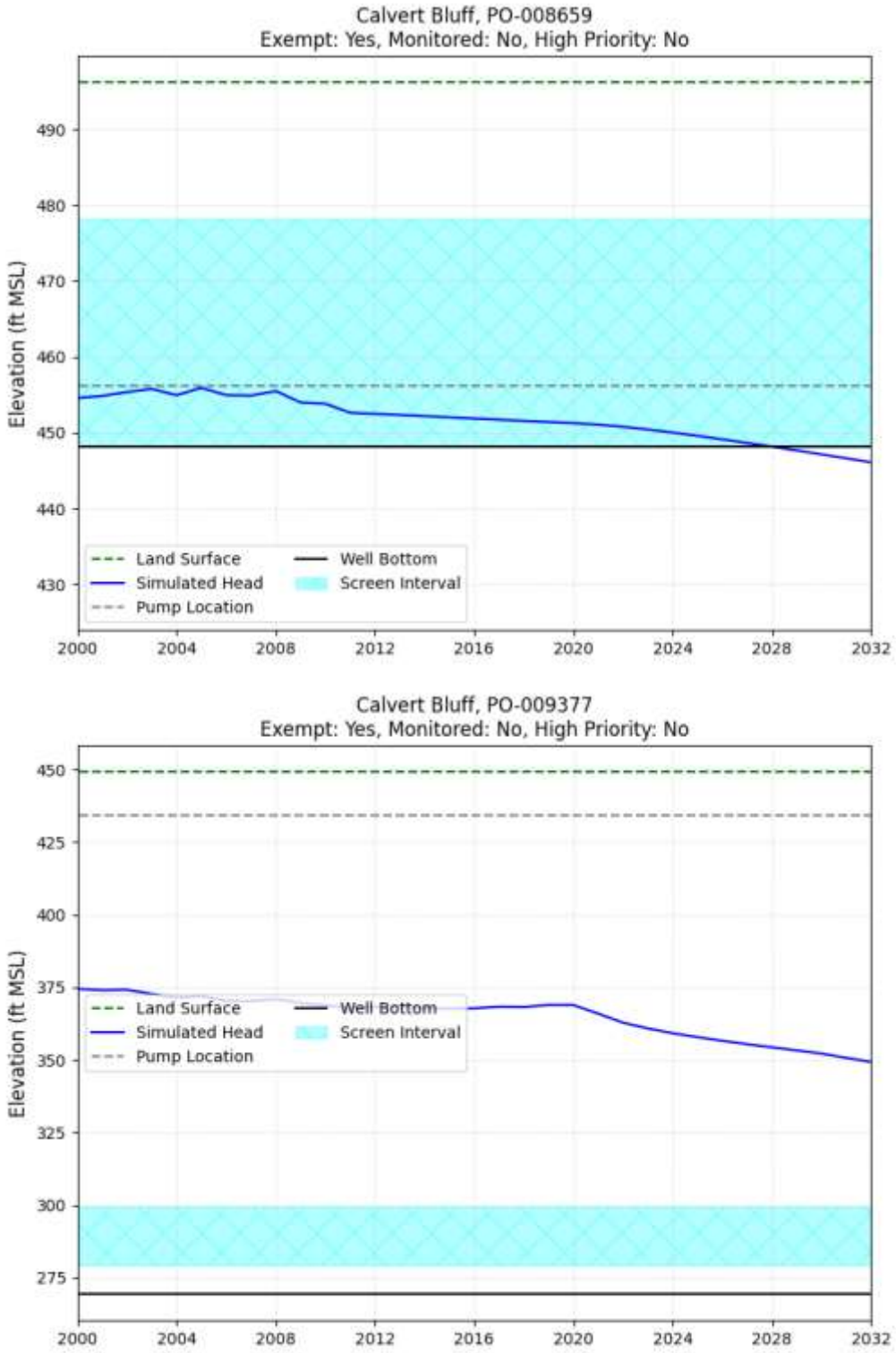

Figure F-9 Simulated water levels for wells of concern PO-008659 and PO-009377 located in the Calvert Bluff Aquifer

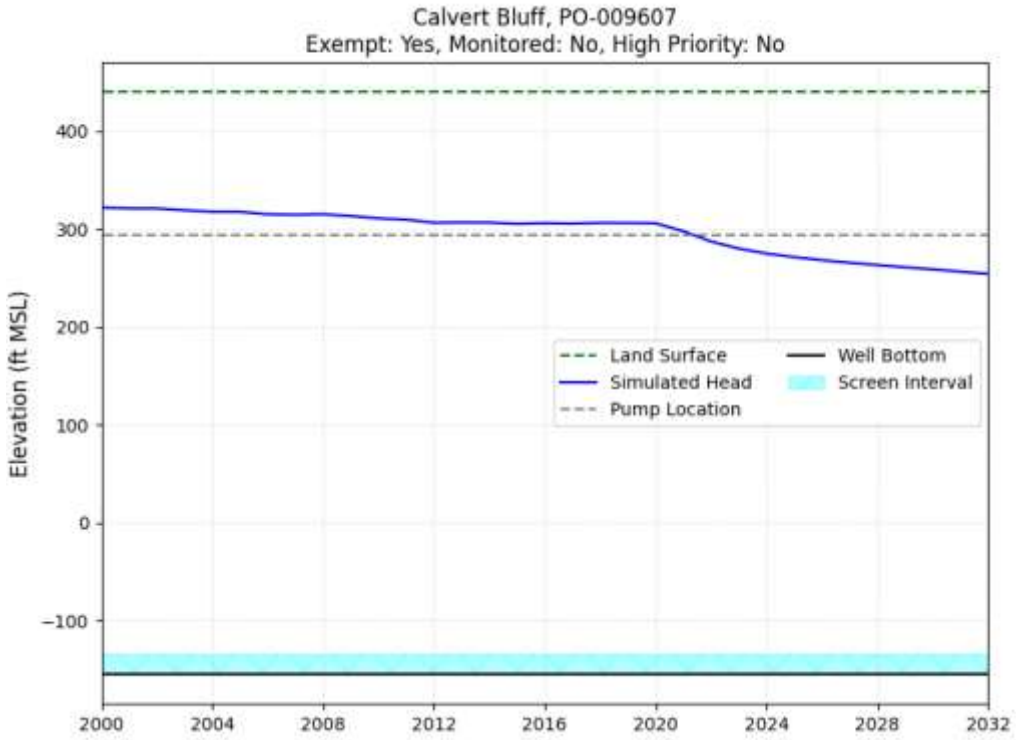

Figure F-10 Simulated water levels for well of concern PO-009607 located in the Calvert Bluff Aquifer

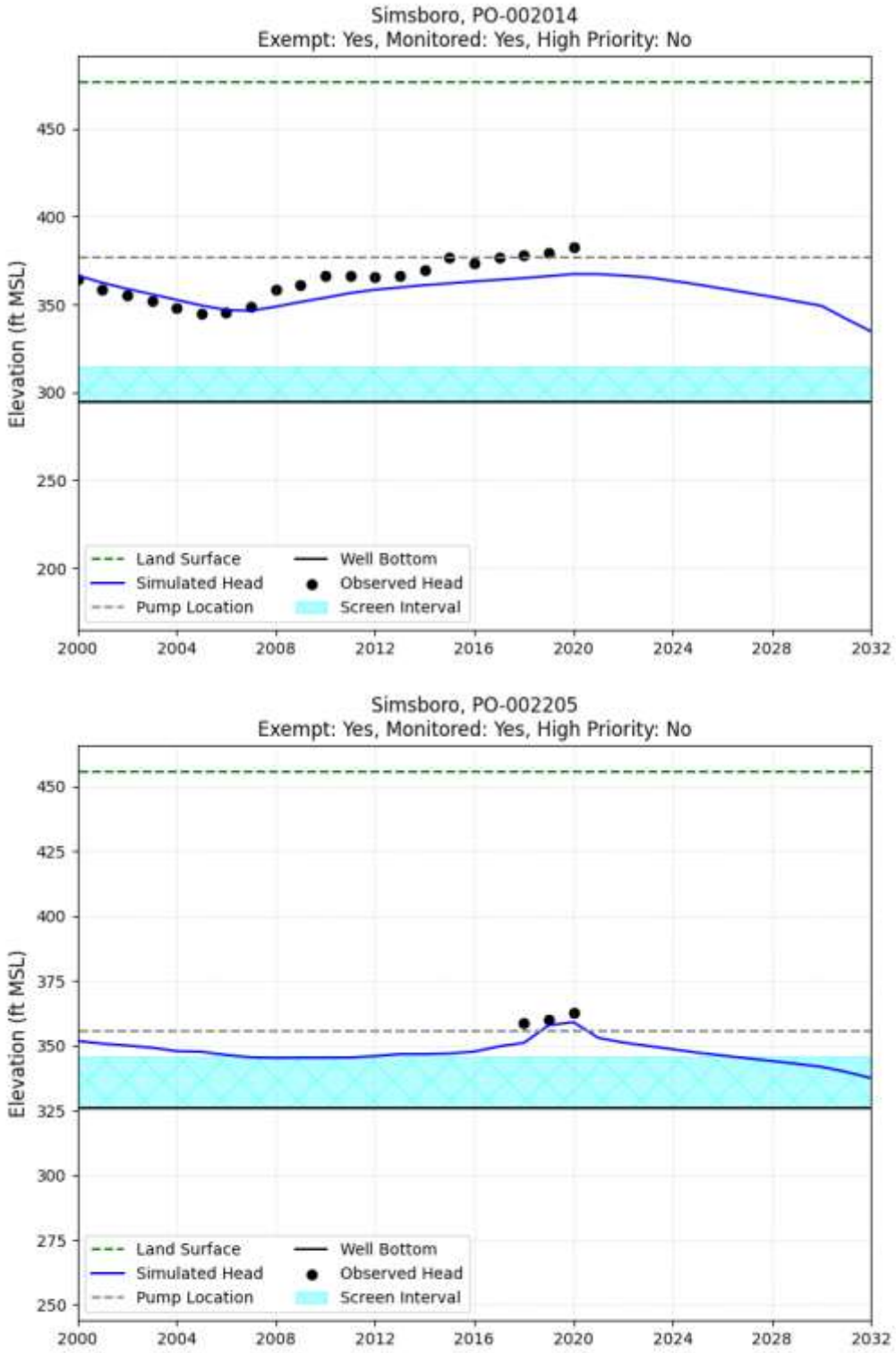

Figure F-11 Simulated water levels for wells of concern PO-002014 and PO-002205 located in the Simsboro Aquifer

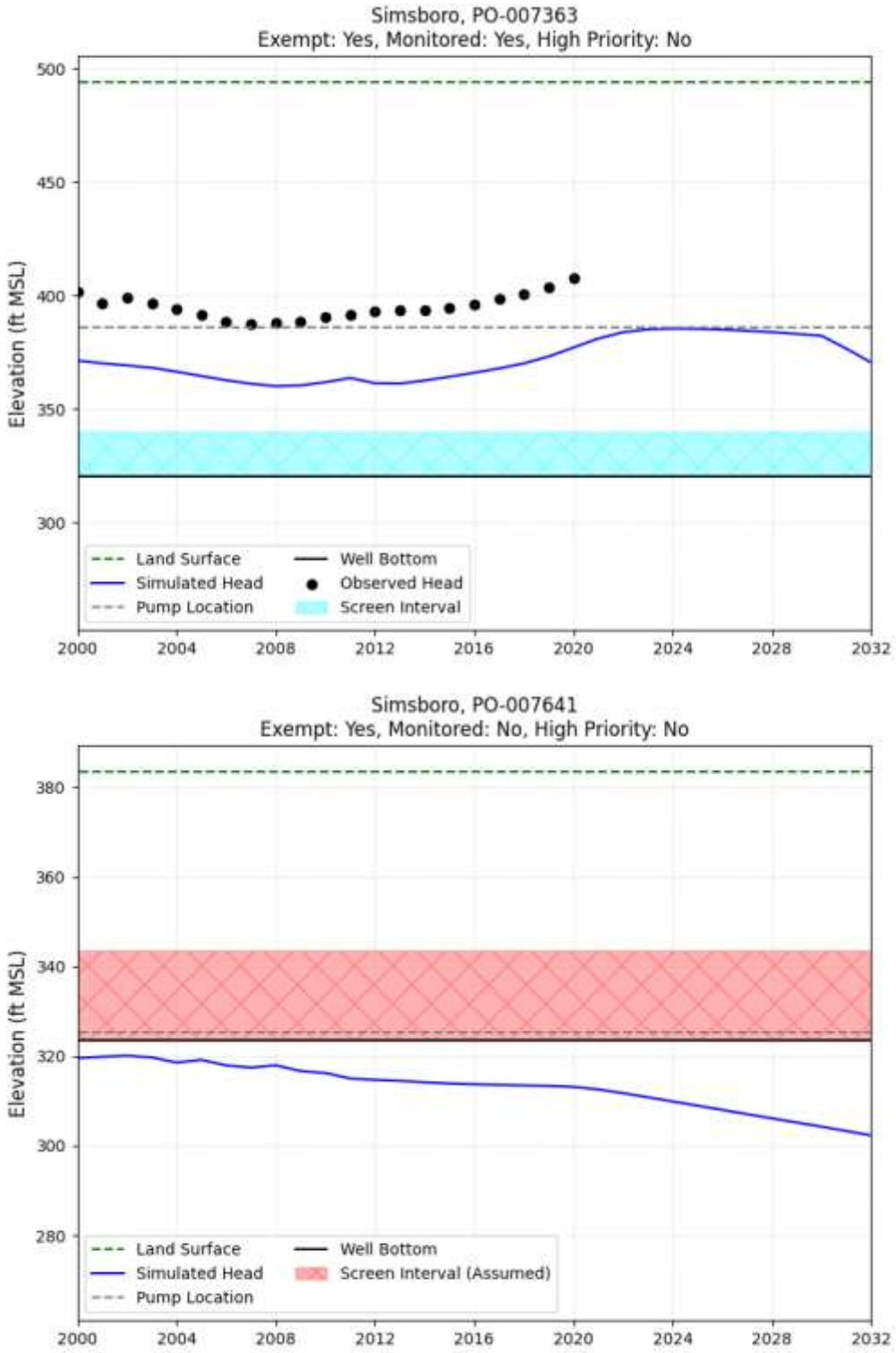

Figure F-12 Simulated water levels for wells of concern PO-007363 and PO-007641 located in the Simsboro Aquifer

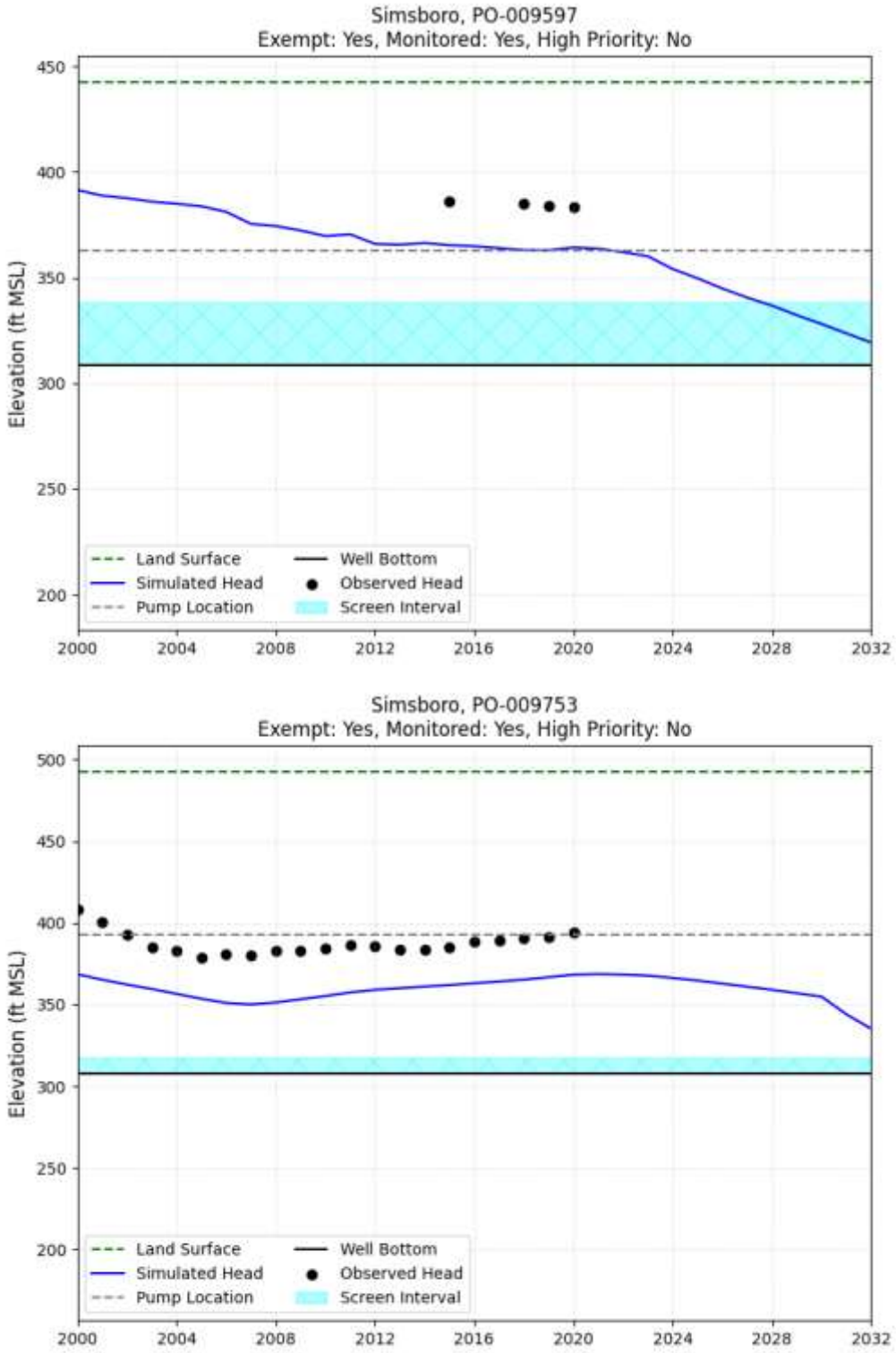

Figure F-13 Simulated water levels for wells of concern PO-009597 and PO-009753 located in the Simsboro Aquifer

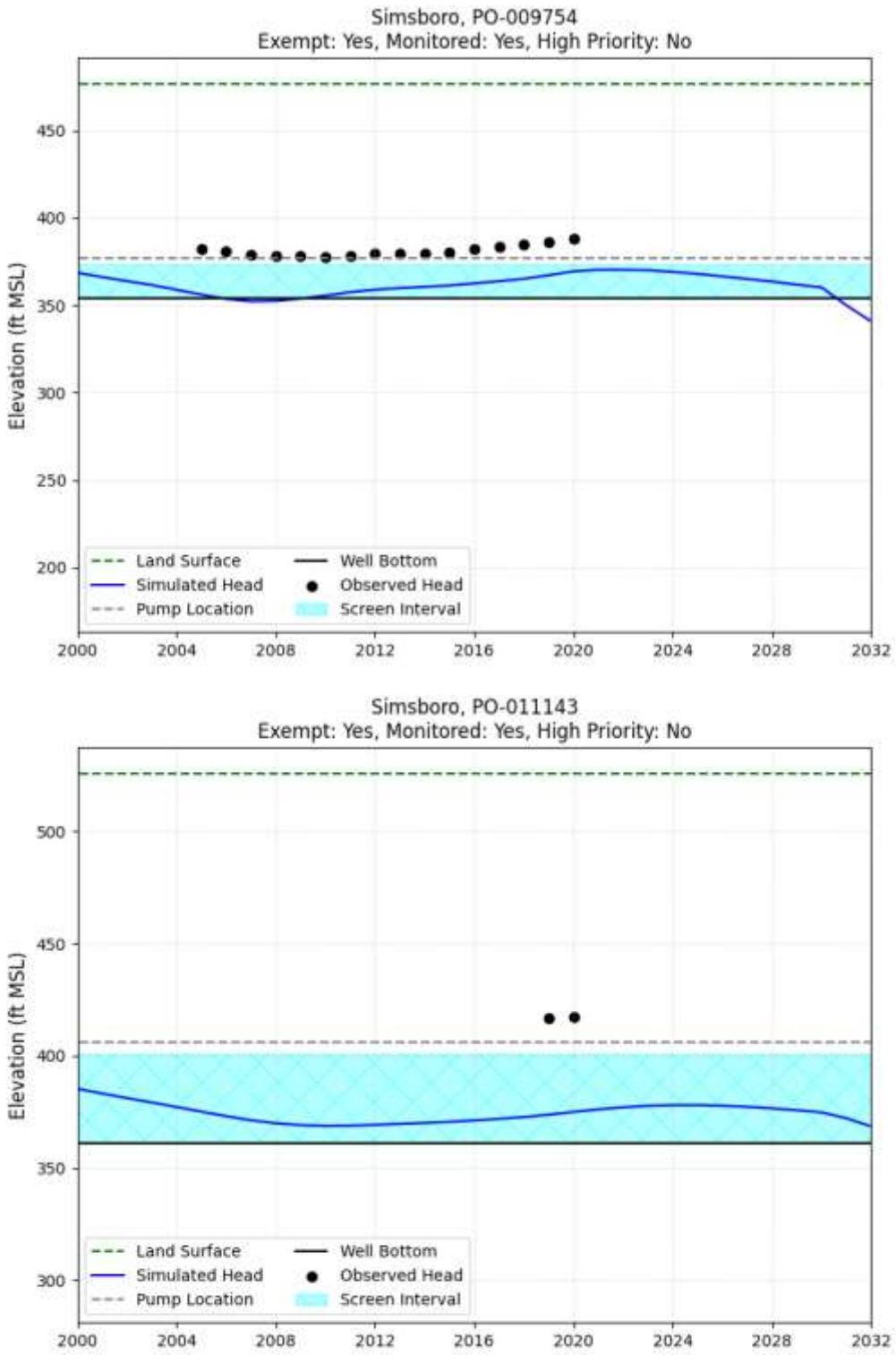

Figure F-14 Simulated water levels for wells of concern PO-009754 and PO-011143 located in the Simsboro Aquifer

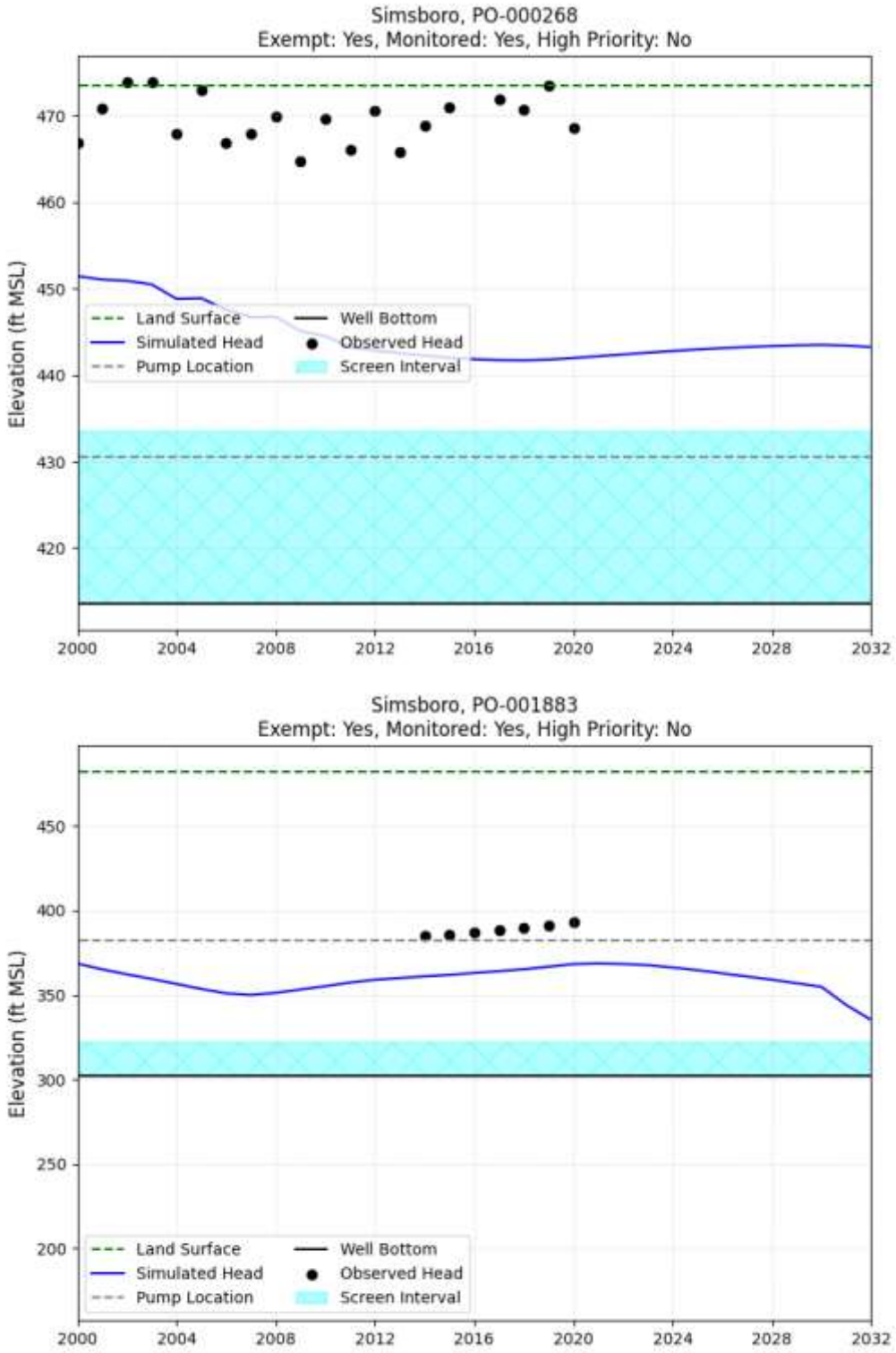

Figure F-15 Simulated water levels for wells of concern PO-000268 and PO-001883 located in the Simsboro Aquifer

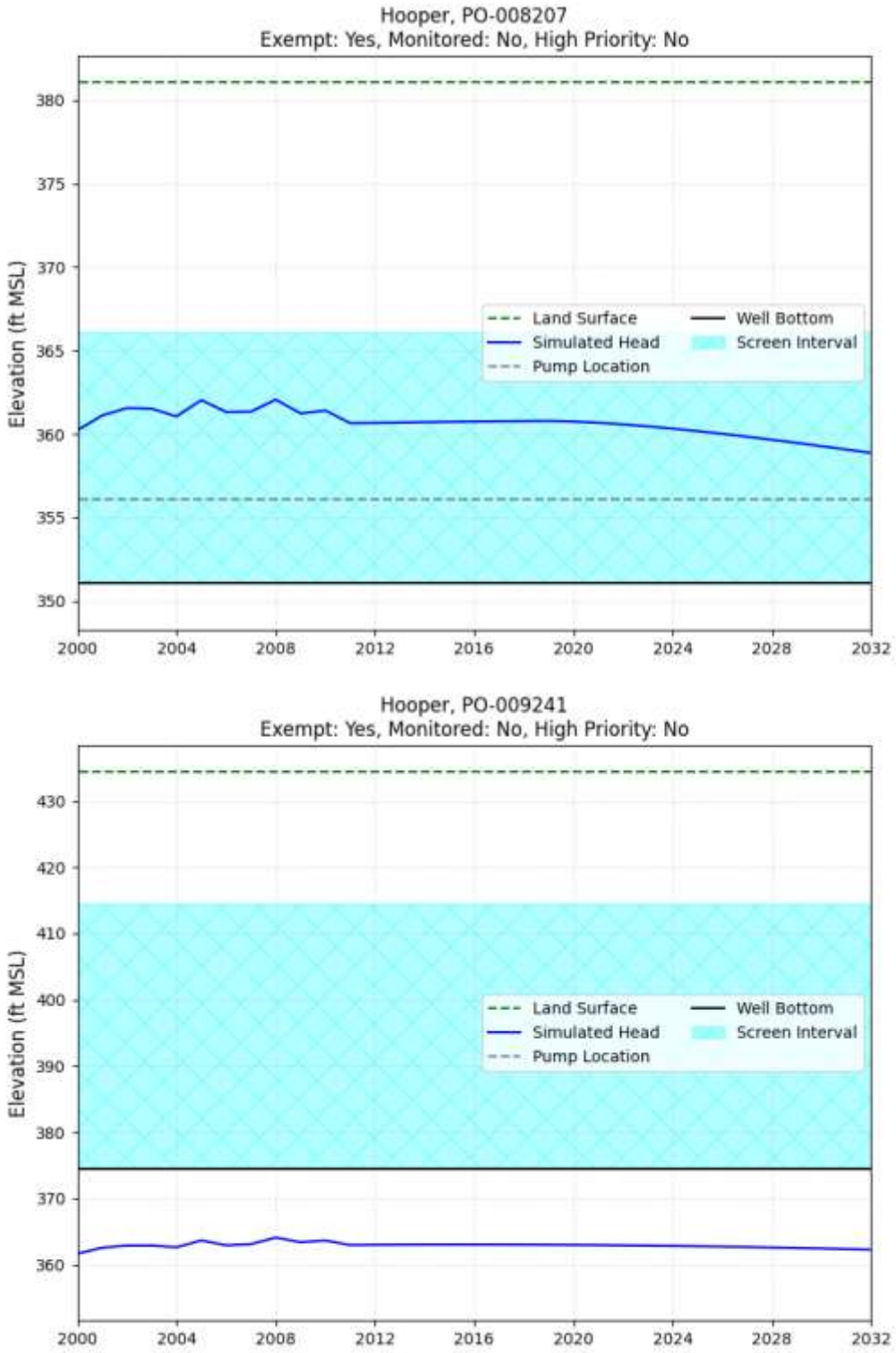

Figure F-16 Simulated water levels for wells of concern PO-008207 and PO-009241 located in the Hooper Aquifer

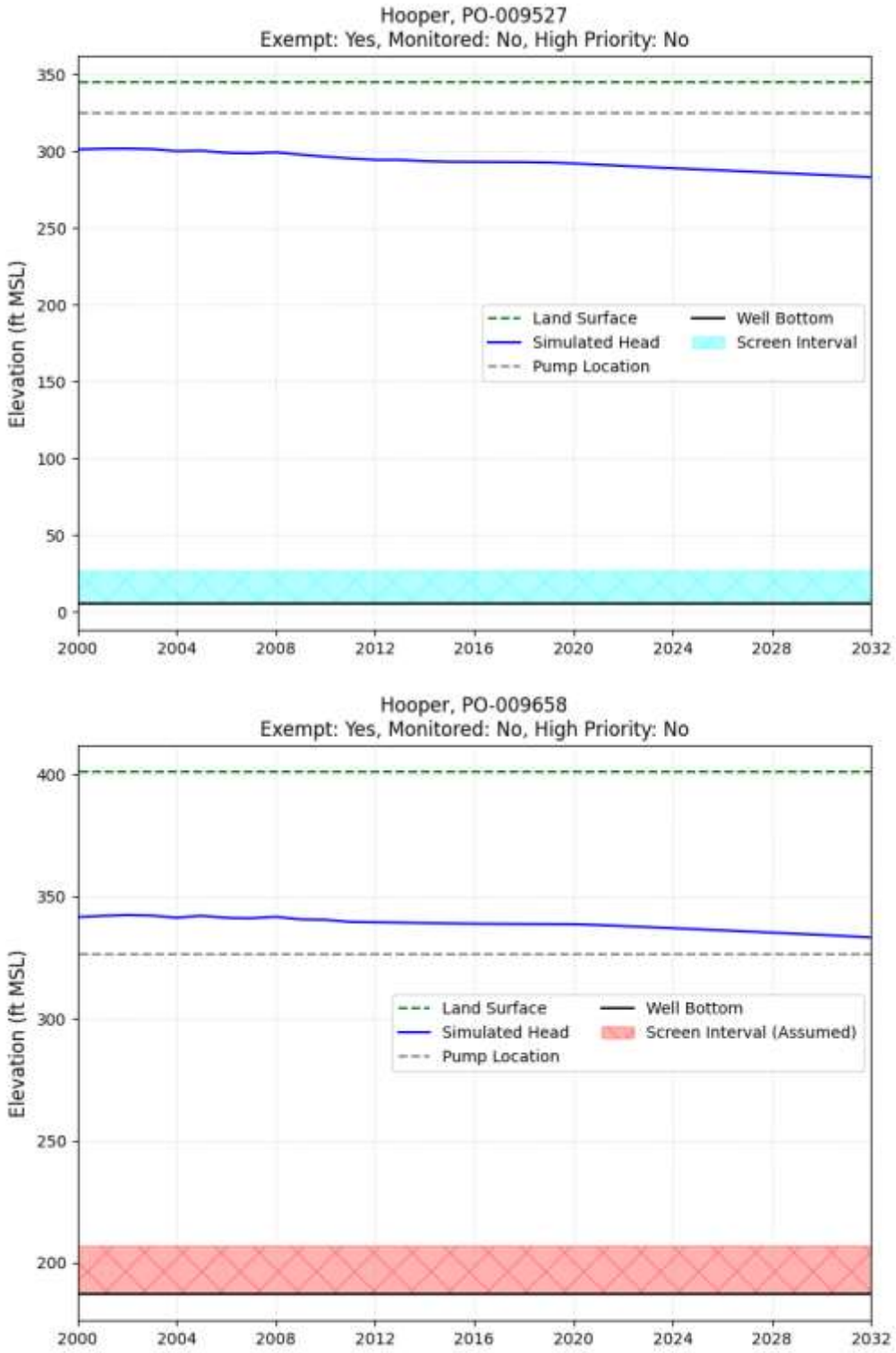

Figure F-17 Simulated water levels for wells of concern PO-009527 and PO-009658 located in the Hooper Aquifer

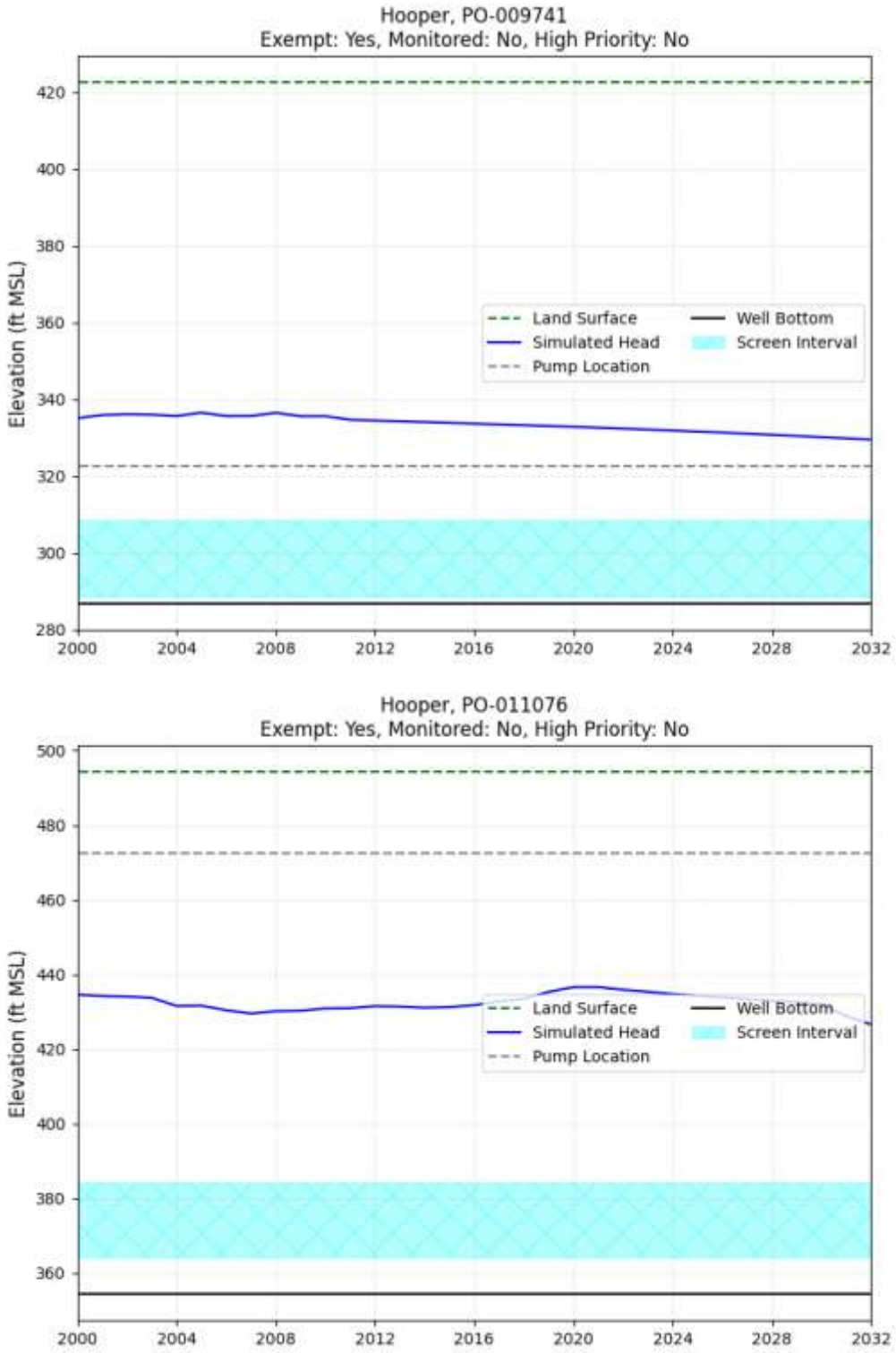

Figure F-18 Simulated water levels for wells of concern PO-009741 and PO-011076 located in the Hooper Aquifer

APPENDIX G

Listing of moderate-priority wells in the Carrizo Aquifer

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WellId
PO-000302
PO-000315
PO-000325
PO-000393
PO-000488
PO-000493
PO-000496
PO-000497
PO-000506
PO-000510
PO-000525
PO-000625
PO-001331
PO-001342
PO-001365
PO-003430
PO-003437
PO-004965
PO-004971
PO-004998
PO-005098
PO-005102
PO-005109
PO-005113
PO-005114
PO-005178
PO-005214
PO-005218
PO-005224
PO-005231
PO-005244
PO-005246
PO-005249
PO-005252
PO-005490
PO-005728

PO-005729
PO-005754
PO-005759
PO-005763
PO-005813
PO-005814
PO-005816
PO-005817
PO-006049
PO-006058
PO-006551
PO-006815
PO-006816
PO-007246
PO-007332
PO-009239
PO-009386
PO-009449
PO-010970
PO-011380

APPENDIX H

Hydrographs for Moderate-Priority Wells in the Carrizo Aquifer

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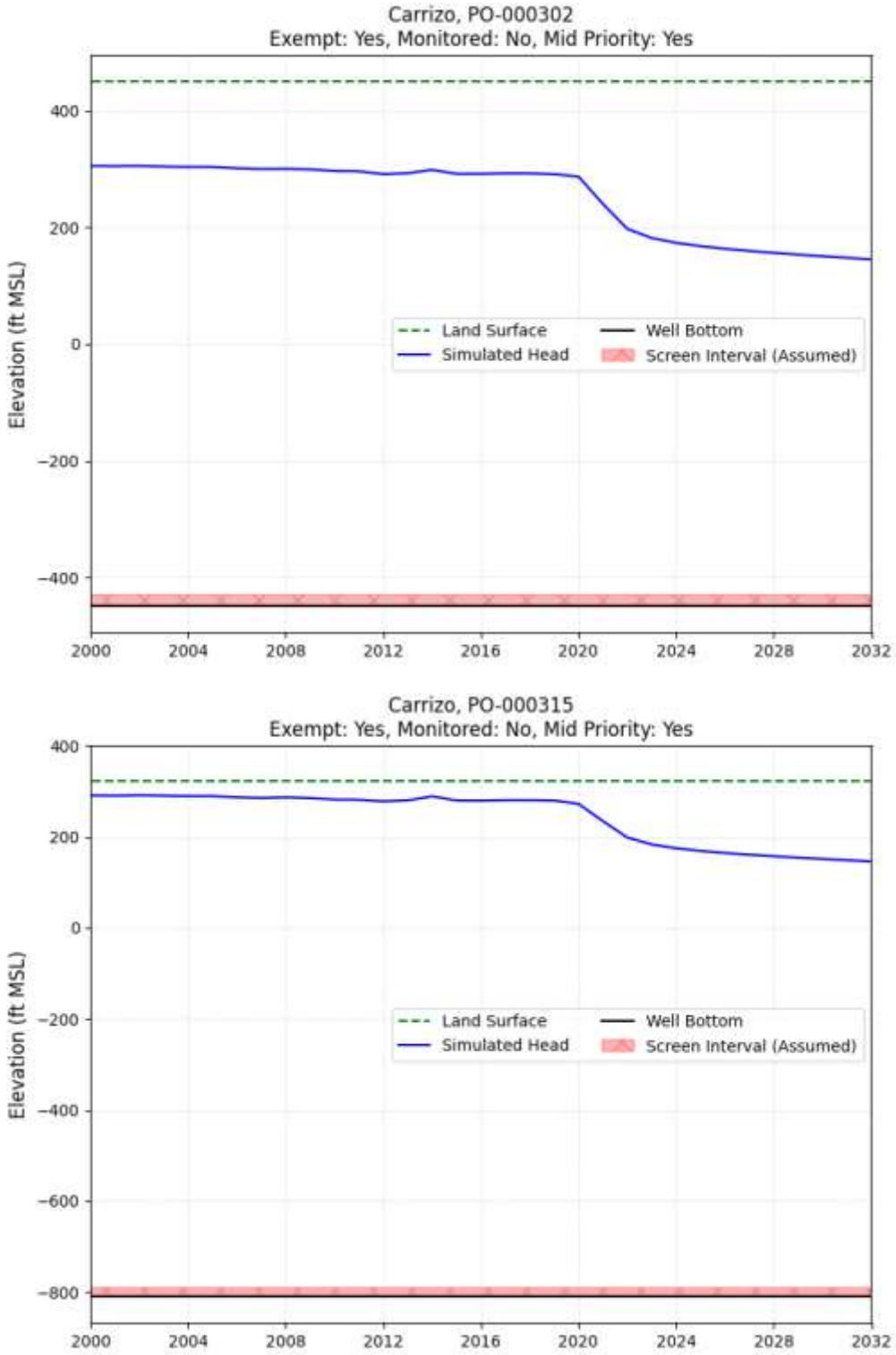

Figure H-1 Simulated water levels for moderate-priority wells PO-000302 and PO-000315 located in the Carrizo Aquifer

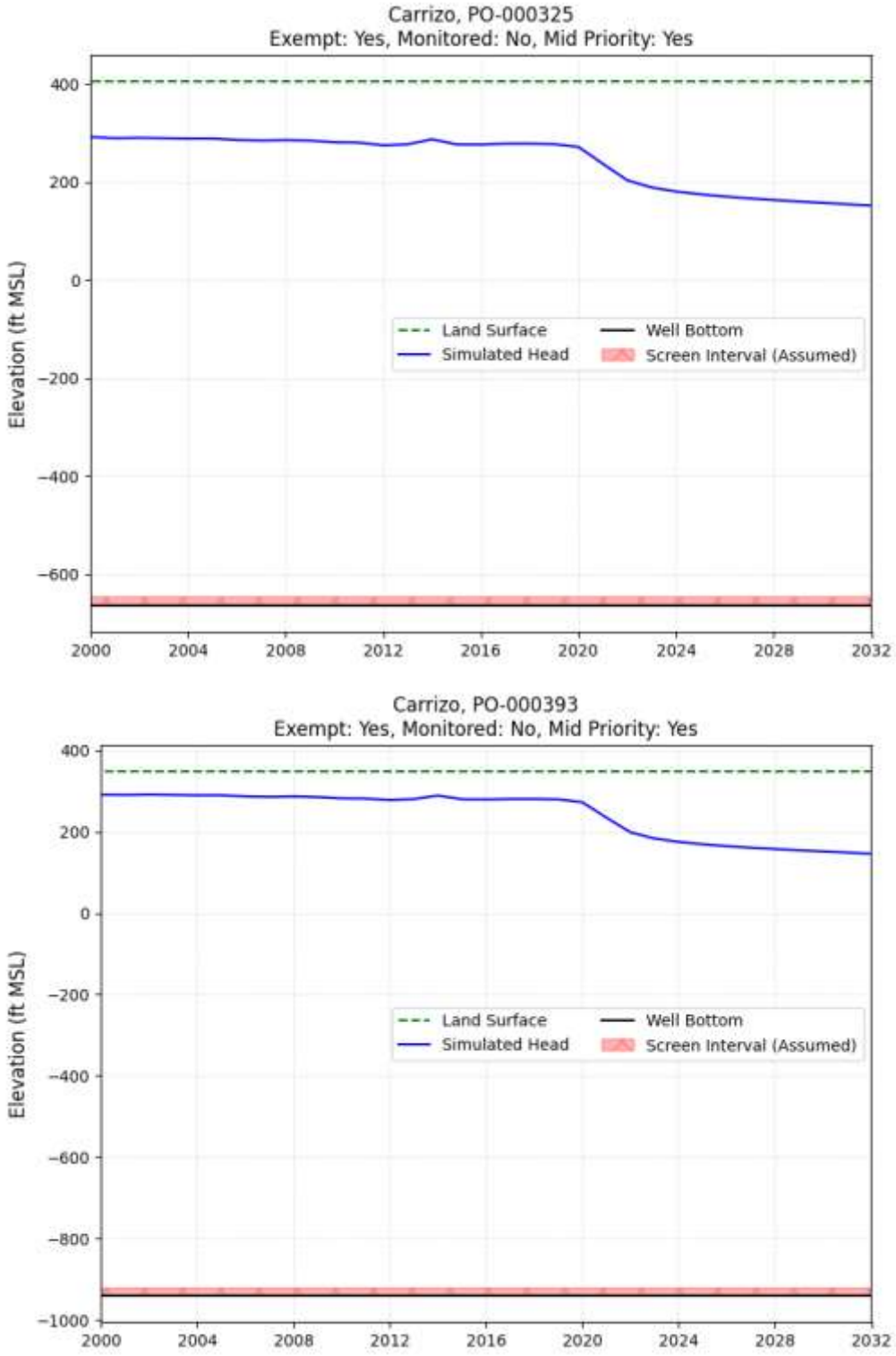

Figure H-2 Simulated water levels for moderate-priority wells PO-000325 and PO-000393 located in the Carrizo Aquifer

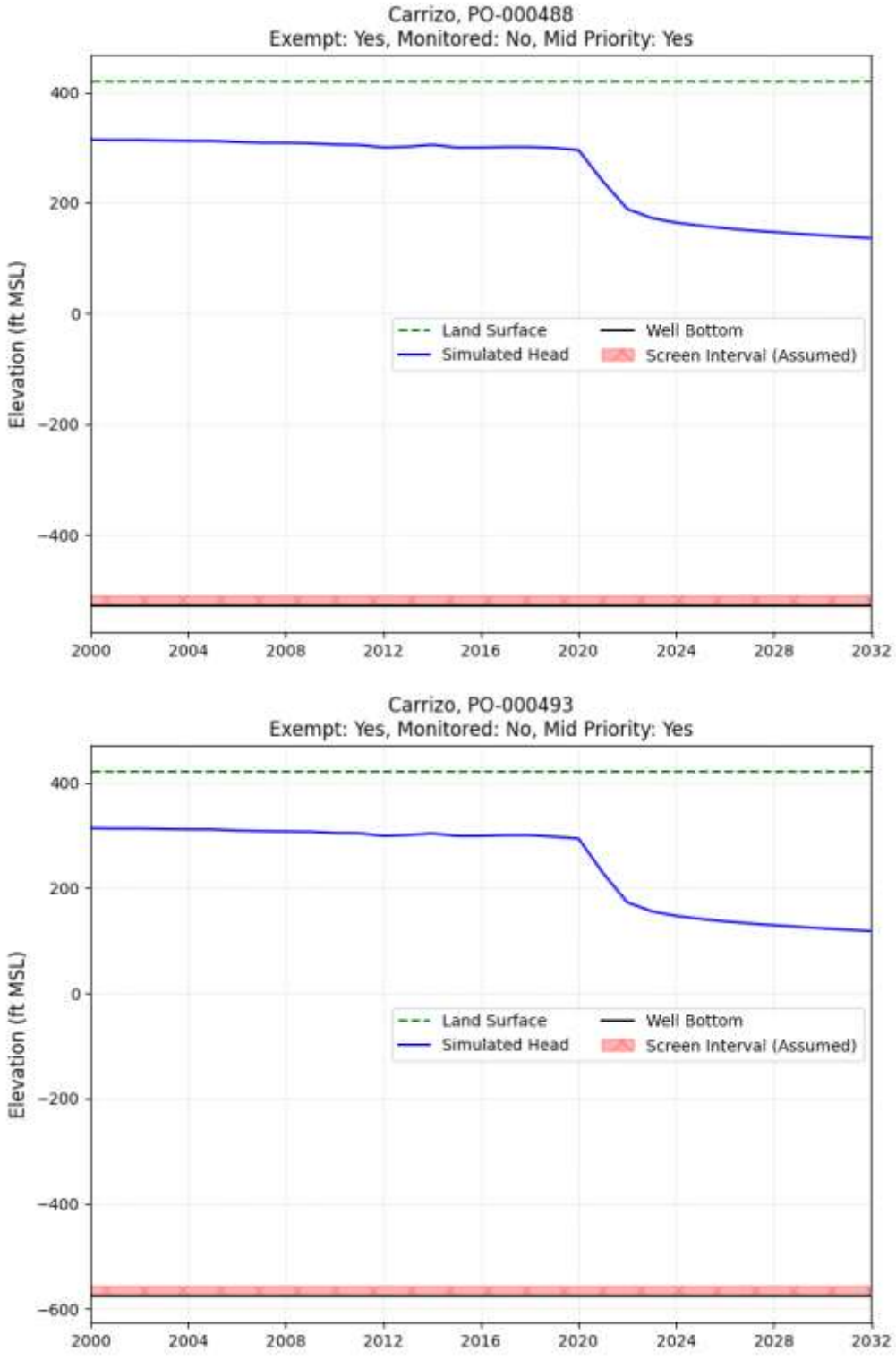

Figure H-3 Simulated water levels for moderate-priority wells PO-000488 and PO-000493 located in the Carrizo Aquifer

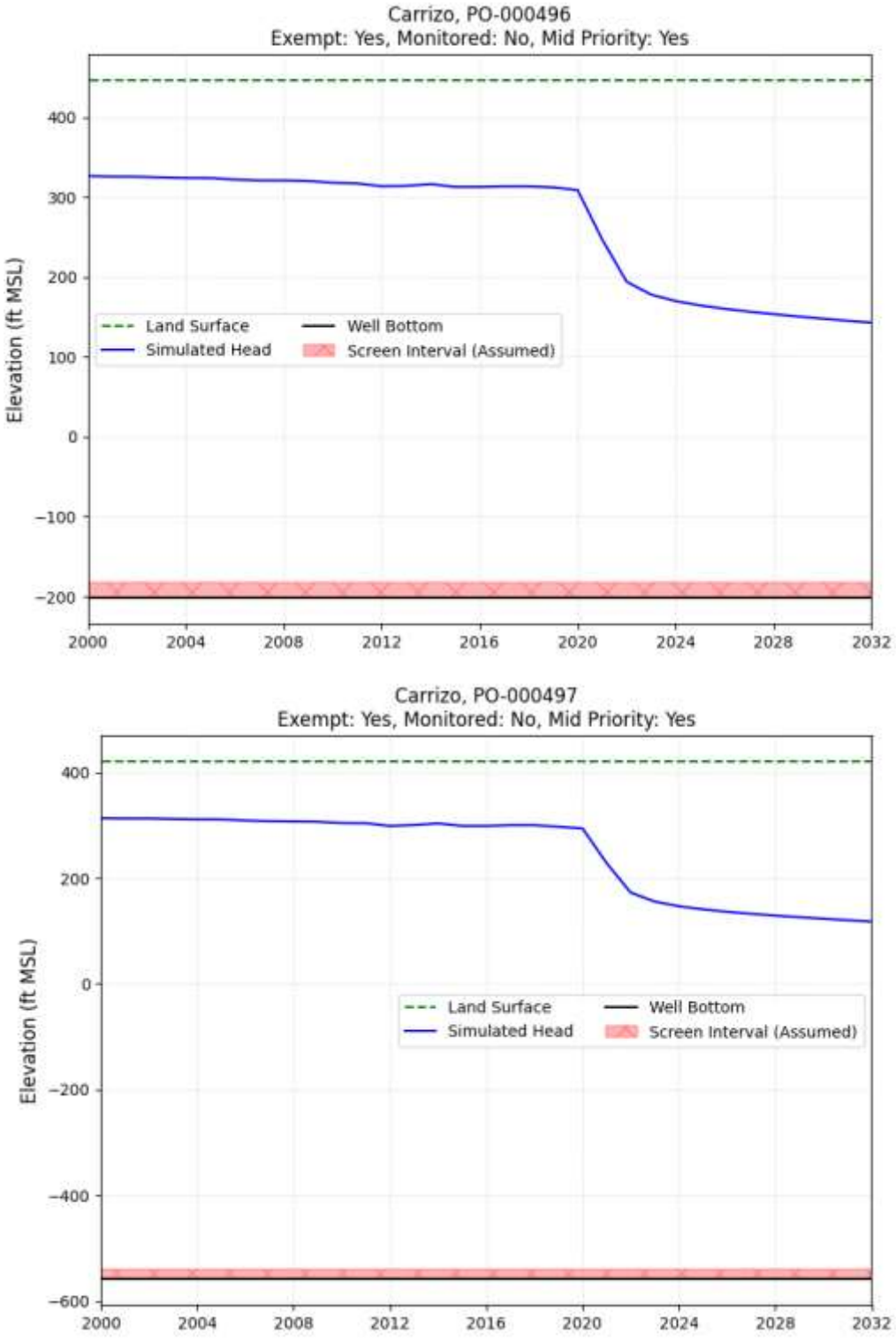

Figure H-4 Simulated water levels for moderate-priority wells PO-000496 and PO-000497 located in the Carrizo Aquifer

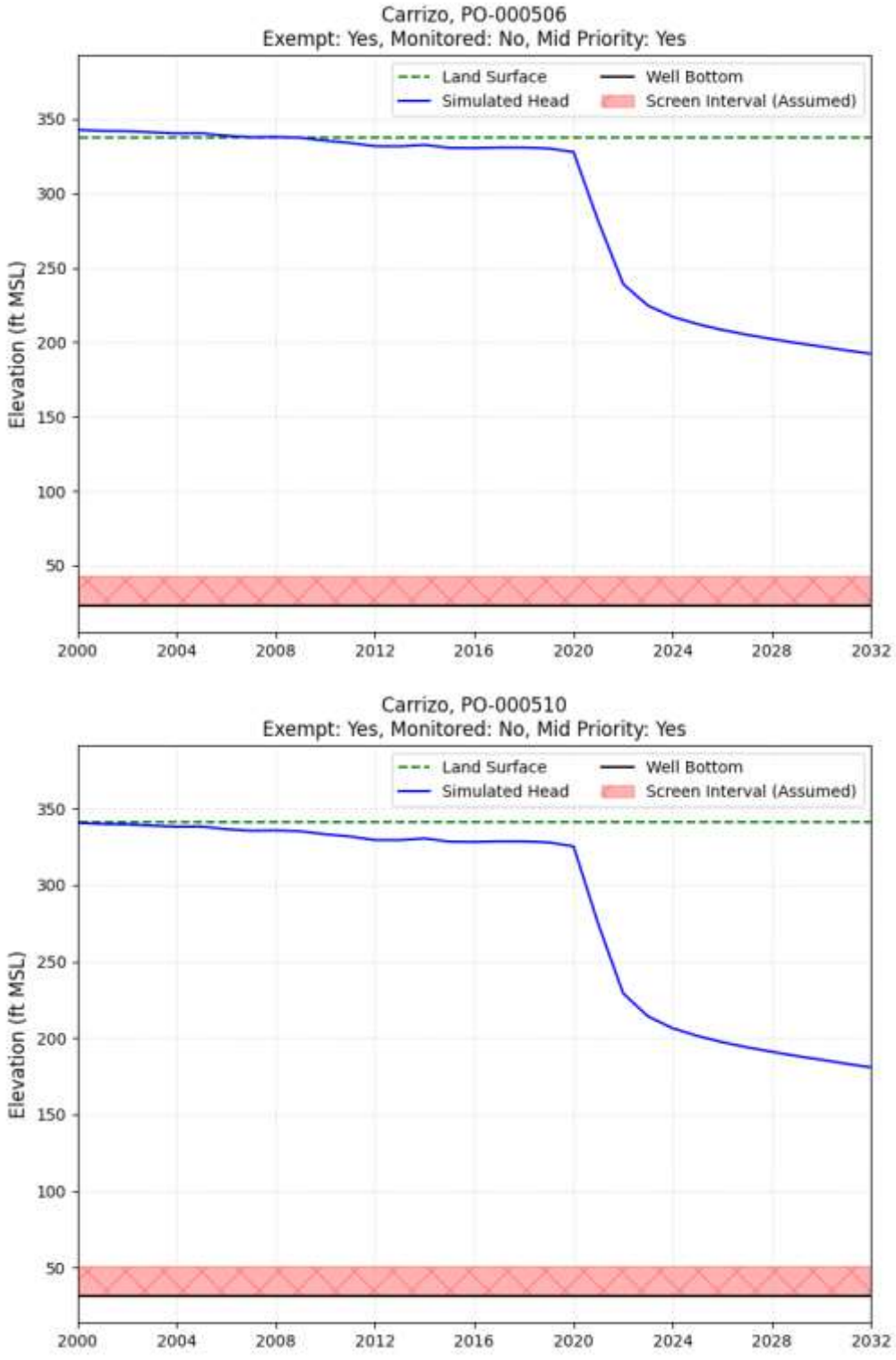

Figure H-5 Simulated water levels for moderate-priority wells PO-000506 and PO-000510 located in the Carrizo Aquifer

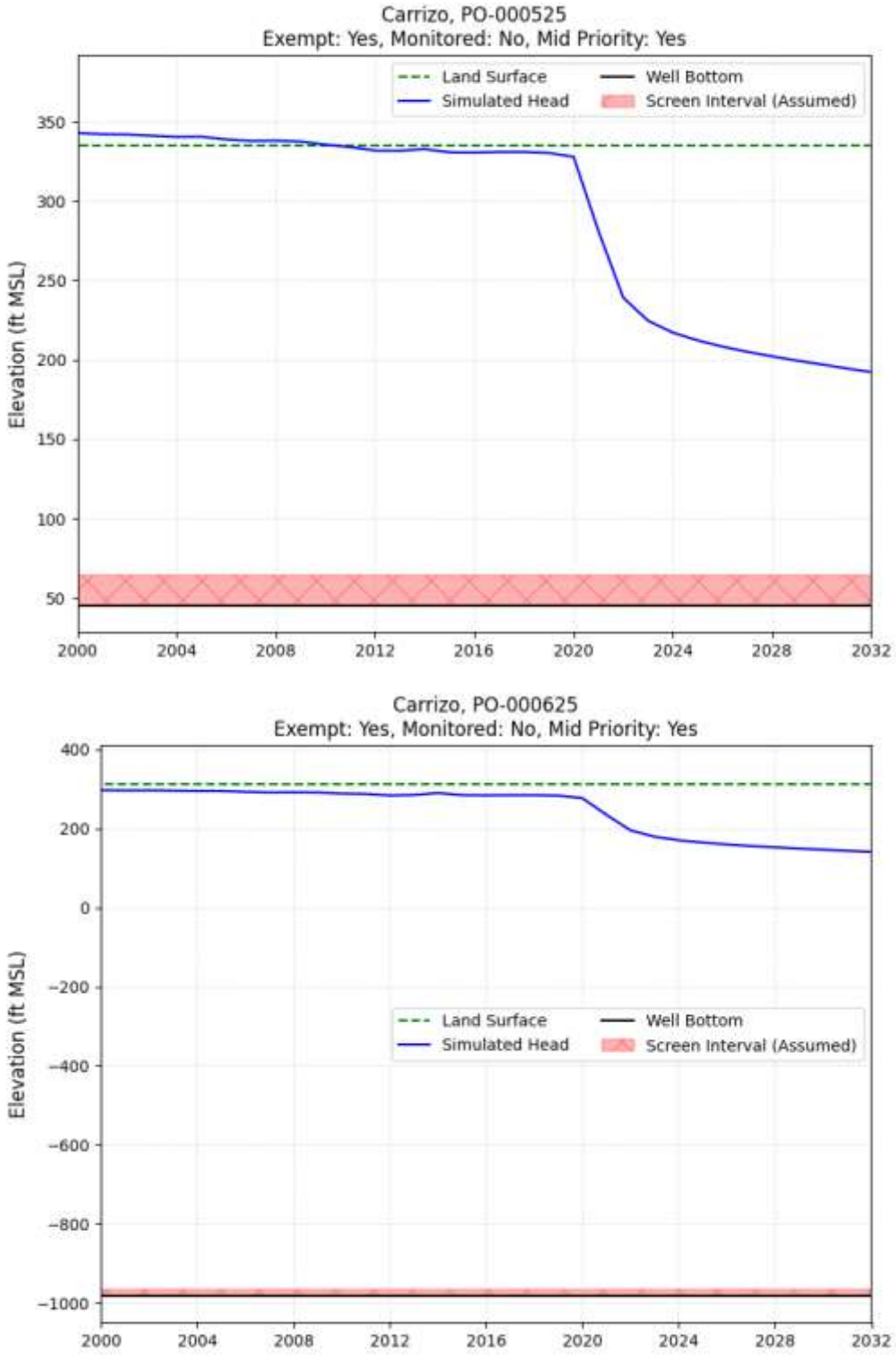

Figure H-6 Simulated water levels for moderate-priority wells PO-000525 and PO-000625 located in the Carrizo Aquifer

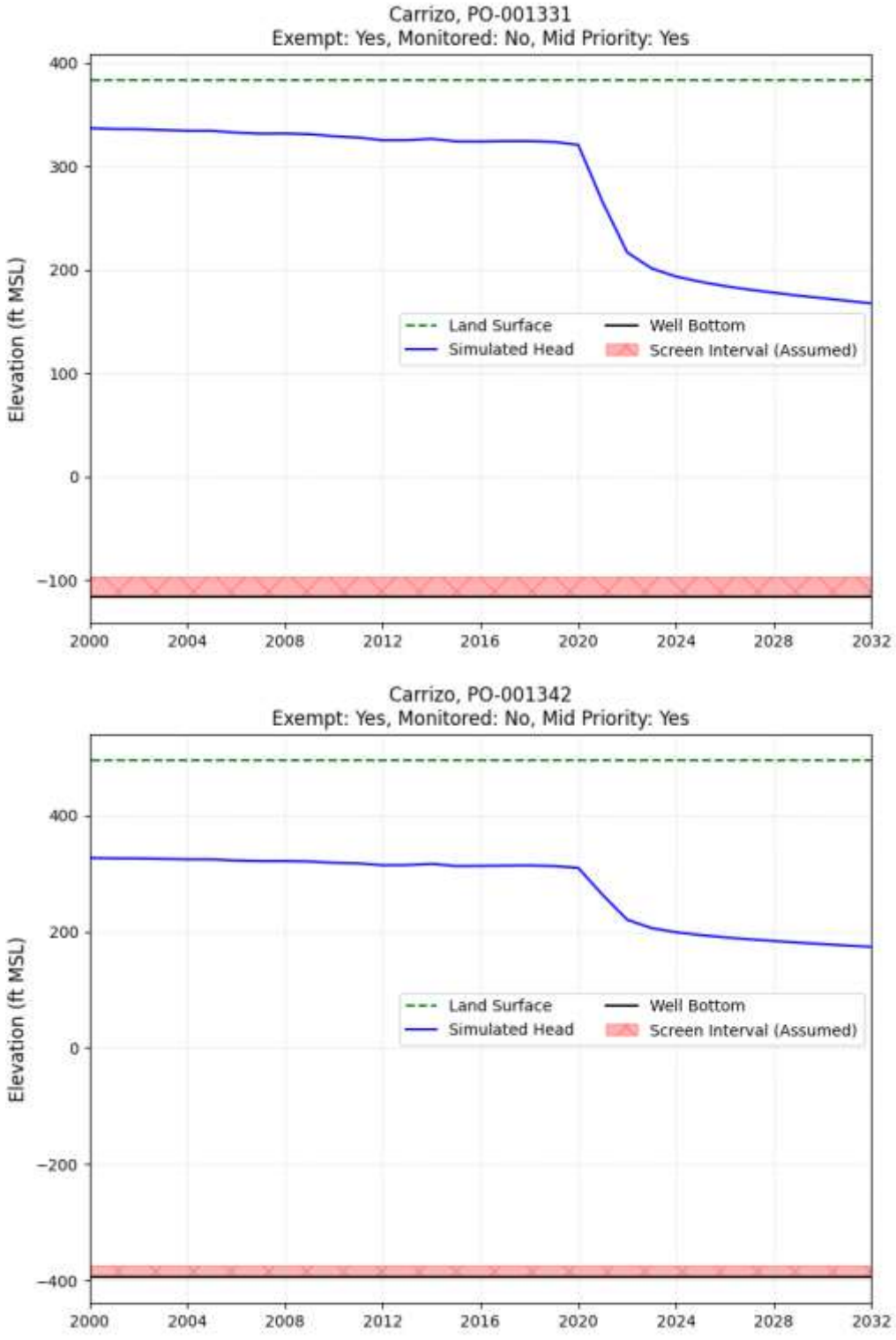

Figure H-7 Simulated water levels for moderate-priority wells PO-001331 and PO-001342 located in the Carrizo Aquifer

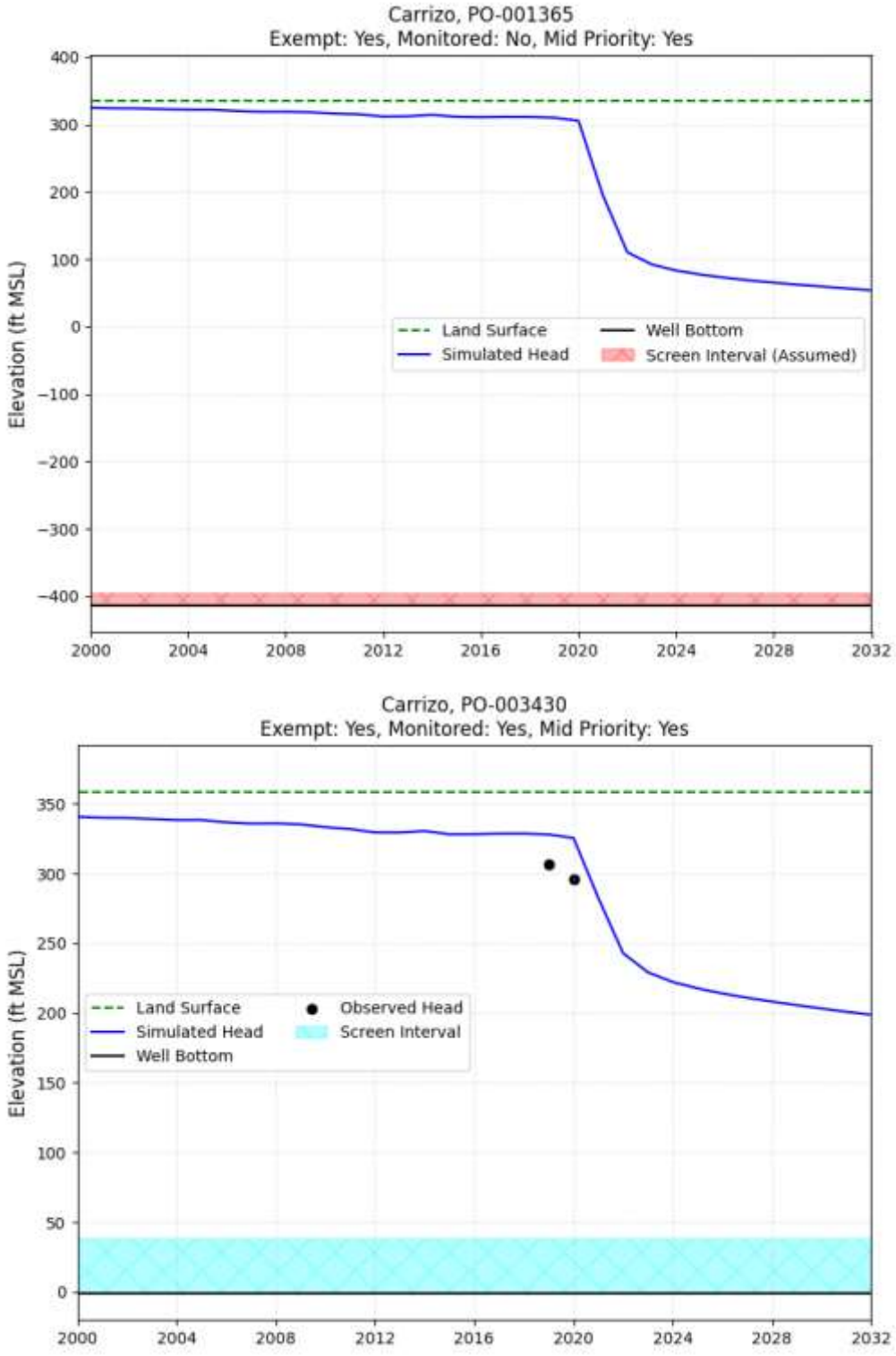

Figure H-8 Simulated water levels for moderate-priority wells PO-001365 and PO-003430 located in the Carrizo Aquifer

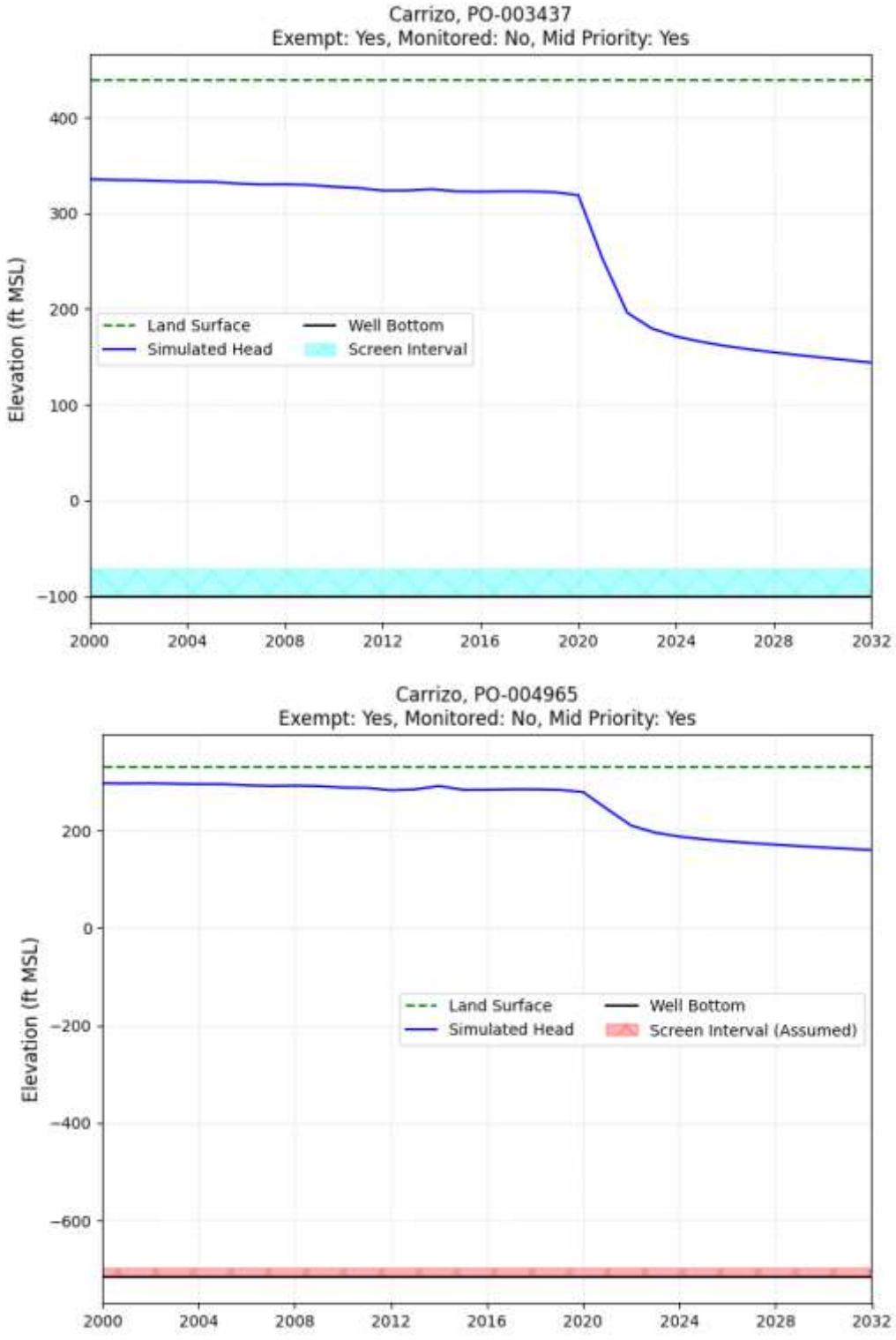

Figure H-9 Simulated water levels for moderate-priority wells PO-003437 and PO-04965 located in the Carrizo Aquifer

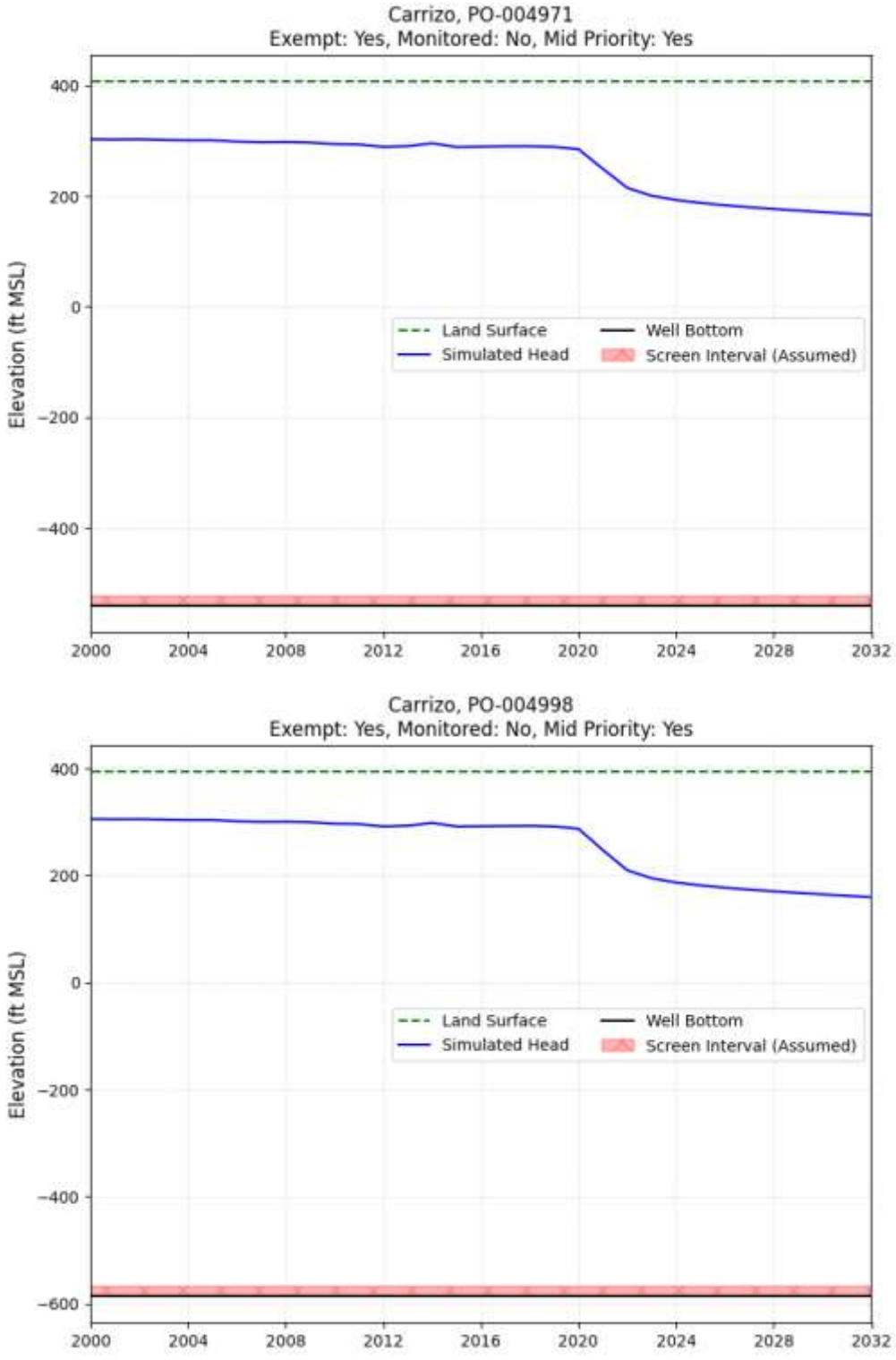

Figure H-10 Simulated water levels for moderate-priority wells PO-004971 and PO-004998 located in the Carrizo Aquifer

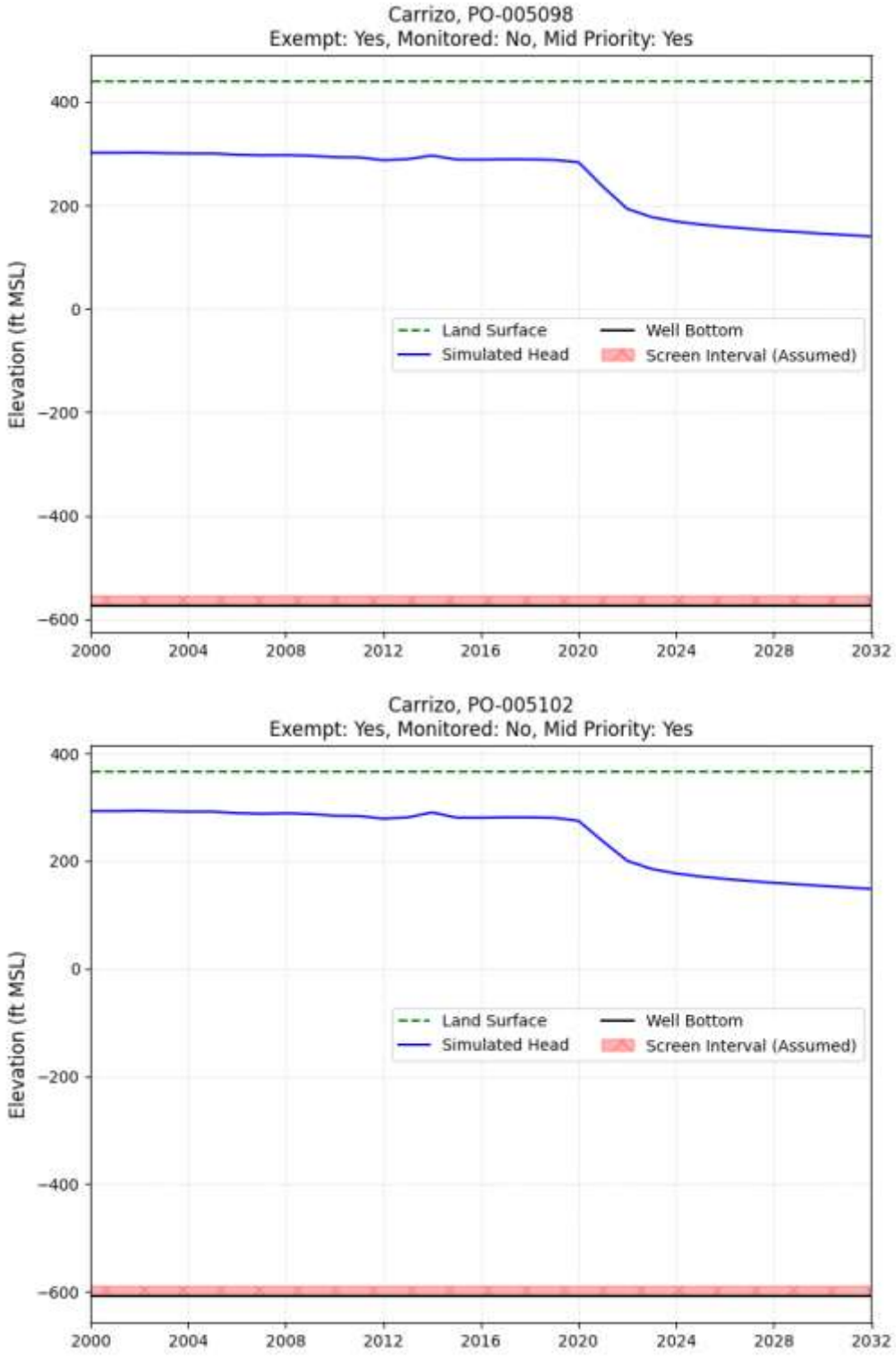

Figure H-11 Simulated water levels for moderate-priority wells PO-005098 and PO-005102 located in the Carrizo Aquifer

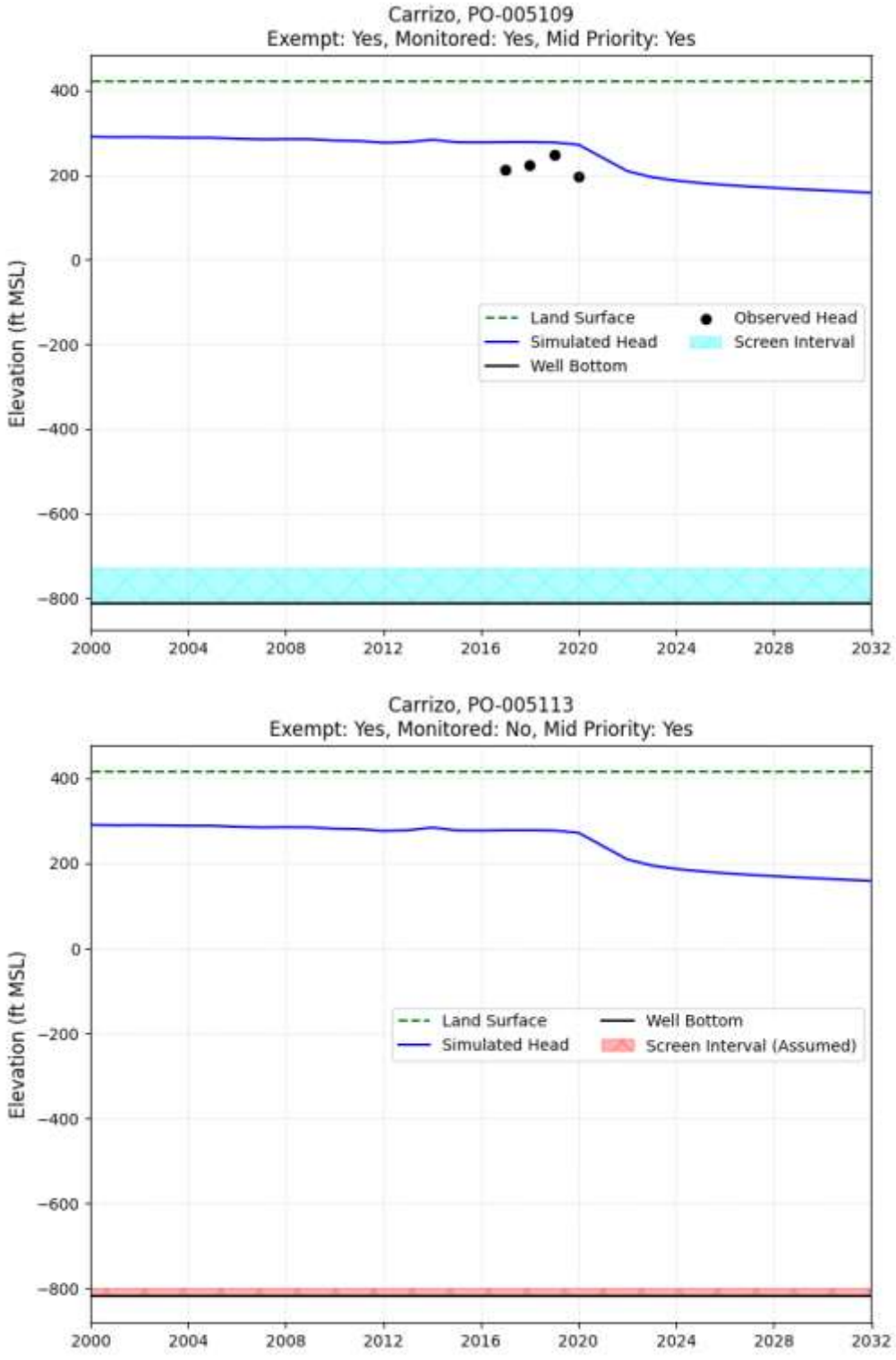

Figure H-12 Simulated water levels for moderate-priority wells PO-005109 and PO-005113 located in the Carrizo Aquifer

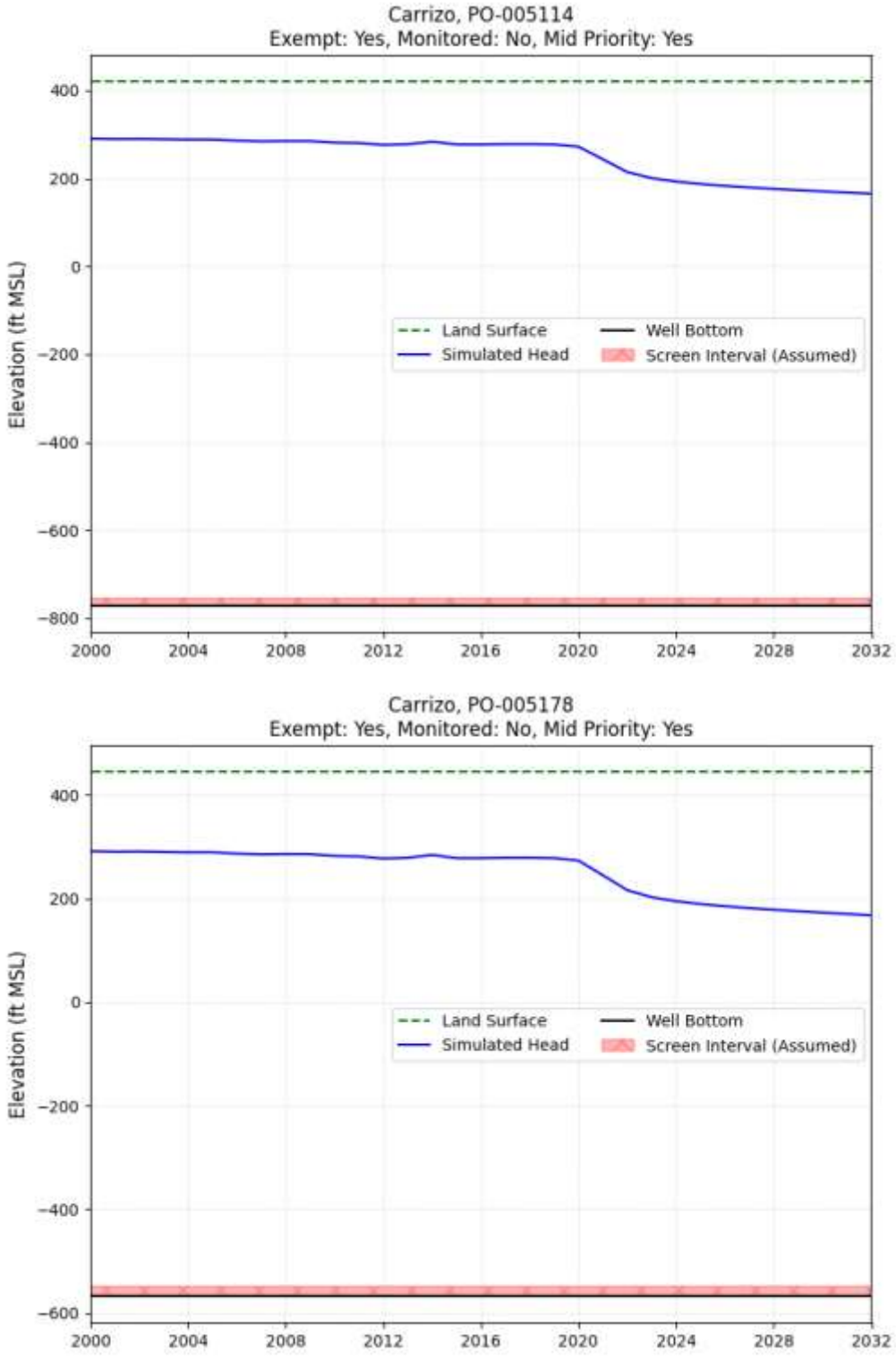

Figure H-13 Simulated water levels for moderate-priority wells PO-005114 and PO-005178 located in the Carrizo Aquifer

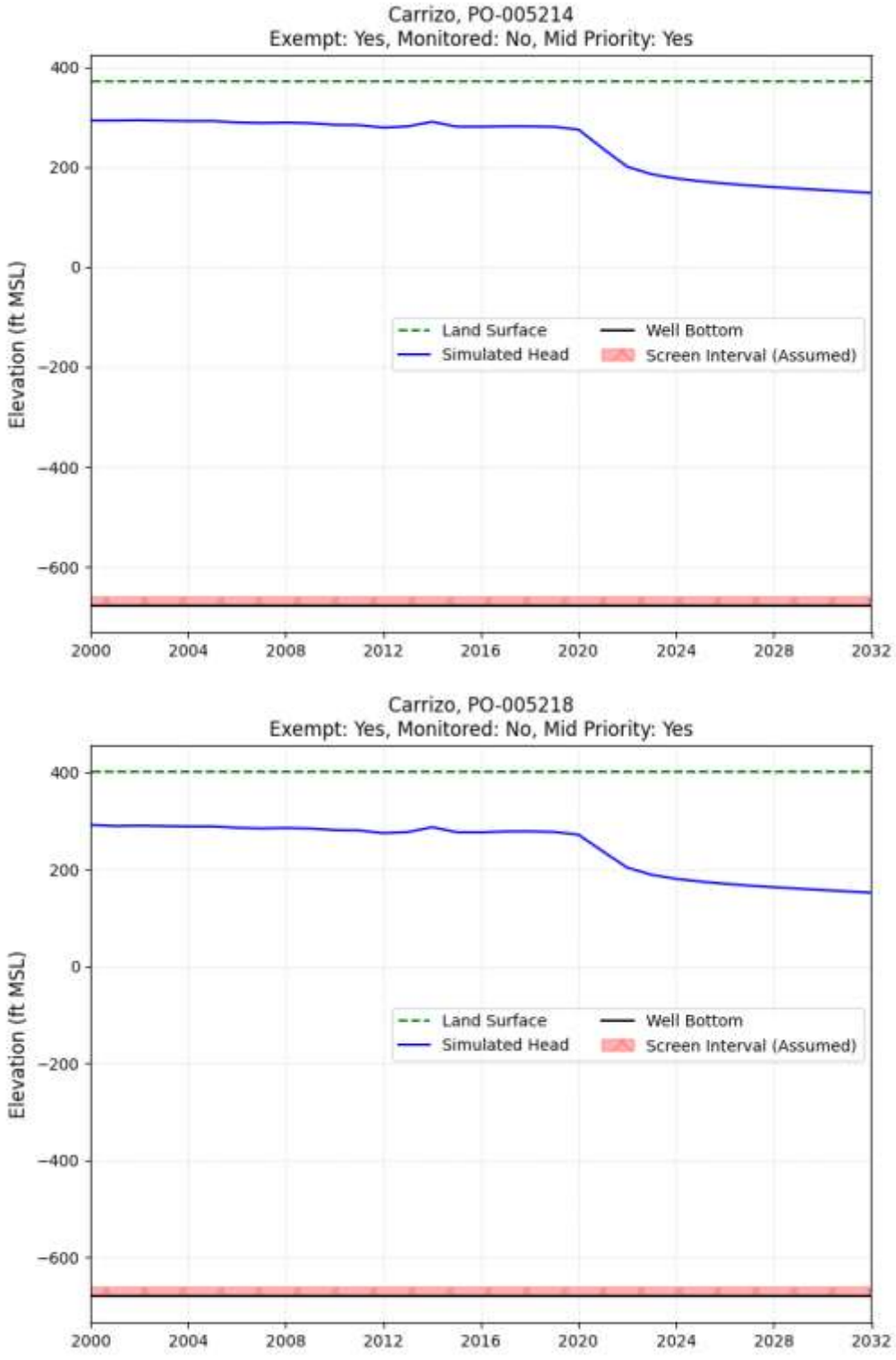

Figure H-14 Simulated water levels for moderate-priority wells PO-005214 and PO-005218 located in the Carrizo Aquifer

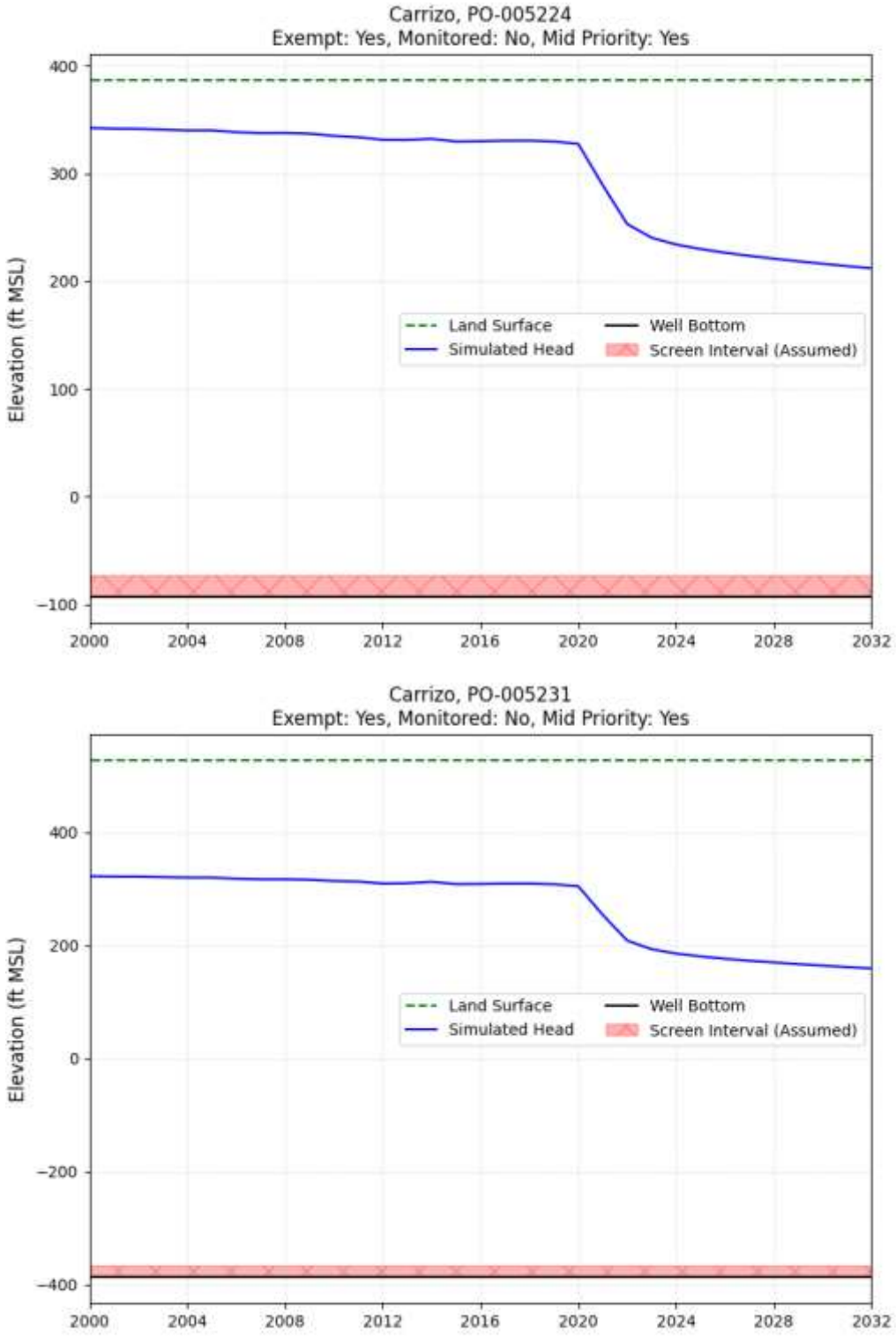

Figure H-15 Simulated water levels for moderate-priority wells PO-005224 and PO-005231 located in the Carrizo Aquifer

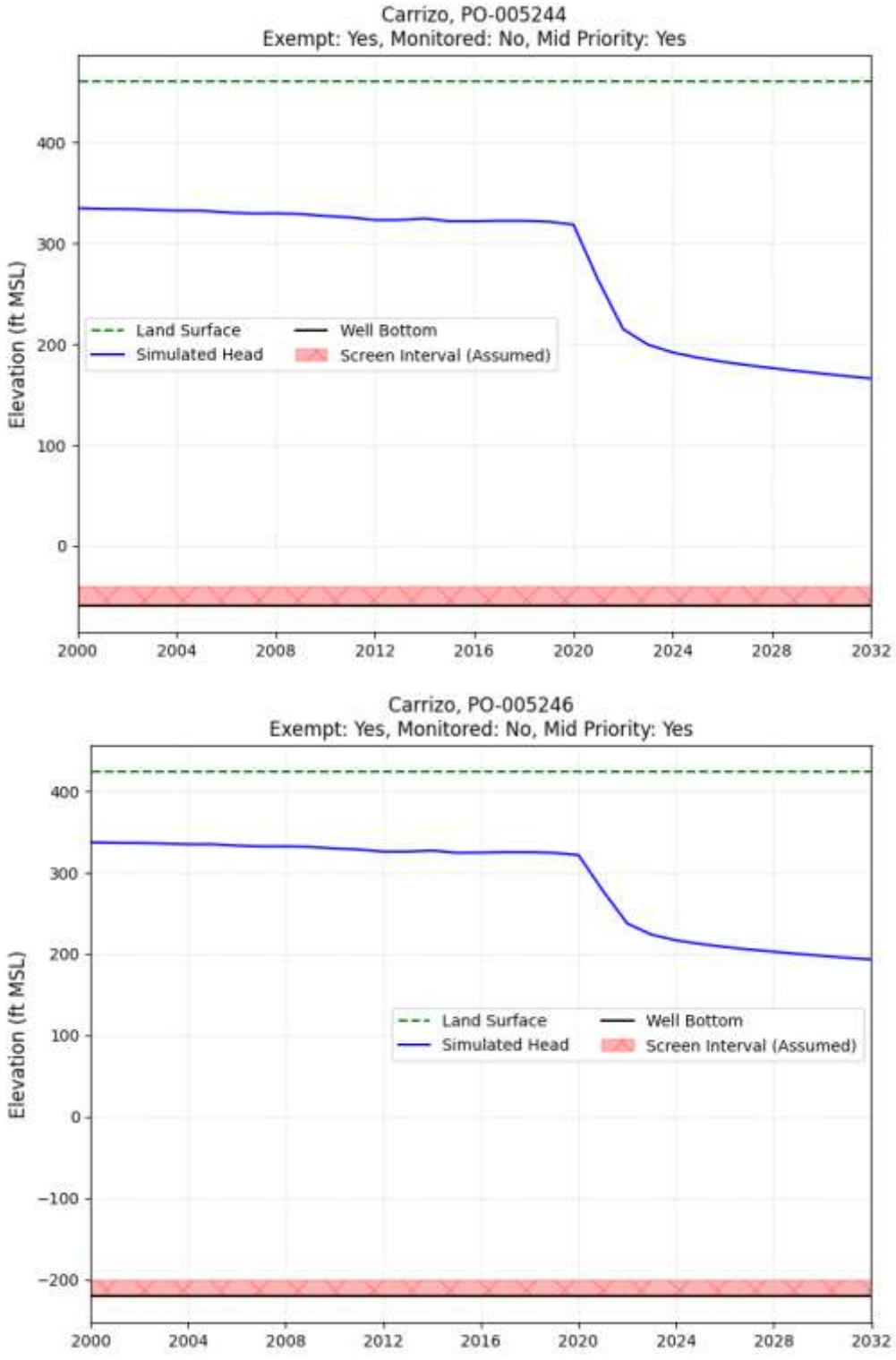

Figure H-16 Simulated water levels for moderate-priority wells PO-005244 and PO-005246 located in the Carrizo Aquifer

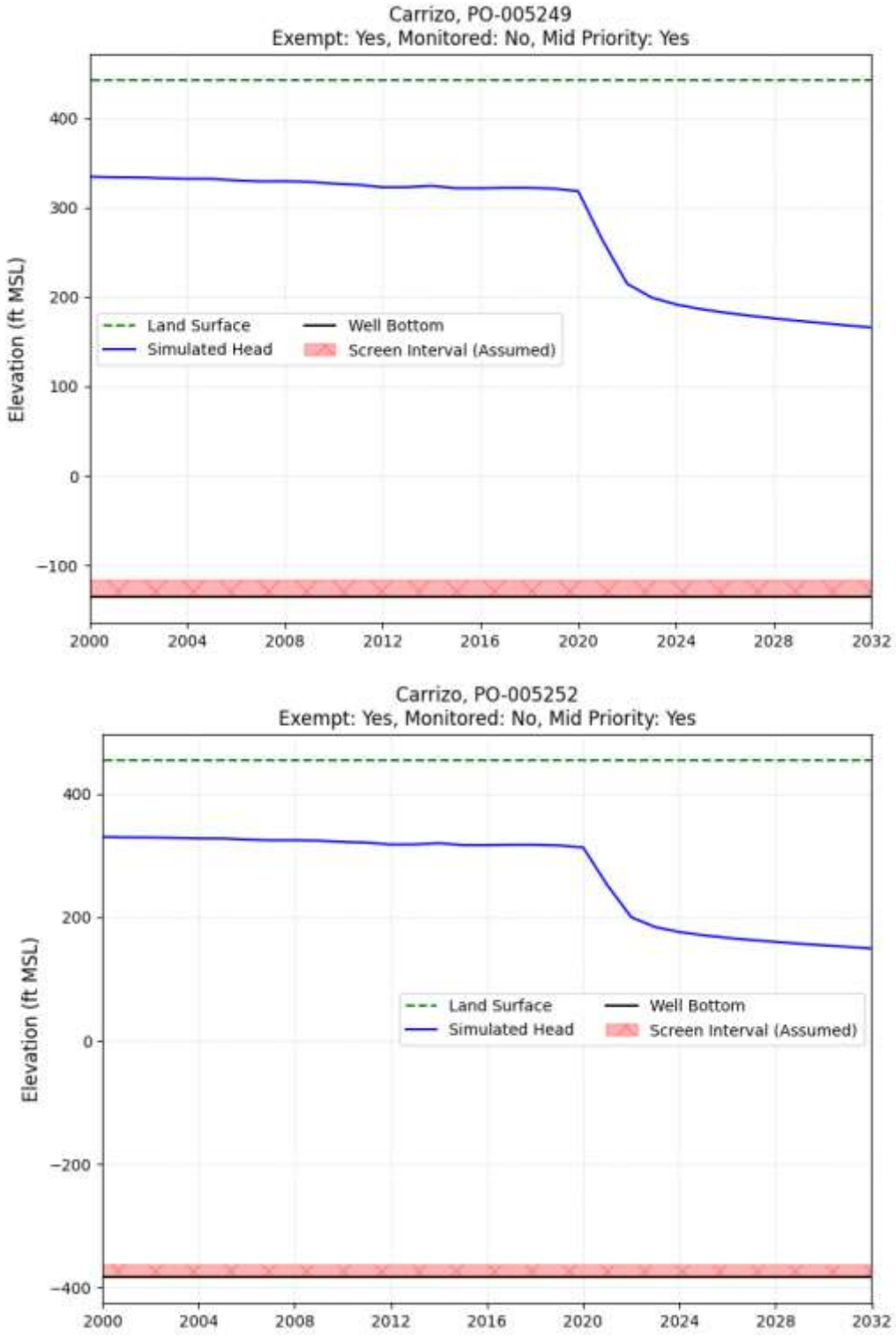

Figure H-17 Simulated water levels for moderate-priority wells PO-005249 and PO-005252 located in the Carrizo Aquifer

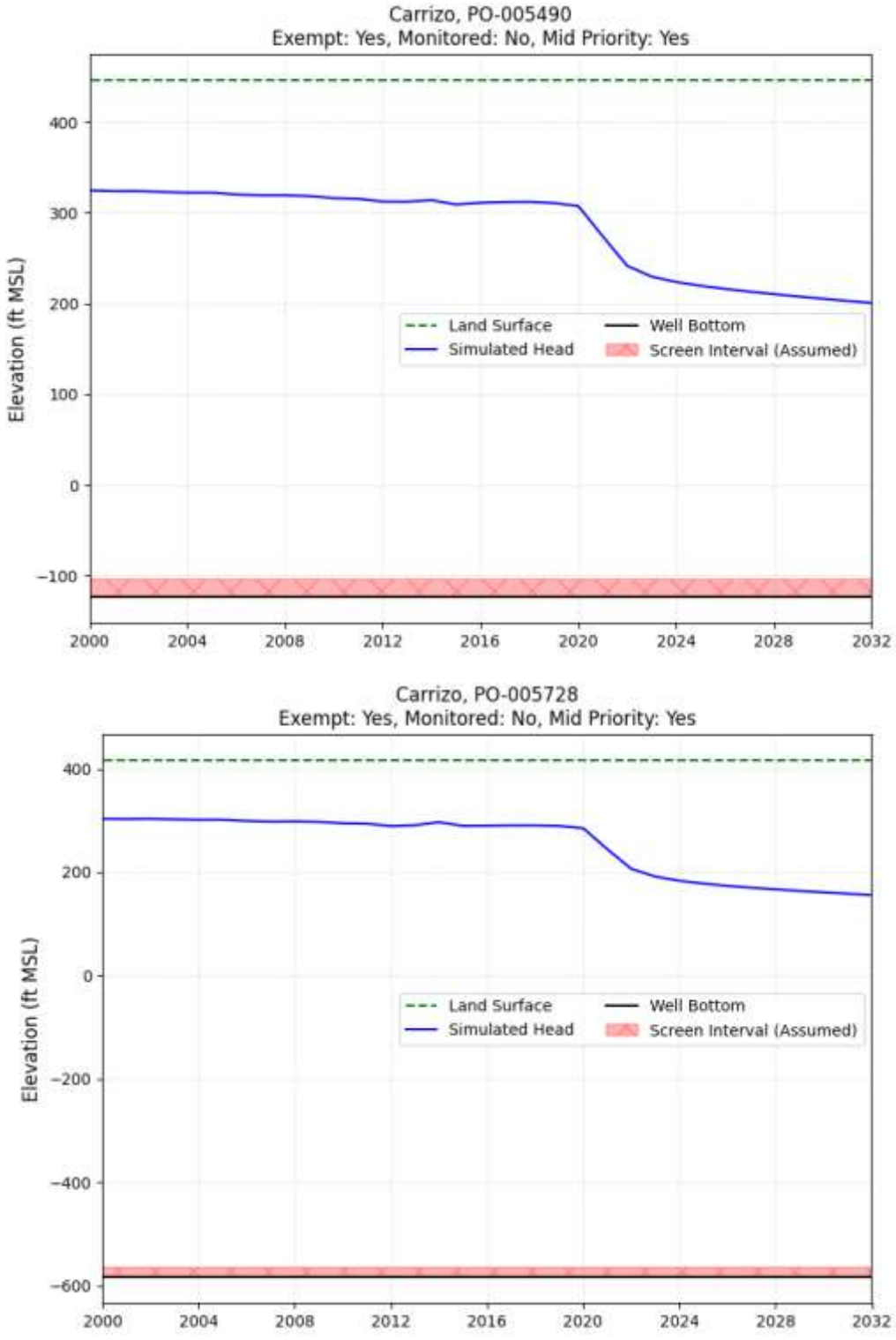

Figure H-18 Simulated water levels for moderate-priority wells PO-005490 and PO-005728 located in the Carrizo Aquifer

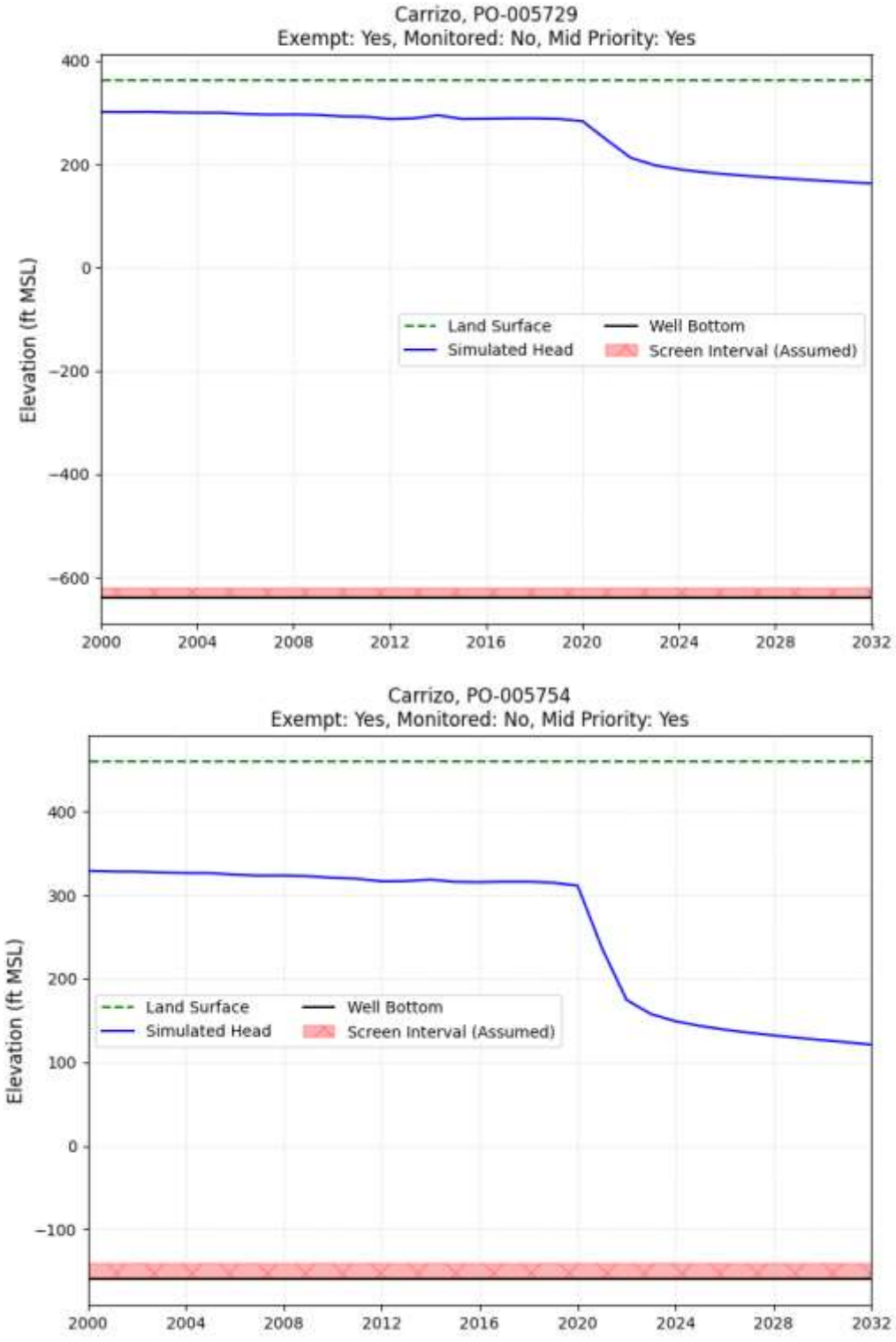

Figure H-19 Simulated water levels for moderate-priority wells PO-005729 and PO-005754 located in the Carrizo Aquifer

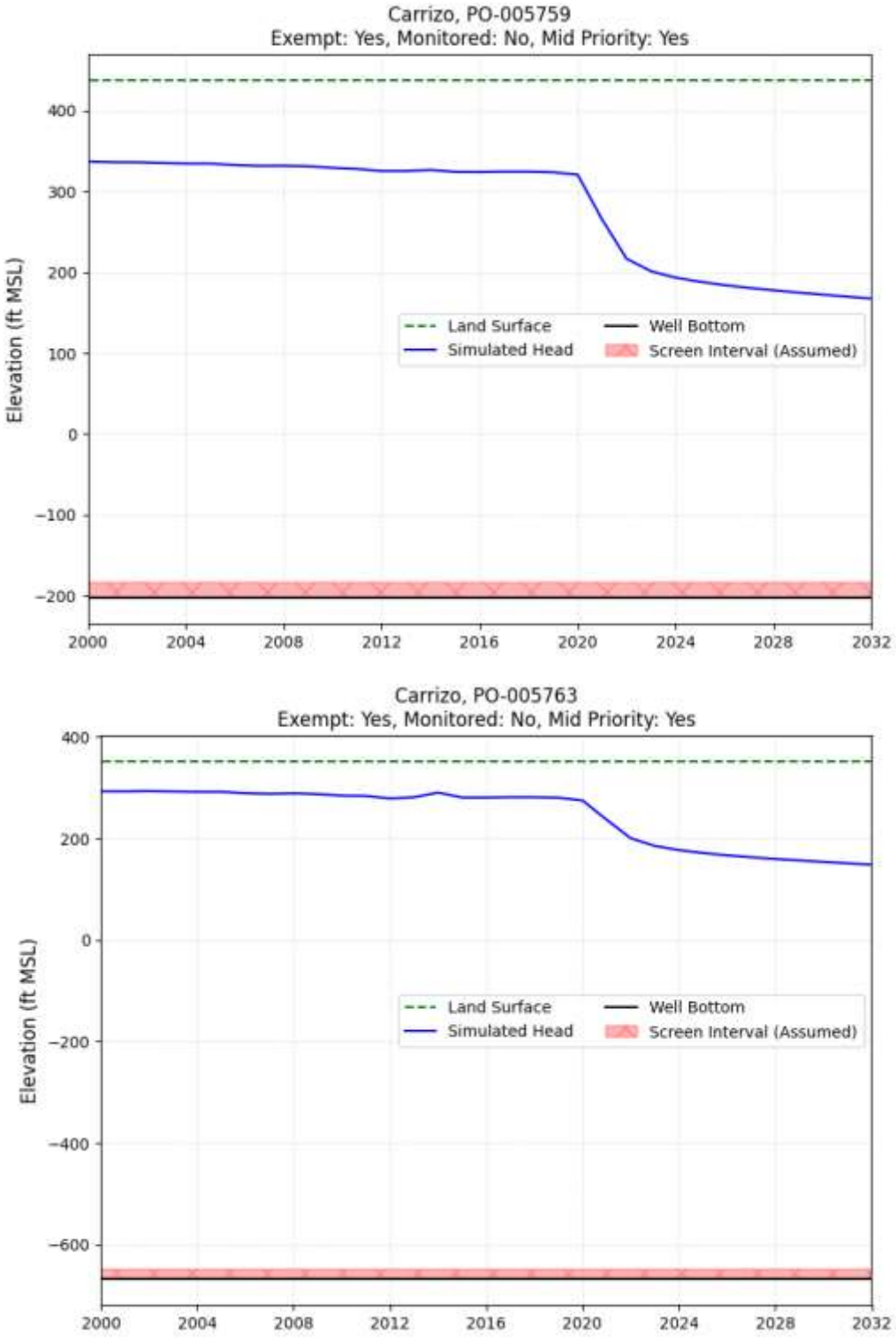

Figure H-20 Simulated water levels for moderate-priority wells PO-005759 and PO-005763 located in the Carrizo Aquifer

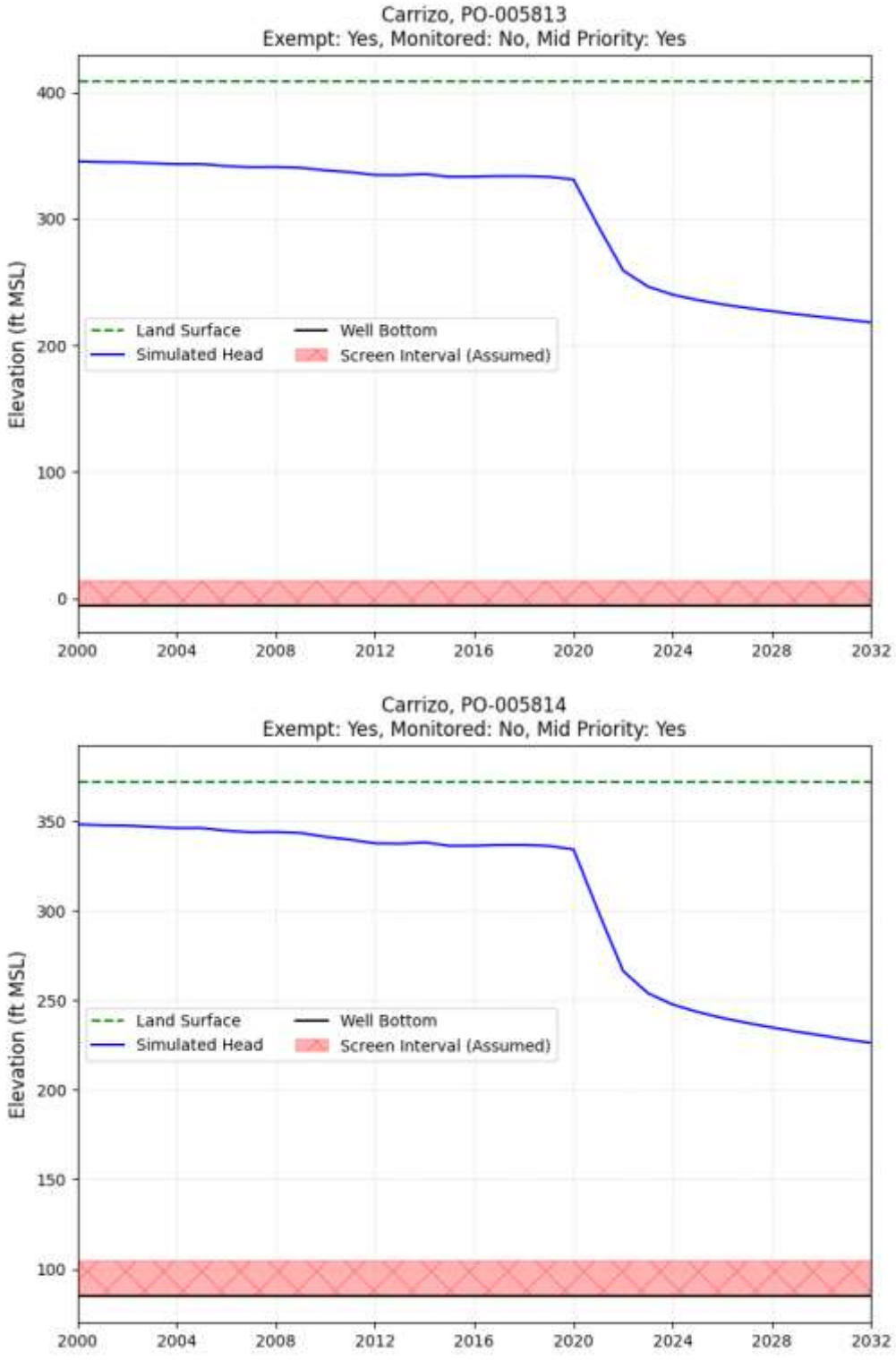

Figure H-21 Simulated water levels for moderate-priority wells PO-005813 and PO-005814 located in the Carrizo Aquifer

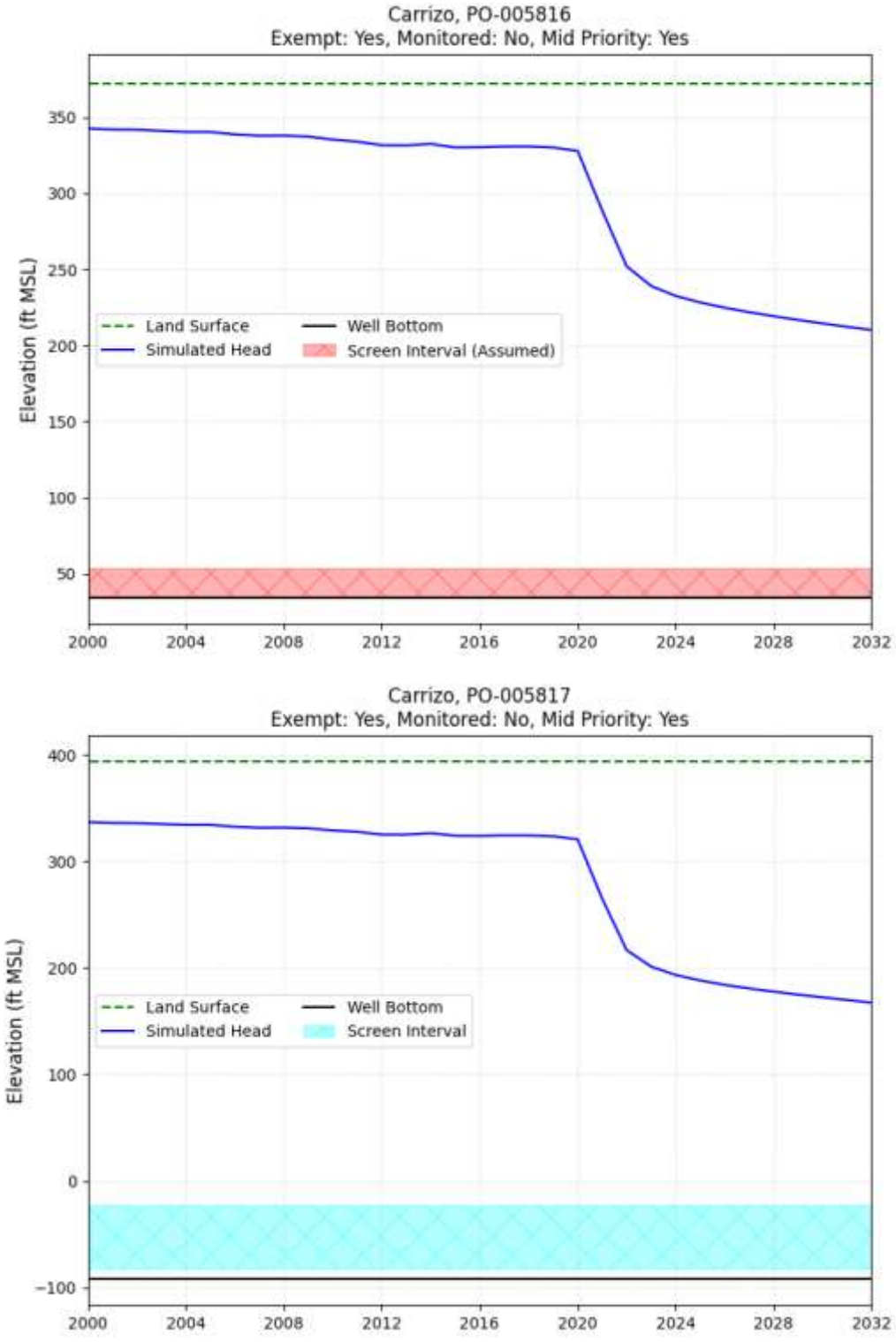

Figure H-22 Simulated water levels for moderate-priority wells PO-005816 and PO-005817 located in the Carrizo Aquifer

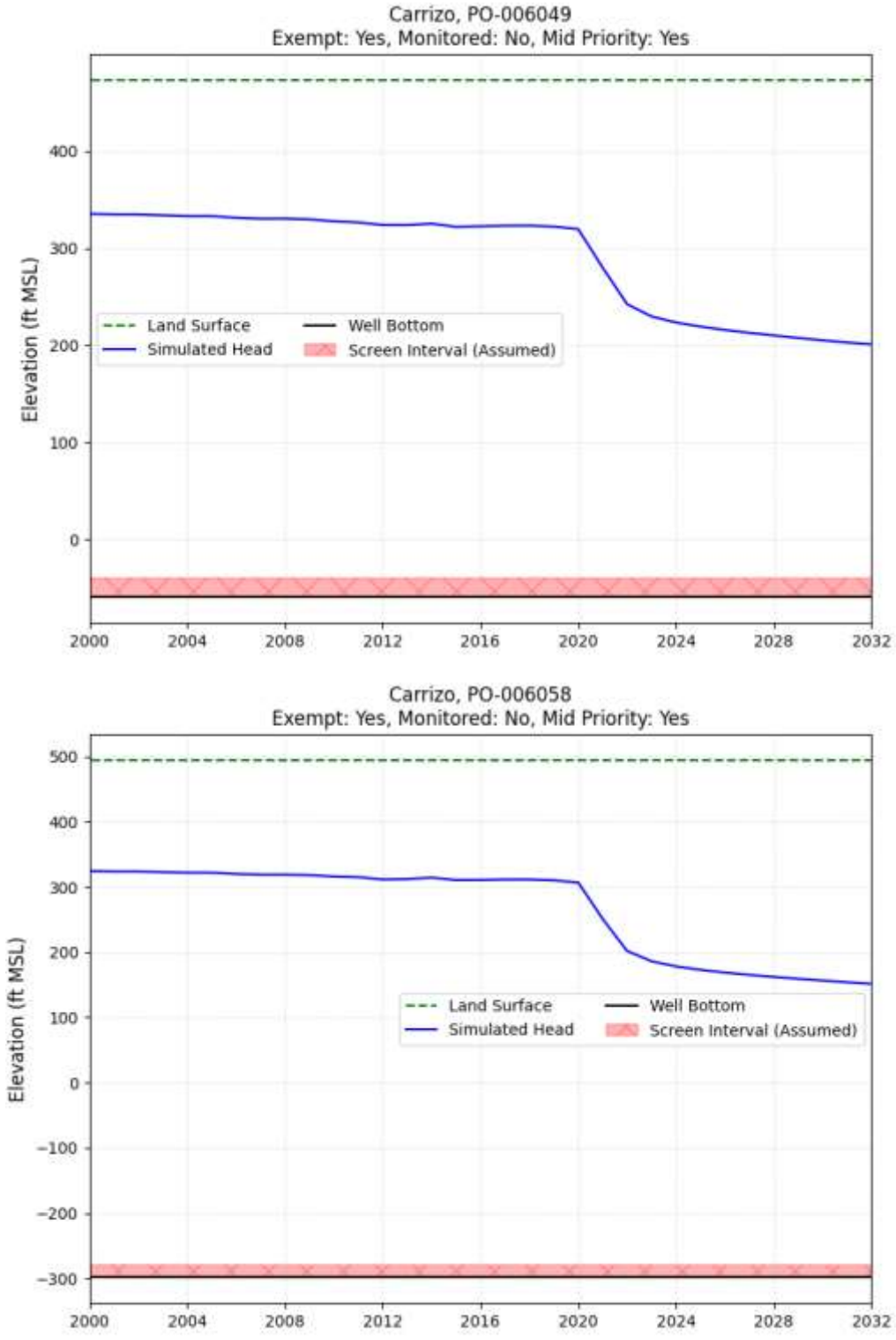

Figure H-23 Simulated water levels for moderate-priority wells PO-006049 and PO-006058 located in the Carrizo Aquifer

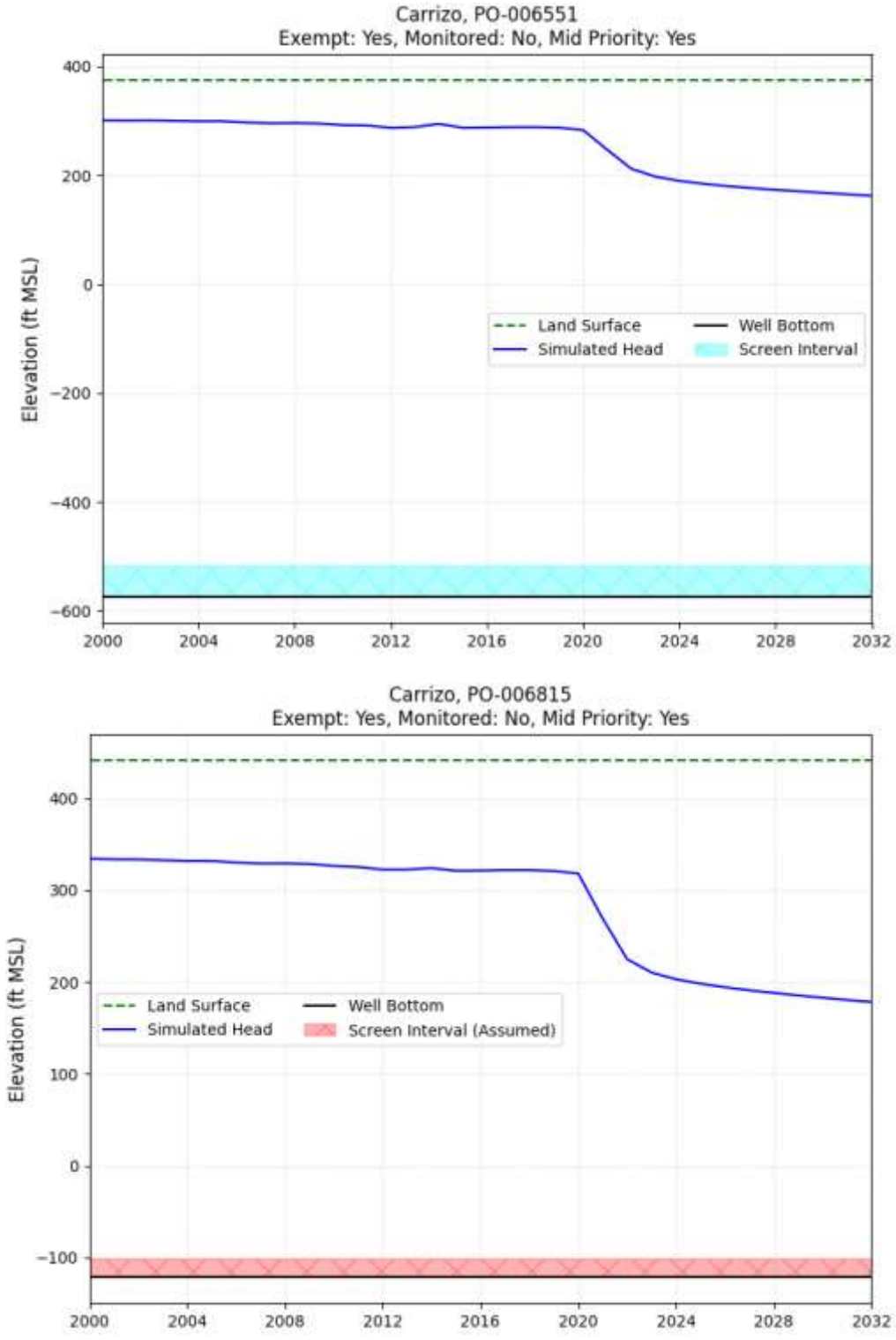

Figure H-24 Simulated water levels for moderate-priority wells PO-006551 and PO-006815 located in the Carrizo Aquifer

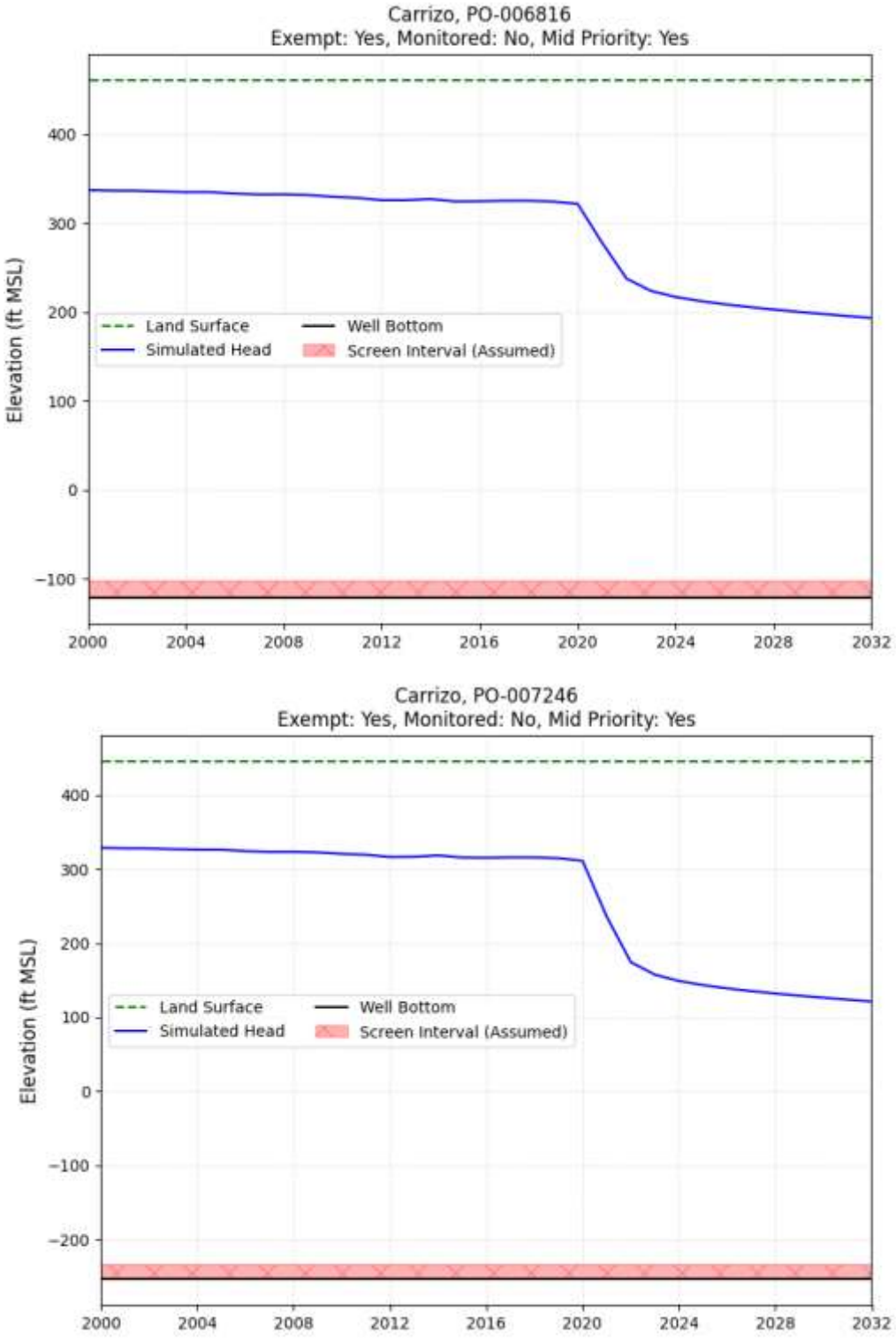

Figure H-25 Simulated water levels for moderate-priority wells PO-006816 and PO-007246 located in the Carrizo Aquifer

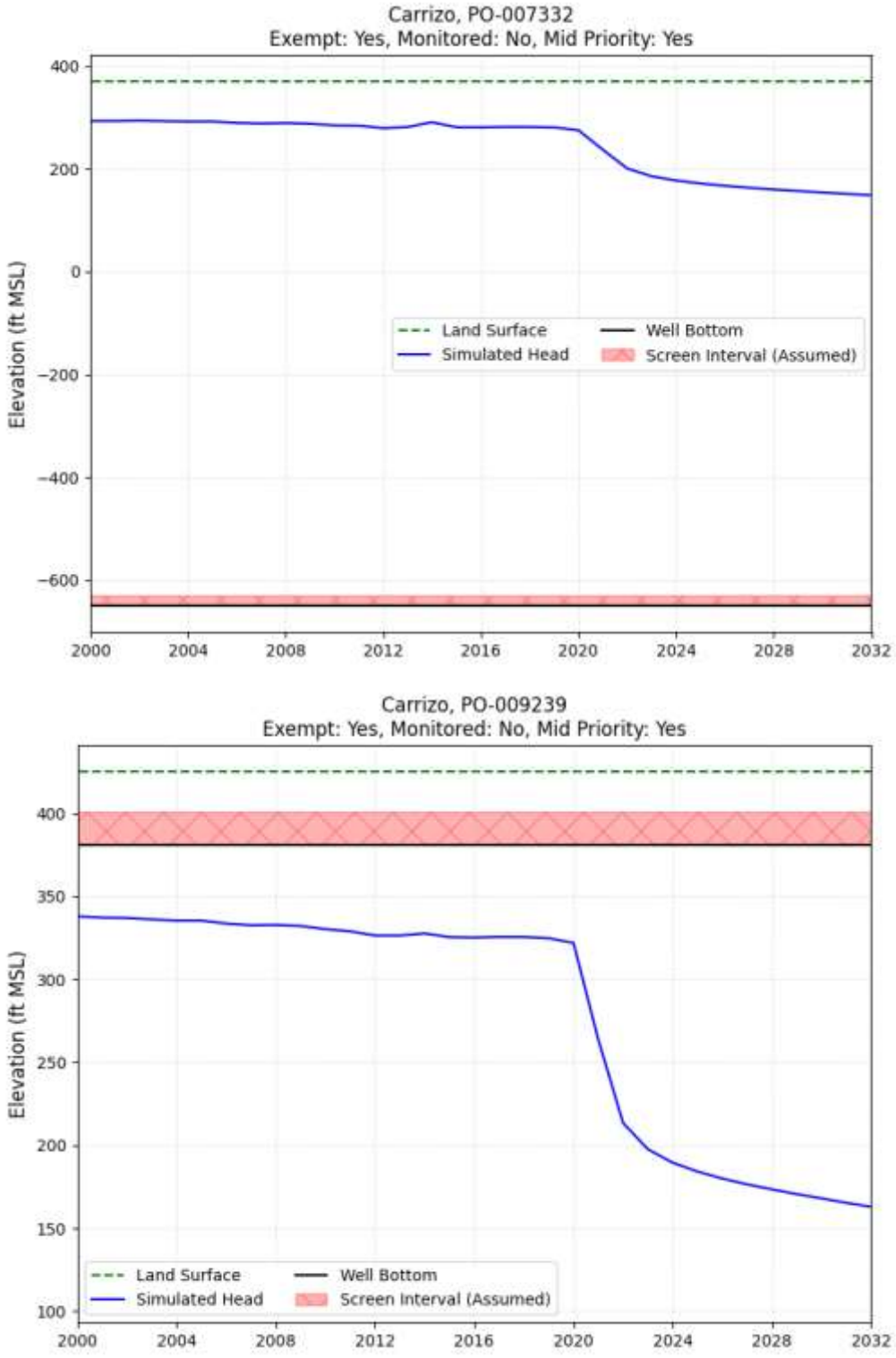

Figure H-26 Simulated water levels for moderate-priority wells PO-007332 and PO-009239 located in the Carrizo Aquifer

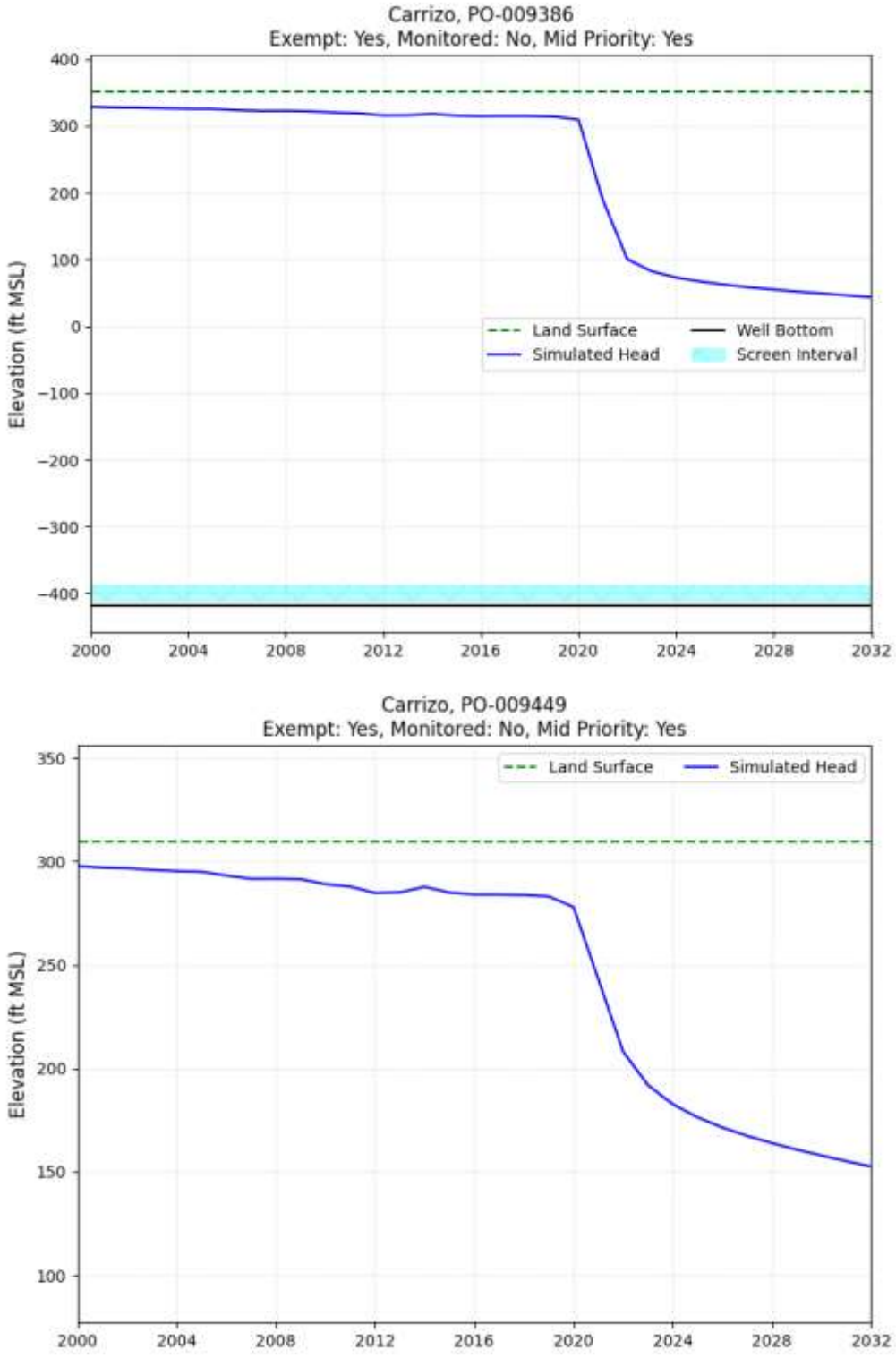

Figure H-27 Simulated water levels for moderate-priority wells PO-009386 and PO-009449 located in the Carrizo Aquifer

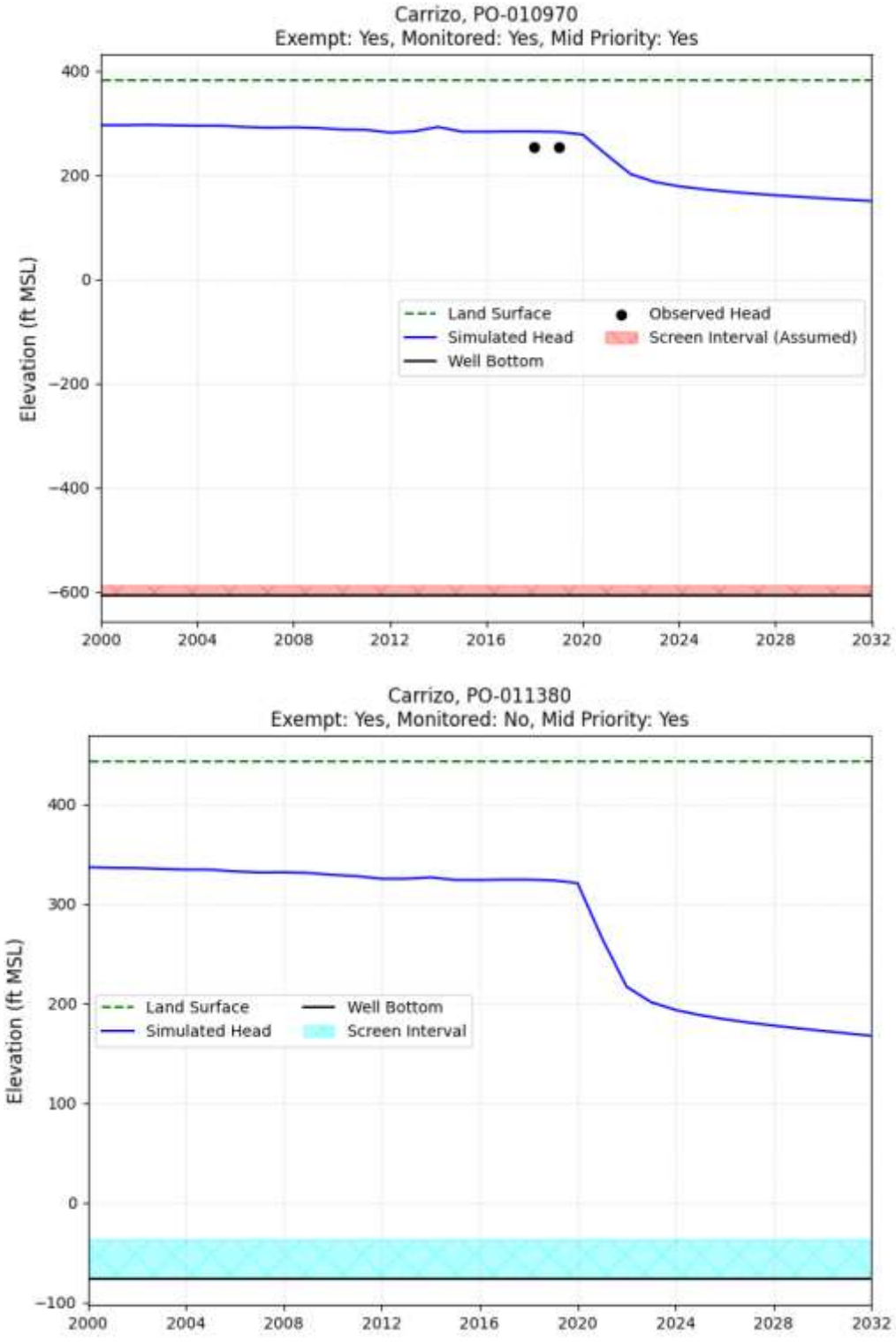

Figure H-28 Simulated water levels for moderate-priority wells PO-010970 and PO-011380 located in the Carrizo Aquifer