Appendix 5A

Technical Approach for Developing Chronic Lowering of Groundwater Levels Sustainable Management Criteria in the Kaweah Subbasin

DRAFT

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Technical Approach for Developing Chronic Lowering of Groundwater Levels Sustainable Management Criteria in the Kaweah Subbasin

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ACRONYMS & ABBREVIATIONS

DWR ....California Department of Water Resources
EKGSA ....East Kaweah Groundwater Sustainability Agency
GKGSA..........Greater Kaweah Groundwater Sustainability Agency
GSA................Groundwater Sustainability Agency
GSP ....Groundwater Sustainability Plan
MKGSA ....Mid-Kaweah Groundwater Sustainability Agency
MO ....measurable objective
MT..................minimum threshold
SGMA ....Sustainable Groundwater Management Act
SMC ....Sustainable Management Criteria
Subbasin.........Kaweah Subbasin
WCR ....Well Completion Report

1 INTRODUCTION

This technical report describes the methodology applied to a revision of the chronic lowering of groundwater level sustainable management criteria (SMC) for the San Joaquin Valley - Kaweah Subbasin (Subbasin). The revisions are in response to the California Department of Water Resources (DWR) incomplete determination of the three Groundwater Sustainability Plans (GSPs) submitted in January 2020. The three GSPs are being implemented by three Groundwater Sustainability Agencies (GSAs) covering the entirety of the Subbasin: East Kaweah GSA, Greater Kaweah GSA, and Mid-Kaweah GSA (Figure 1).

DWR provided a staff report with a statement of findings explaining the incomplete determination for the Subbasin GSPs. The staff report states, “The Plan does not define sustainable management criteria for chronic lowering of groundwater levels in the manner required by Sustainable Groundwater Management Act (SGMA) and the GSP Regulations." DWR’s findings specified the following:

1. *The GSPs do not define metrics for undesirable results and minimum thresholds based on avoiding a significant and unreasonable depletion of groundwater supply, informed by, and considering, the relevant and applicable beneficial uses and users in their Subbasin.*
2. *The GSPs do not describe specific potential effects from the chronic lowering of groundwater levels and depletion of supply that would be significant and unreasonable to beneficial uses and users of groundwater, on land uses and property interests, and other potential effects and, therefore, constitute an undesirable result.*
3. *The GSPs do not consider how minimum thresholds developed for one sustainability indicator will affect other related sustainability indicators.”*

The GSAs are given up to 180 days from the receipt of DWR’s staff report to address the deficiencies for chronic lowering of groundwater levels SMC. This report provides the technical support to fulfill that purpose.

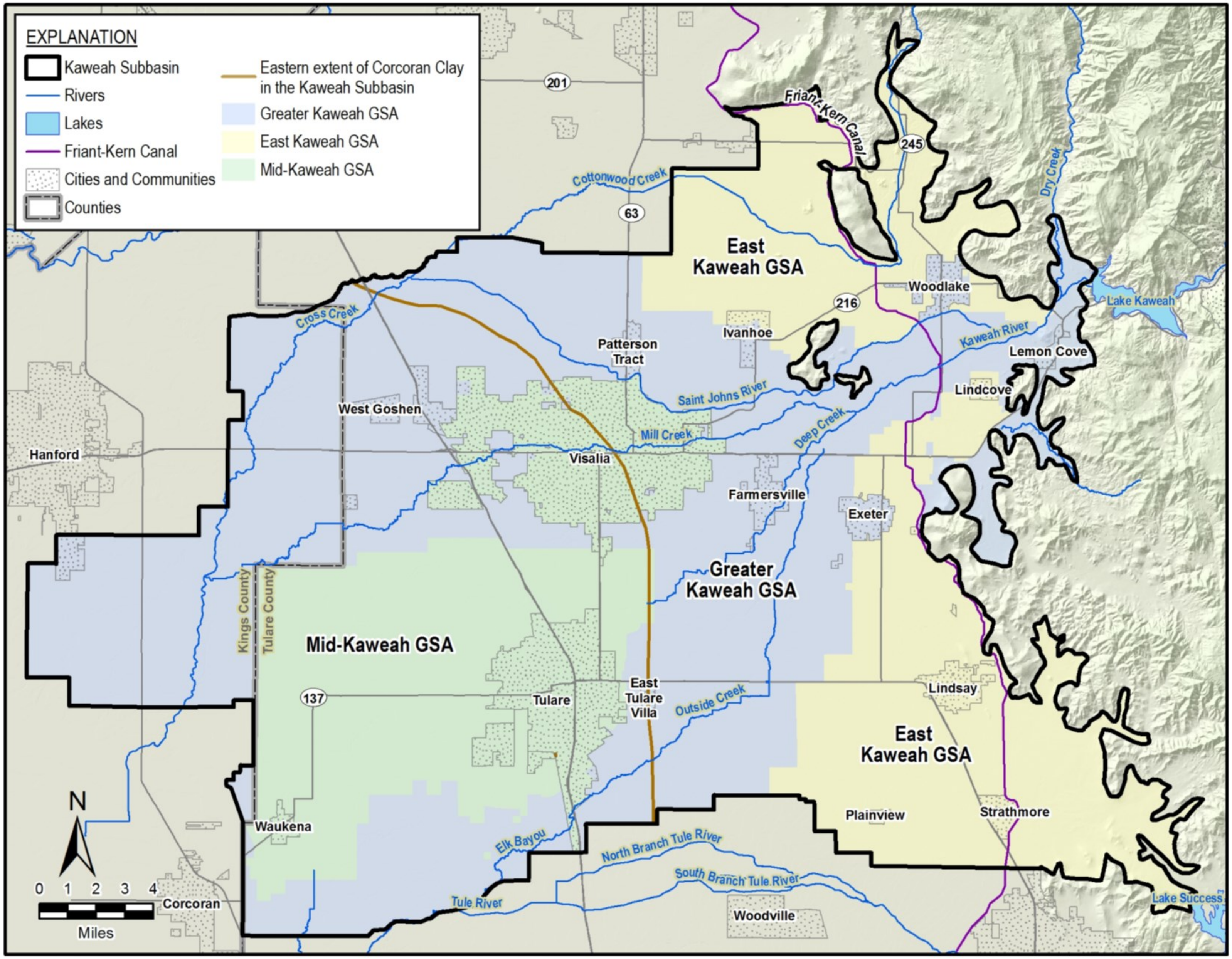


Figure 1. Groundwater Sustainability Agencies in the Kaweah Subbasin

1.1 General Approach Used to Develop Sustainable Management Criteria

Chronic lowering of groundwater levels SMC are developed to protect relevant and applicable beneficial uses and users of groundwater in the Subbasin. Beneficial users of groundwater are domestic pumpers, disadvantaged communities, small water systems (2 to 14 connections), municipal water systems (>14 connections), agricultural pumpers, California Native American Tribes, environmental users, and entities engaged in monitoring and reporting groundwater elevations. Understanding the types of users and their access to groundwater is the first step taken to inform what the GSAs and their stakeholder groups consider significant and unreasonable impacts to those users.

Since wells are how users access groundwater, the approach used to develop SMC is based on water supply well depths. The depth of wells across the Subbasin varies by depth to groundwater and beneficial user type. Because of well depth variability, the Subbasin is subdivided into analysis zones based on GSP management area boundaries, clusters of beneficial user types, aquifers, and completed well depths. Completed well depth statistics inform significant and unreasonable groundwater levels, with the SMC being based on protecting at least 90% of all water supply wells in the Subbasin.

1.2 Data Sources and Quality Control

Information used for establishing the chronic lowering of groundwater levels SMC include:

- Completed depths, screen depths, and locations of wells installed since January 1, 2002, and included in DWR's Well Completion Report (WCR) dataset (Figure 2). Only well records drilled since 2002 are used for analysis to filter out wells that may have been abandoned or no longer represent typical modern depths for active wells and current groundwater elevations. Data download date was March 1, 2022.
- Historical groundwater elevation data from DWR's California Statewide Groundwater Elevation Monitoring Program, SGMA Portal Monitoring Network Module, and individual water agencies.
- Maps of current and historical groundwater elevation contours.

The WCR dataset does not contain a complete accurate dataset, however, it is the best public source of data available. Approximately one-third of the wells drilled from 2002 on did not have well completion depths and could not be used in the analysis. For purposes of well depth analyses, we assumed the available wells with depth information are typical of depths in the Subbasin.

Well logs were reviewed for wells with completion depths less than 100 feet. This review generally found that either 1) the planned well use field was incorrectly classified as a water supply well when it was supposed to be a destroyed or remediation well, or 2) the completed well depth field was the depth of the conductor casing (often 50 feet) and not the bottom of the completed well. These inaccuracies were corrected. Furthermore, where coordinates of wells are unavailable, DWR locates the well in the middle of the Public Land Survey System section.

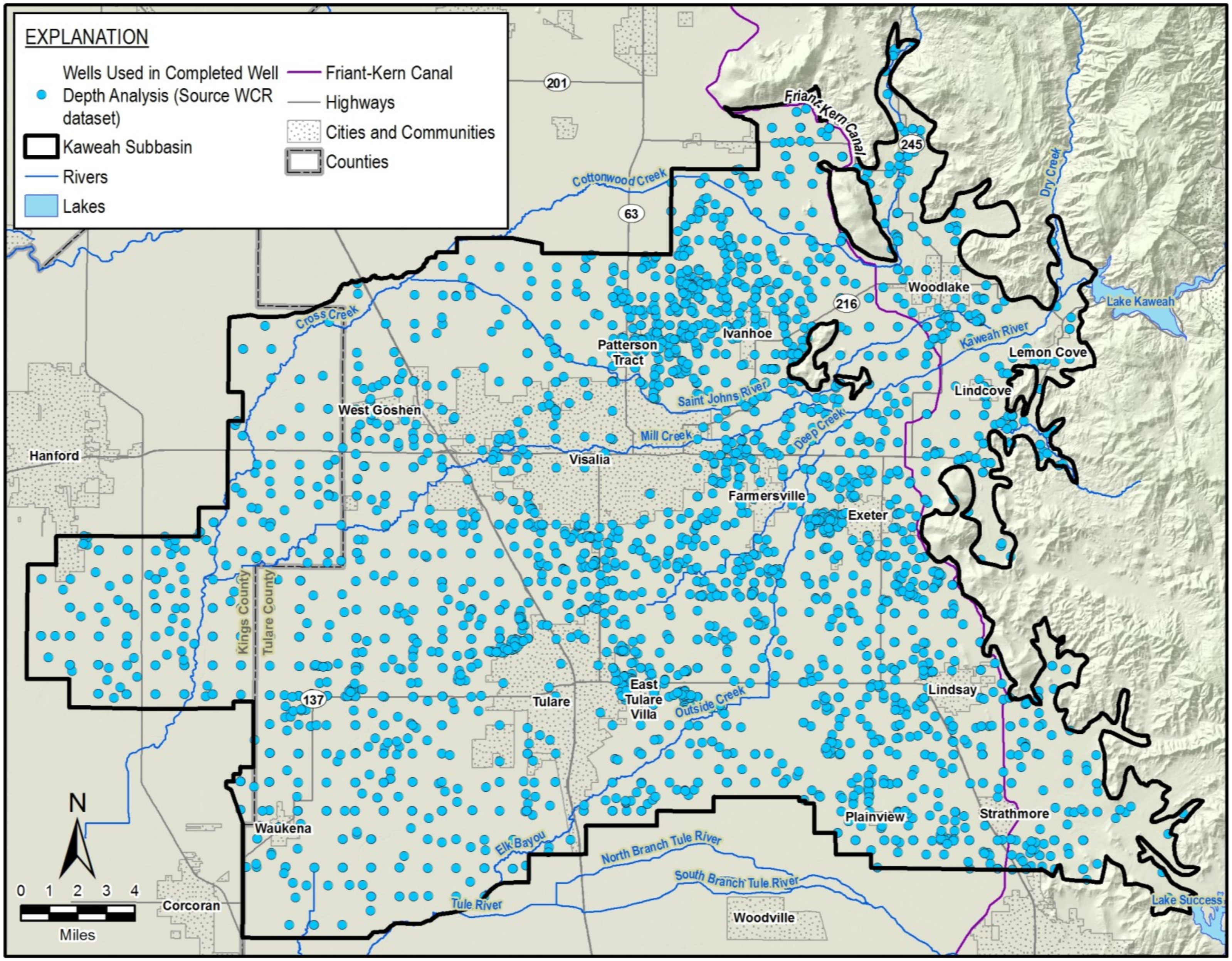


Figure 2. Location of WCR Water Supply Wells Used for Completed Well Depth Analysis

2 PROCESS USED TO ESTABLISH MINIMUM THRESHOLDS

Minimum thresholds (MTs) are derived from groundwater elevations that protect at least 90% of all water supply wells drilled since January 1, 2002, in each analysis zone, and that do not result in a greater rate of decline over water years 2020 to 2040 than experienced over a specific historical time period. Groundwater elevations representing MTs are set at representative monitoring sites identified in the Monitoring Network section of the GSPs.

The process for developing MTs is based on a comparison of three methodologies. The process is generally to:

1. Develop analysis zones based on GSP management areas, aquifer type, beneficial user types, and similar completed well depths (described in Section 2.1.1).
2. Identify water supply wells drilled since January 1, 2002, with well screen depth information or a completed well depth.
3. Designate water supply wells to either the Upper, Lower, or Single Aquifer System based on a set of assumptions (described in Section 2.1.2).
4. Designate representative monitoring sites to either the Upper, Lower, or Single Aquifer System (described in Section 2.1.2).
5. Estimate MT depths through Methodology 1 by calculating the 90th percentile well completion depth for water supply wells in each analysis zone and aquifer (described in Section 2.1.3).
6. Apply the 90th percentile protective depth corresponding to the representative monitoring sites' aquifer designation and analysis zone (described in Section 2.1.4).
7. Estimate MT depths through Methodology 2 by projecting relevant base period groundwater level trends to 2040 for each representative monitoring site (described in Section 2.1).
8. Compare elevations resultant from protective depths (Step 6) and projecting a groundwater levels trend out to 2040 (Step 7). The initial MT for the representative monitoring site is the higher elevation of the two methods (Figure 3).
9. Contour the representative monitoring site MTs obtained in Step 8 for the unconfined aquifers (Single and Upper Aquifer Systems) to determine if the MT surface is relatively smooth. If there are anomalous MTs, remove the anomalous points and interpolate the final MT elevations at these points from MT contours generated by excluding the anomalous sites. This is shown as Method 3 in Figure 3.

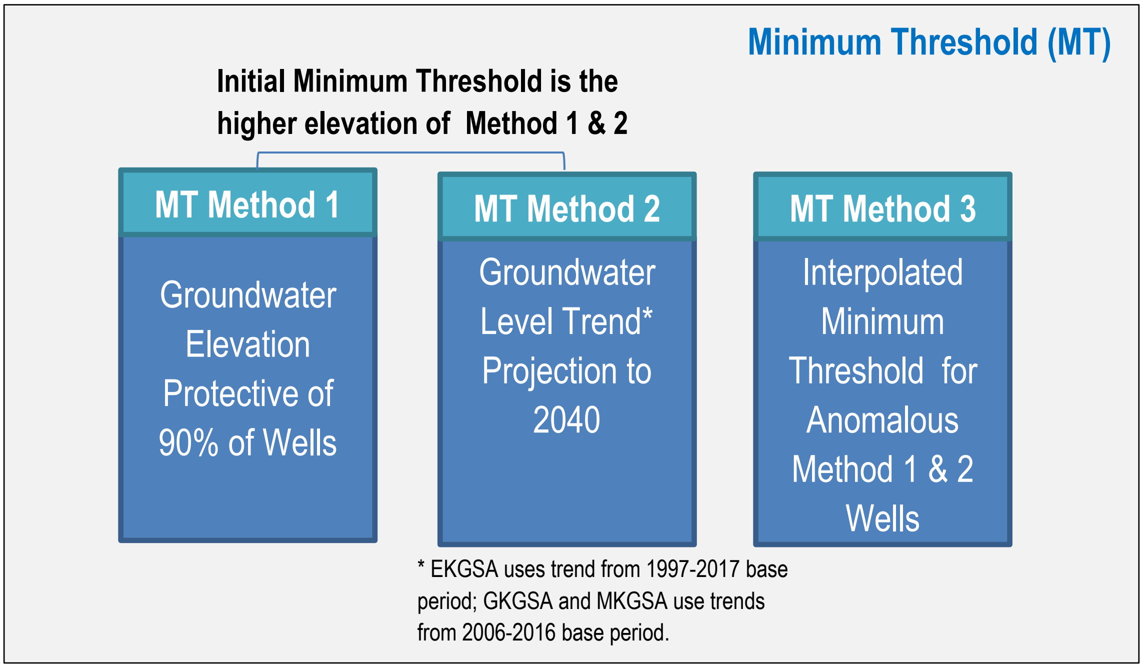


Figure 3. Minimum Threshold Methodologies

2.1 Methodology 1, Protective Elevations

The primary methodology for establishing MTs is designed to protect at least 90% of all wells in the Subbasin. This approach is protective of most beneficial uses and users of groundwater. The 90% threshold was chosen in acknowledgment that it is impractical to manage groundwater to protect the shallowest wells. More importantly, the GSAs wanted to set elevations based on well records of active wells, and not wells that may be destroyed or replaced. Because there is no active well registry to provide more accurate records, there is uncertainty regarding which wells are active. For example, the 2012-2016 drought was a period when approximately 480 wells in the Subbasin were reported dry according to the DWR's Dry Well Reporting System and a record number of wells were drilled in the Subbasin (Figure 4). Wells replaced by new deeper wells during this time are those that are presumed part of the shallowest 10% of wells in the dataset used to determine protective elevations. In consideration of the abovementioned factors, the GSA Managers selected 90% so that the dataset used to establish minimum thresholds contained well records reflective of current active wells.

Given approximately 10% of wells are shallower than the protected elevations, the GSAs in the Subbasin are in the process of establishing a Well Mitigation Program to assist impacted well owners.

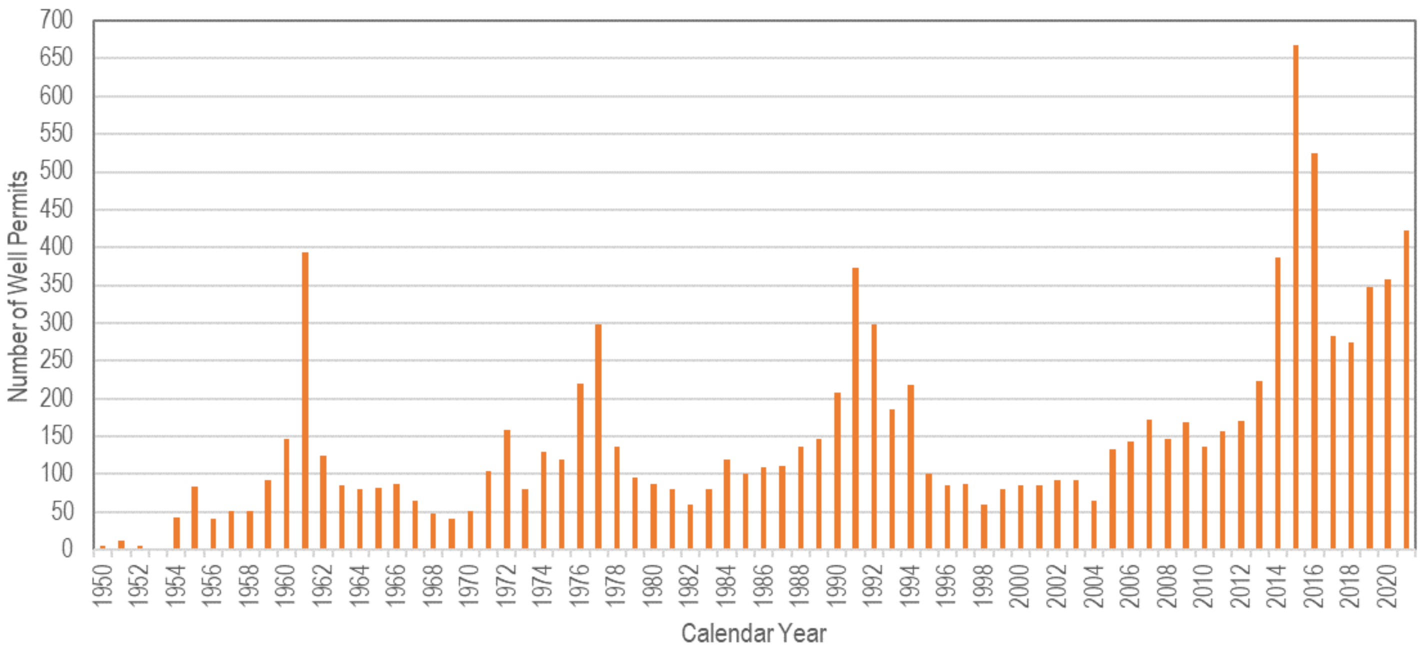


Figure 4. Annual Number of Water Supply Wells Drilled in the Kaweah Subbasin from 1950 to 2021

A total of 3,353 water supply well records from the WCR dataset are used for identifying significant and unreasonable groundwater elevations for beneficial groundwater users and uses. Criteria used to select well records from the WCR dataset include:

- The wells are drilled after January 1, 2002
- The wells are water supply wells with a planned purpose of domestic supply (includes DACs and private domestic wells), agricultural use, industrial use, or public supply (includes small water systems and municipal wells), and
- The wells have completed well depth data.

2.1.1 Analysis Zones

Because well depths vary with location, unique protective elevations are set for analysis zones that divide the Subbasin. The analysis zones are intended to group wells that would experience similar impacts by accounting for GSP management areas, groundwater elevations, base of aquifer, aquifer type, beneficial user type, land use, and similar completed well depths. A total of 39 spatial analysis zones are delineated (Figure 5). Twenty-three zones (analysis zones 1-23) cover the Single Aquifer System east of the limit of the Corcoran Clay shown on Figure 5. Sixteen zones (analysis zones 24-39) underlain by Corcoran Clay are split into an Upper and Lower Aquifer System based on the depth of the Corcoran Clay (described in Section 2.1.2). The Corcoran Clay is delineated vertically and spatially from recent airborne electromagnetic data acquired in the Subbasin by Stanford University (Kang *et al*., 2022).

2.1.2 Aquifer Designations

Aquifer designations are assigned to wells in the WCR dataset and the GSAs' representative monitoring sites based on available construction information and Corcoran Clay extent, depth, and thickness. As shown on Figure 6, the Corcoran Clay is a prominent confining geologic unit that underlies the western portion of the Subbasin and pinches out below the eastern portion of the Subbasin. The clay surface dips slightly with shallower occurrence to the east than the west. The Corcoran Clay is between 290 and 490 feet deep and up to 80 feet thick in the Subbasin.

All wells located east of the Corcoran Clay extent are designated as in the Single Aquifer System (Figure 6). Where the Corcoran Clay is present, wells are designated as Upper Aquifer System if the bottom of the well is above the bottom of the Corcoran Clay, and Likely Upper if the bottom of the well is within 50 feet of the bottom of the Corcoran Clay. Wells are designated as Lower Aquifer System if the top of its screen is within or below the Corcoran Clay. Wells are designated as Likely Lower if the total depth of the well with unknown screen depth is more than

50 feet below the bottom of the Corcoran Clay, or it is screened from less than 50 feet below the Corcoran Clay to more than 50 feet below the Corcoran Clay.

For wells without construction information that are underlain by the Corcoran Clay, groundwater level hydrographs are compared with hydrographs of other wells with construction information in the same analysis zone to determine in which aquifer the well is likely screened. Wells are designated as assumed Upper or assumed Lower Aquifer System based on similarities in seasonal and long-term groundwater level trends. Groundwater level hydrographs for representative monitoring sites are grouped by analysis zone and aquifer in Appendix A.

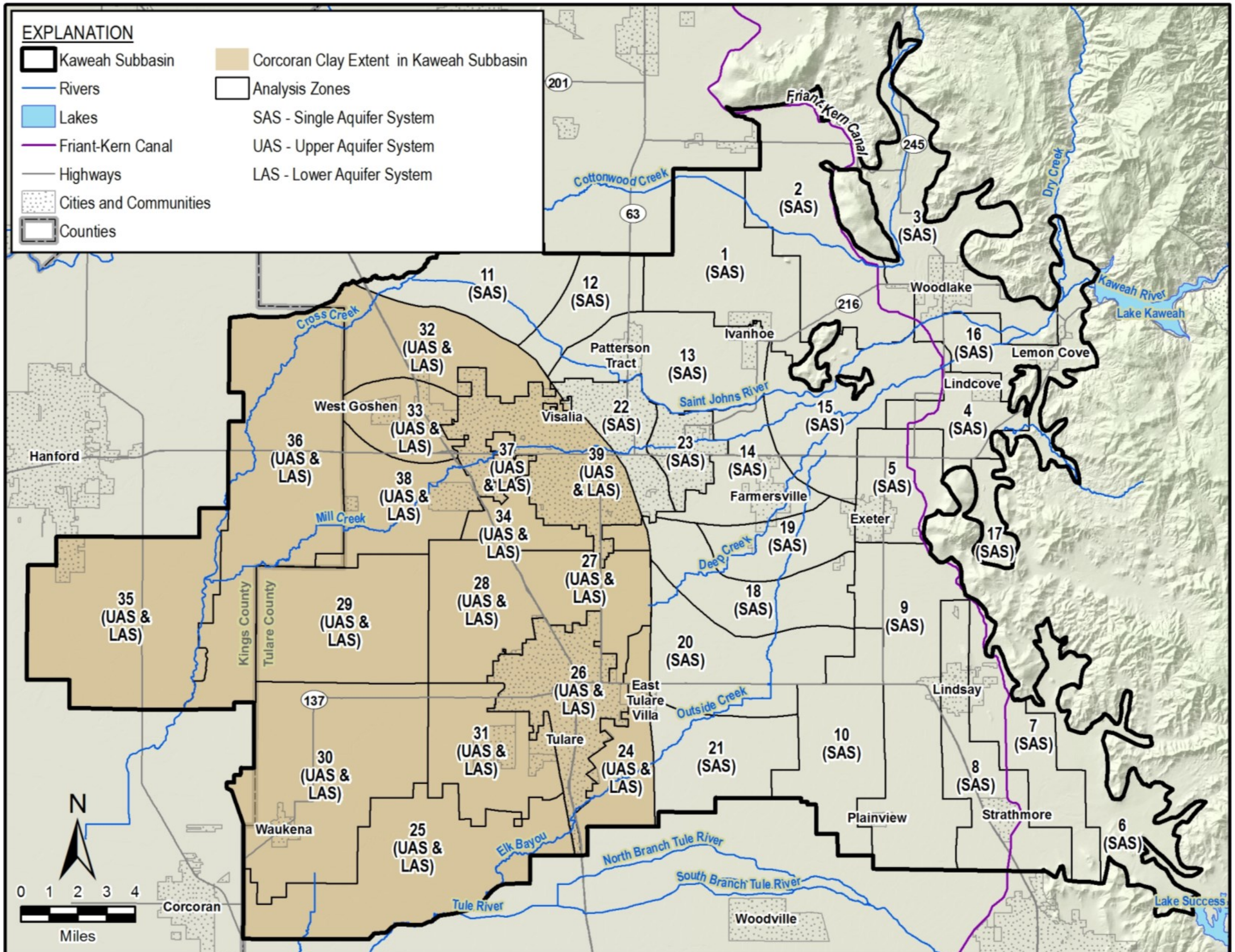


Figure 5. Kaweah Subbasin Analysis Zones

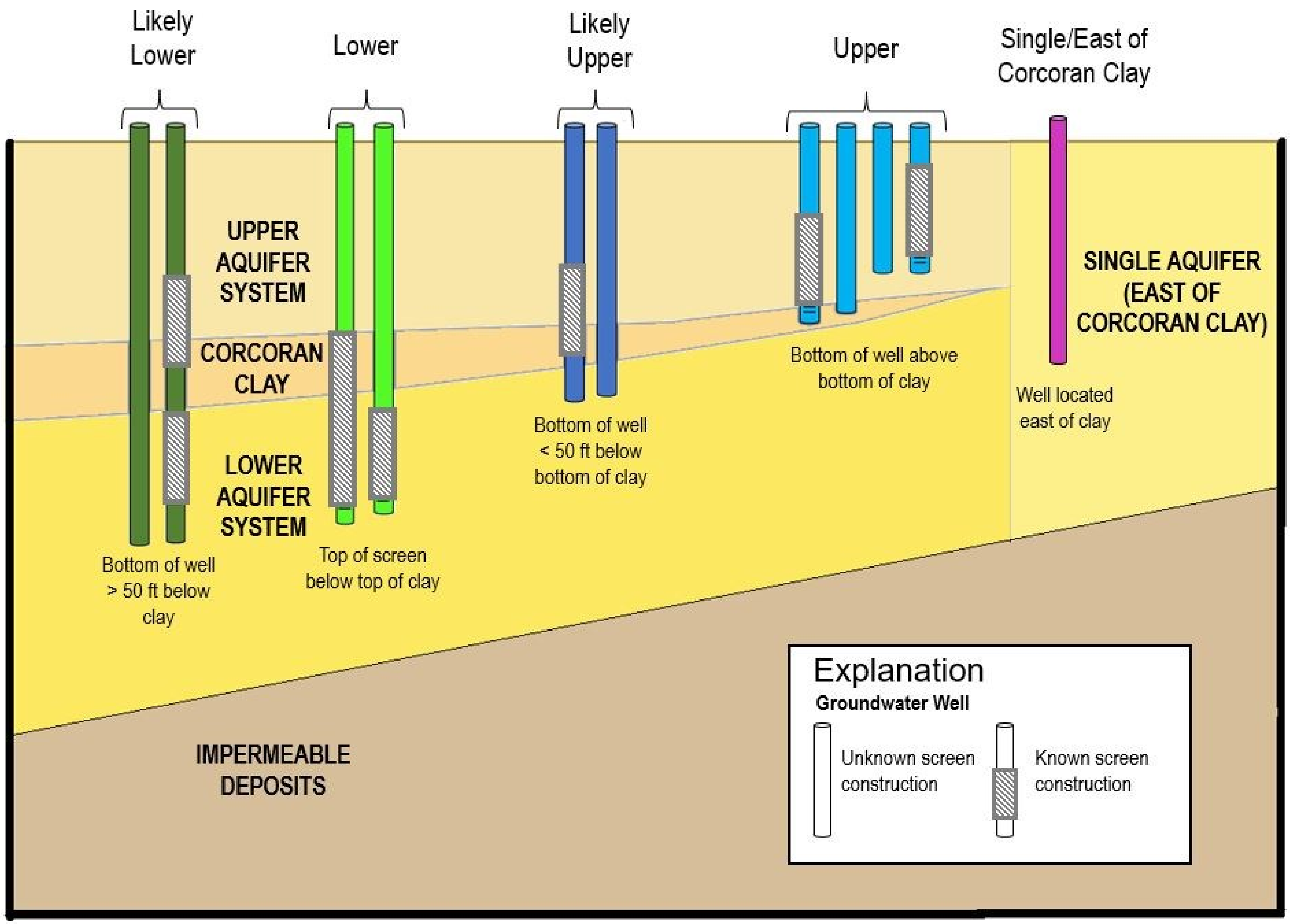


Figure 6. Kaweah Subbasin Aquifer Designation Assumptions

2.1.3 Completed Well Depth Analysis

Completed well depth is analyzed rather than total depth or depth of screens for the following reasons.

- Total depth drilled is typically deeper than the completed depth. Sometimes the difference can be quite large if the bottom portion of the well is not considered water bearing enough by the driller and is backfilled up to where the well is to be screened.
- More wells in the WCR dataset have completed depth information than well screen information. Of the wells with completed well depth information, 80% of those wells have screen depths. Since it is typical that wells are screened near the bottom of the completed well, more wells could be used in the analysis if completed well depth is used rather than screen depth.

Completed well depths vary by well use type, depth to groundwater, and aquifer. Figure 7 though Figure 13 depict the distribution of well use type and completed well depths across the Subbasin. Figure 7 shows a histogram of completed well depths across the entire Subbasin. Wells used in analysis are designated an aquifer system according to the assumptions outlined in Section 2.1.2.

Most wells in the Subbasin are completed to depths between 100 and 700 feet. The most common completed well depth is 350 to 400 feet, with about 700 total wells drilled to this depth. Well depth by type and aquifer is reviewed to assess which beneficial users would be impacted by lower groundwater levels. Figure 8 through Figure 10 are aquifer-specific histograms of completed well depth by well use type. Most supply wells in the Subbasin are either used for agricultural or domestic water supply. Agricultural wells are more numerous than other types of water supply wells and also cover the widest range of depths, including the deepest depths of all wells. Overall, the shallowest wells tend to be domestic supply wells with few domestic wells installed deeper than 450 feet. There are relatively fewer public supply wells, with the majority less than 450 feet deep, although there are some that are deeper than 800 feet.

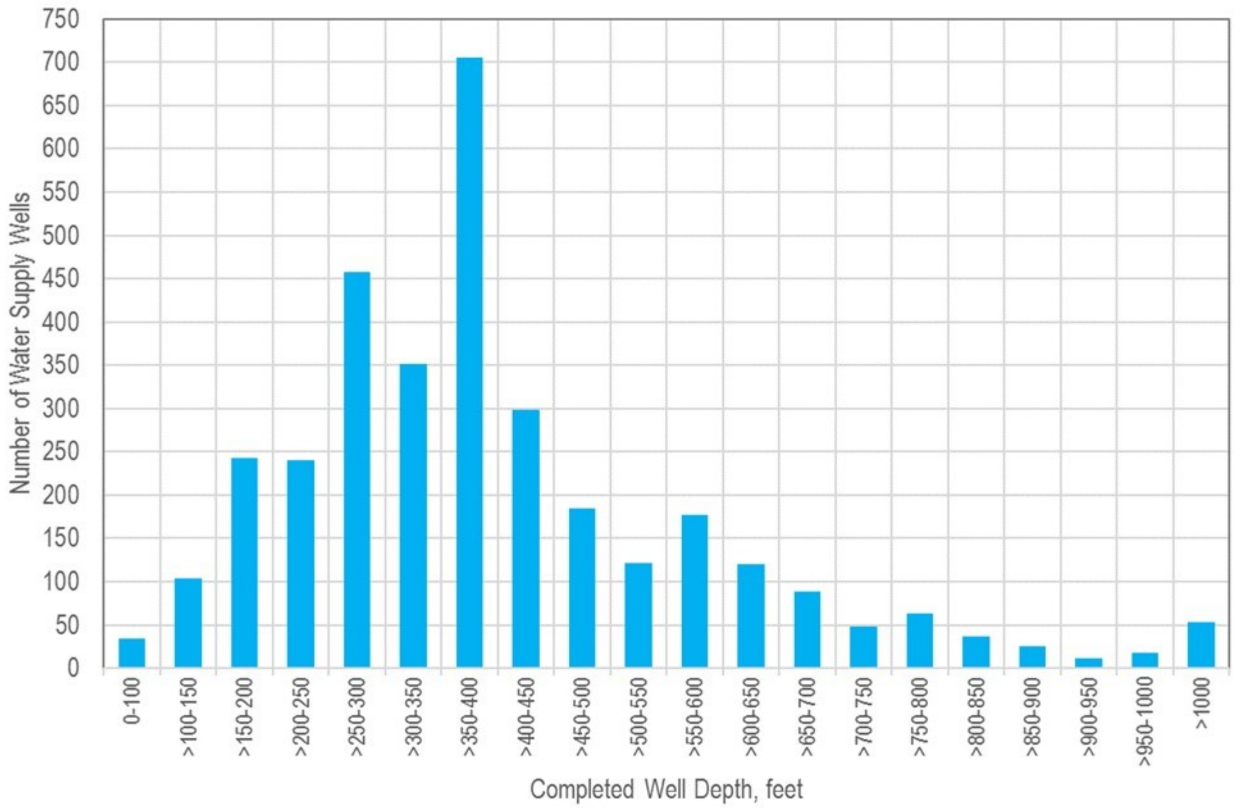


Figure 7. Histogram of Completed Wells Depths for Water Supply Wells in the Kaweah Subabsin

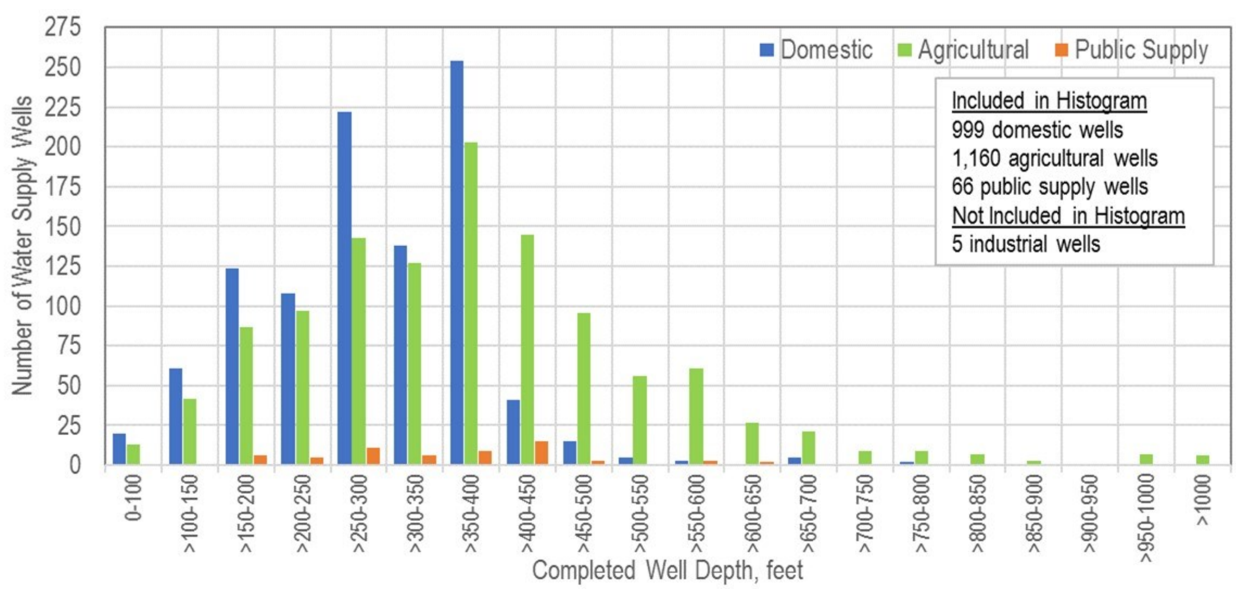


Figure 8. Histogram of Completed Well Depths for Single Aquifer System Water Supply Wells

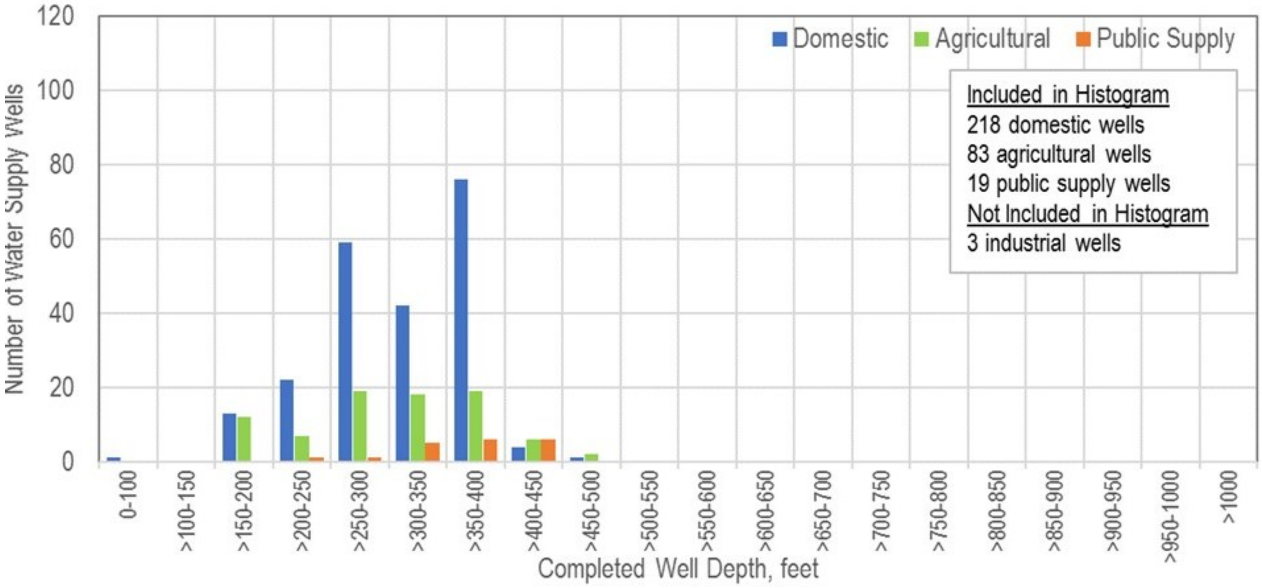


Figure 9. Histogram of Completed Well Depths for Upper Aquifer System Water Supply Wells

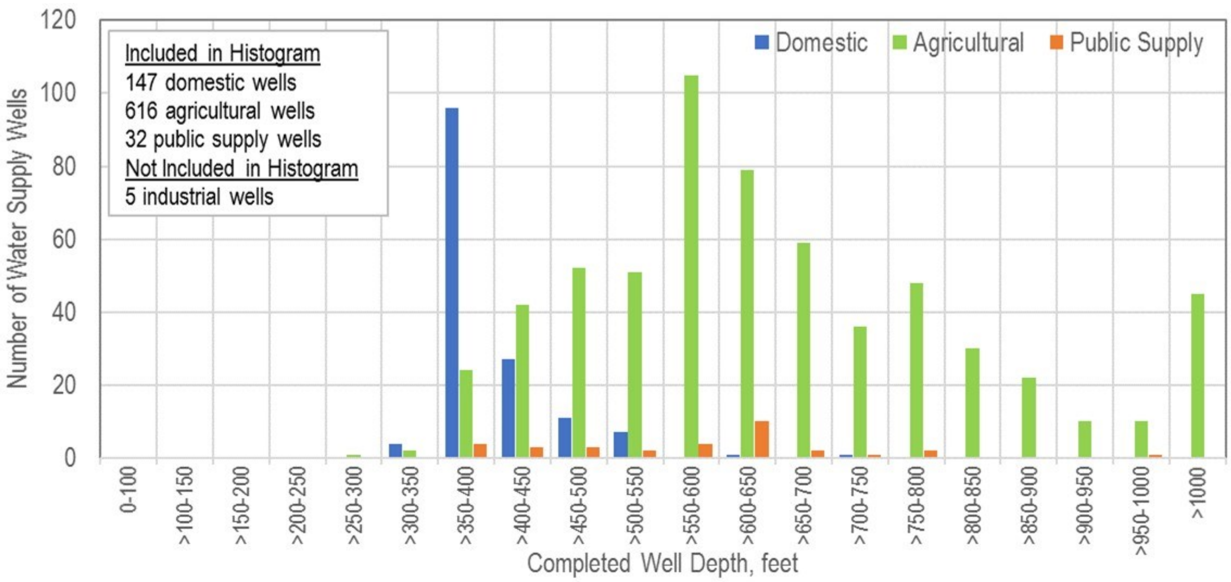


Figure 10. Histogram of Completed Well Depths for Lower Aquifer System Water Supply Wells

The number, depth, and type of water supply wells completed in each of the three aquifer systems are summarized below:

- The Single Aquifer System contains the most wells (2,232) and greatest well density (6.1 wells per square mile) of the three aquifer systems. It also has some of the shallowest wells in the Subbasin, with depths less than 100 feet (Figure 8). It has similar numbers of domestic (999) and agricultural wells (1,160), though overall domestic wells are shallower. About 60% of wells shallower than 200 feet in the Single Aquifer System are domestic wells and about 40% are agricultural wells.
- The Upper Aquifer System has the fewest total wells of the three aquifers (323) and has a well density of about 1 well per square mile. About 2.5 times as many domestic wells (218) as agriculture supply wells (83) are completed in the Upper Aquifer System, as shown on Figure 9. The shallowest wells in the Upper Aquifer System are between 150 and 200 feet, which is slightly deeper than the Single Aquifer System. This is because groundwater levels are deeper in the western portion of the Subbasin underlain by the Corcoran Clay. About 60% of wells in the top 100 feet of the saturated Upper Aquifer System (from 150 to 250 feet) are domestic wells and 40% are agricultural wells.
- The Lower Aquifer System wells are screened mostly below the Corcoran Clay and are generally deeper than 300 feet (Figure 10). The dataset analyzed has 803 wells and a well density of about 2.5 wells per square mile. About 77% of wells screened in the Upper Aquifer System are agricultural wells (616). However, since most domestic wells are installed shallower than 450 feet and most agricultural wells are installed deeper than 450 feet, there are more domestic wells than agricultural wells in the shallower portions of the Lower Aquifer System. In total, about 65% of wells that are less than 450 feet deep are domestic wells and 35% are agricultural wells.

Completion well depths are evaluated by analysis zone because their depths vary spatially due to different groundwater depths across the Subbasin. Appendix B contains histograms of completed well depth by water use type and analysis zone. Figure 11 through Figure 13 show the proportions of well use types distributed across the Subbasin by analysis zone. By grouping wells in analysis zones, the predominant well use depths in the zone influence statistics used to determine protective groundwater elevations. For example, analysis zone 19 on Figure 11 has more domestic wells than other well use types which means the completed depth statistics derived from wells in the zone are influenced more by domestic wells than other use types.

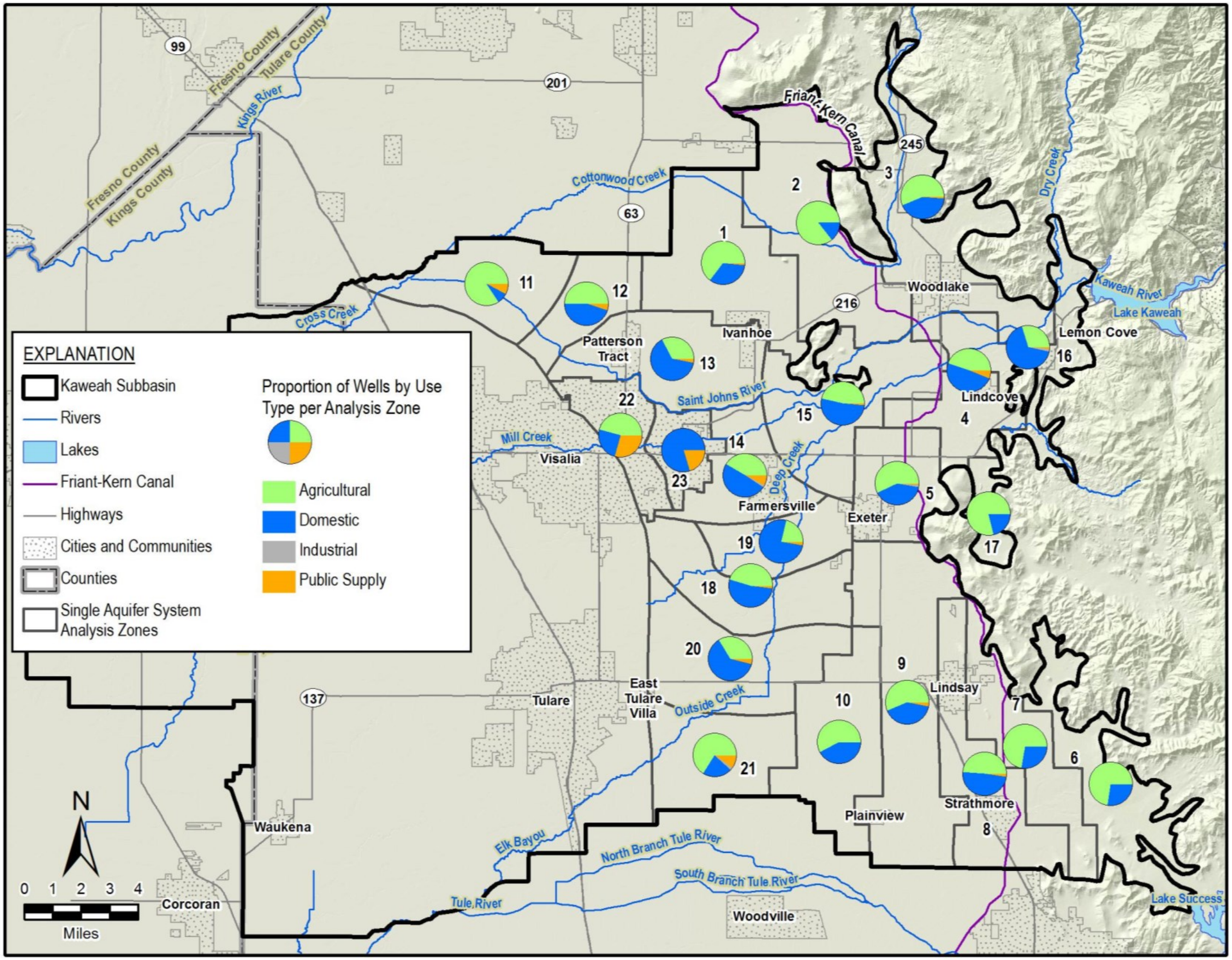


Figure 11. Single Aquifer System Well Use Types by Analysis Zone

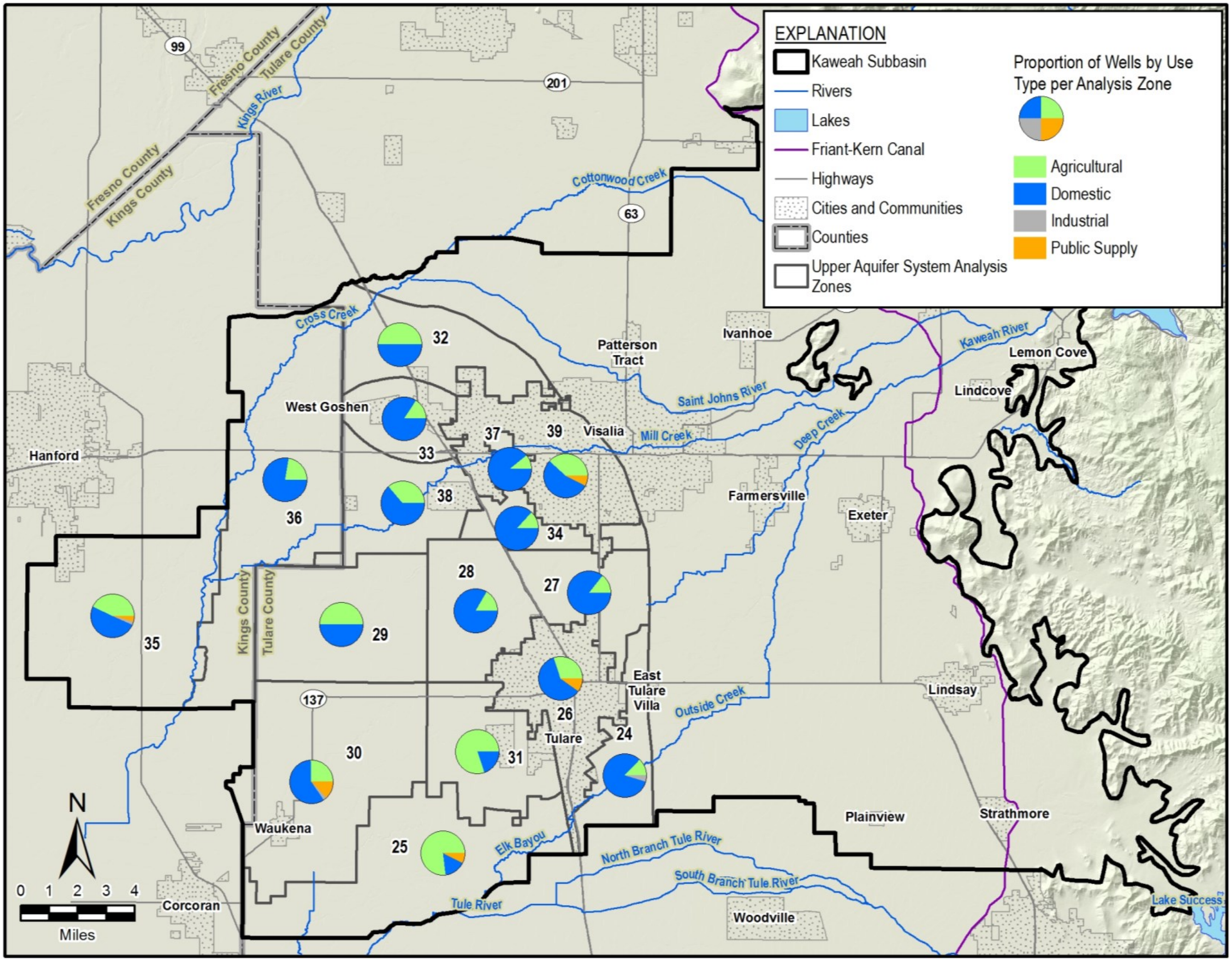


Figure 12. Upper Aquifer System Well Use Types by Analysis Zone

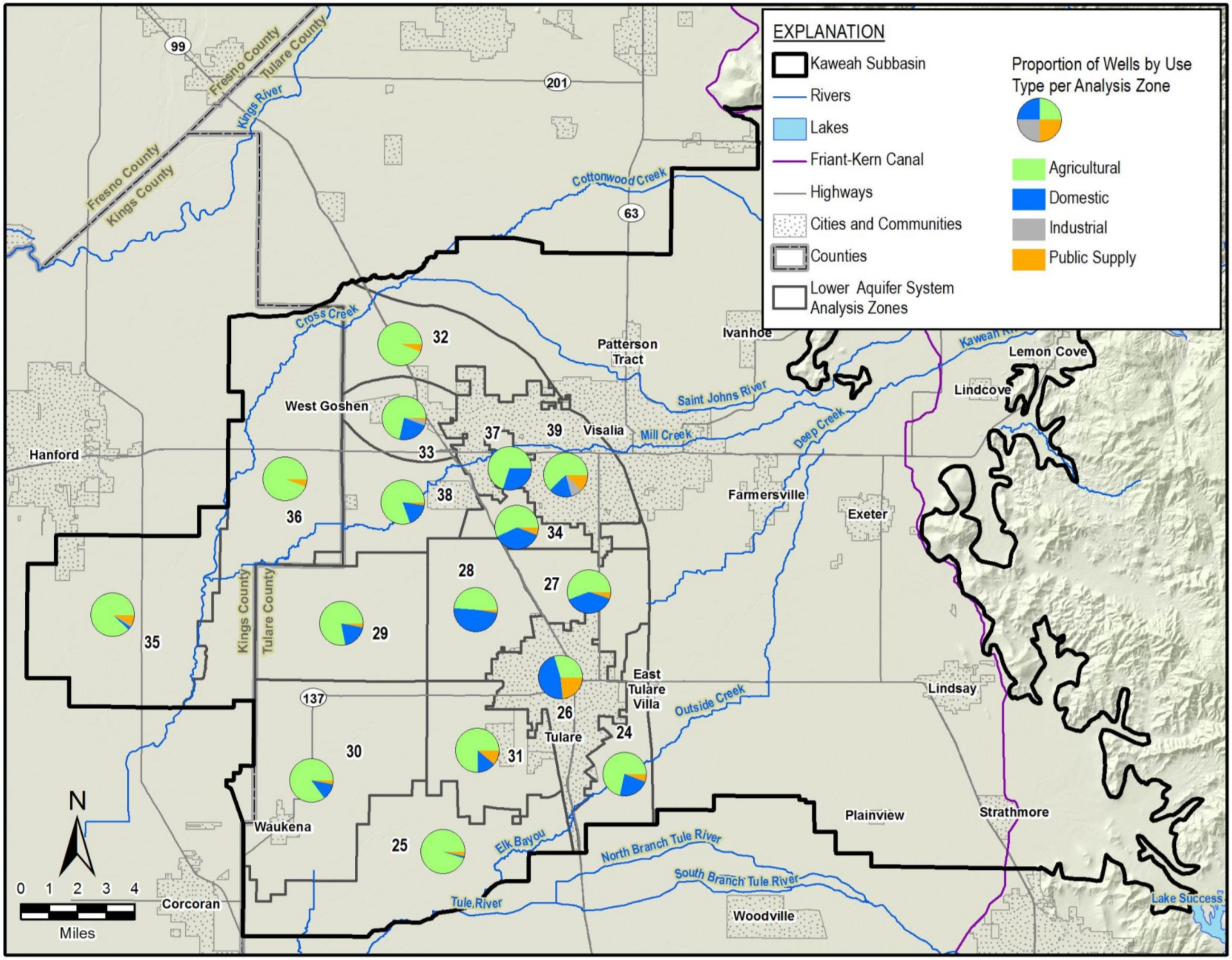


Figure 13. Lower Aquifer System Well Use Types by Analysis Zone

Well type spatial variability within the various aquifer systems is described below:

- The Single Aquifer System wells are relatively evenly split between domestic and agricultural use as shown on Figure 11. Wells around the margins of the Subbasin, including analysis zones 1, 2, 3, 11, and 17 are predominantly used for agriculture, while wells near the Kaweah River distributaries in the middle of the Subbasin such as zones 16, 19, 20, and 23 are predominantly used for domestic purposes. Visalia is the only area with greater than 20% public supply wells (analysis zones 22 and 23).
- The Upper Aquifer System is predominantly pumped by domestic wells as shown on Figure 12. However, there are parts of the Subbasin that are not heavily populated and nearly all wells are used for agriculture (analysis zones 25 and 31). Other areas with a relatively even number of domestic and agricultural supply wells include analysis zones 29 and 35 to the west and 32 to the north. Public supply wells make up less than 20% of all wells in each analysis zone, with the most concentrated distribution near Waukena (analysis zone 30).
- The Lower Aquifer System is primarily pumped by agricultural wells but there are a few areas near Tulare and Visalia where domestic wells make up between 25% to 50% of all wells (Zones 26, 27, 28, 34, and 37). Areas with the greatest number of public supply or industrial wells are in Tulare (analysis zone 26) and Visalia (analysis zone 39).

2.1.4 Protective Elevations

To calculate a groundwater elevation minimum threshold based on protection of active water supply wells, a statistical approach using percentiles was taken to develop a realistic view of active wells given well status uncertainties. A percentile well depth, or percentage of wells that would be deeper than a particular depth, was calculated for each analysis zone and aquifer. For example, the 90th percentile well depth (for wells ranked from deepest to shallowest), is the depth that 90% of wells are deeper than or equal to. This means 10% of wells are shallower than the 90th percentile depth. The 10% shallowest completed well depth are not used in the analysis as it is likely they are no longer active.

Selecting the 90th percentile recognizes the uncertainty in the accuracy and completeness of the DWR WCR dataset and accounts for destroyed or replaced shallower wells. The impracticability of managing the Subbasin to the shallowest wells is an additional factor leading to consensus amongst the three GSAs to, at a minimum, protect 90% of all water supply wells.

The 90th percentile completed well depths are calculated for each of the analysis zones by aquifers using the data described in Section 1.2. The analysis was not performed on a particular well use type but for all water supply wells within each analysis zone. Figure 14 shows the protective elevation depths for the three aquifer systems by analysis zone.

Protective well depths follow similar trends as the well completion statistics. The protective well depths are generally shallowest for the Single Aquifer System (Table 1), followed by the Upper Aquifer System, with the deepest protective depths in the Lower Aquifer System. The median protective well depth is 200 feet for the Single Aquifer System, 241 feet for the Upper Aquifer System, and 400 feet for the Lower Aquifer System. The range of protective depths are 100 to 378 feet for the Single Aquifer System, 168 to 300 feet for the Upper Aquifer System, and 380 to 606 feet for the Lower Aquifer System.

Table 1. Summary of Protective Elevations Statistics by Aquifer

Aquifer	90th Percentile Protective Depth (feet below ground surface)		
	Minimum	Median	Maximum
Single Aquifer System	100	200	378
Upper Aquifer System	168	241	300
Lower Aquifer System	380	400	606

The number of well records in the WCR dataset with construction information, above or below the protective elevation are summarized in Table 2. As mentioned previously, some of these shallow wells are likely destroyed and replaced with deeper wells, Domestic well depths tend to be shallower than wells used for other purposes, so a slightly higher number and percentage of domestic wells are potentially impacted by groundwater declines compared to other wells. Of the 297 wells shallower than the 90^{th} percentile well depth, 58% are domestic wells, 39% are agricultural wells, and 3% are public supply wells. However, in total, 90% of all well types installed since January 2002 are deeper than protective well depths, including 88% of domestic wells, 94% of agricultural wells, and 92% of public supply wells. Although the full set of WCR wells lacks construction information for many wells, if it is assumed the percentages of well use type and depth are the same for the full set of WCR wells as the subset of wells with construction information, the subset percentages may be used to scale up the number of potentially impacted wells to the full set of WCR wells.

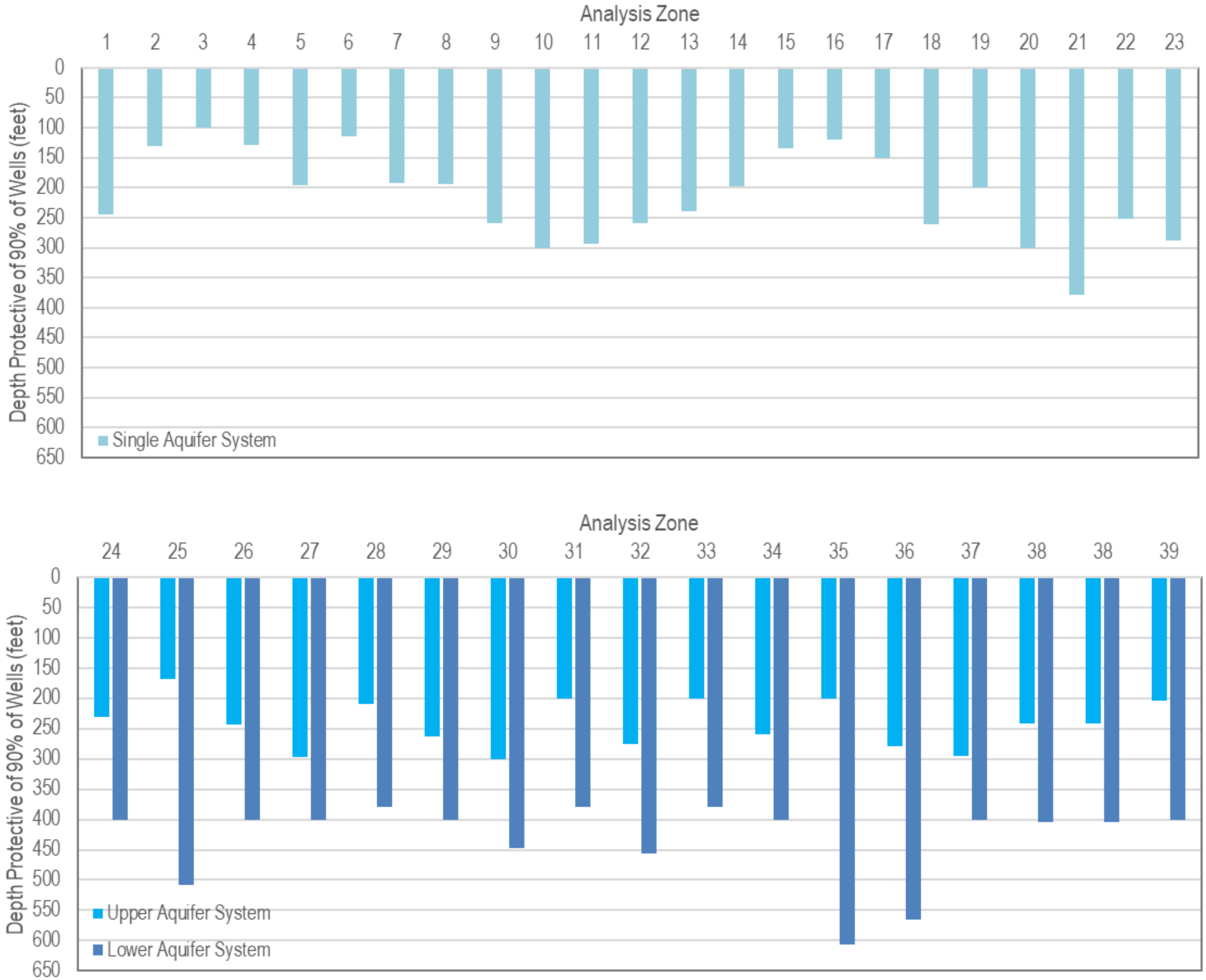


Figure 14. Analysis Zone Depths Protective of 90% of Water Supply Wells in the Kaweah Subbasin

Table 2. Summary of Basinwide Potential Well Impacts of Groundwater Levels at 90% Protective Depths Using WCR Well Records with Construction Information

Well Use Type	Deeper than 90% Protective Depth		Shallower than 90% Protective Depth		Total Number
	Number of Wells Deeper than the Protective Depth	Well Use Type Percentage	Number of Potentially Impacted Wells	Well Use Type Percentage	
Domestic	1,193	39%	171	58%	1,364
Agricultural	1,742	57%	117	39%	1,859
Public Supply	108	4%	9	3%	117
Industrial	13	0%	0	0%	13
Total	**3,056**		**297**		**3,353**

The number of well records in the WCR dataset of wells with construction information, potentially impacted at the 90% protective depth for each of the three aquifer systems are summarized in Table 4. Domestic wells in the Single Aquifer System will be the most impacted if groundwater levels fall to the protective elevation, followed by agricultural wells. Lower Aquifer System agricultural wells will be impacted more than domestic wells because of the greater number of agricultural wells in the Lower Aquifer System (Figure 10). The Upper Aquifer System has the least potentially impacted wells, with more domestic wells than agricultural wells potentially impacted.

Table 3. Summary of Potential Well Impacts of Groundwater Levels at 90% Protective Depths by Aquifer Using WCR Well Records with Construction Information

Well Use Type	Single Aquifer System		Upper Aquifer System		Lower Aquifer System		Total
	Number of Potentially Impacted Wells	Well Use Type Percentage	Number of Potentially Impacted Wells	Well Use Type Percentage	Number of Potentially Impacted Wells	Well Use Type Percentage	
Domestic	135	63%	19	68%	17	30%	**171**
Agricultural	74	35%	9	32%	34	61%	**117**
Public Supply	4	2%	0	0%	5	9%	**9**
Industrial	0	0%	0	0%	0	0%	**0**
Total	**213**		**28**		**56**		**297**

The East Kaweah Groundwater Sustainability Agency (EKGSA) and Greater Kaweah Groundwater Sustainability Agency (GKGSA) areas are those with the greatest number of wells shallower than the 90% protective depth (Table 4). This is because the Single Aquifer System underlies all of the EKGSA and a portion of the GKGSA, and it is the aquifer with the largest number of potentially impacted wells above the 90% protective depth. The GKGSA has the greatest total number of potentially impacted wells and the Mid-Kaweah Groundwater Sustainability Agency (MKGSA) has the fewest. The GSA areas are shown on Figure 1. Table 4 also summarizes the density of potentially unprotected wells within each GSA area. The EKGSA has the greatest overall density at 0.63 wells per square mile, GKGSA has 0.42 wells per square mile, and MKGSA the lowest density at 0.22 wells per square mile.

The protective elevation for each representative monitoring site is calculated by subtracting the analysis zone-specific 90th percentile protective depth from the representative monitoring site's surface elevation. Appendix C lists the 90% protective elevations for all the representative monitoring sites.

Table 4. Summary of Potential Well Impacts with Groundwater Levels at 90% Protective Depths by GSA Using WCR Well Records with Construction Information

Well Use Type	East Kaweah GSA			Greater Kaweah GSA			Mid-Kaweah GSA			Total
	Potentially Impacted Wells		Well Use Type Percentage in GSA	Potentially Impacted Wells		Well Use Type Percentage in GSA	Potentially Impacted Wells		Well Use Type Percentage in GSA	
	Number	Wells per Square Mile		Number	Wells per Square Mile		Number	Wells per Square Mile		
Domestic	61	0.33	53%	93	0.27	64%	17	0.10	49%	**171**
Agricultural	52	0.28	45%	47	0.13	32%	18	0.11	51%	**117**
Public Supply	3	0.02	3%	6	0.02	4%	0	0	0%	**9**
Industrial	0	0	0%	0	0	0%	0	0	0%	**0**
Total	**116**	**0.63**		**146**	**0.42**		**35**	**0.22**		**297**

2.2 Methodology 2, Groundwater Level Trend

This method extrapolates groundwater level trends for individual representative monitoring sites over a selected base period out to 2040. In all cases the trend is a decline with a rate that varies across the Subbasin. The EKGSA used a different base period than the GKGSA and MKGSA base period as described below. If the MT is derived from this method, it means groundwater levels are set to protect more than 90% of wells in the analysis zone while not allowing groundwater levels to decline at a greater rate than the base period.

In the EKGSA, groundwater level trends over a historical 21-year base period (1997-2017) are projected to 2040. EKGSA critically analyzed the projected 2040 groundwater levels and determined the magnitude of potential impacts likely to occur due to the current pumping and recharge regime. In cases where projected groundwater levels mirror the condition of the basin before the 1950s, when Central Valley Project brought in surface water supplies, or were not sufficiently protective of aquifer storage capacity it was determined that returning groundwater conditions similar to pre-1950 is undesirable. In EKGSA's eastern analysis zones (also called threshold regions), some initial MT elevations were increased due to the shallow depth to the bottom of the aquifer. Groundwater level MTs are established for each of the EKGSA's 10 analysis zones based on available groundwater level trend data for wells within each analysis zone. EKGSA representative monitoring sites within an analysis zone are therefore assigned the same MT groundwater elevations.

For representative monitoring sites in the GKGSA and MKGSA, the groundwater level trend base period projected to 2040 is the 11-year period from 2006 to 2016. The 2006-2016 base period represents a more recent period that reflects recent pumping patterns and includes the effects of the 2012-2016 drought. Unlike EKGSA which assigns a single MT to all representative monitoring sites within an analysis zone, GKGSA and MKGSA representative monitoring sites all have unique MTs based upon the 11-year groundwater level trend.

2.3 Methodology 3, Interpolated Minimum Threshold

After estimating MTs using methodologies 1 and 2, some GKGSA and MKGSA representative monitoring site MTs were determined to be anomalously low compared to neighboring monitoring sites because the wells' 2006-2016 groundwater level trend are much steeper than adjacent representative monitoring sites. There are four sites in the Single Aquifer System and three sites in the Upper Aquifer System where this occurs.

For representative monitoring sites with anomalously low MTs derived from the higher of Methodology 1 and 2 elevations, MTs were raised to an elevation determined by interpolating from MT contours. The contours are generated from the representative monitoring site MTs without the seven sites as control points. Figure 15 identifies the resultant MT contours and identifies the seven sites with pre-adjusted and adjusted MTs labeled. The result of using Methodology 3 is that MTs were interpolated into a smooth surface of MTs without any significant level change ("cliffs") between representative monitoring sites.

2.4 Selection of Method to Use for Minimum Threshold

For each representative monitoring site, the elevations based on the 90% protective depth (Method 1) and groundwater levels trend (Method 2) are compared. The higher of the two elevations is selected as the MT. If the groundwater level trend elevation is higher than the protective elevation, more than 90% of wells in the analysis zone are protected. Appendix C includes the elevations for both methods and highlights the elevation of the method used for MTs.

Even though multiple methods are used by the GSAs to establish MTs, contours of MTs for the Single and Upper Aquifer Systems (unconfined) and the Lower Aquifer System (confined) onFigure 15 and Figure 16, respectively, demonstrate MTs across the Subbasin do not show abnormal differences between RMS and MTs decrease in elevation from east to west similar to groundwater elevations.

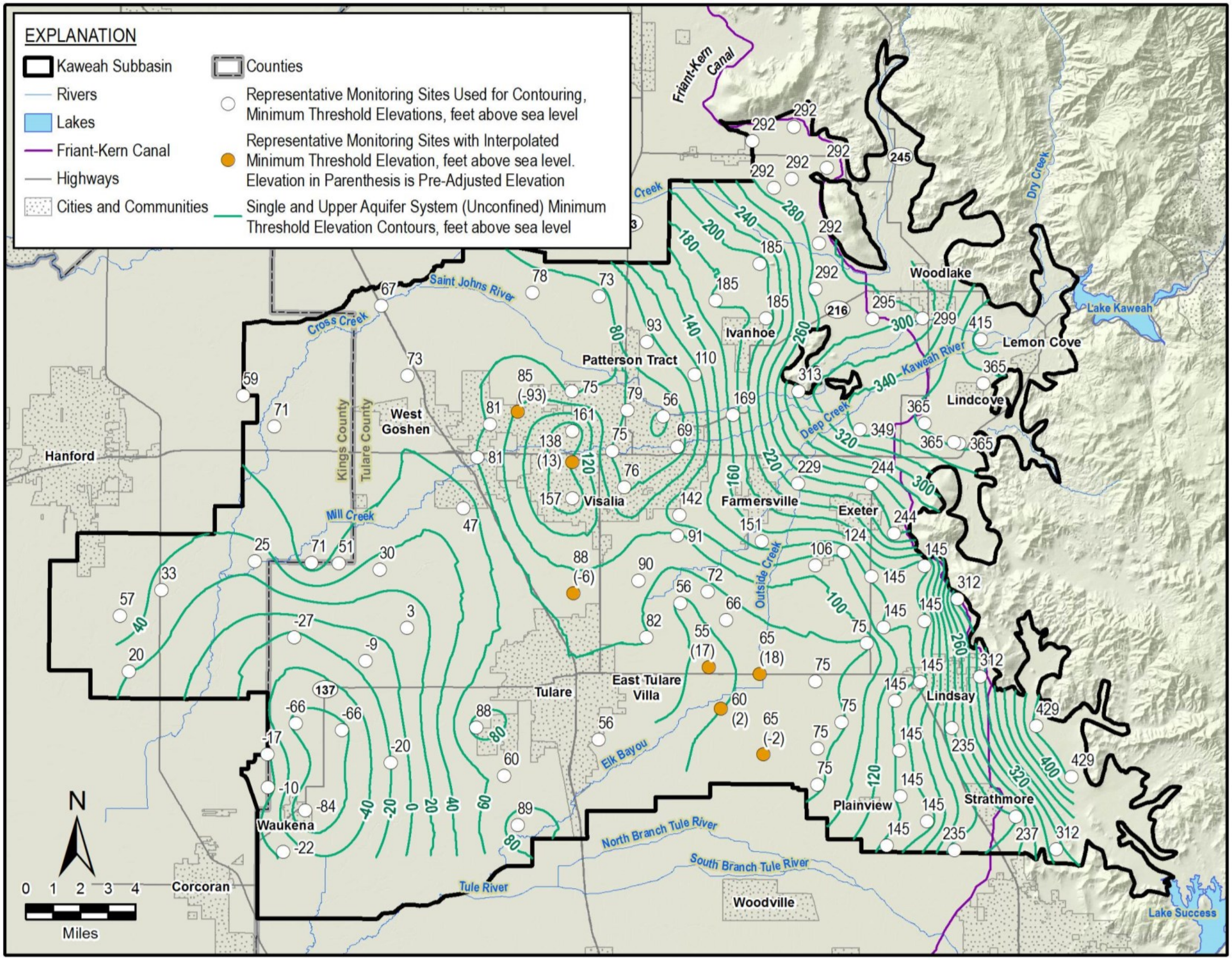


Figure 15. Single and Upper (Unconfined) Aquifer System Minimum Threshold Contours Across the Kaweah Subbasin

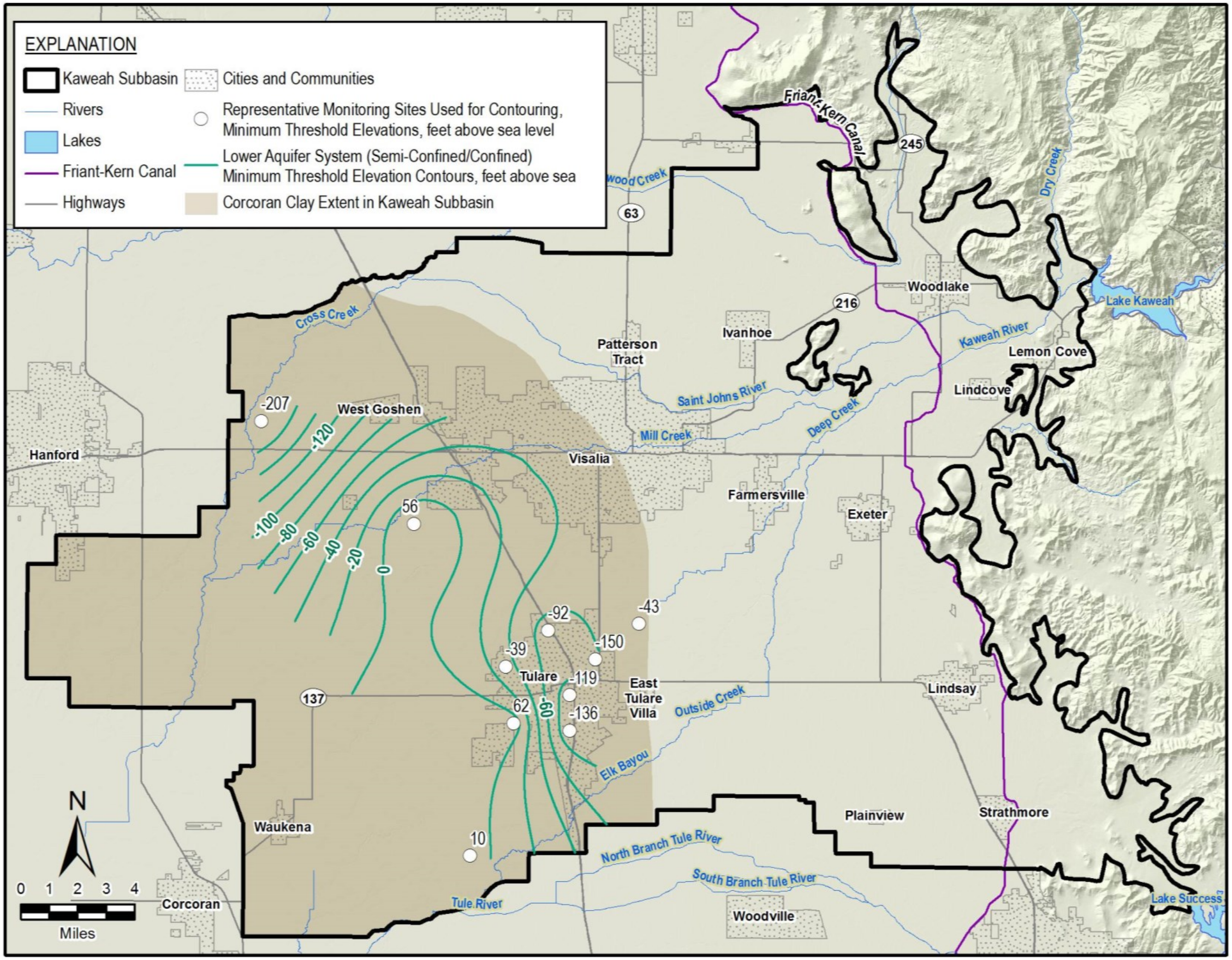


Figure 16. Lower Aquifer (Semi-Confined/Confined) System Minimum Threshold Contours Across the Kaweah Subbasin

3 PROCESS USED TO ESTABLISH MEASURABLE OBJECTIVES AND INTERIM MILESTONES

3.1 Measurable Objective Methodologies

Measurable objectives (MOs) are established at groundwater elevations higher than MTs to provide operational flexibility and reflect the GSAs' desired groundwater conditions in 2040. The margin of operational flexibility accounts for droughts, climate change, conjunctive use operations, other groundwater management activities, and data uncertainty. The GSAs in the Kaweah Subbasin are managing their groundwater sustainability to meet the MO in 2040.

The EKGSA MOs are based on Spring 2017 groundwater levels. Spring 2017 was a wet year that followed the 2012-2016 drought. This approach applies to wells where the MT is based on the 1997-2017 groundwater level trend projection described in Section 1.1 and shown on Figure 17.

The GKGSA and MKGSA MOs are based on one of two methods, depending on which methodology was used to set MTs. Figure 17 graphically shows the relationship between the different MT and MO methodologies.

MO Method 1, Groundwater Level Trend Projection to 2030:

- For GKGSA and MKGSA representative monitoring sites with MTs derived from the groundwater level trend projection, the MO is the 2006-2016 groundwater elevation projected to 2030 (Figure 18).
- For representative monitoring sites where the MT is set using the protective elevation, and the difference between the MT and groundwater elevation trend projected to 2030 is 20 feet or more, the MO is the 2006-2016 groundwater elevation projected to 2030 (Figure 18).

MO Method 2: 5-Year Drought Storage Based on 2006-2016 Trend

- For representative monitoring sites where the MT is set using the protective elevation, and the difference between the MT and groundwater elevation trend projected to 2030 is less than 20 feet, the MO is set at an elevation that provides for 5 years of drought storage above the MT. Five years of drought storage is determined as the groundwater level change occurring over 5 years using the 2006-2016 groundwater level trend (Figure 19). The groundwater level change is added to the MT elevation to establish the MO elevation (Figure 19).

- For representative monitoring sites where anomalously low MTs are adjusted by interpolating from MT contours, the MO is set at an elevation that provides for 5 years of drought storage above the adjusted MT.

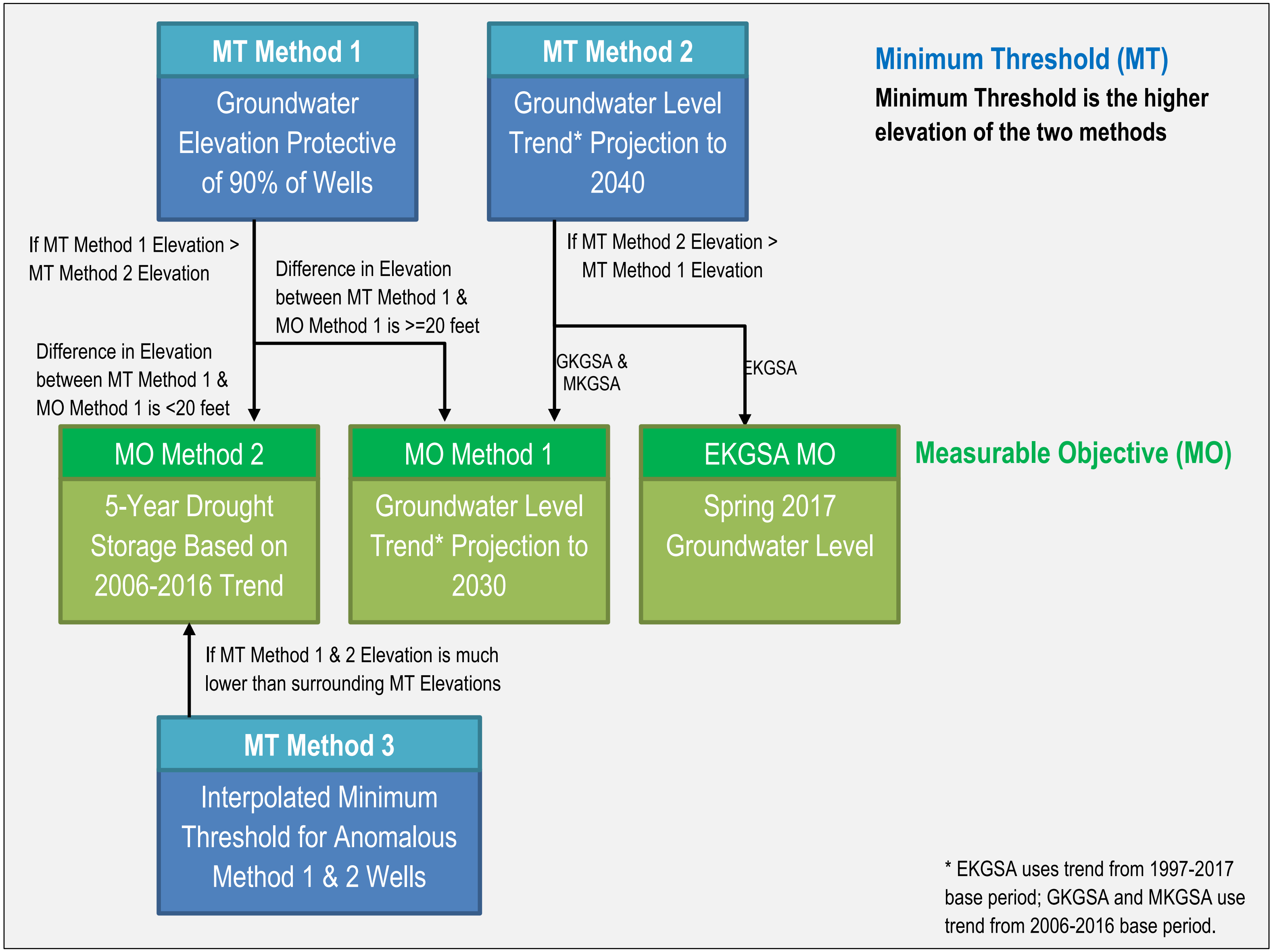


Figure 17. Relationship Between Minimum Threshold and Measurable Objective Methodologies

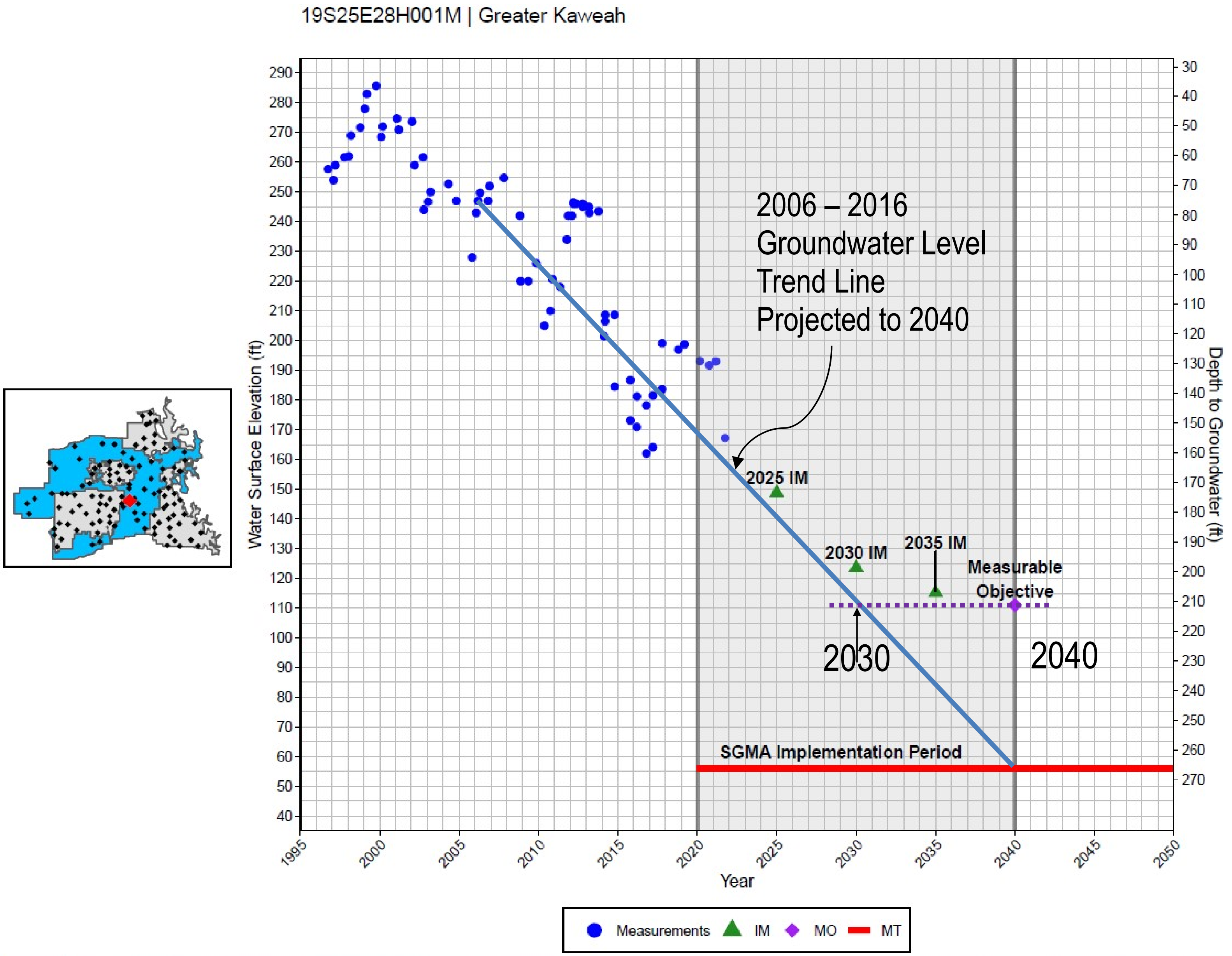


Figure 18. Example Hydrograph Showing Projection of 2006 – 2016 Trend Line

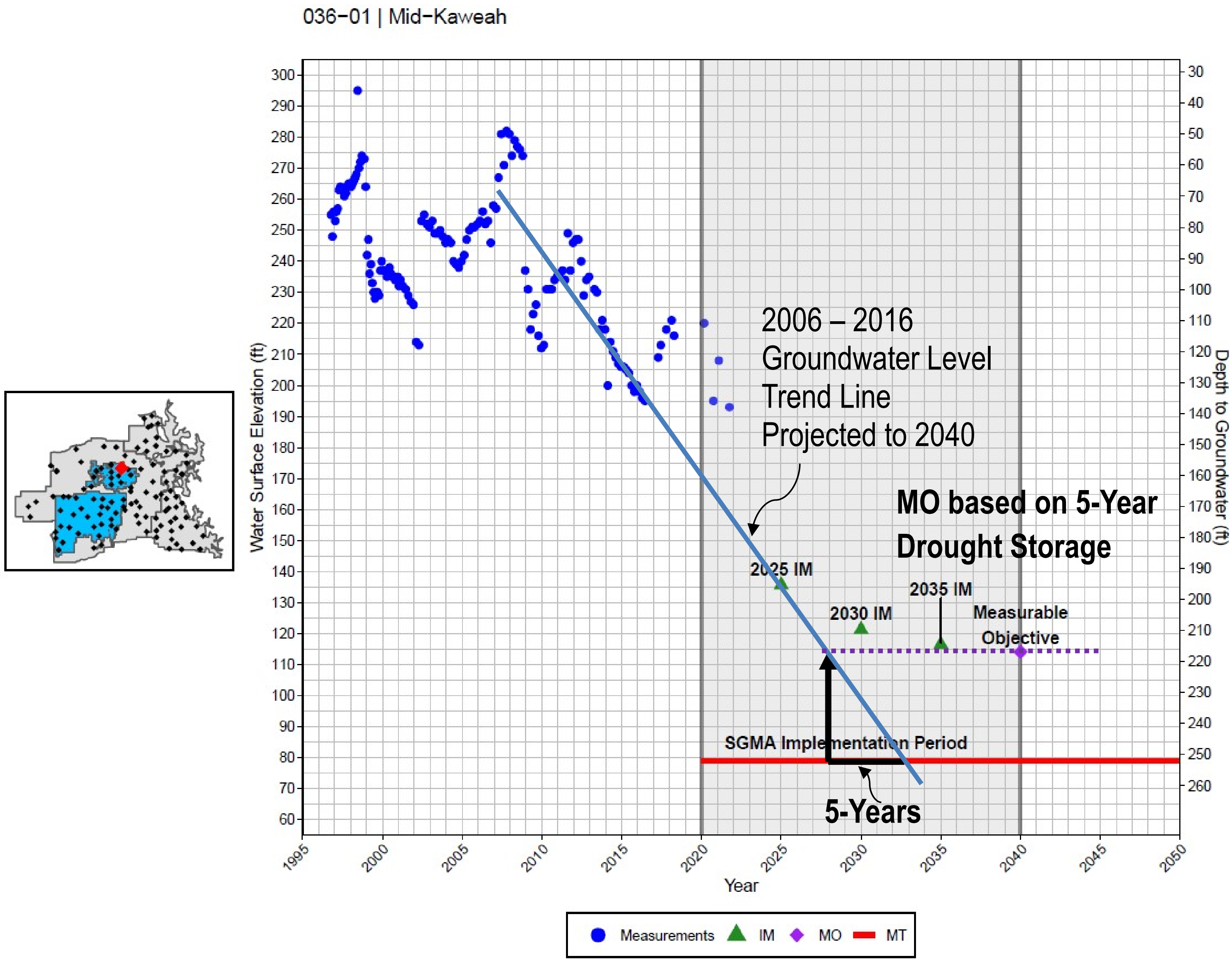


Figure 19. Example Hydrograph Showing Measurable Objective Based on 5-Year Drought Storage

3.2 Interim Milestone Methodology

Interim milestones for all representative monitoring sites take the form of a curve that flattens out toward 2040 when the MO is reached. The curve shape is determined based on implementation of projects and management actions over the next 18 years.

For the EKGSA, interim milestones are proportional to percent of overdraft to be corrected in 5-year intervals through implementation period. The interim milestones leading to groundwater level stabilization are unique to each analysis zone but follow the same incremental mitigation rate for correction of 5%, 25%, 55%, and 100% by 2025, 2030, 2035, and 2040, respectively.

Interim milestones for GKGSA and MKGSA representative monitoring sites are based on incrementally decreasing groundwater level change over time based on the following:

- 2025 interim milestone– extend the 2006-2016 groundwater level trend to 2025
- 2030 interim milestone –elevation at two-thirds of the elevation difference between the 2025 interim milestone and the MO
- 2035 interim milestone - elevation at two-thirds of the elevation difference between the 2030 interim milestone and the MO

The method for setting GKGSA and MKGSA interim milestones is illustrated on Figure 20.

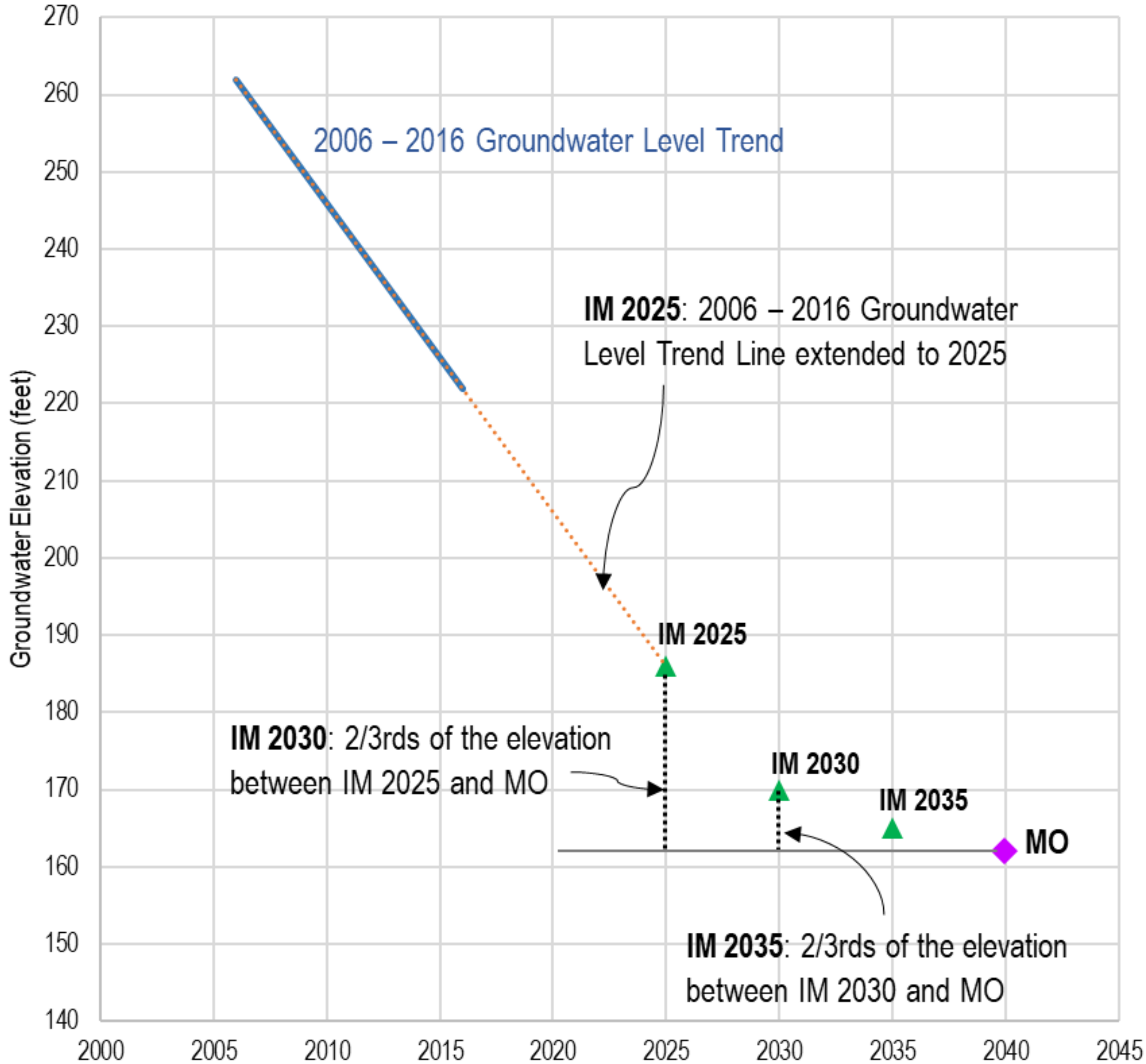


Figure 20. Example of Interim Milestone Method for GKGSA and MKGSA Represenative Monitoring Sites

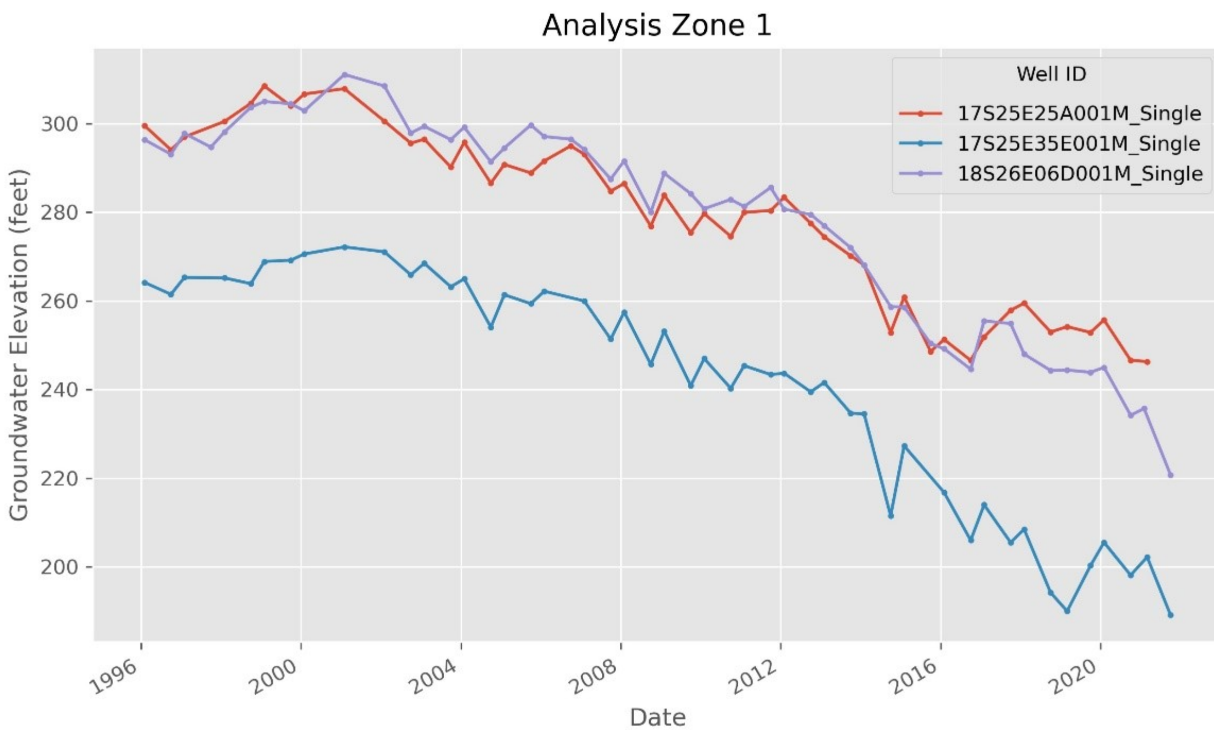
4 REFERENCES

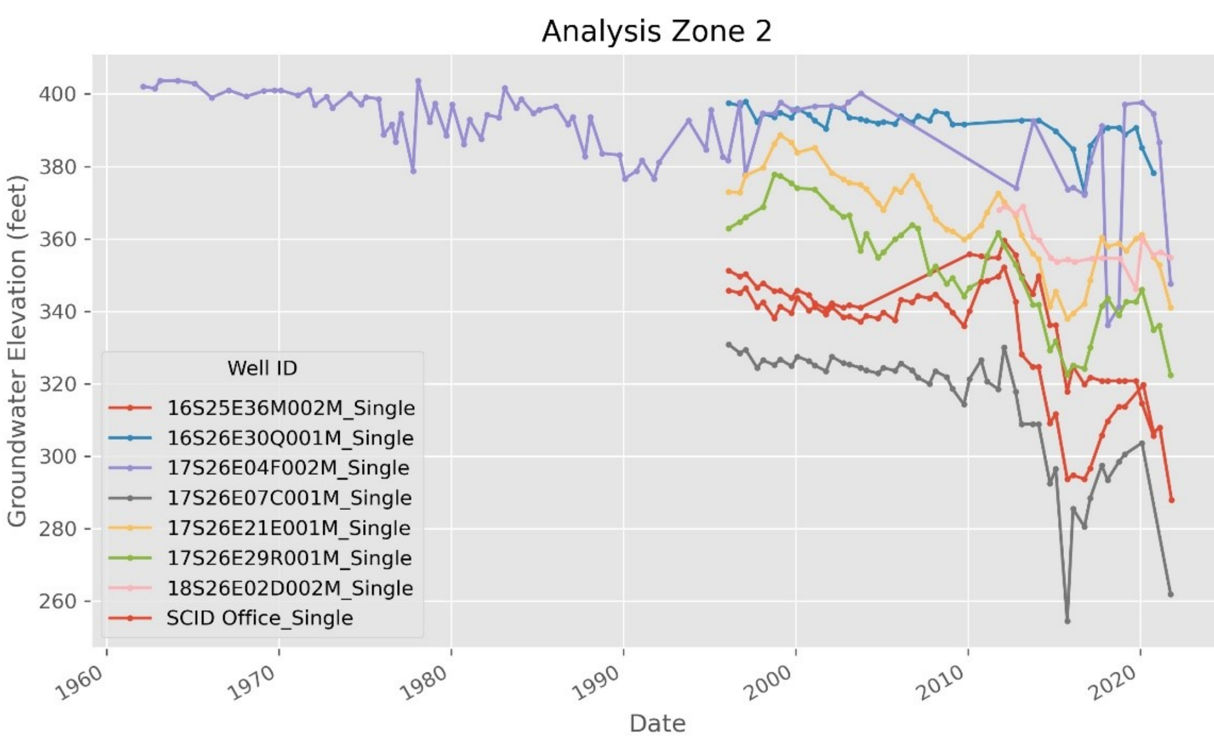
Kang, S., Knight, R., & Goebel, M. (2022). Improved imaging of the large-scale structure of a groundwater system with airborne electromagnetic data. *Water Resources Research*, 58, e2021WR031439. https://doi.org/10.1029/2021WR031439

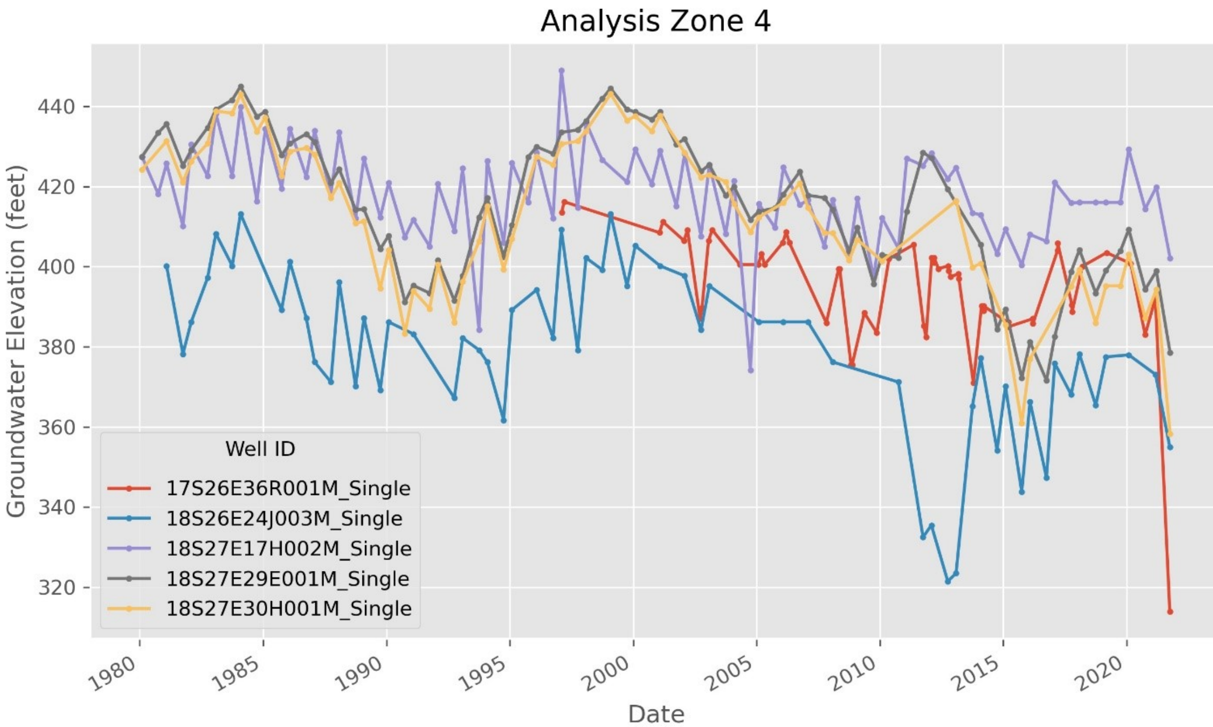
MONTGOMERY & ASSOCIATES

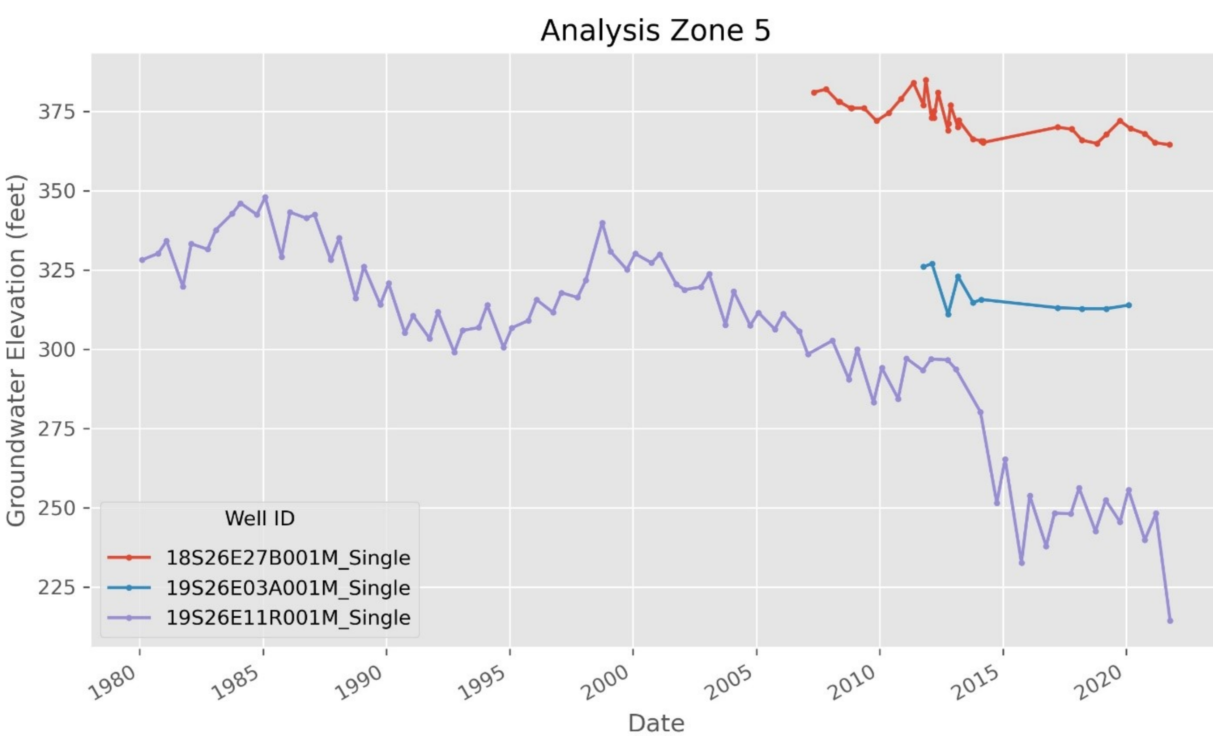
Appendix A

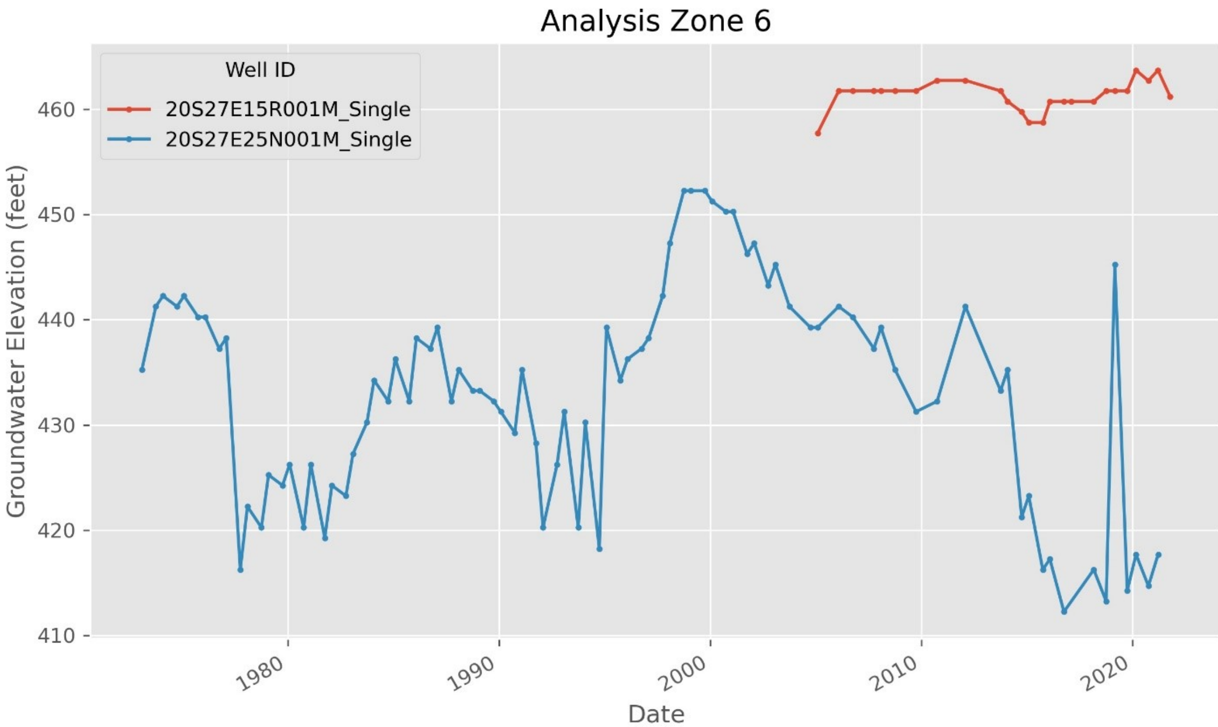
Representative Monitoring Site Hydrographs by Aquifer and Analysis Zone

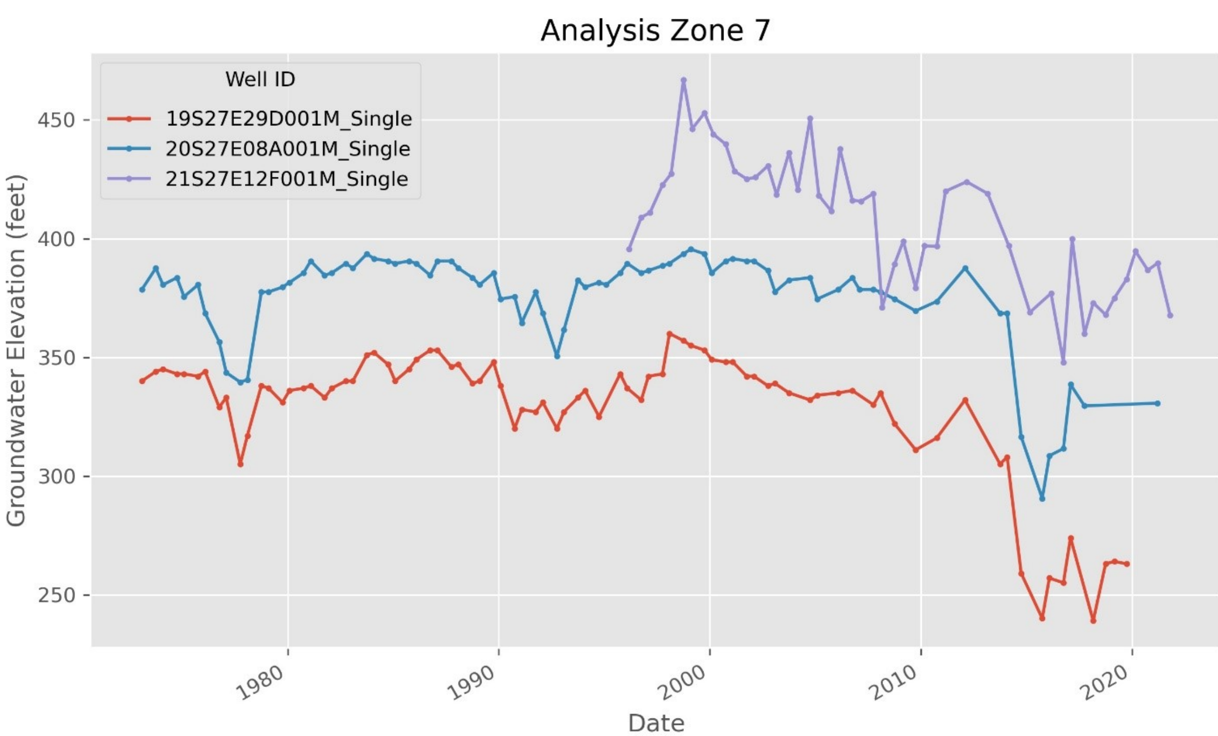

Analysis Zone 1
Well ID
17S25E25A001M_Single
17S25E35E001M_Single
18S26E06D001M_Single
Groundwater Elevation (feet)
300
280
260
240
220
200
1996
2000
2004
2008
2012
2016
2020
Date

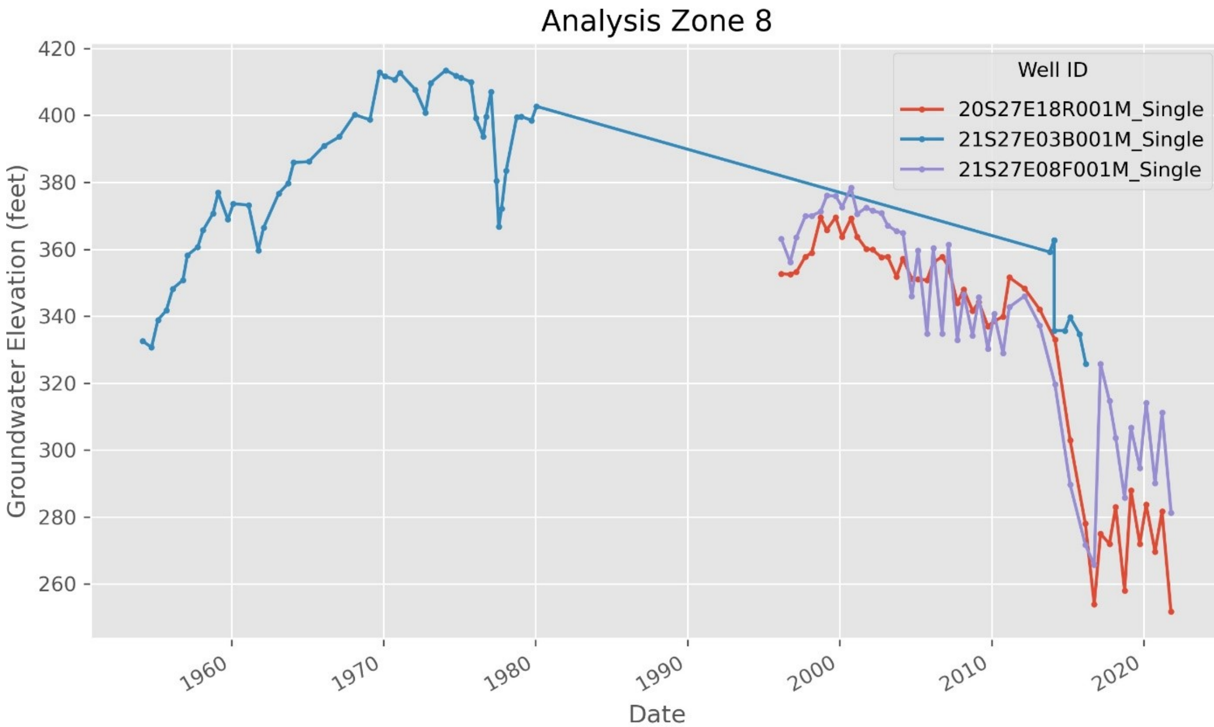

Analysis Zone 2
Well ID
16S25E36M002M_Single
16S26E30Q001M_Single
17S26E04F002M_Single
17S26E07C001M_Single
17S26E21E001M_Single
17S26E29R001M_Single
18S26E02D002M_Single
SCID Office_Single
Groundwater Elevation (feet)
400
380
360
340
320
300
280
260
1960
1970
1980
1990
2000
2010
2020
Date

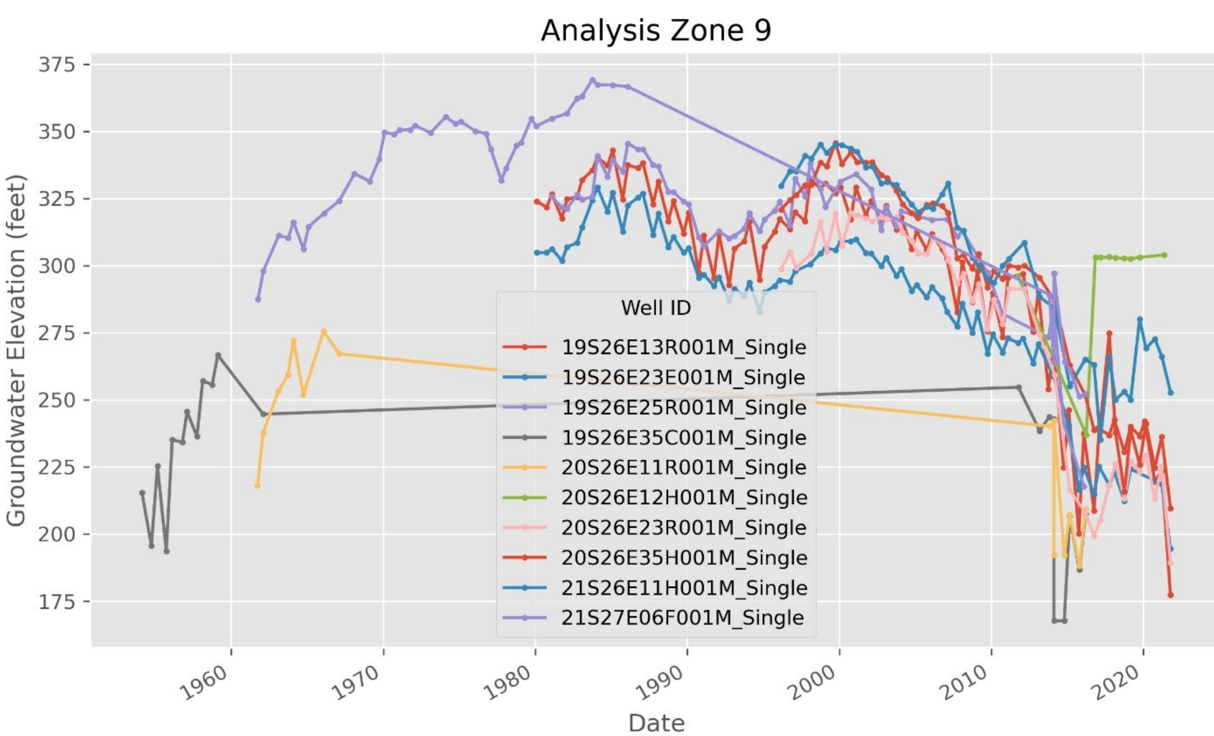

Analysis Zone 4
Groundwater Elevation (feet)
440
420
400
380
360
340
320
Well ID
17S26E36R001M_Single
18S26E24J003M_Single
18S27E17H002M_Single
18S27E29E001M_Single
18S27E30H001M_Single
1980
1985
1990
1995
2000
2005
2010
2015
2020
Date

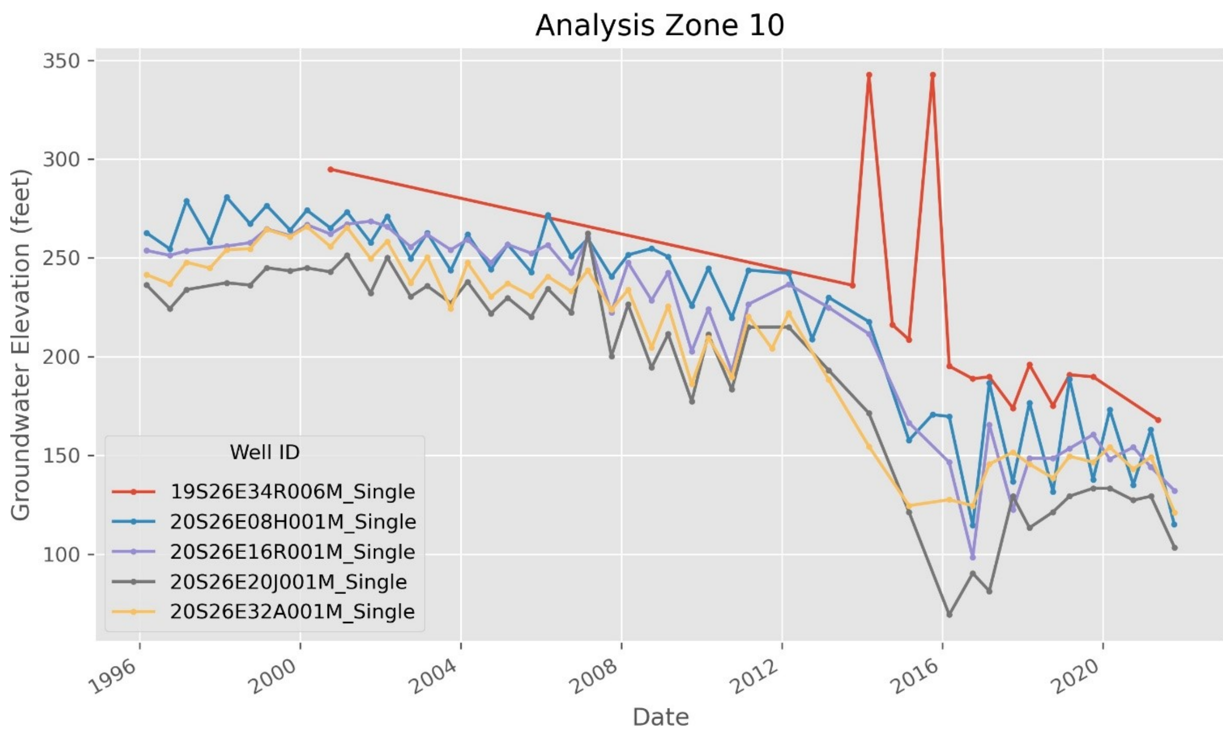

Analysis Zone 5
Groundwater Elevation (feet)
375
350
325
300
275
250
225
Well ID
18S26E27B001M_Single
19S26E03A001M_Single
19S26E11R001M_Single
1980
1985
1990
1995
2000
2005
2010
2015
2020
Date

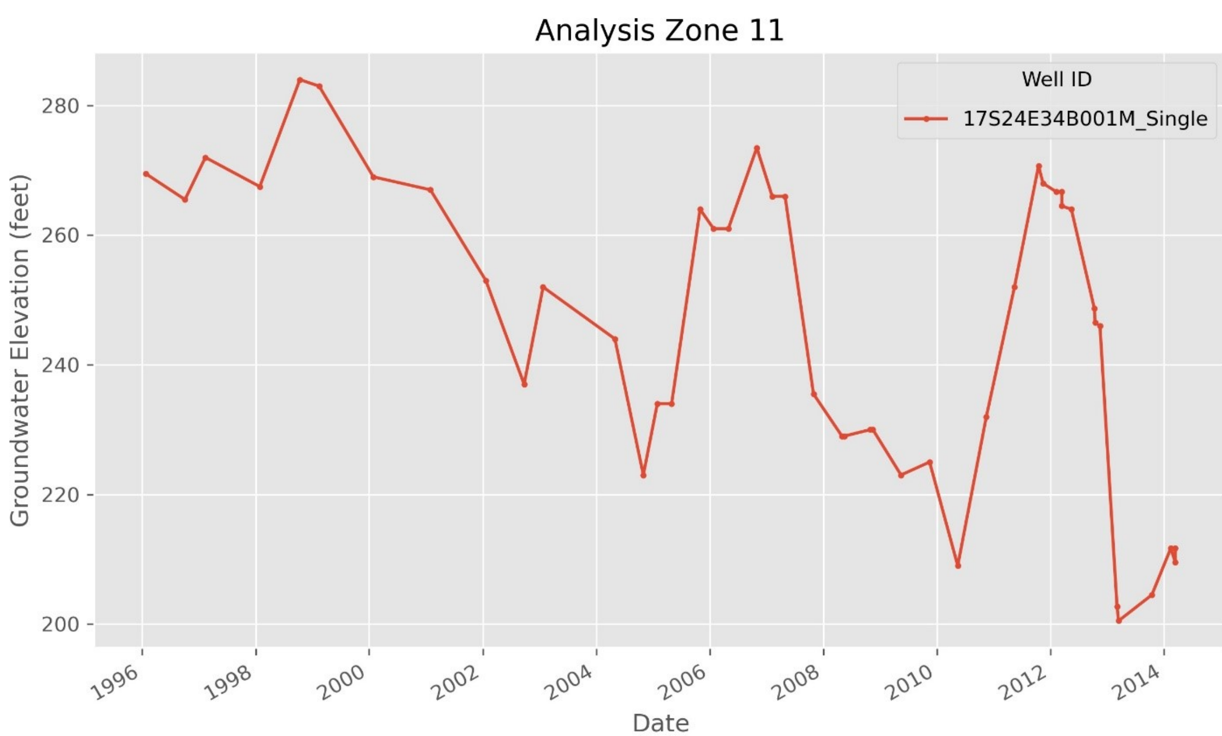

Analysis Zone 6
Well ID
20S27E15R001M_Single
20S27E25N001M_Single
Groundwater Elevation (feet)
410
420
430
440
450
460
1980
1990
2000
2010
2020
Date

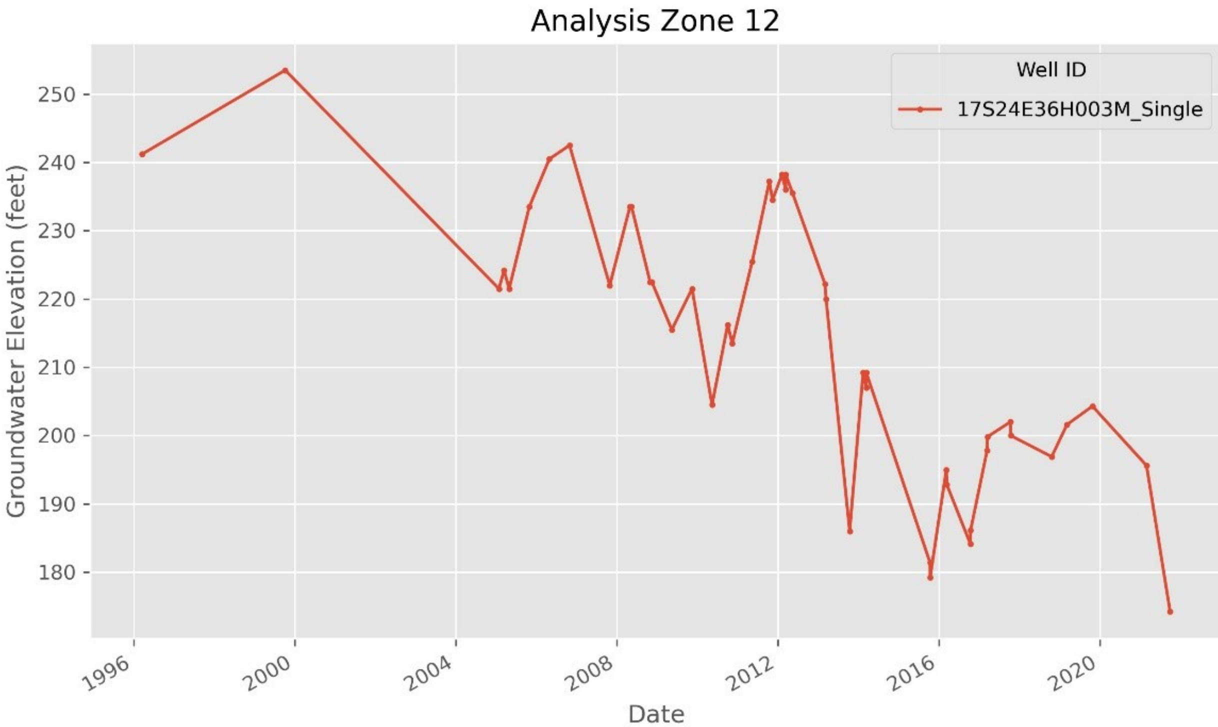

Analysis Zone 7
Well ID
19S27E29D001M_Single
20S27E08A001M_Single
21S27E12F001M_Single
Groundwater Elevation (feet)
250
300
350
400
450
1980
1990
2000
2010
2020
Date

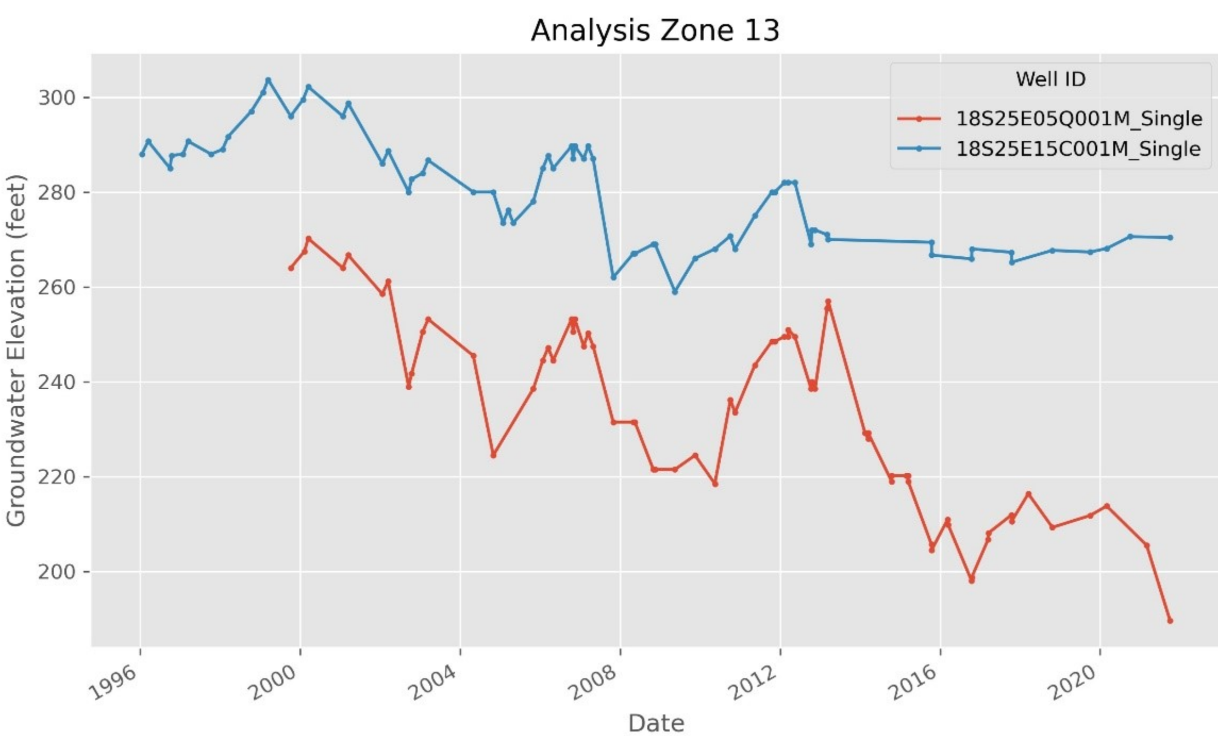

Analysis Zone 8
Well ID
20S27E18R001M_Single
21S27E03B001M_Single
21S27E08F001M_Single
Groundwater Elevation (feet)
420
400
380
360
340
320
300
280
260
1960
1970
1980
1990
2000
2010
2020
Date

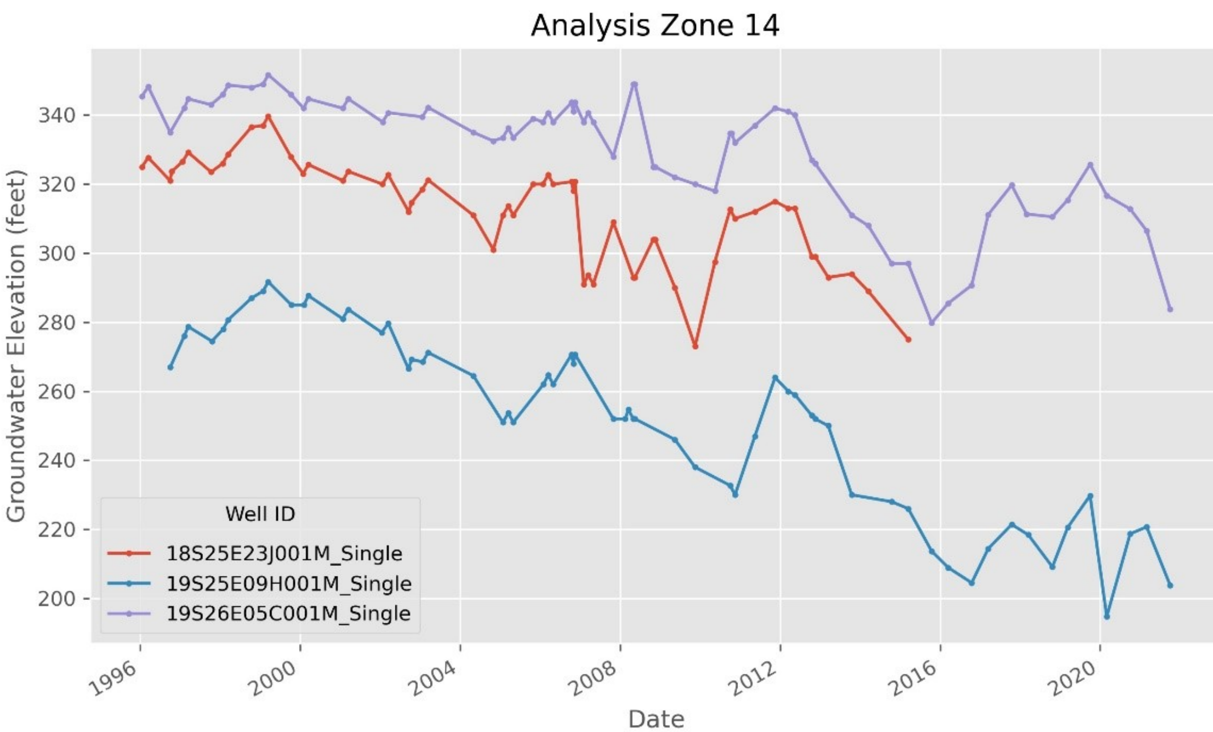

Analysis Zone 9
Well ID
19S26E13R001M_Single
19S26E23E001M_Single
19S26E25R001M_Single
19S26E35C001M_Single
20S26E11R001M_Single
20S26E12H001M_Single
20S26E23R001M_Single
20S26E35H001M_Single
21S26E11H001M_Single
21S27E06F001M_Single
Groundwater Elevation (feet)
375
350
325
300
275
250
225
200
175
1960
1970
1980
1990
2000
2010
2020
Date

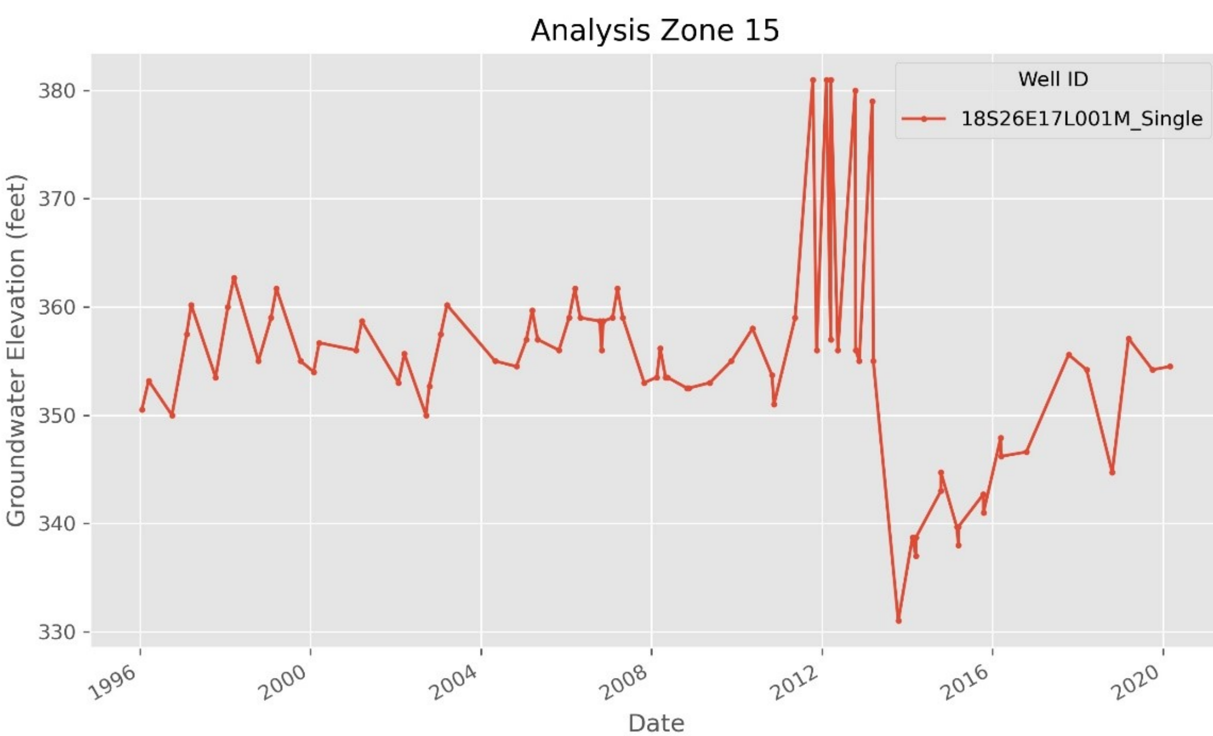

Analysis Zone 10
Groundwater Elevation (feet)
350
300
250
200
150
100
Well ID
19S26E34R006M_Single
20S26E08H001M_Single
20S26E16R001M_Single
20S26E20J001M_Single
20S26E32A001M_Single
1996
2000
2004
2008
2012
2016
2020
Date

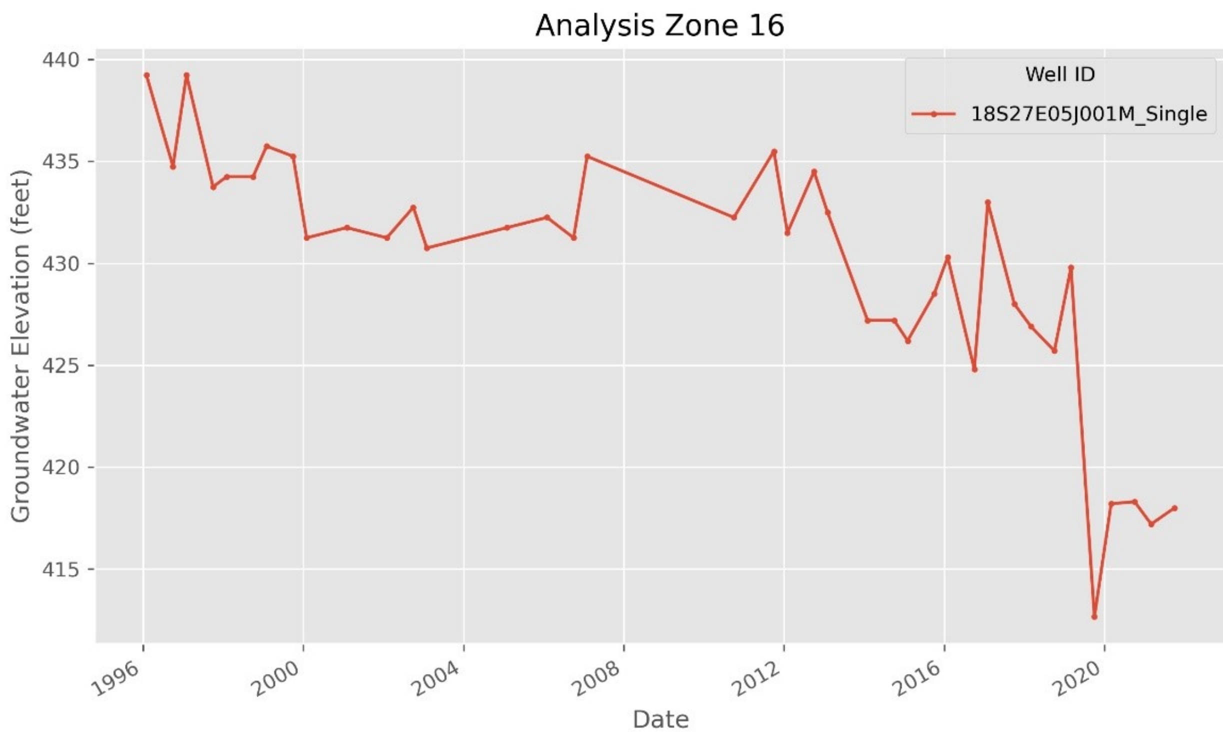

Analysis Zone 11
Groundwater Elevation (feet)
280
260
240
220
200
Well ID
17S24E34B001M_Single
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
Date

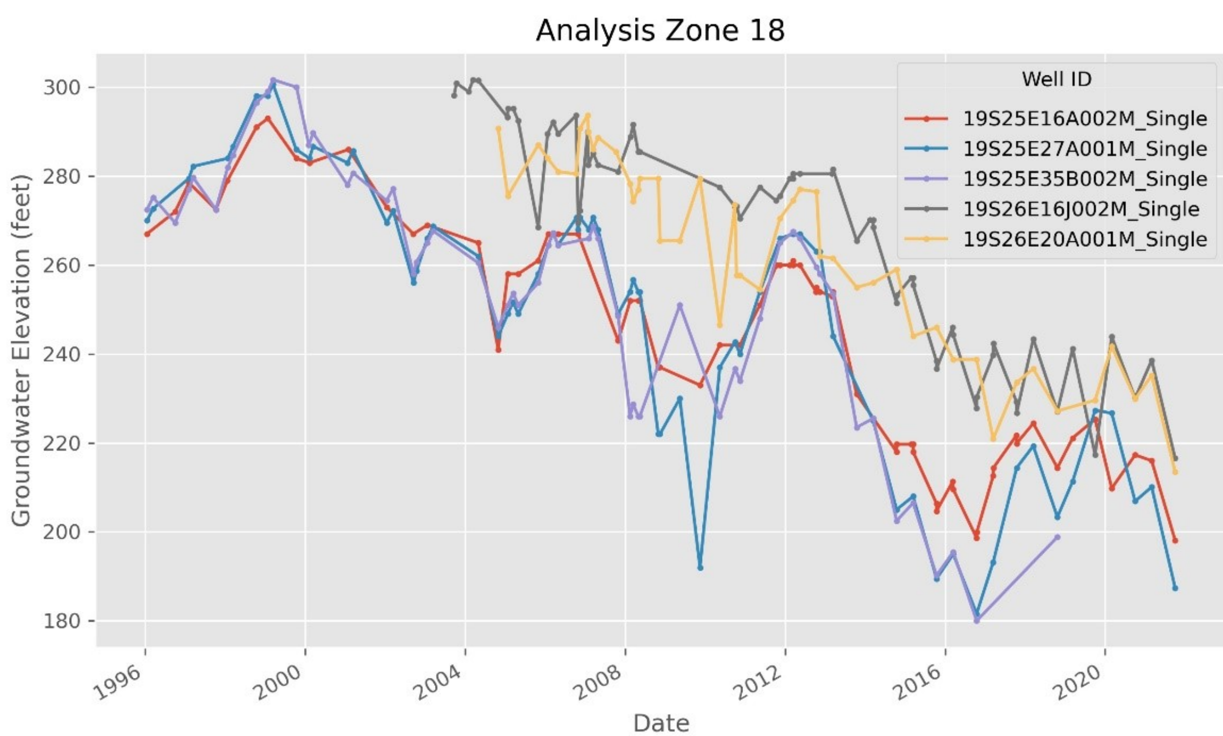

Analysis Zone 12
Well ID
17S24E36H003M_Single
Groundwater Elevation (feet)
250
240
230
220
210
200
190
180
1996
2000
2004
2008
2012
2016
2020
Date


Analysis Zone 13
Well ID
18S25E05Q001M_Single
18S25E15C001M_Single
Groundwater Elevation (feet)
300
280
260
240
220
200
1996
2000
2004
2008
2012
2016
2020
Date


Analysis Zone 14
Groundwater Elevation (feet)
340
320
300
280
260
240
220
200
Well ID
18S25E23J001M_Single
19S25E09H001M_Single
19S26E05C001M_Single
1996
2000
2004
2008
2012
2016
2020
Date


Analysis Zone 15
Groundwater Elevation (feet)
380
370
360
350
340
330
Well ID
18S26E17L001M_Single
1996
2000
2004
2008
2012
2016
2020
Date


Analysis Zone 16
Well ID
18S27E05J001M_Single
Groundwater Elevation (feet)
440
435
430
425
420
415
1996
2000
2004
2008
2012
2016
2020
Date


Analysis Zone 18
Well ID
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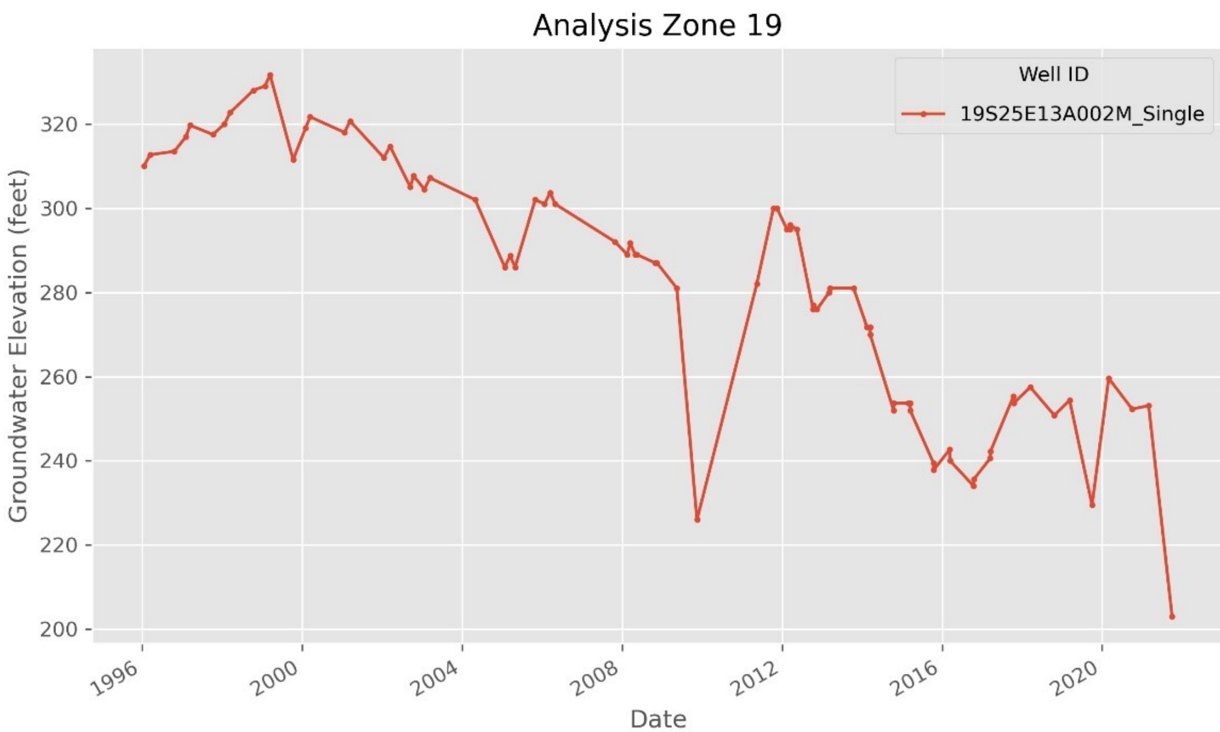
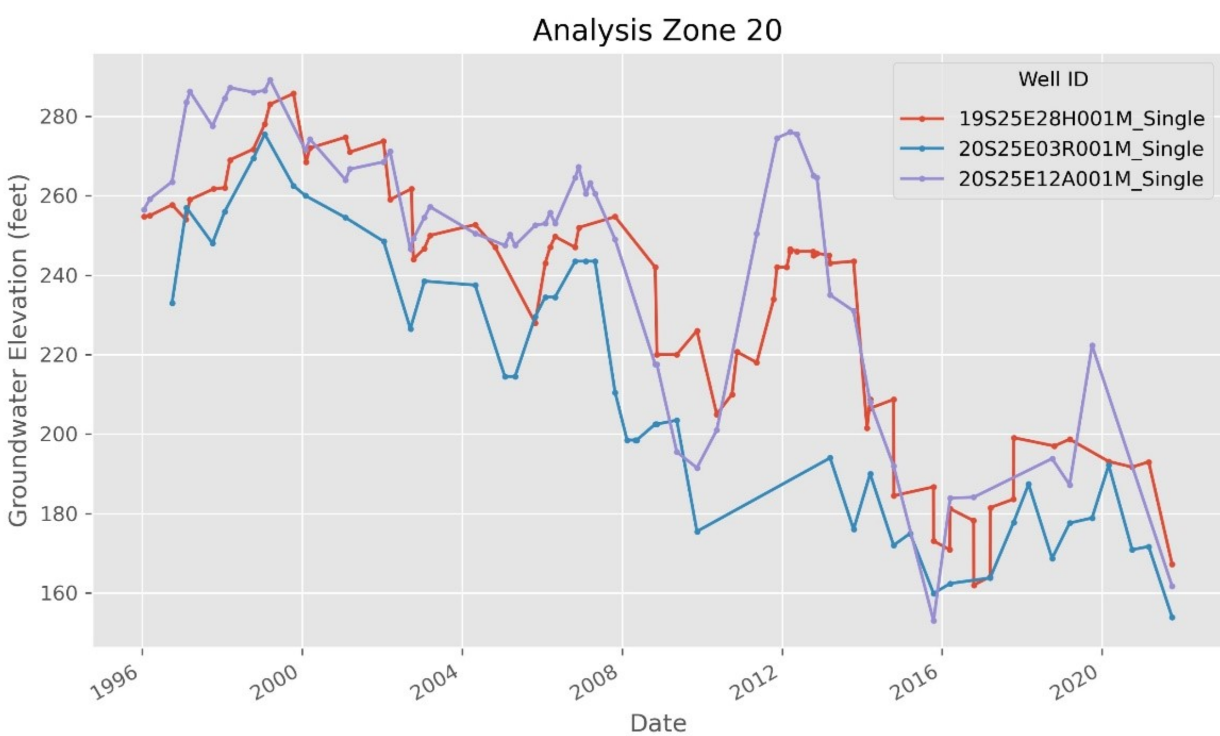
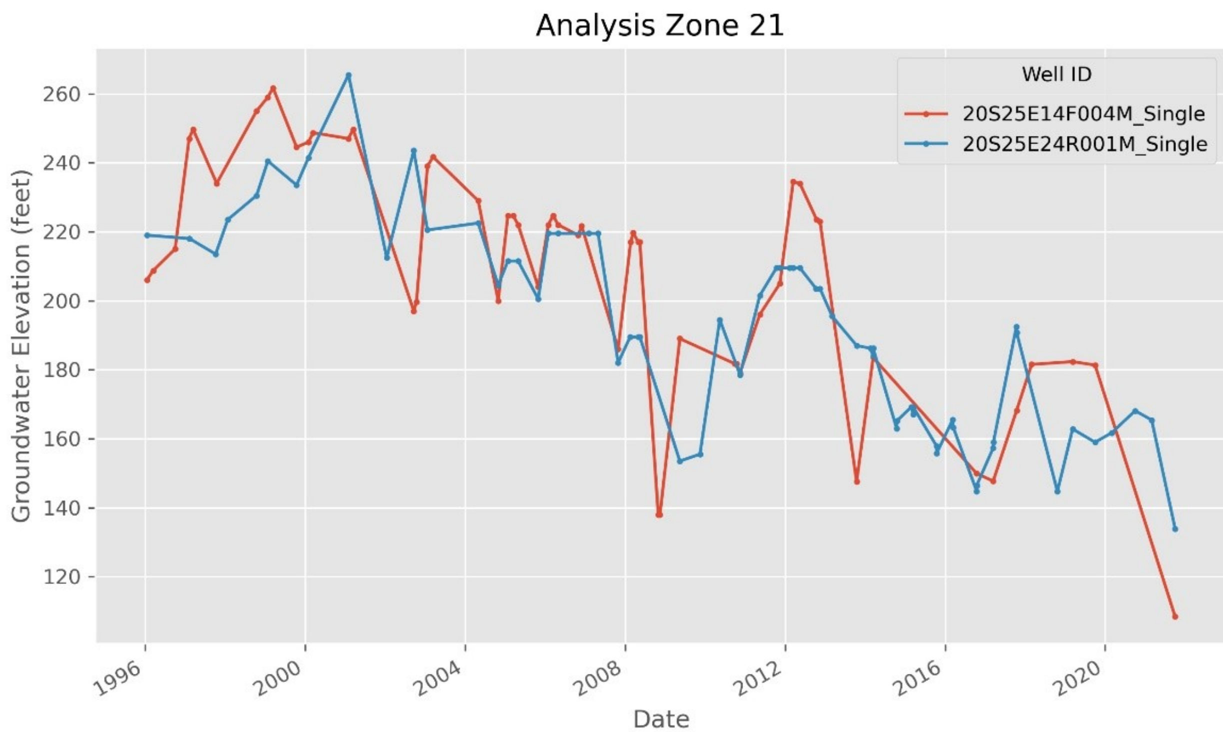
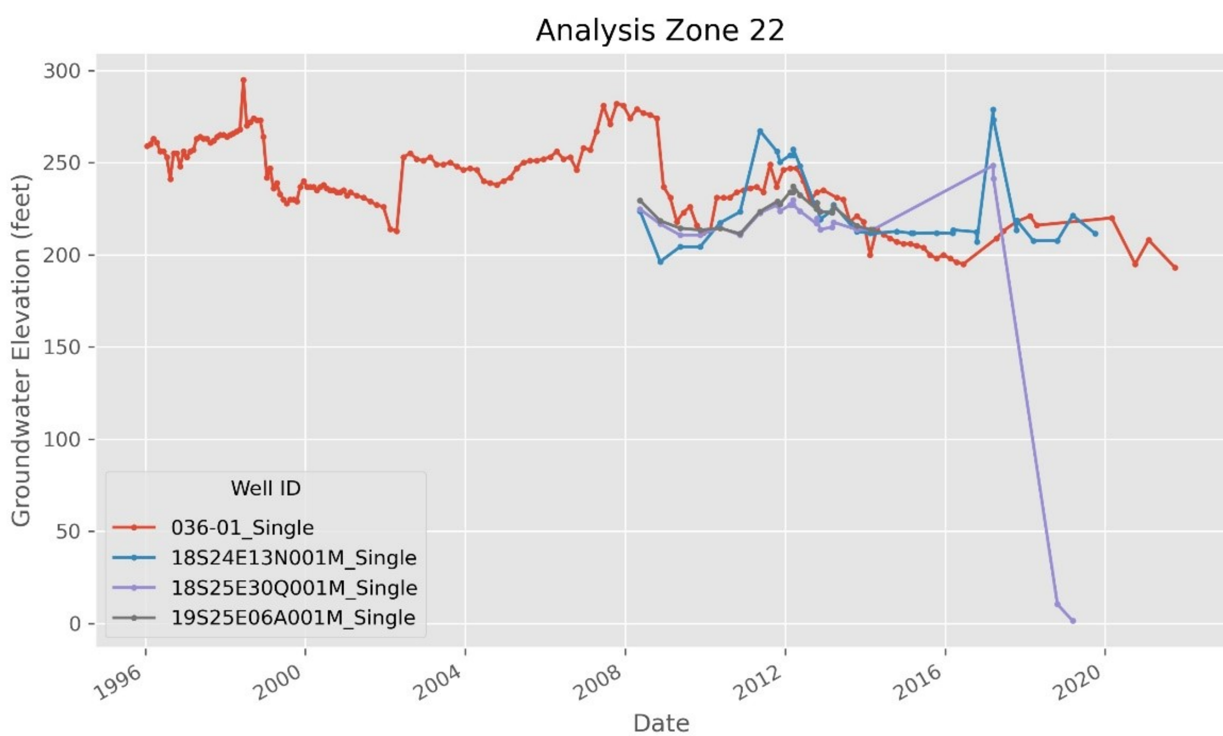
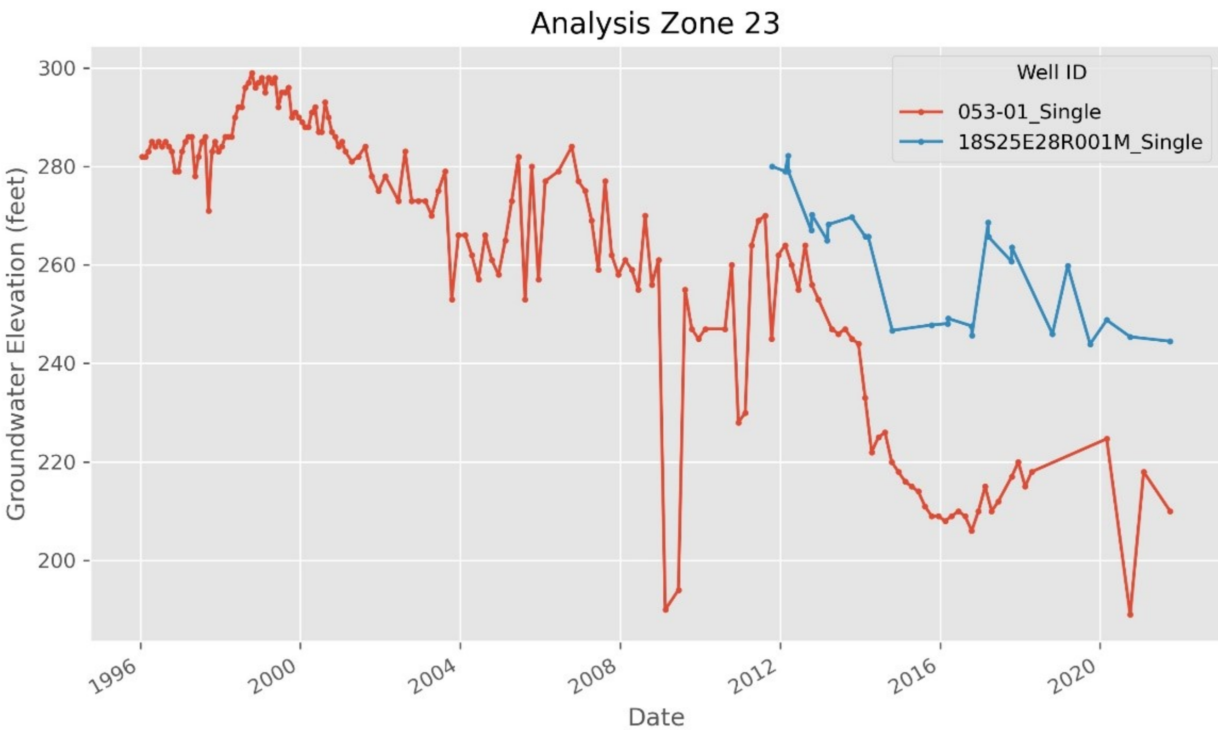
19S25E27A001M_Single
19S25E35B002M_Single
19S26E16J002M_Single
19S26E20A001M_Single
Groundwater Elevation (feet)
300
280
260
240
220
200
180
1996
2000
2004
2008
2012
2016
2020
Date

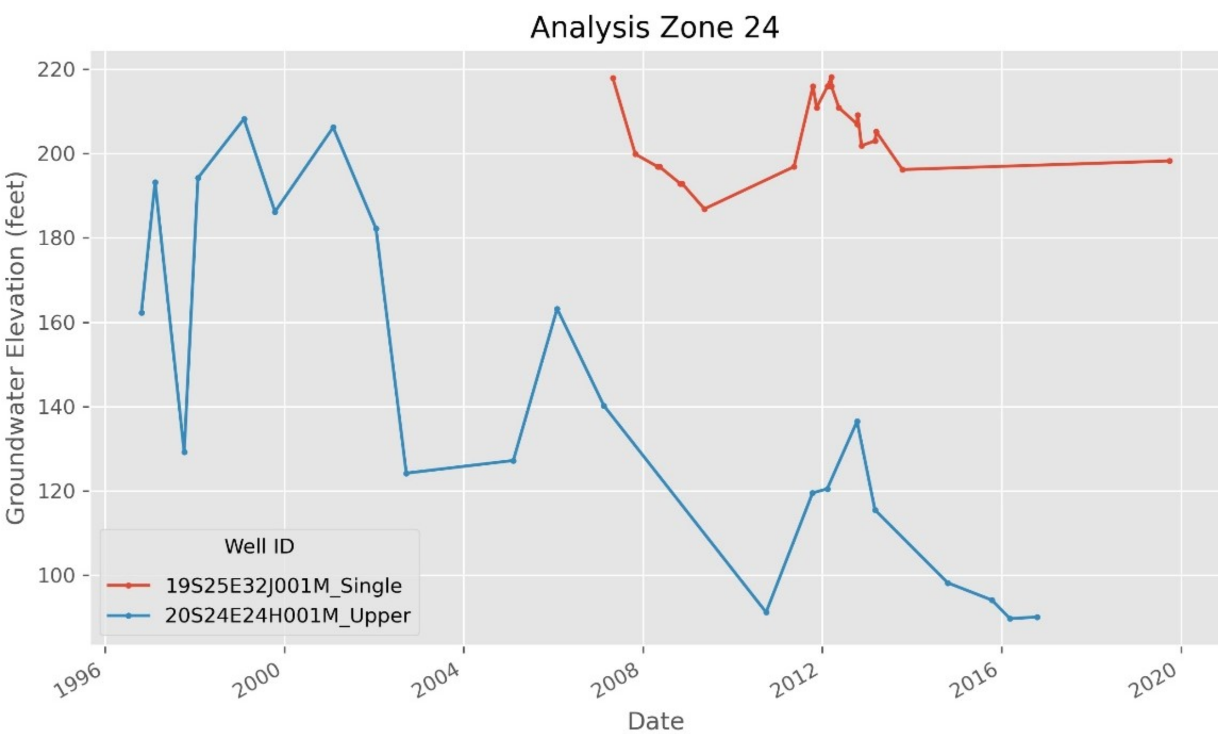

Analysis Zone 19
Well ID
19S25E13A002M_Single
Groundwater Elevation (feet)
320
300
280
260
240
220
200
1996
2000
2004
2008
2012
2016
2020
Date

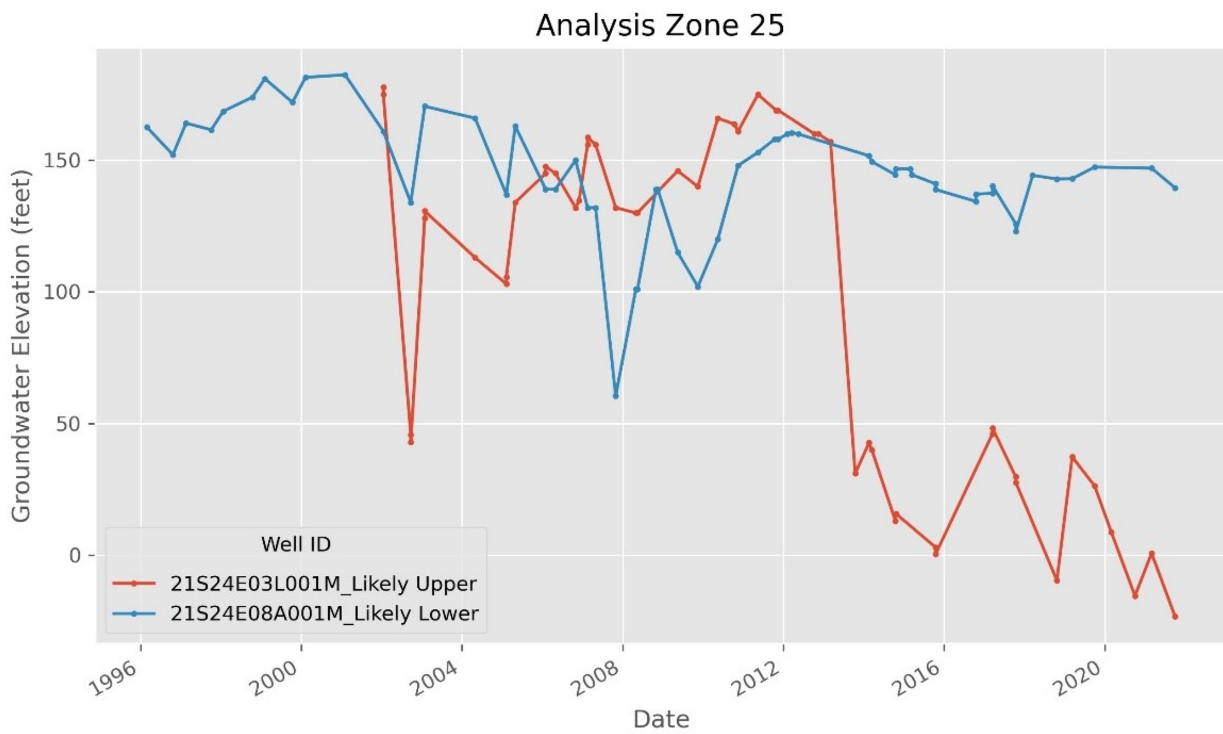

Analysis Zone 20
Well ID
19S25E28H001M_Single
20S25E03R001M_Single
20S25E12A001M_Single
Groundwater Elevation (feet)
280
260
240
220
200
180
160
1996
2000
2004
2008
2012
2016
2020
Date

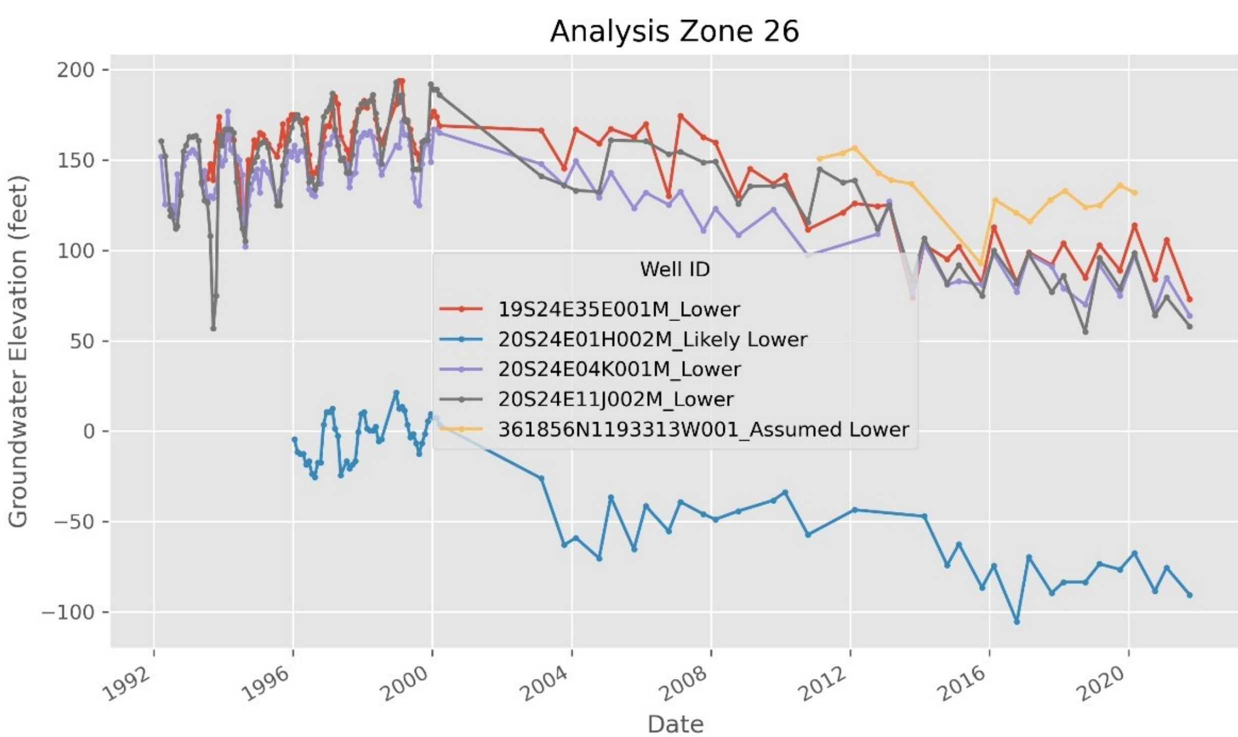

Analysis Zone 21
Groundwater Elevation (feet)
Date
Well ID
20S25E14F004M_Single
20S25E24R001M_Single

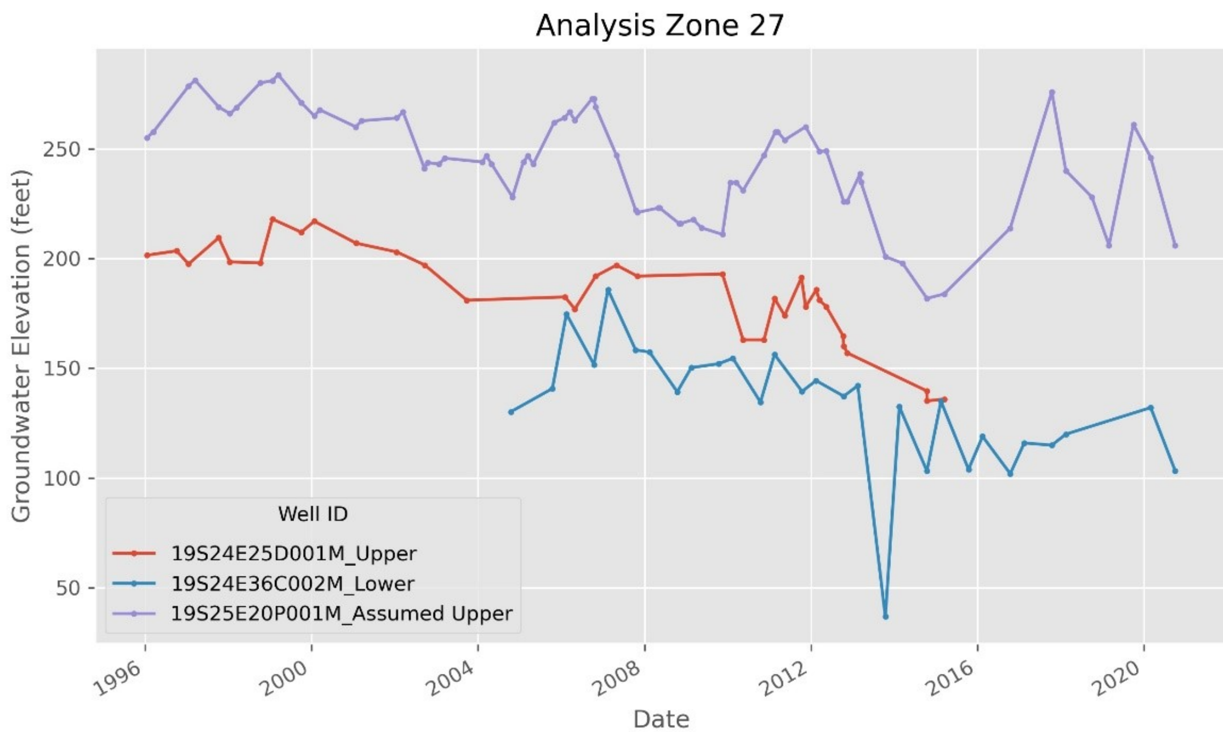

Analysis Zone 22
Groundwater Elevation (feet)
Date
Well ID
036-01_Single
18S24E13N001M_Single
18S25E30Q001M_Single
19S25E06A001M_Single

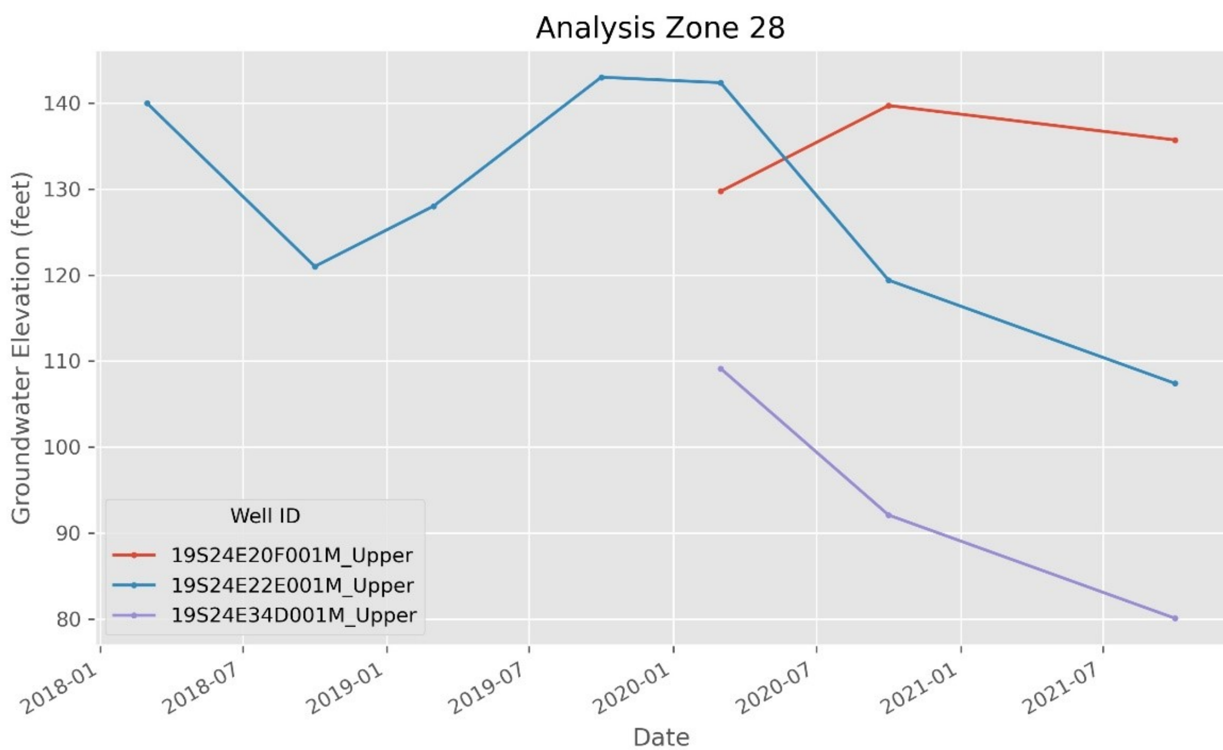

Analysis Zone 23
Well ID
053-01_Single
18S25E28R001M_Single
Groundwater Elevation (feet)
300
280
260
240
220
200
1996
2000
2004
2008
2012
2016
2020
Date

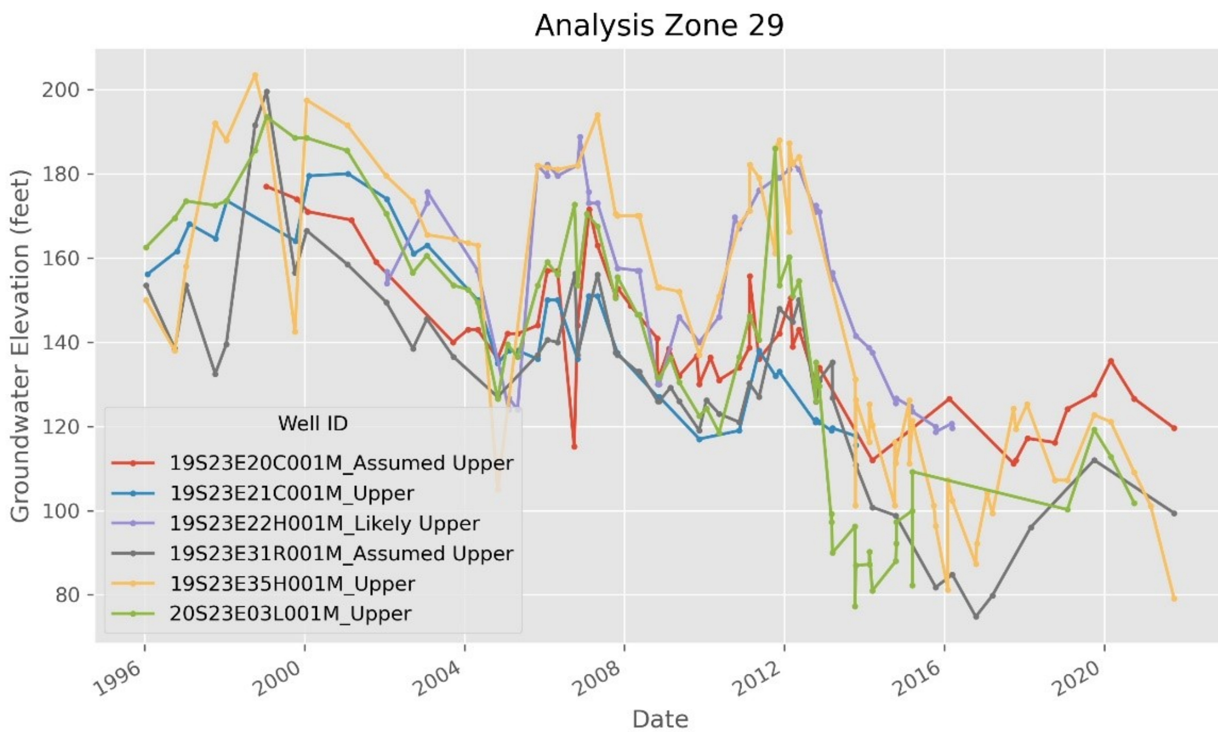

Analysis Zone 24
Well ID
19S25E32J001M_Single
20S24E24H001M_Upper
Groundwater Elevation (feet)
220
200
180
160
140
120
100
1996
2000
2004
2008
2012
2016
2020
Date

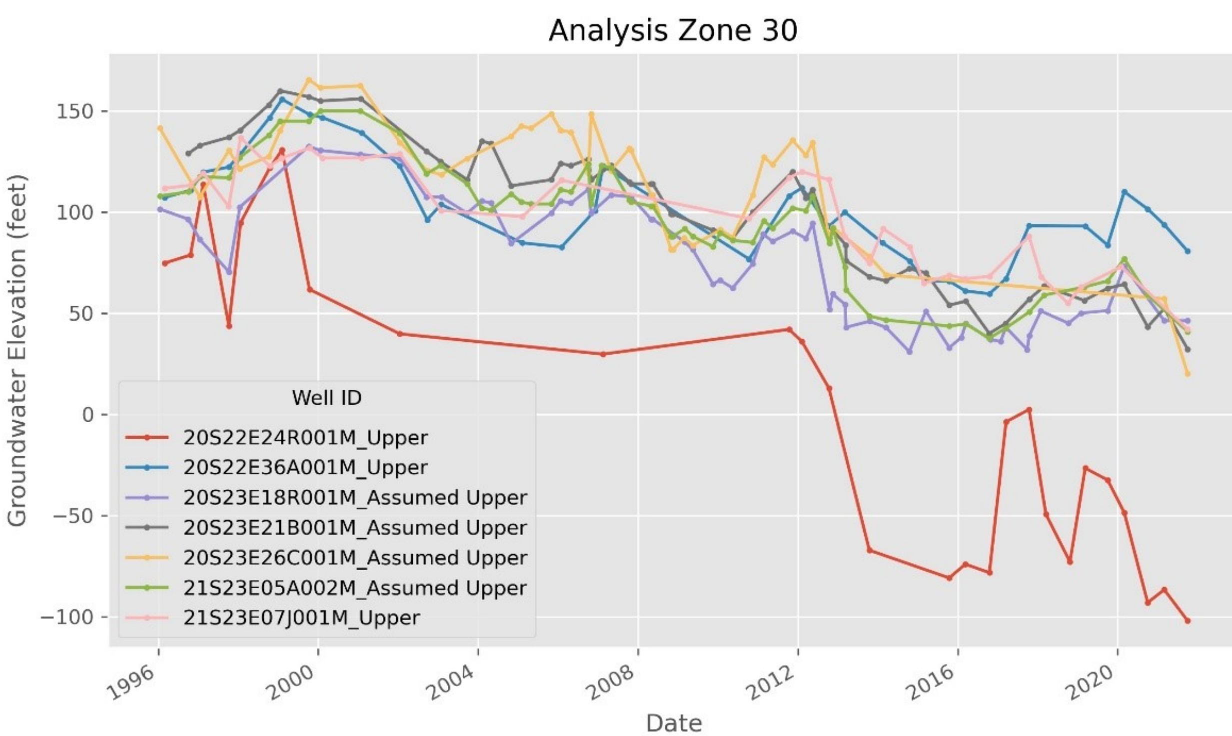

Analysis Zone 25
Groundwater Elevation (feet)
150
100
50
0
1996
2000
2004
2008
2012
2016
2020
Date
Well ID
21S24E03L001M_Likely Upper
21S24E08A001M_Likely Lower

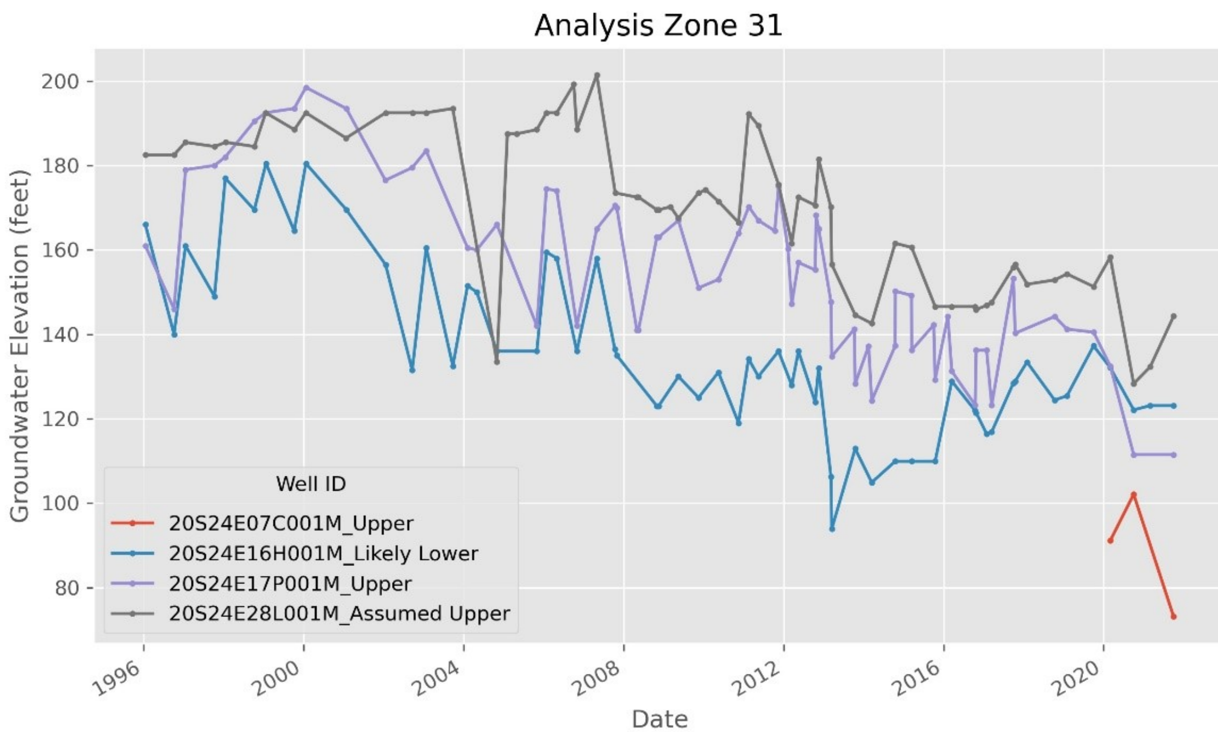

Analysis Zone 26
Groundwater Elevation (feet)
200
150
100
50
0
−50
−100
1992
1996
2000
2004
2008
2012
2016
2020
Date
Well ID
19S24E35E001M_Lower
20S24E01H002M_Likely Lower
20S24E04K001M_Lower
20S24E11J002M_Lower
361856N1193313W001_Assumed Lower

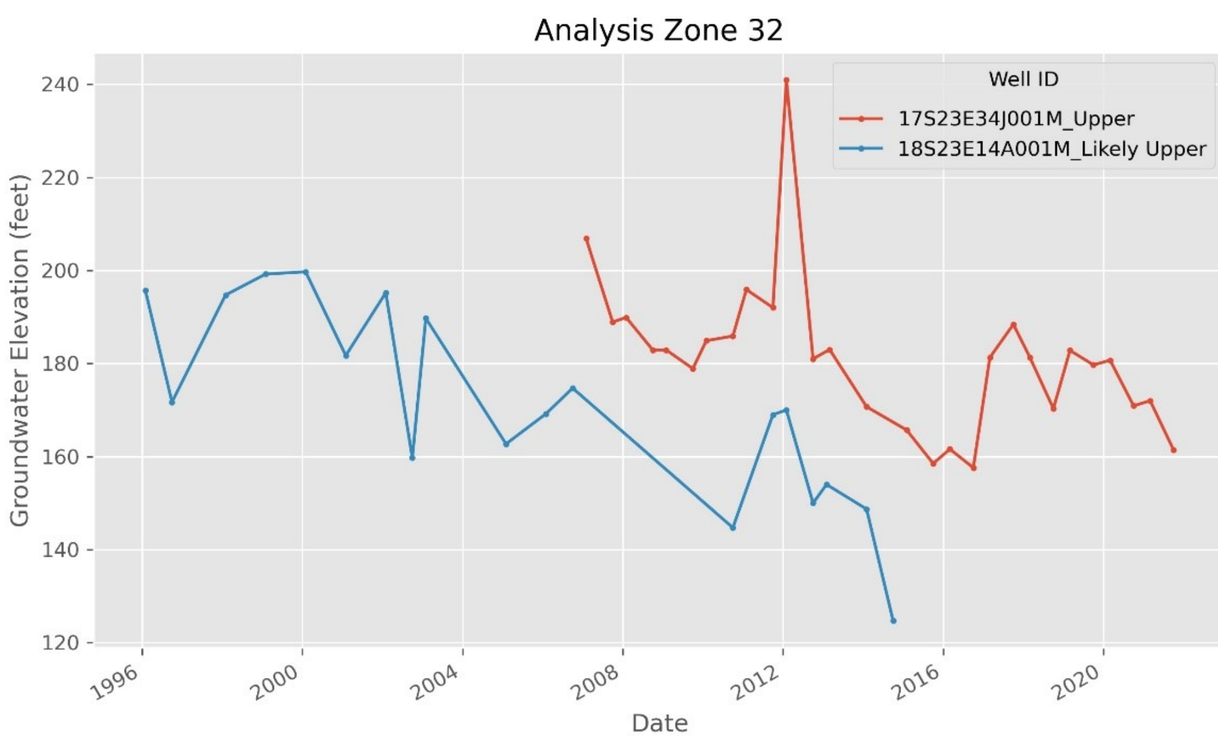

Analysis Zone 27
Groundwater Elevation (feet)
250
200
150
100
50
1996
2000
2004
2008
2012
2016
2020
Date
Well ID
19S24E25D001M_Upper
19S24E36C002M_Lower
19S25E20P001M_Assumed Upper

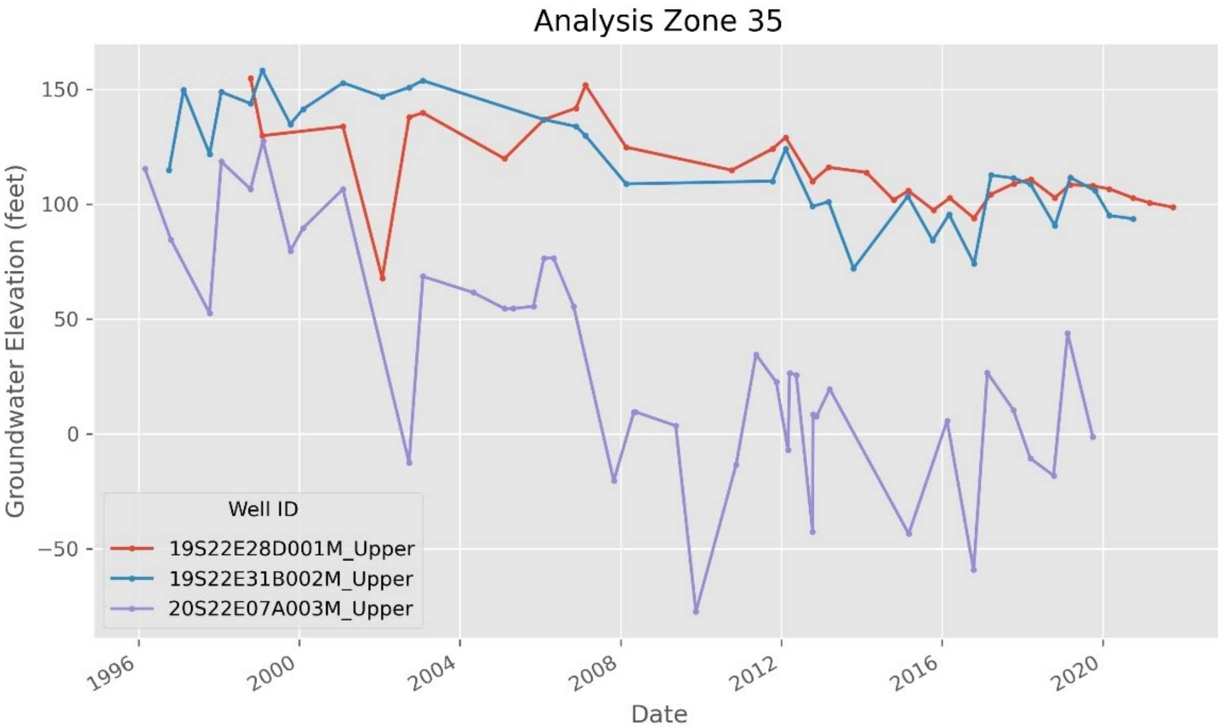

Analysis Zone 28
Groundwater Elevation (feet)
140
130
120
110
100
90
80
2018-01
2018-07
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
Date
Well ID
19S24E20F001M_Upper
19S24E22E001M_Upper
19S24E34D001M_Upper

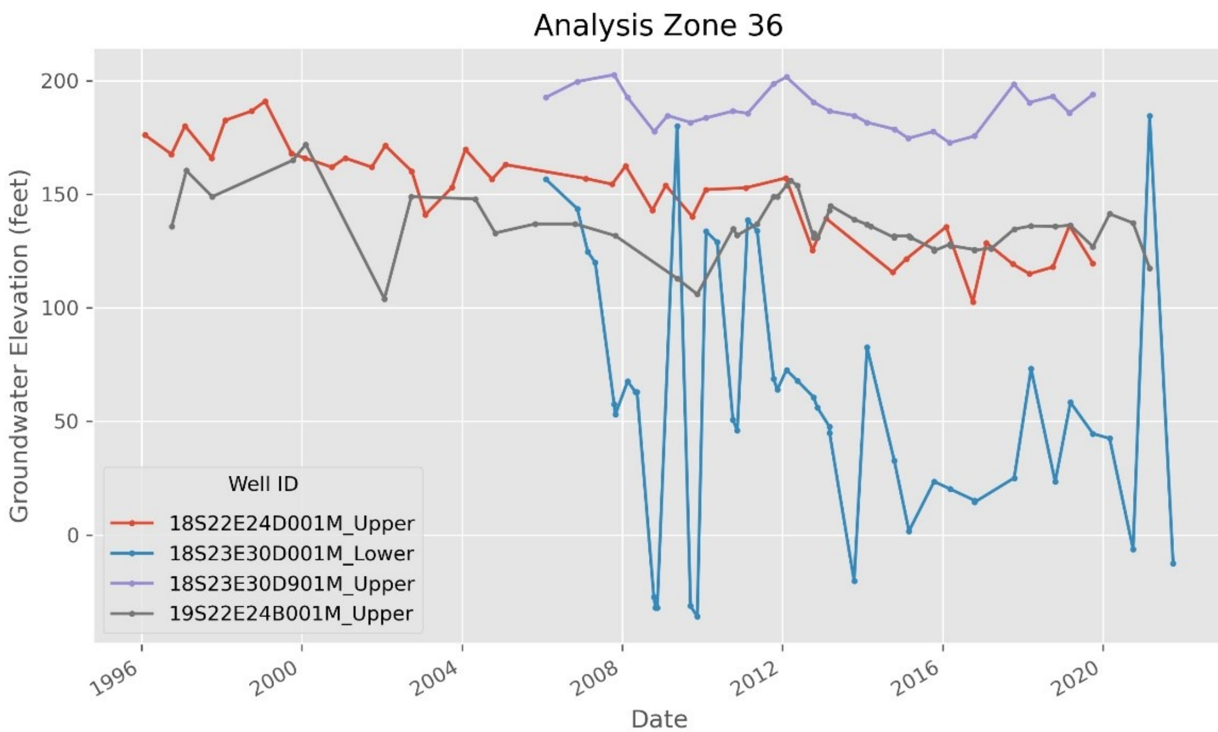

Analysis Zone 29
Groundwater Elevation (feet)
200
180
160
140
120
100
80
1996
2000
2004
2008
2012
2016
2020
Date
Well ID
19S23E20C001M_Assumed Upper
19S23E21C001M_Upper
19S23E22H001M_Likely Upper
19S23E31R001M_Assumed Upper
19S23E35H001M_Upper
20S23E03L001M_Upper

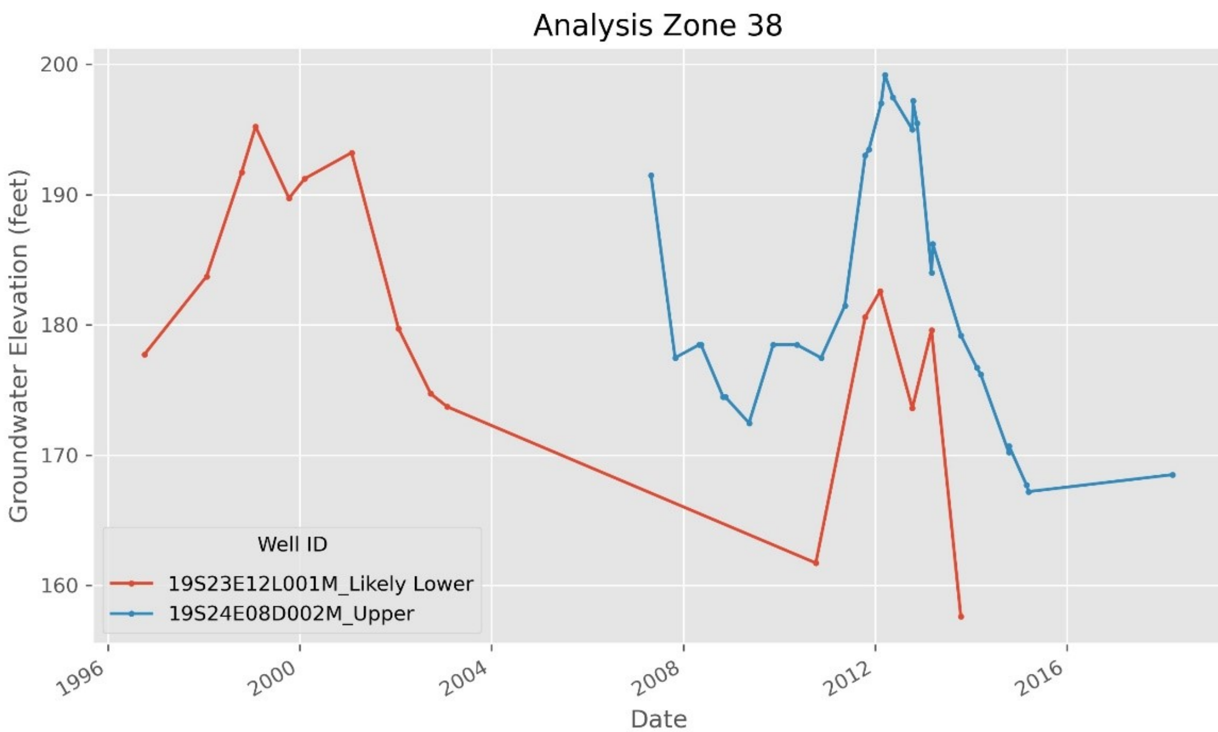

Analysis Zone 30
Groundwater Elevation (feet)
150
100
50
0
−50
−100
1996
2000
2004
2008
2012
2016
2020
Date
Well ID
20S22E24R001M_Upper
20S22E36A001M_Upper
20S23E18R001M_Assumed Upper
20S23E21B001M_Assumed Upper
20S23E26C001M_Assumed Upper
21S23E05A002M_Assumed Upper
21S23E07J001M_Upper

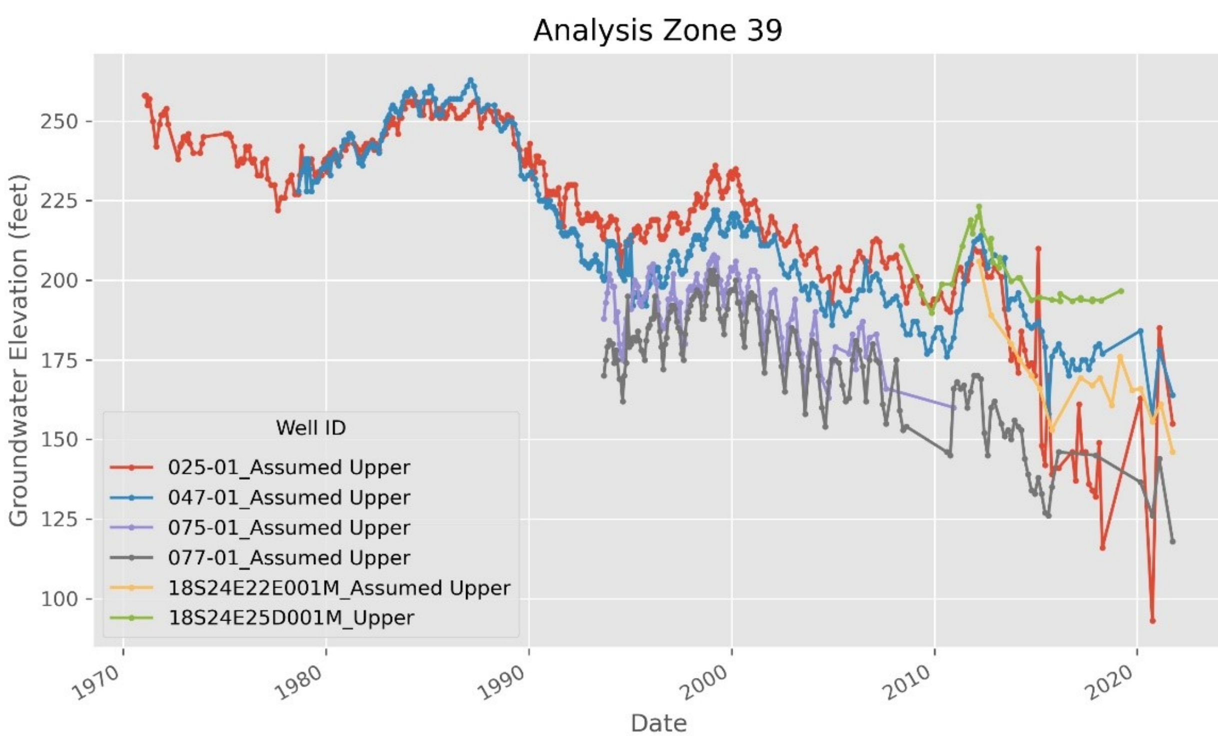

Analysis Zone 31
Groundwater Elevation (feet)
Date
Well ID
20S24E07C001M_Upper
20S24E16H001M_Likely Lower
20S24E17P001M_Upper
20S24E28L001M_Assumed Upper


Analysis Zone 32
Groundwater Elevation (feet)
Date
Well ID
17S23E34J001M_Upper
18S23E14A001M_Likely Upper


Analysis Zone 35
Groundwater Elevation (feet)
150
100
50
0
−50
Well ID
19S22E28D001M_Upper
19S22E31B002M_Upper
20S22E07A003M_Upper
1996
2000
2004
2008
2012
2016
2020
Date

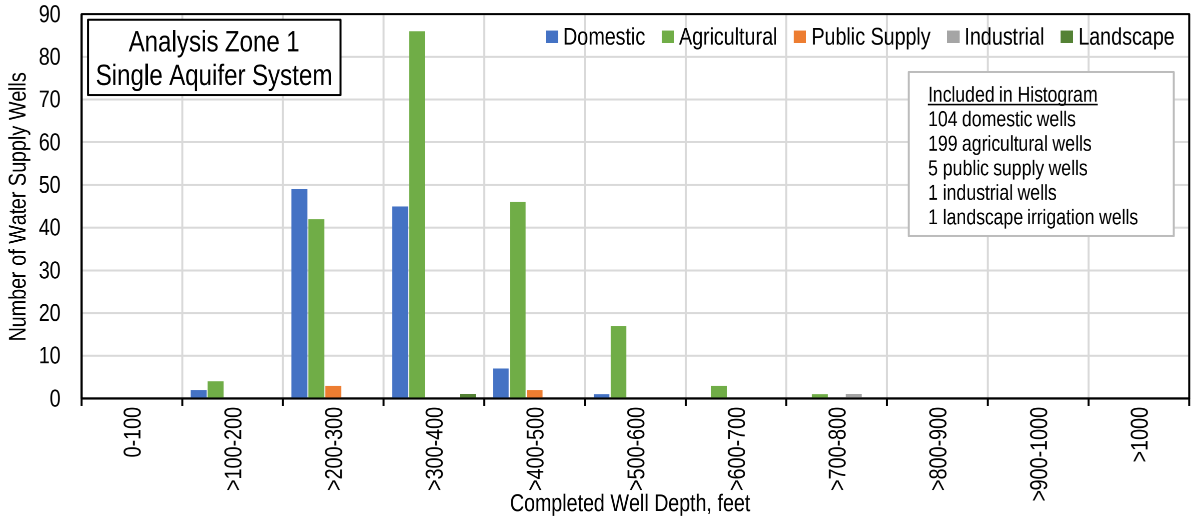

Analysis Zone 36
Groundwater Elevation (feet)
200
150
100
50
0
Well ID
18S22E24D001M_Upper
18S23E30D001M_Lower
18S23E30D901M_Upper
19S22E24B001M_Upper
1996
2000
2004
2008
2012
2016
2020
Date

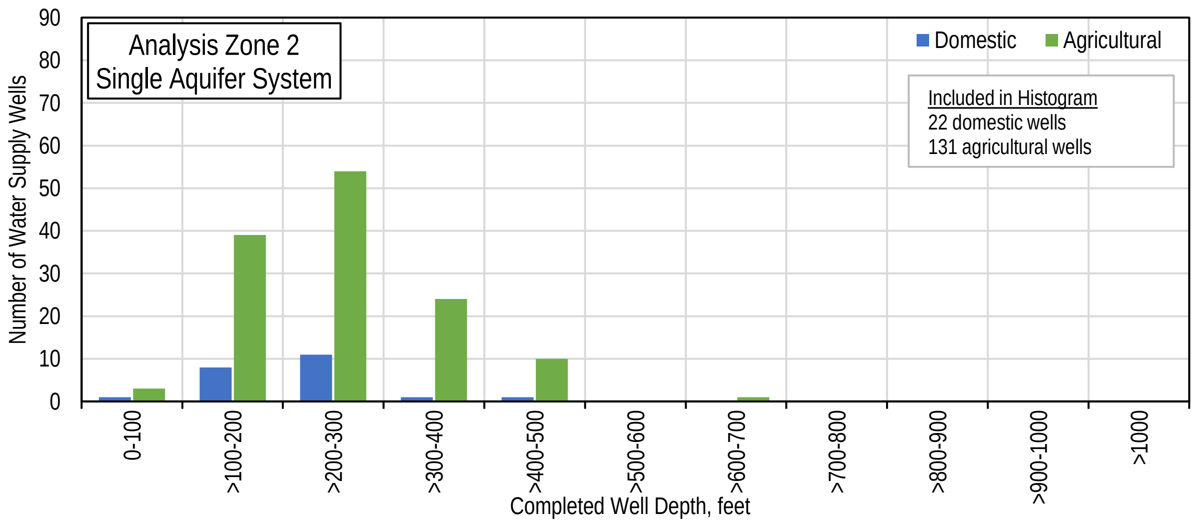

Analysis Zone 38
Groundwater Elevation (feet)
200
190
180
170
160
Well ID
19S23E12L001M_Likely Lower
19S24E08D002M_Upper
1996
2000
2004
2008
2012
2016
Date

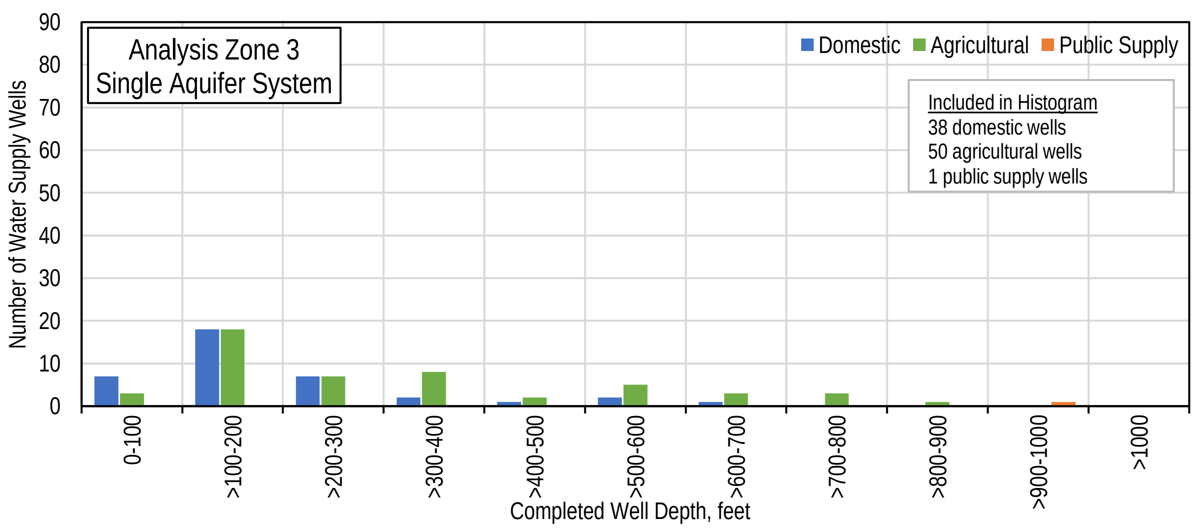

Analysis Zone 39
Groundwater Elevation (feet)
250
225
200
175
150
125
100
Well ID
025-01_Assumed Upper
047-01_Assumed Upper
075-01_Assumed Upper
077-01_Assumed Upper
18S24E22E001M_Assumed Upper
18S24E25D001M_Upper
1970
1980
1990
2000
2010
2020
Date

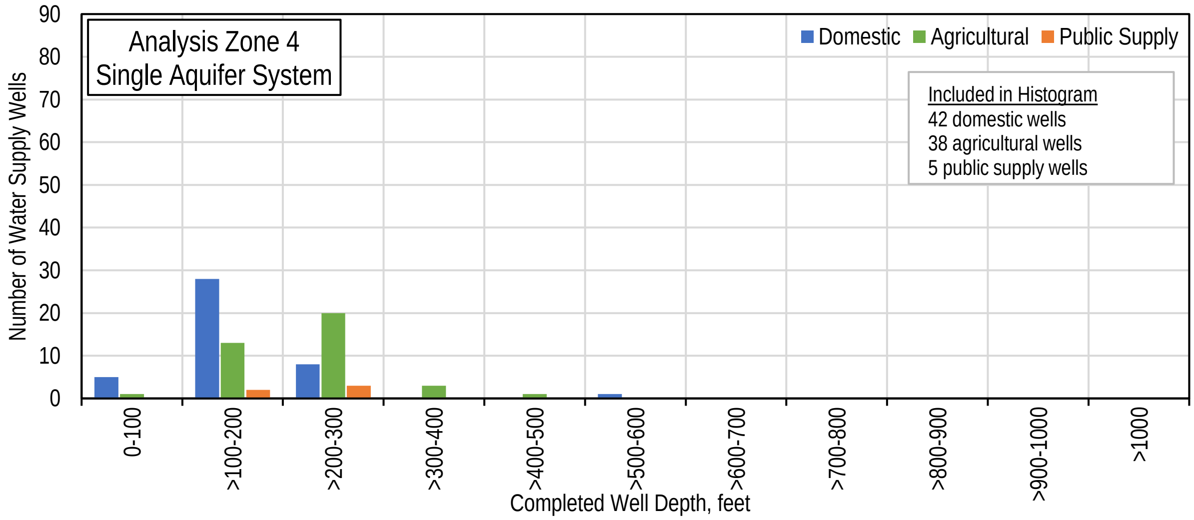
Appendix B

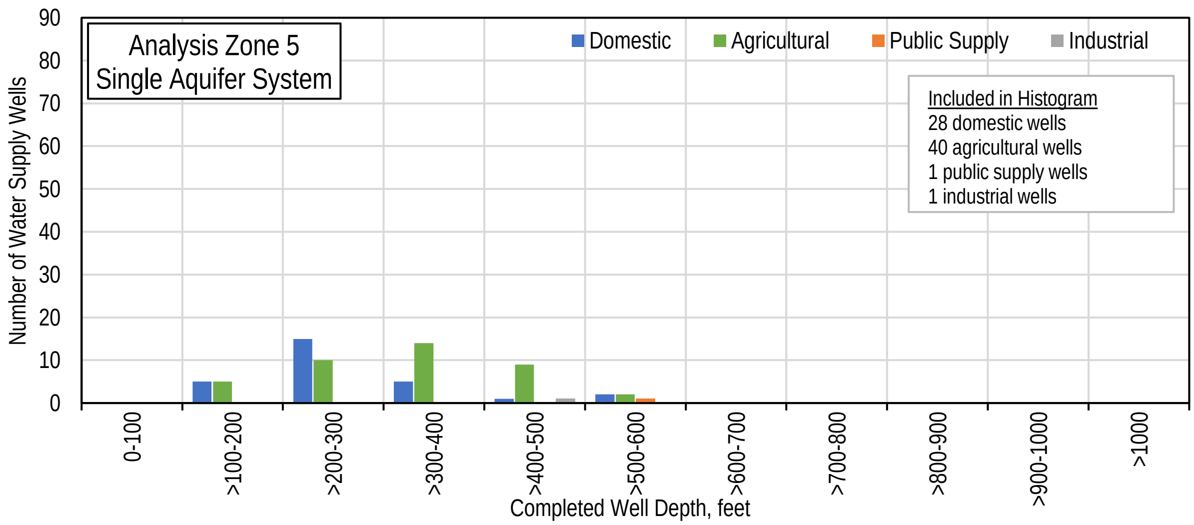
Completed Well Depth Histograms by Analysis Zone

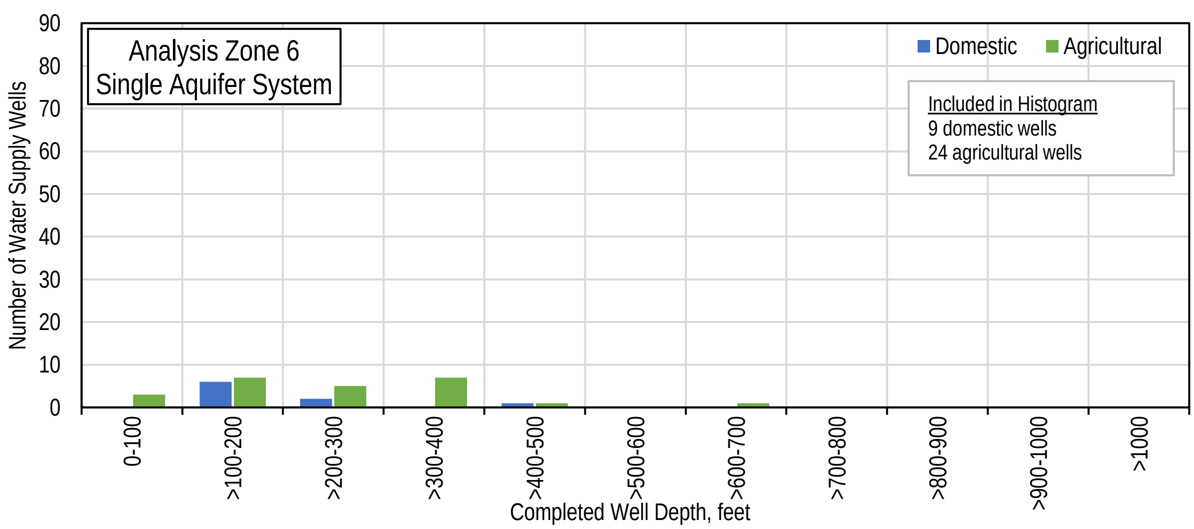

Analysis Zone 1
Single Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Landscape
Included in Histogram
104 domestic wells
199 agricultural wells
5 public supply wells
1 industrial wells
1 landscape irrigation wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

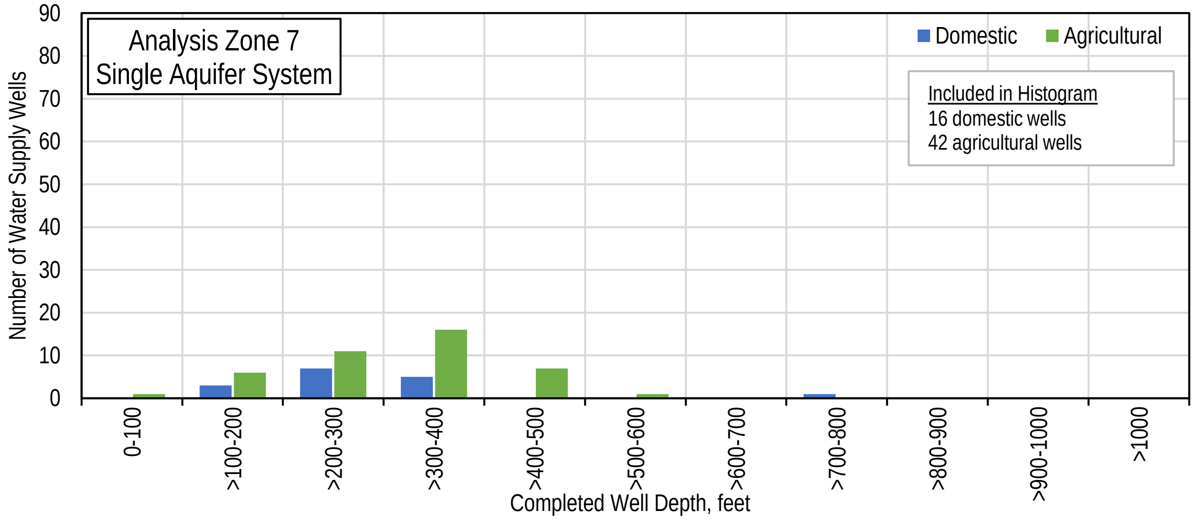

Analysis Zone 2
Single Aquifer System
Domestic
Agricultural
Included in Histogram
22 domestic wells
131 agricultural wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

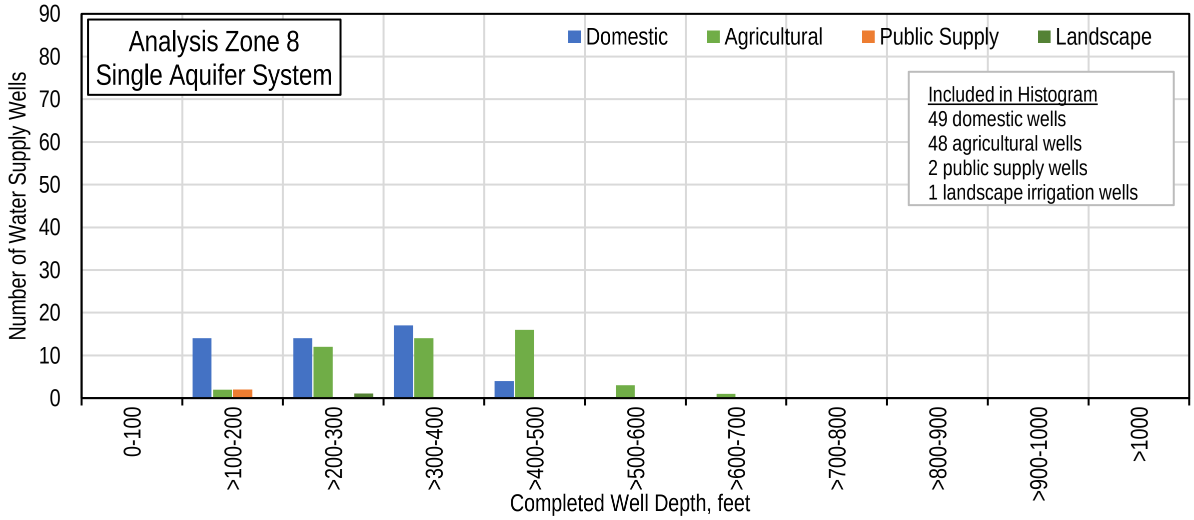

Analysis Zone 3
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
38 domestic wells
50 agricultural wells
1 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

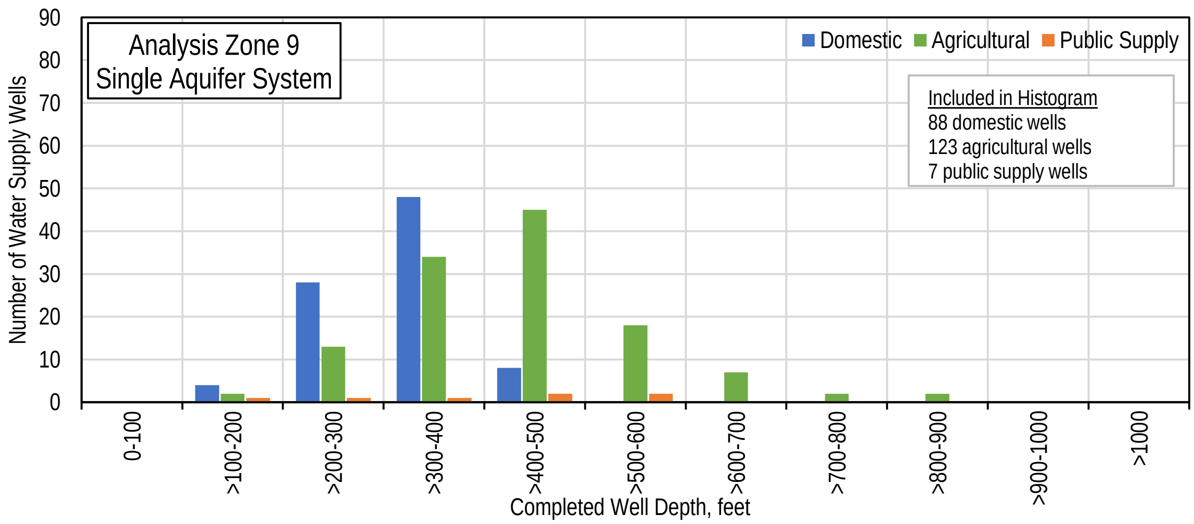

Analysis Zone 4
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
42 domestic wells
38 agricultural wells
5 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

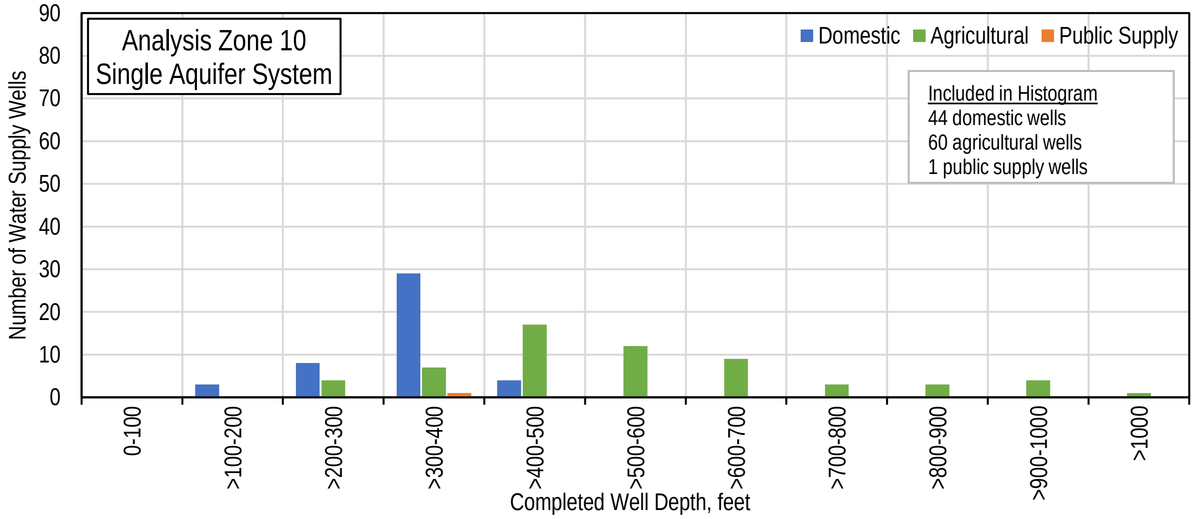

Analysis Zone 5
Single Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Included in Histogram
28 domestic wells
40 agricultural wells
1 public supply wells
1 industrial wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

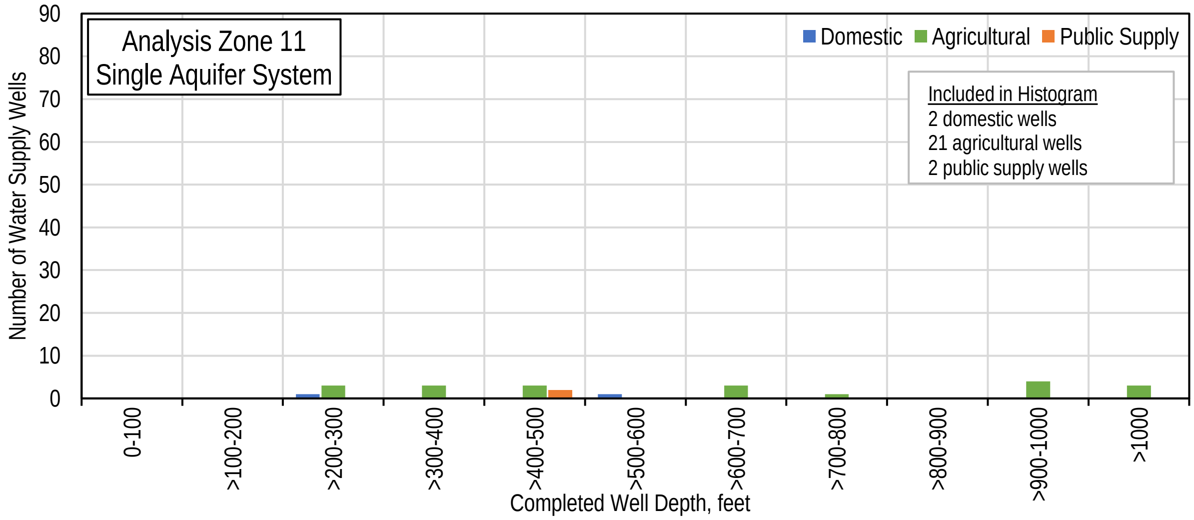

Analysis Zone 6
Single Aquifer System
Domestic
Agricultural
Included in Histogram
9 domestic wells
24 agricultural wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

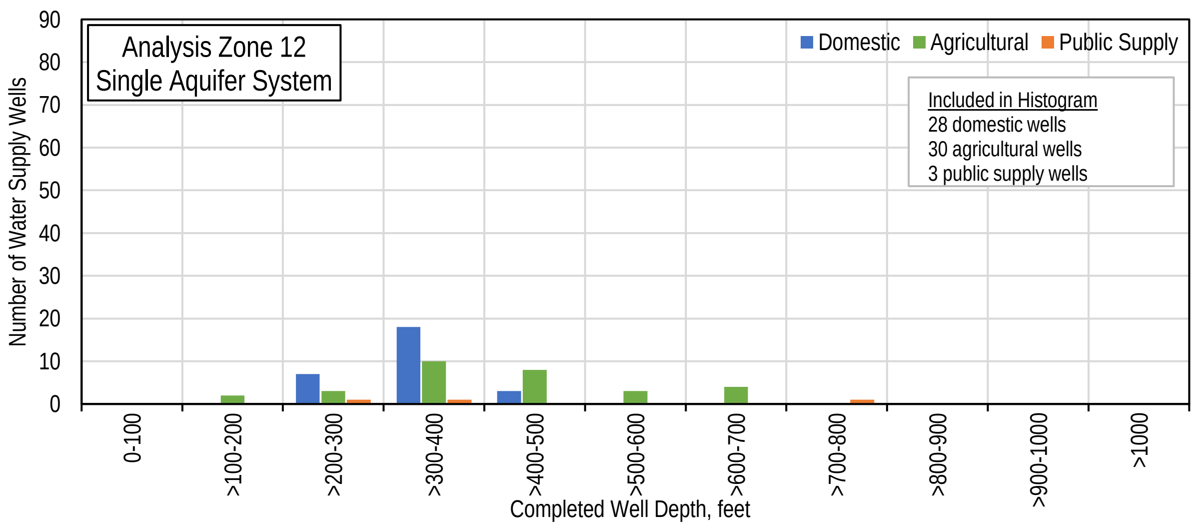

Analysis Zone 7
Single Aquifer System
Domestic
Agricultural
Included in Histogram
16 domestic wells
42 agricultural wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

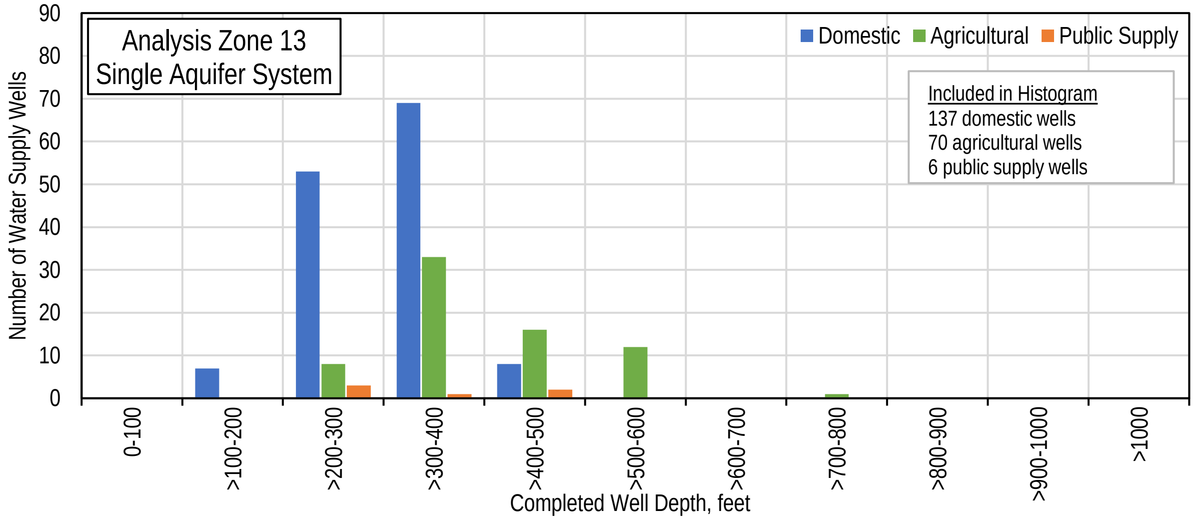

Analysis Zone 8
Single Aquifer System
Domestic
Agricultural
Public Supply
Landscape
Included in Histogram
49 domestic wells
48 agricultural wells
2 public supply wells
1 landscape irrigation wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

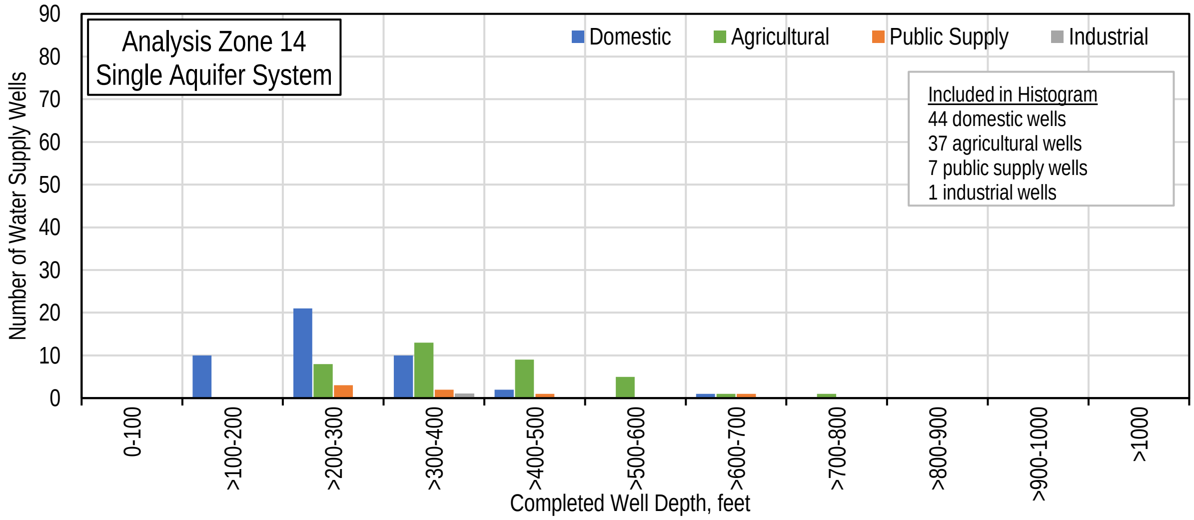

Analysis Zone 9
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
88 domestic wells
123 agricultural wells
7 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

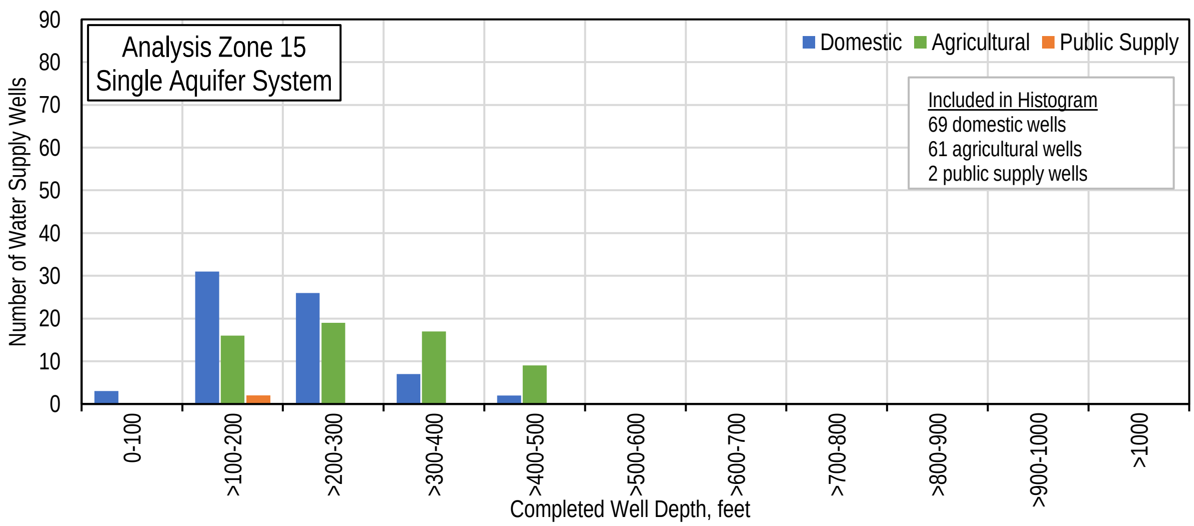

Analysis Zone 10
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
44 domestic wells
60 agricultural wells
1 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

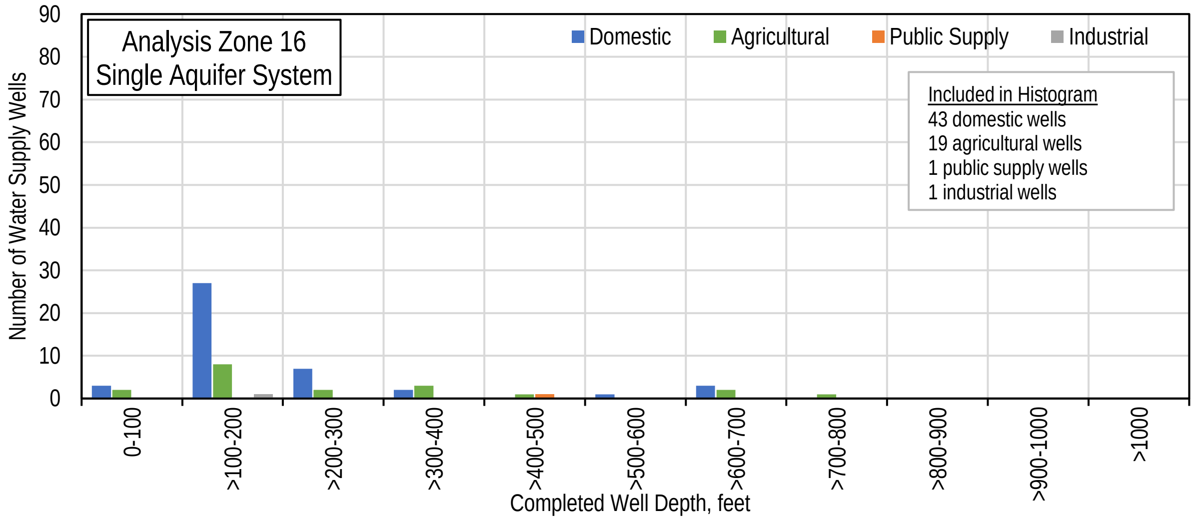

Analysis Zone 11
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
2 domestic wells
21 agricultural wells
2 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

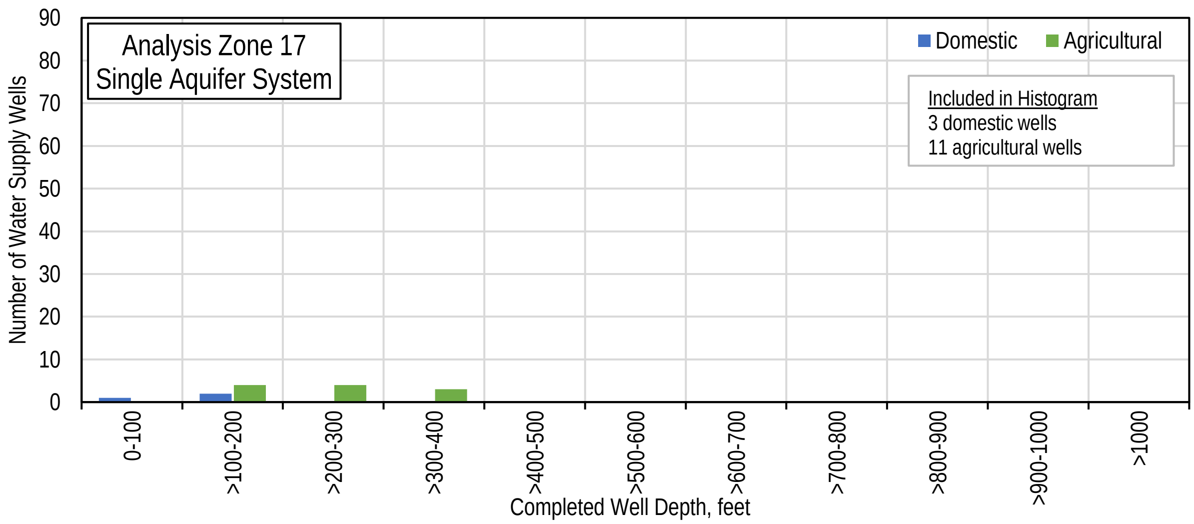

Analysis Zone 12
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
28 domestic wells
30 agricultural wells
3 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

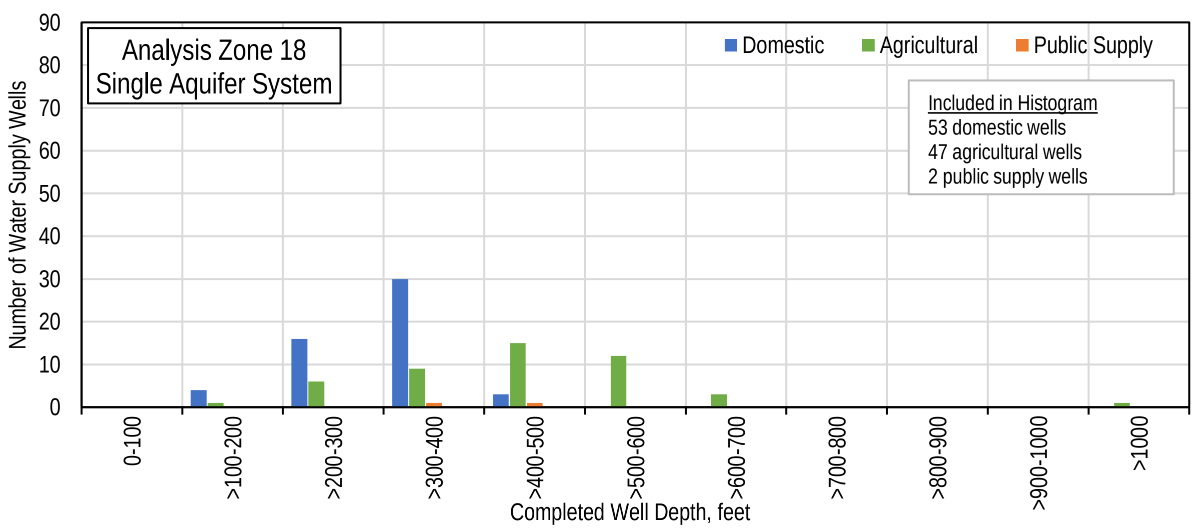

Analysis Zone 13
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
137 domestic wells
70 agricultural wells
6 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

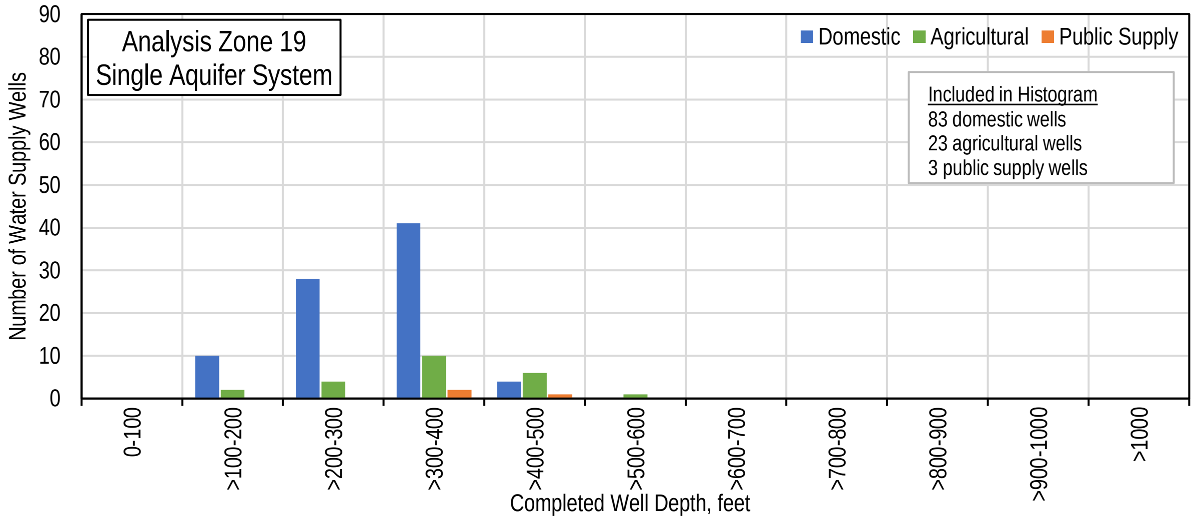

Analysis Zone 14
Single Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Included in Histogram
44 domestic wells
37 agricultural wells
7 public supply wells
1 industrial wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

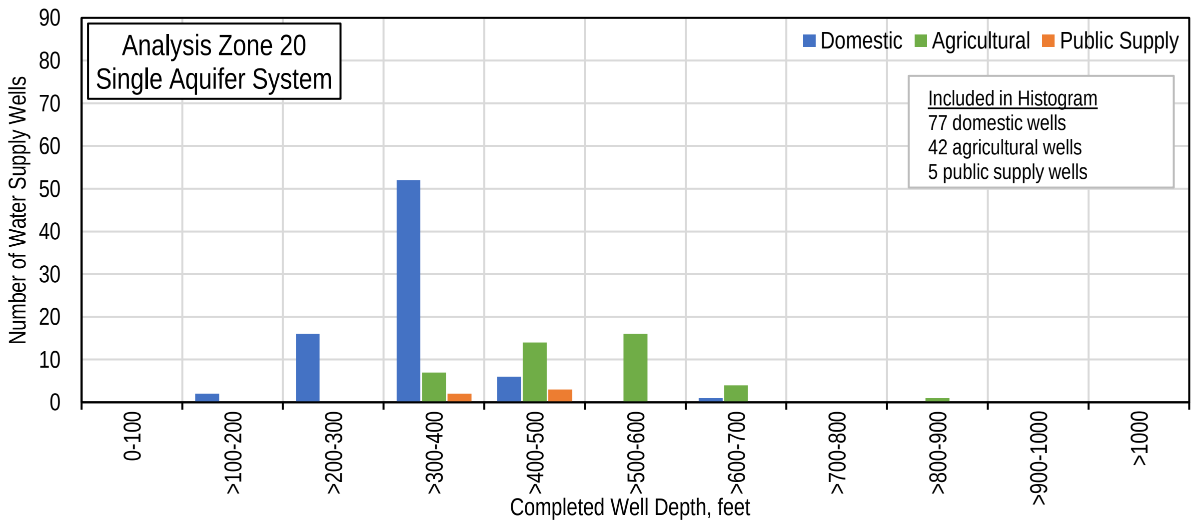

Analysis Zone 15
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
69 domestic wells
61 agricultural wells
2 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

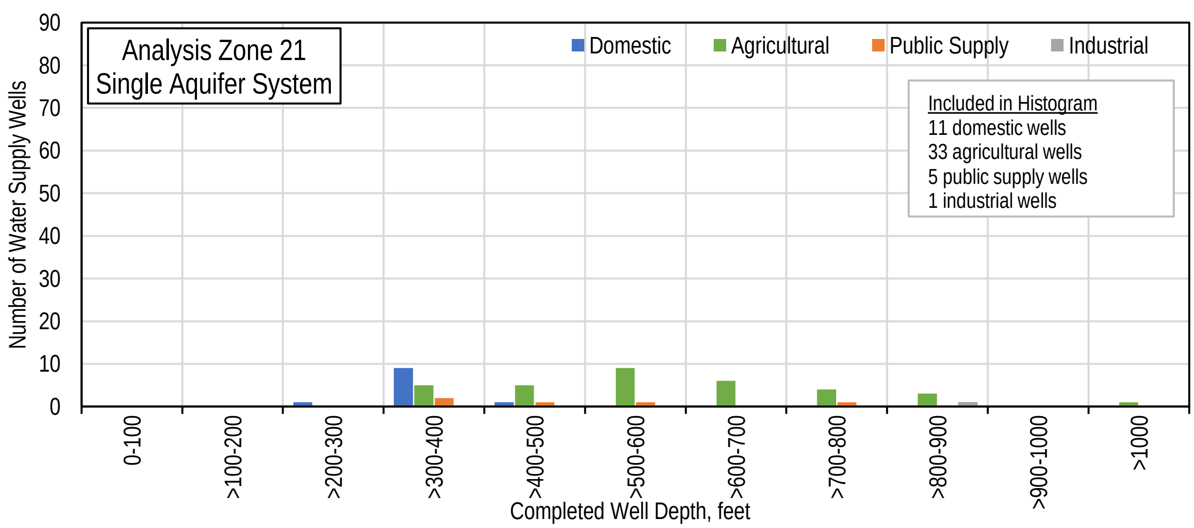

Analysis Zone 16
Single Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Included in Histogram
43 domestic wells
19 agricultural wells
1 public supply wells
1 industrial wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

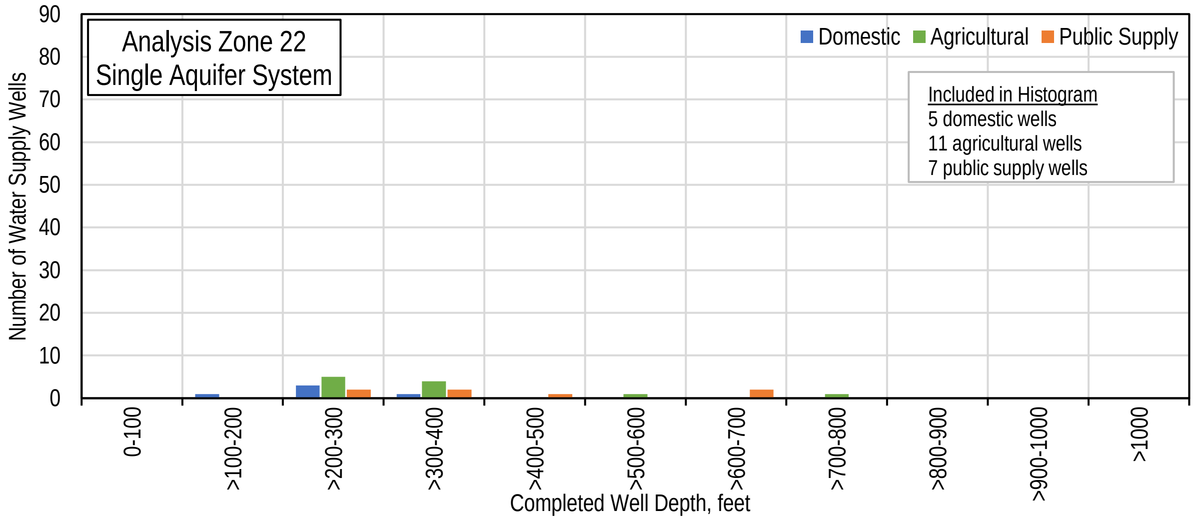

Analysis Zone 17
Single Aquifer System
Domestic
Agricultural
Included in Histogram
3 domestic wells
11 agricultural wells
Number of Water Supply Wells
Completed Well Depth, feet

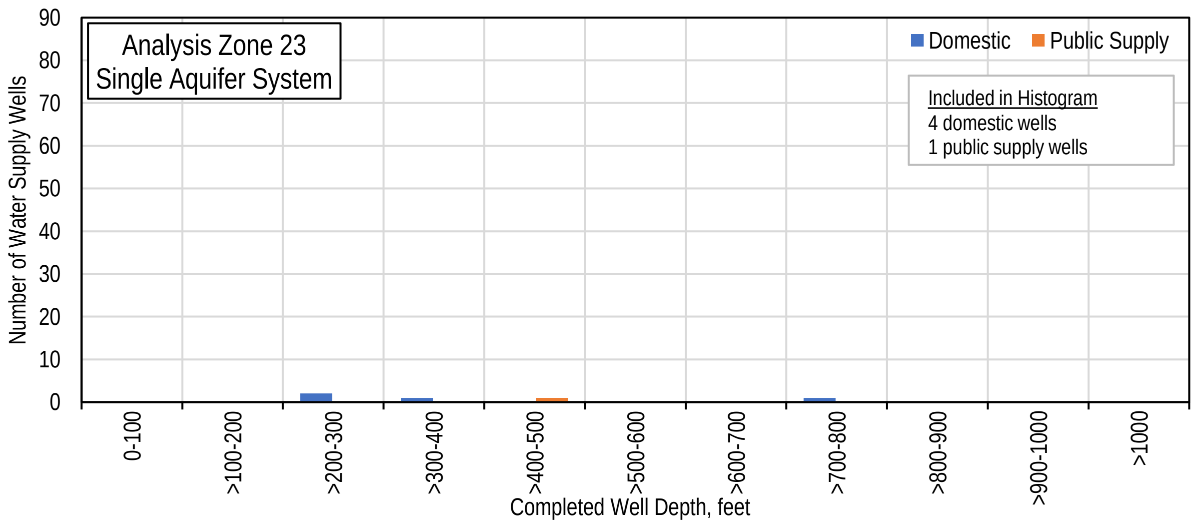

Analysis Zone 18
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
53 domestic wells
47 agricultural wells
2 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet

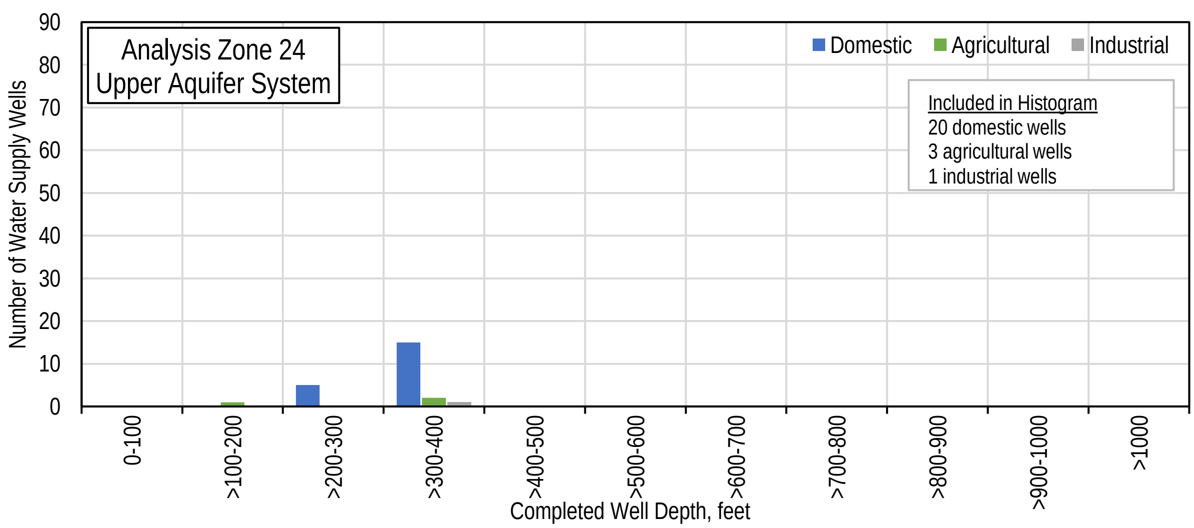

Analysis Zone 19
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
83 domestic wells
23 agricultural wells
3 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

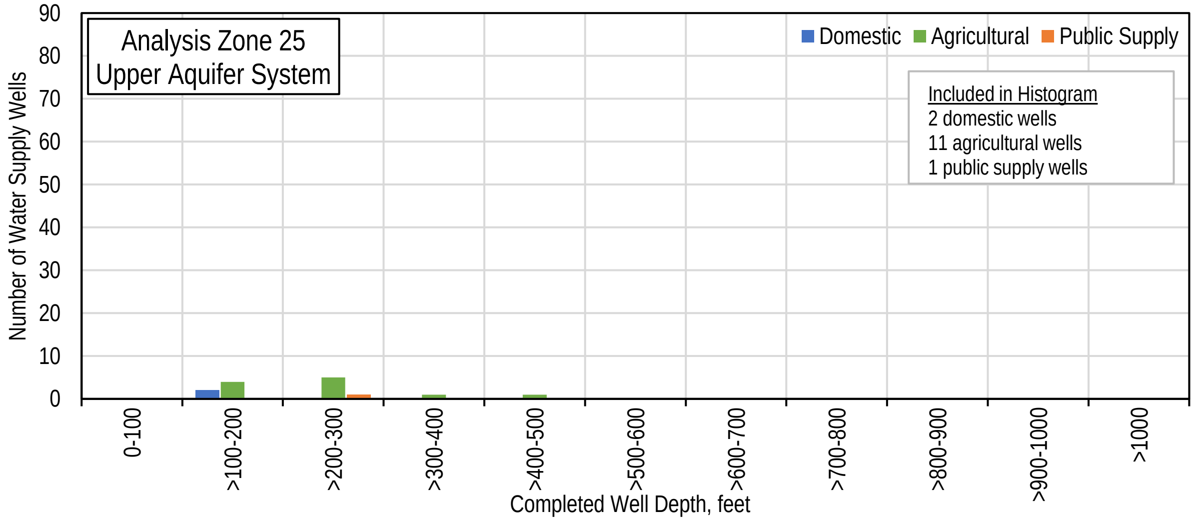

Analysis Zone 20
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
77 domestic wells
42 agricultural wells
5 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

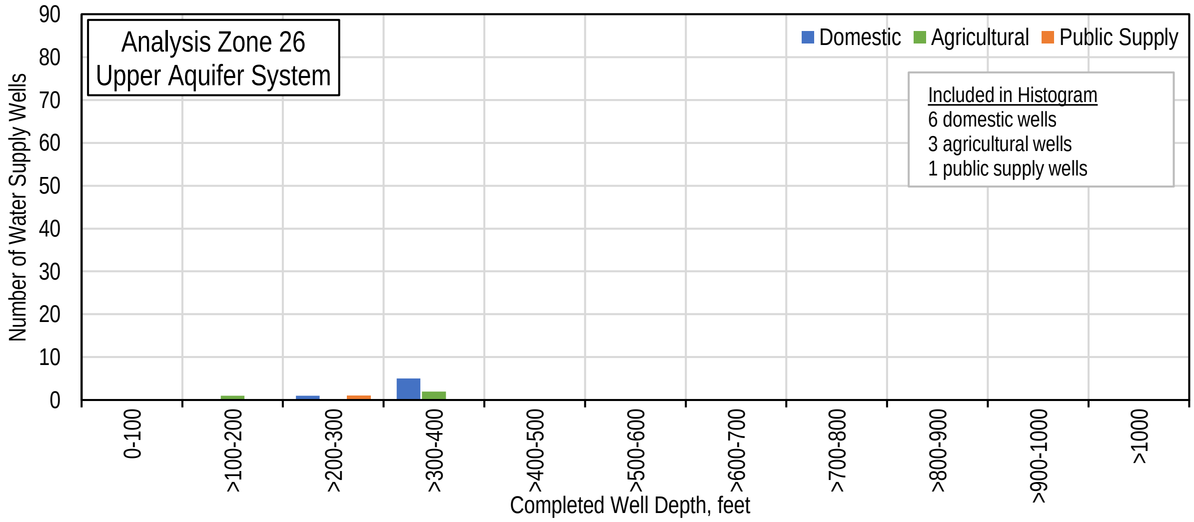

Analysis Zone 21
Single Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Included in Histogram
11 domestic wells
33 agricultural wells
5 public supply wells
1 industrial wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

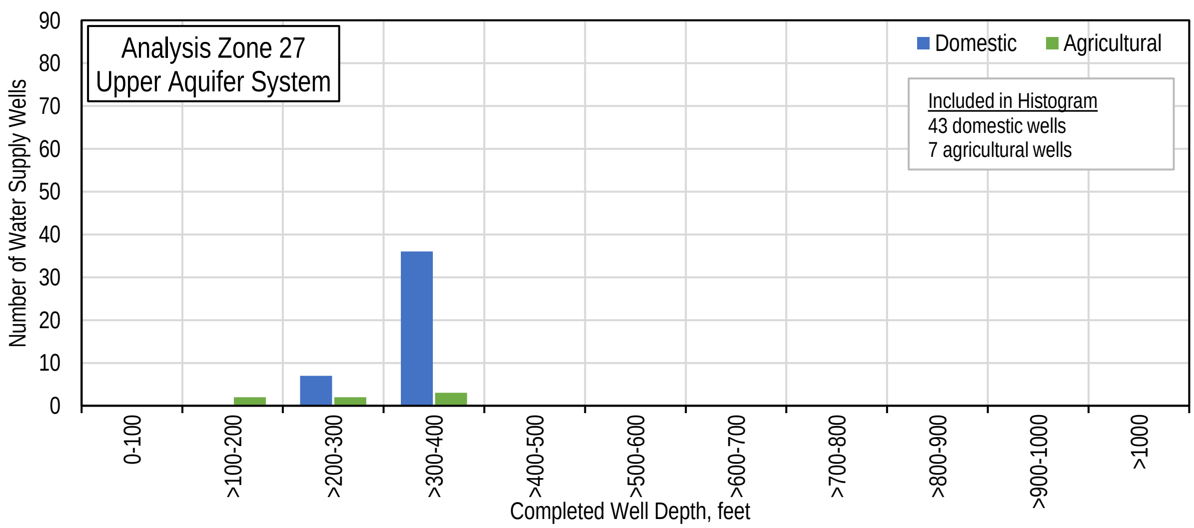

Analysis Zone 22
Single Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
5 domestic wells
11 agricultural wells
7 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

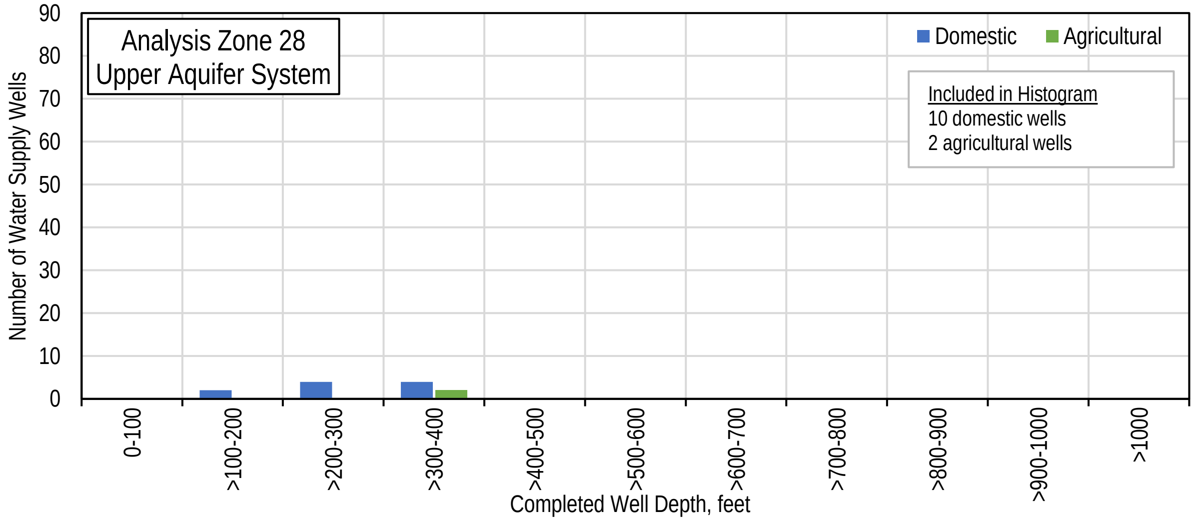

Analysis Zone 23
Single Aquifer System
Domestic
Public Supply
Included in Histogram
4 domestic wells
1 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

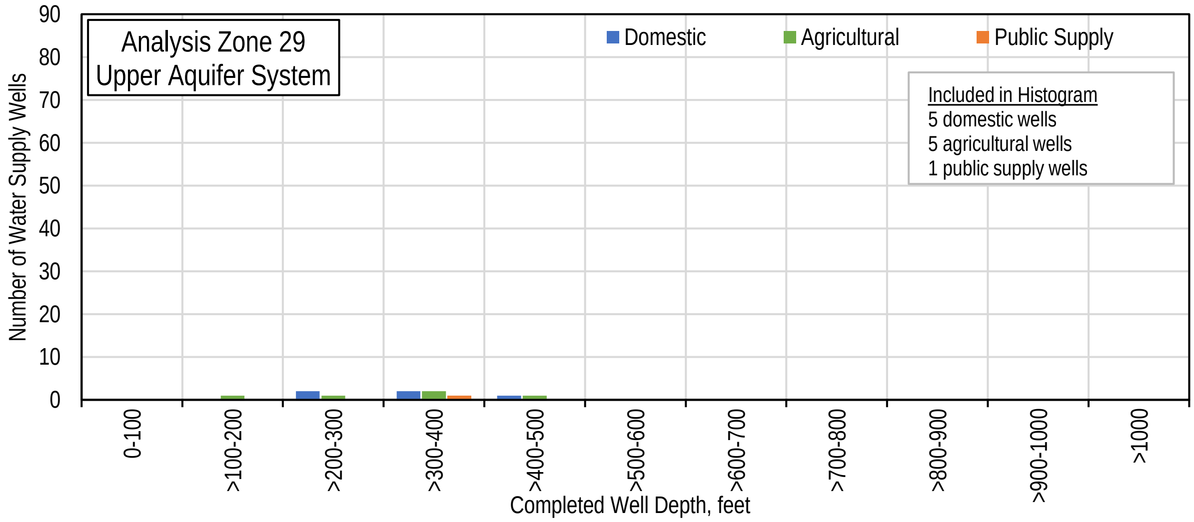

Analysis Zone 24
Upper Aquifer System
Domestic
Agricultural
Industrial
Included in Histogram
20 domestic wells
3 agricultural wells
1 industrial wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

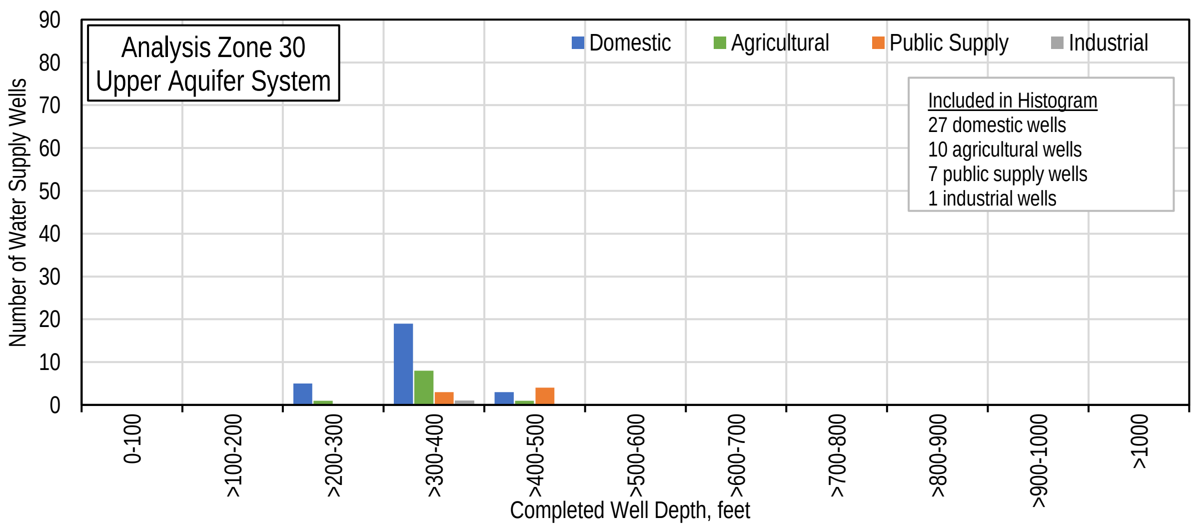

Analysis Zone 25
Upper Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
2 domestic wells
11 agricultural wells
1 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

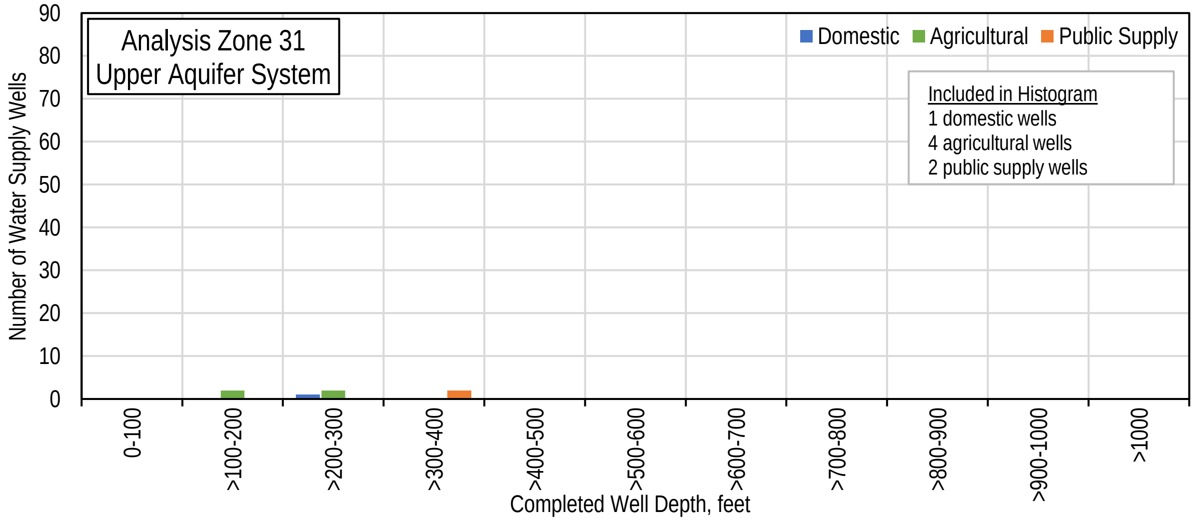

Analysis Zone 26
Upper Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
6 domestic wells
3 agricultural wells
1 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

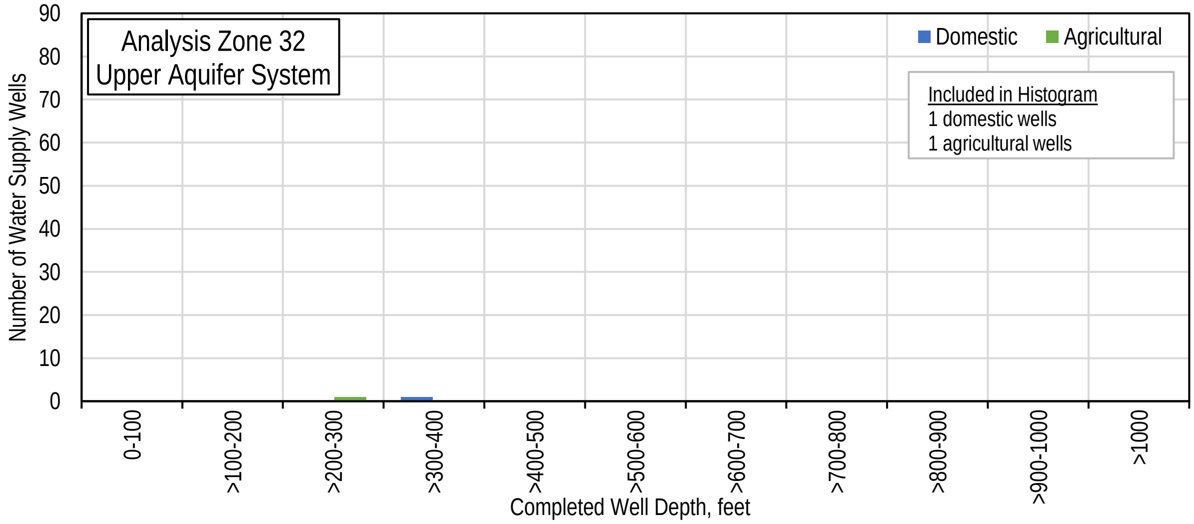

Analysis Zone 27
Upper Aquifer System
Domestic
Agricultural
Included in Histogram
43 domestic wells
7 agricultural wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

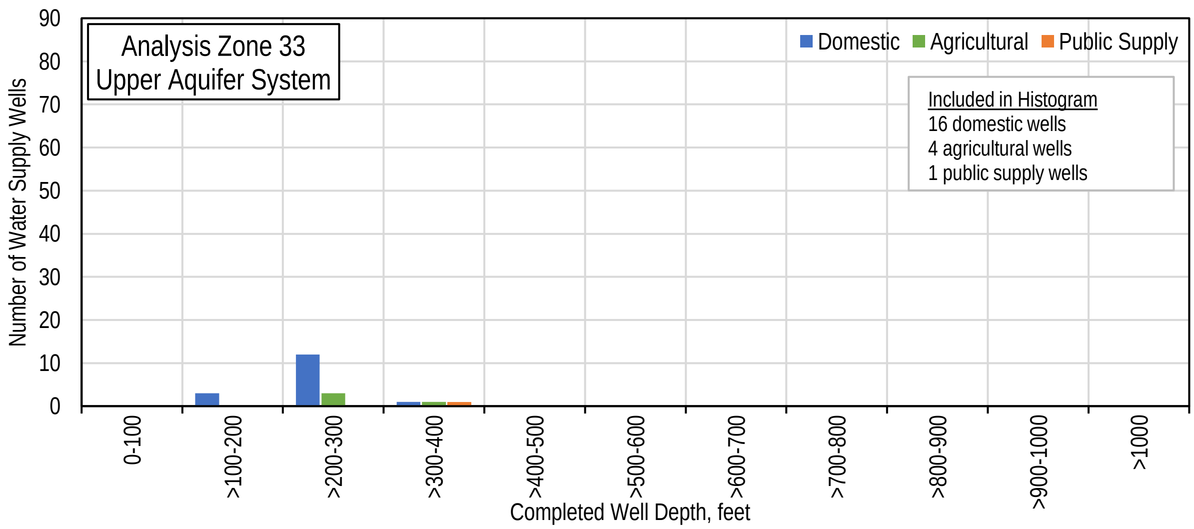

Analysis Zone 28
Upper Aquifer System
Domestic
Agricultural
Included in Histogram
10 domestic wells
2 agricultural wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

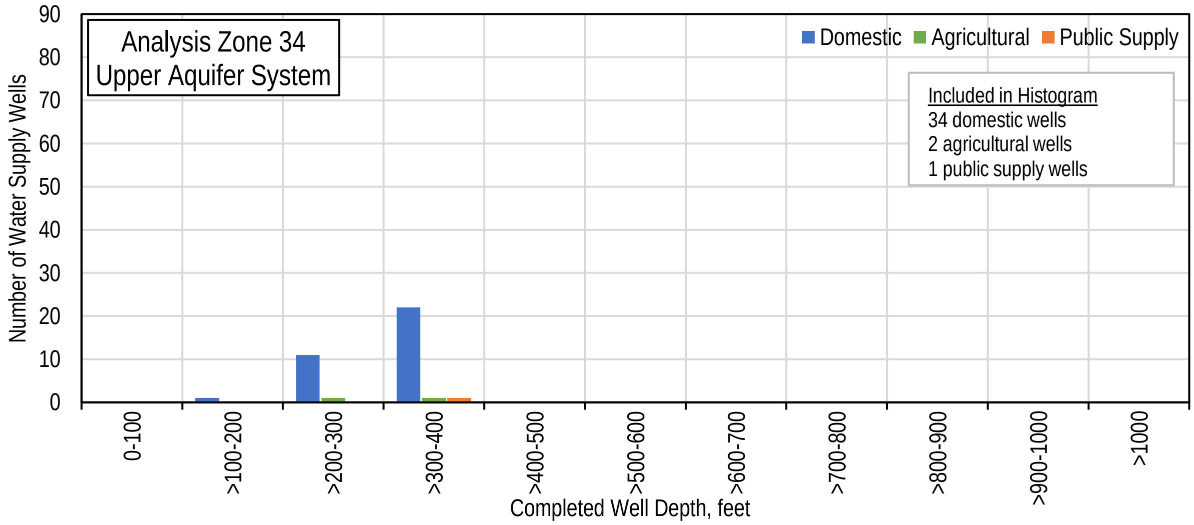

Analysis Zone 29
Upper Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
5 domestic wells
5 agricultural wells
1 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

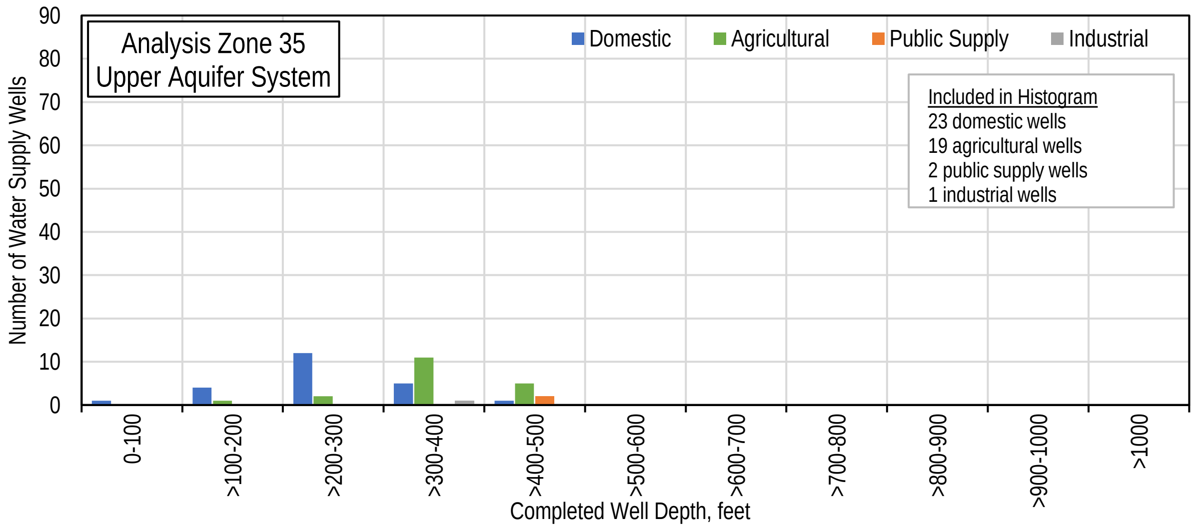

Analysis Zone 30
Upper Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Included in Histogram
27 domestic wells
10 agricultural wells
7 public supply wells
1 industrial wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

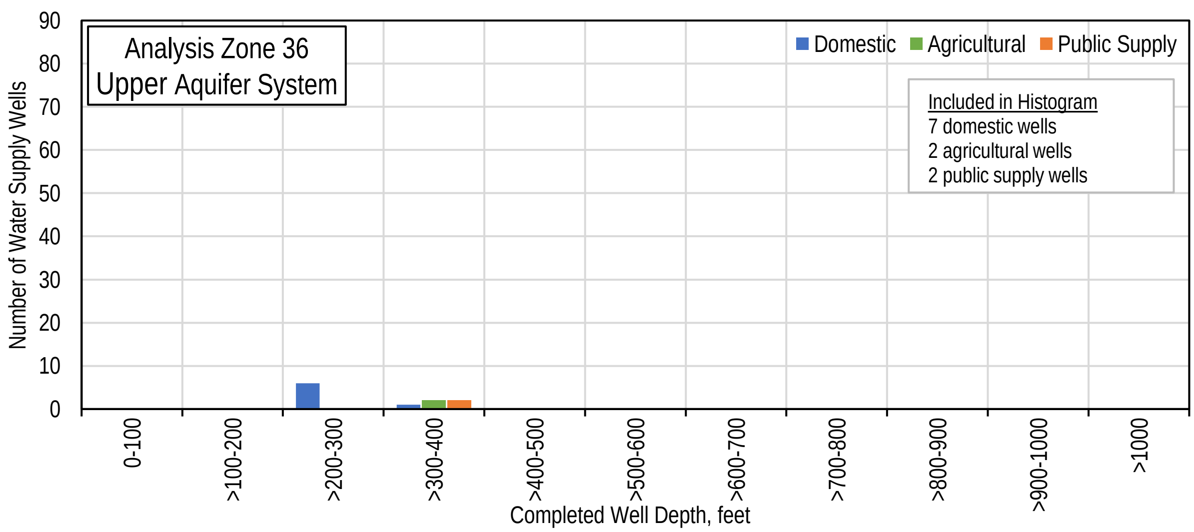

Analysis Zone 31
Upper Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
1 domestic wells
4 agricultural wells
2 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

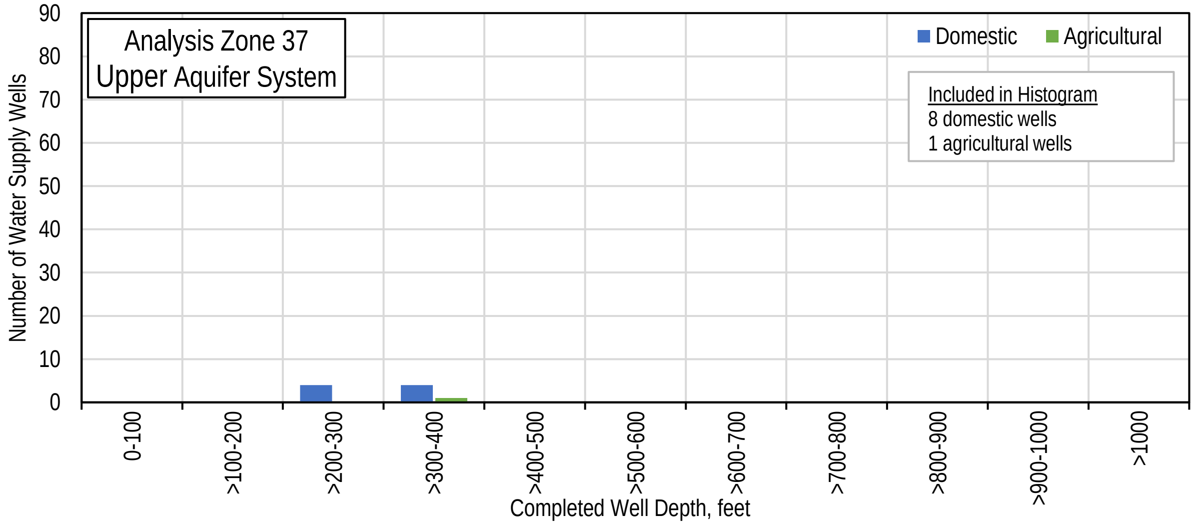

Analysis Zone 32
Upper Aquifer System
Domestic
Agricultural
Included in Histogram
1 domestic wells
1 agricultural wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

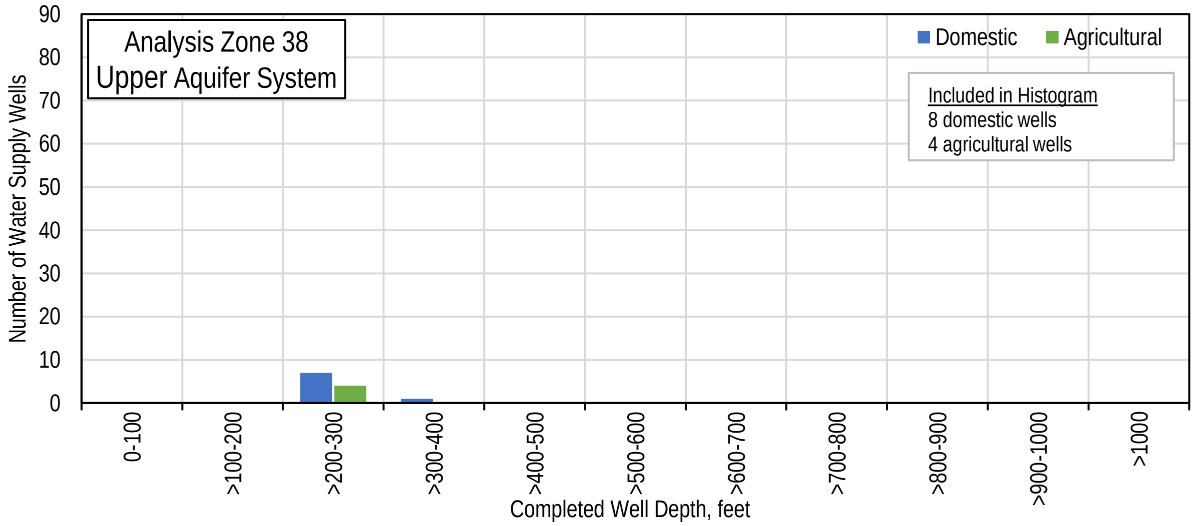

Analysis Zone 33
Upper Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
16 domestic wells
4 agricultural wells
1 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

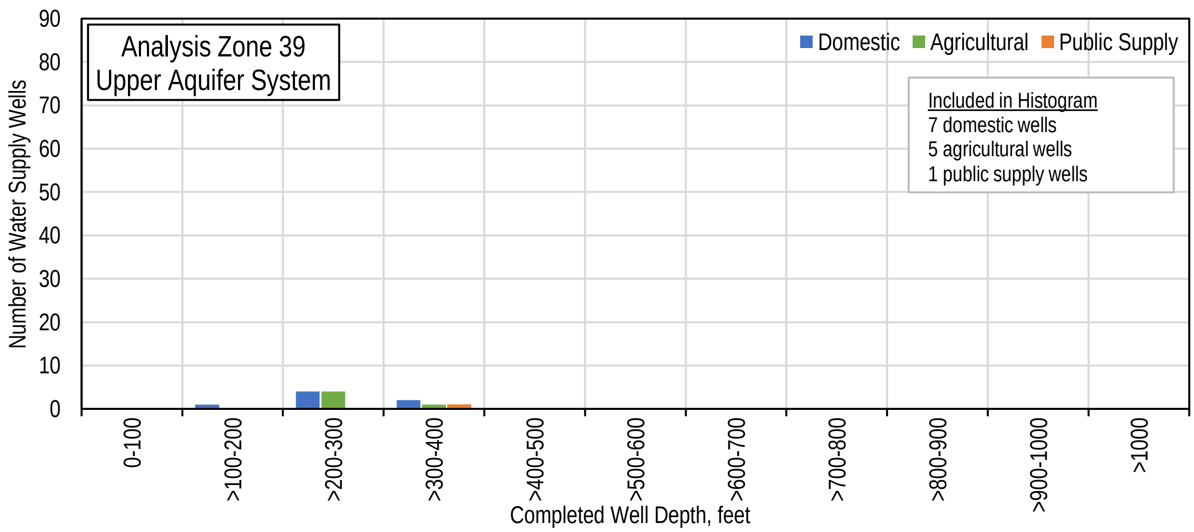

Analysis Zone 34
Upper Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
34 domestic wells
2 agricultural wells
1 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

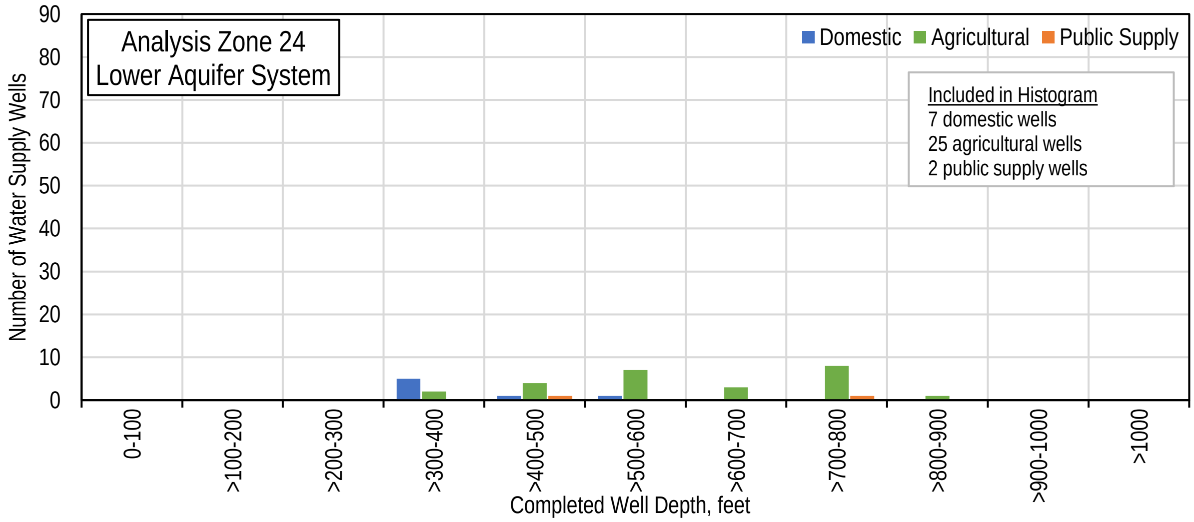

Analysis Zone 35
Upper Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Included in Histogram
23 domestic wells
19 agricultural wells
2 public supply wells
1 industrial wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

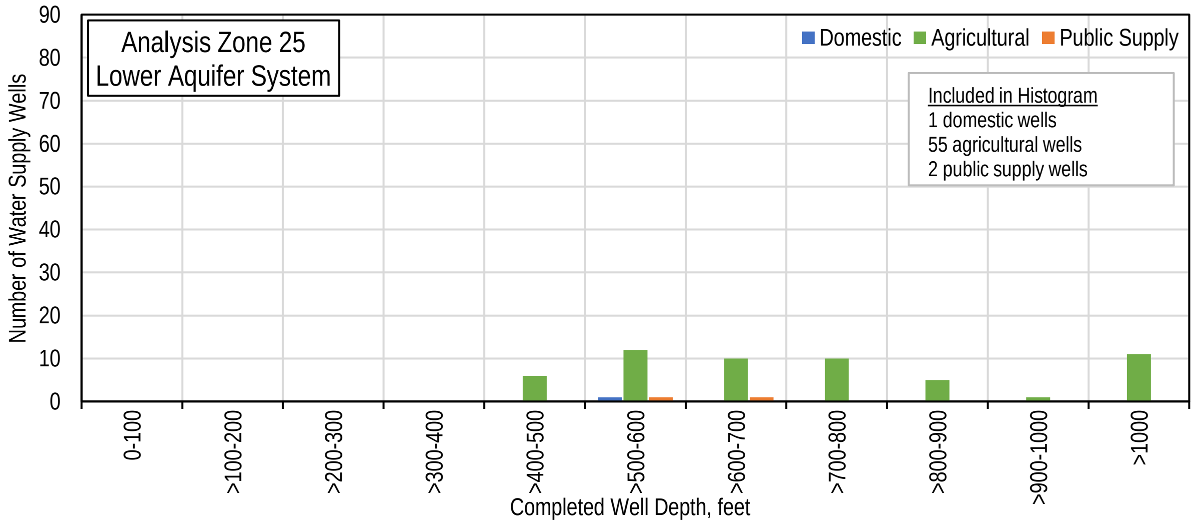

Analysis Zone 36
Upper Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
7 domestic wells
2 agricultural wells
2 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

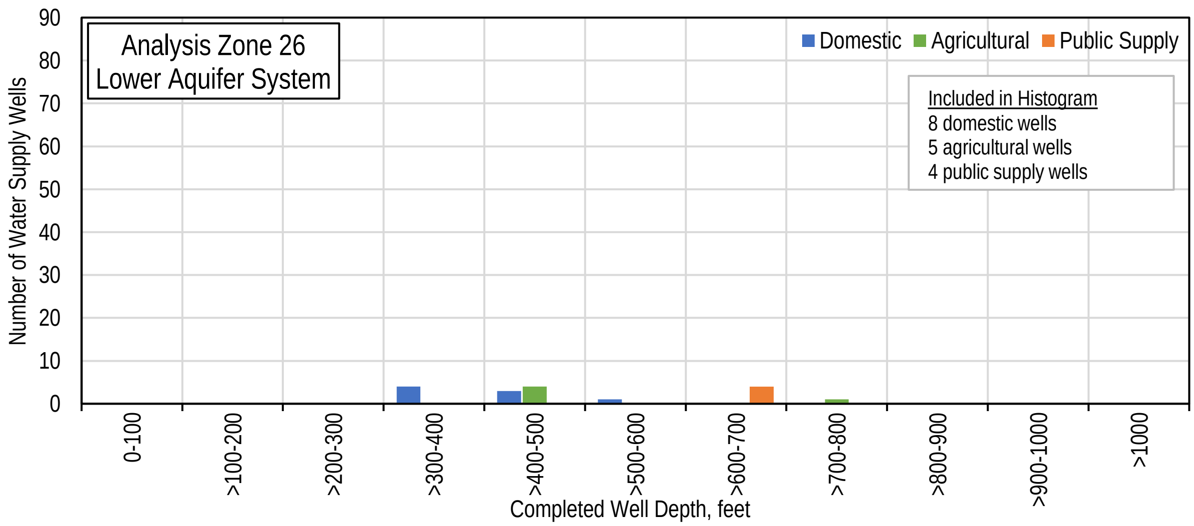

Analysis Zone 37
Upper Aquifer System
Domestic
Agricultural
Included in Histogram
8 domestic wells
1 agricultural wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

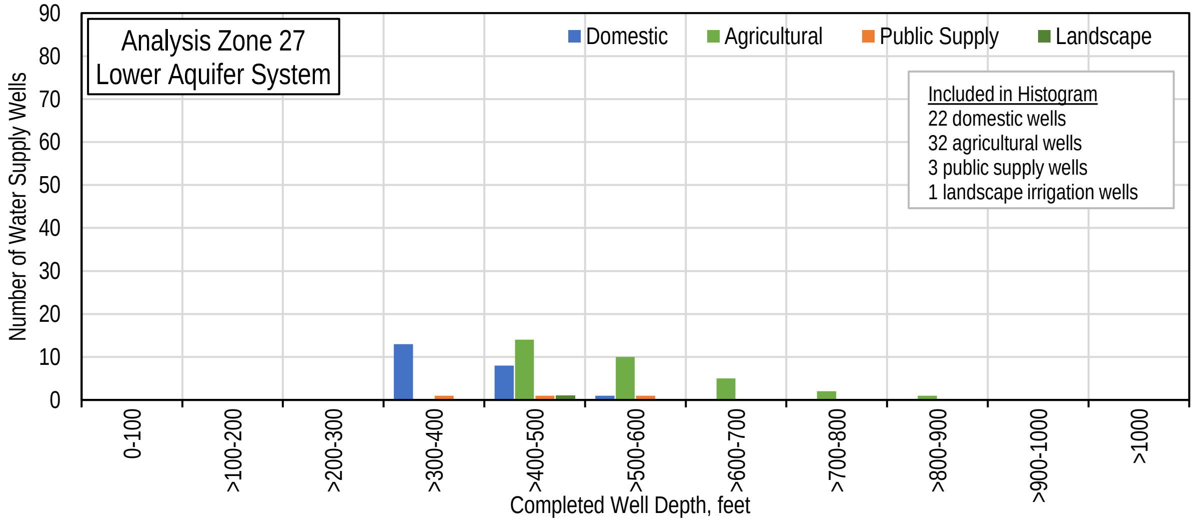

Analysis Zone 38
Upper Aquifer System
Domestic
Agricultural
Included in Histogram
8 domestic wells
4 agricultural wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

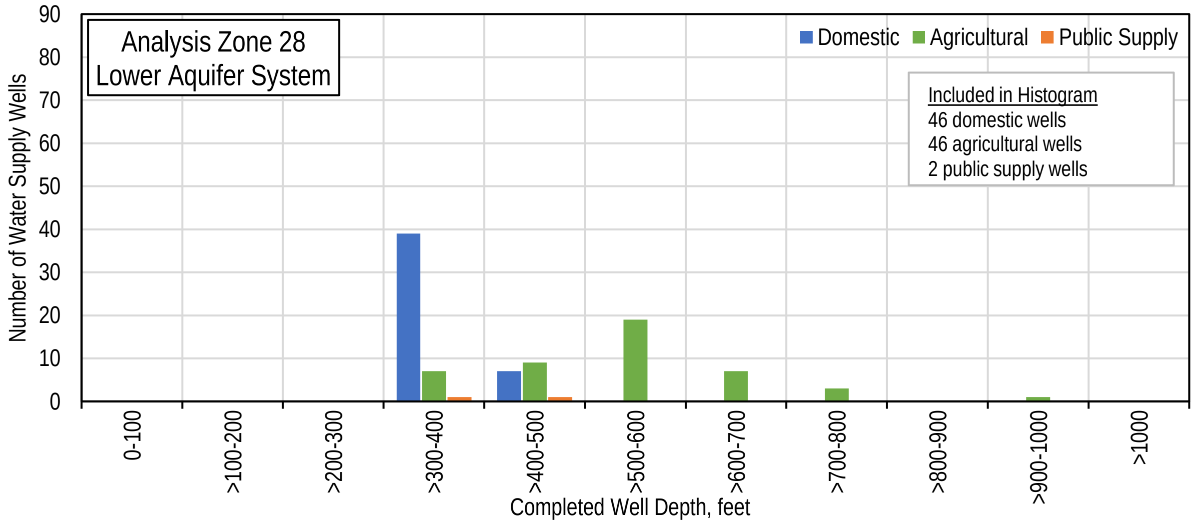

Analysis Zone 39
Upper Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
7 domestic wells
5 agricultural wells
1 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

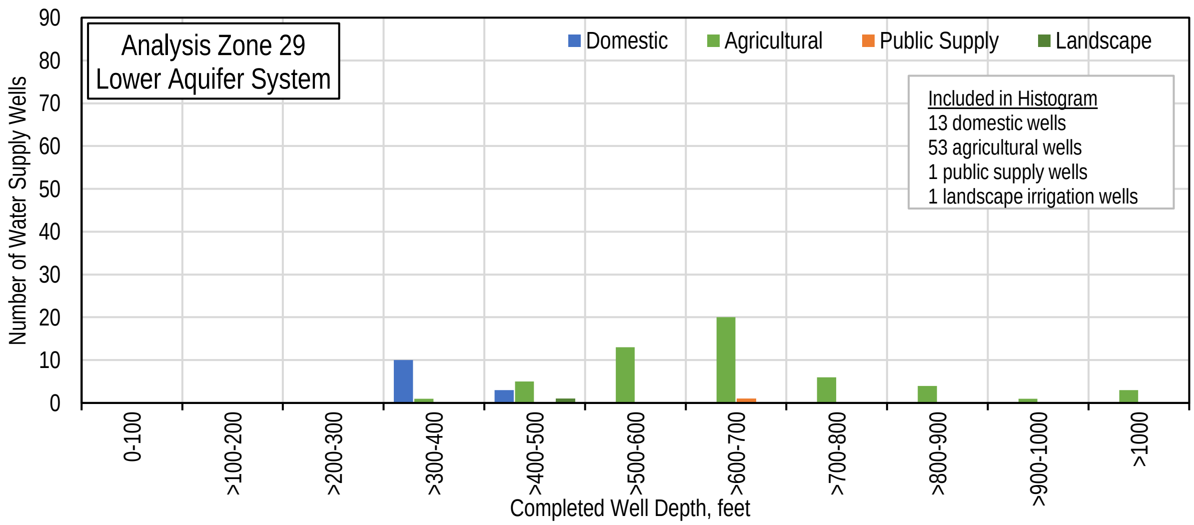

Analysis Zone 24
Lower Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
7 domestic wells
25 agricultural wells
2 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

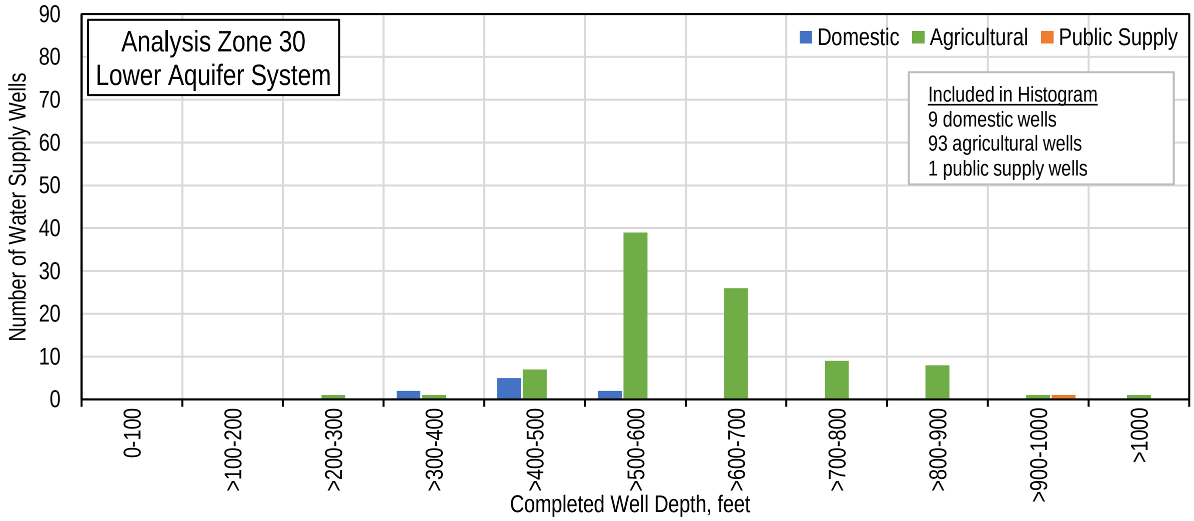

Analysis Zone 25
Lower Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
1 domestic wells
55 agricultural wells
2 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

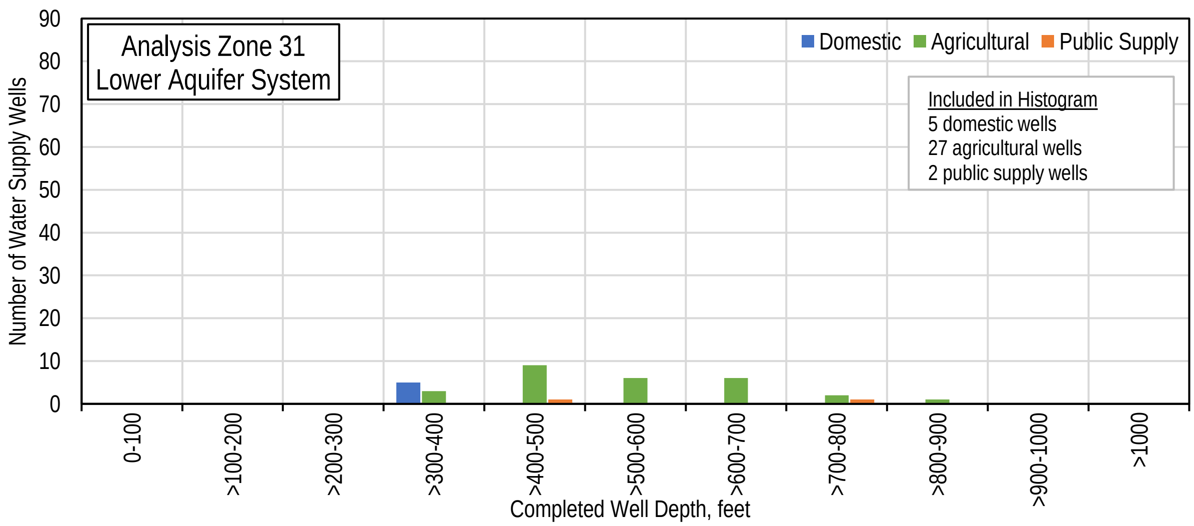

Analysis Zone 26
Lower Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
8 domestic wells
5 agricultural wells
4 public supply wells
Number of Water Supply Wells
Completed Well Depth, feet
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000

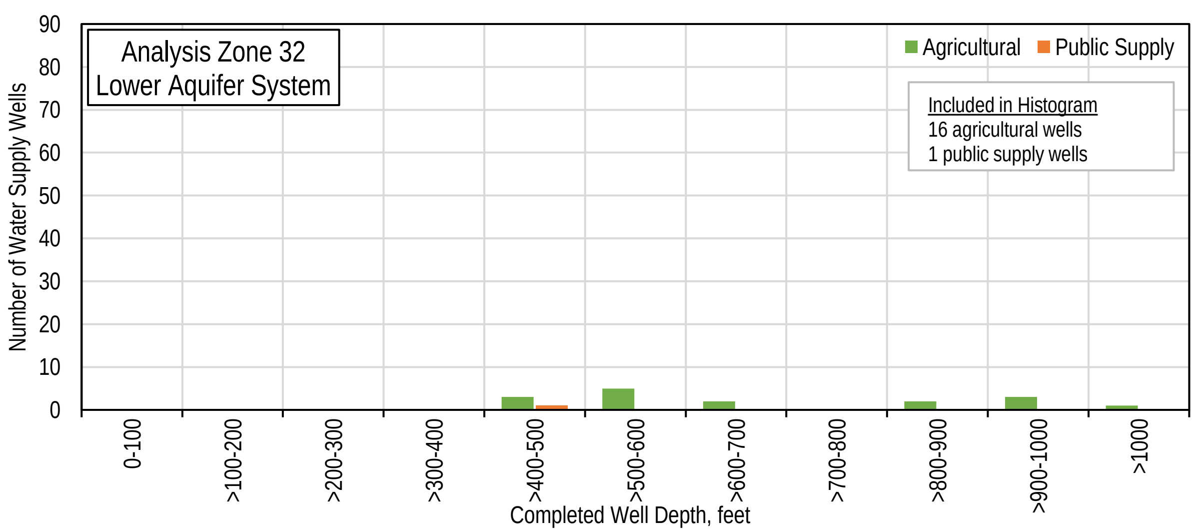

Analysis Zone 27
Lower Aquifer System
Domestic
Agricultural
Public Supply
Landscape
Included in Histogram
22 domestic wells
32 agricultural wells
3 public supply wells
1 landscape irrigation wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

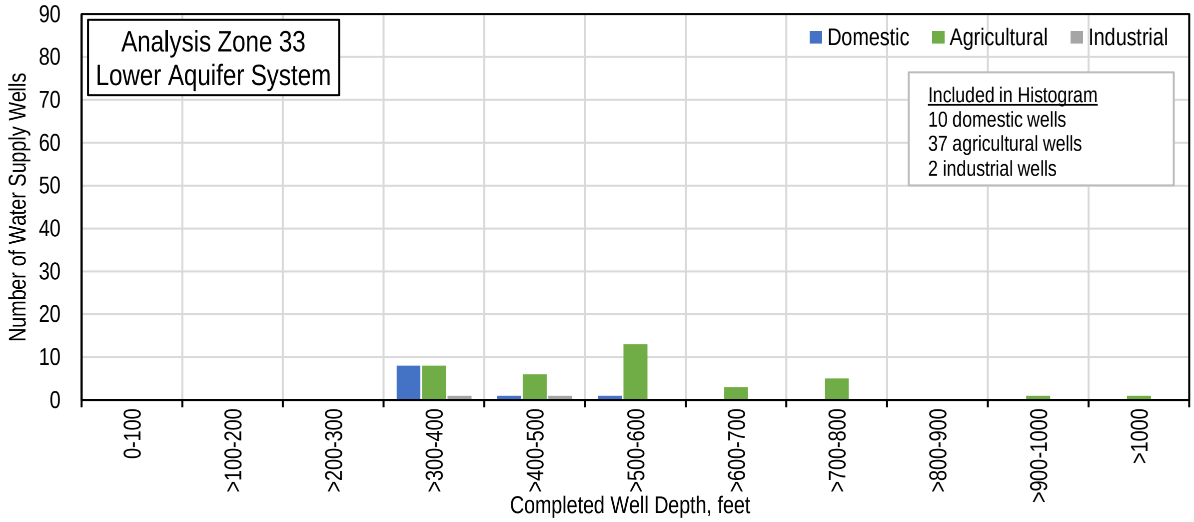

Analysis Zone 28
Lower Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
46 domestic wells
46 agricultural wells
2 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

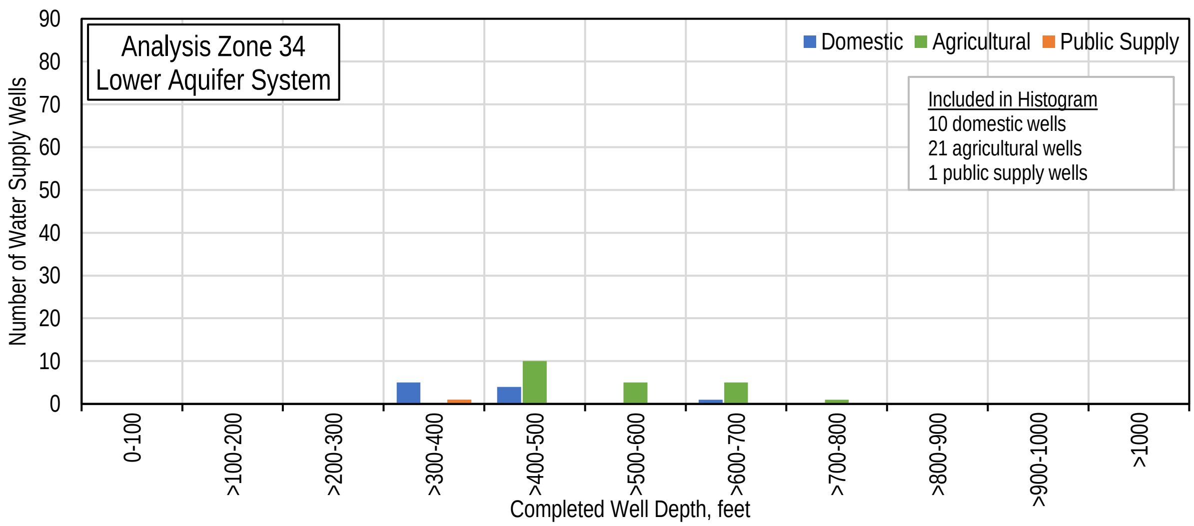

Analysis Zone 29
Lower Aquifer System
Domestic
Agricultural
Public Supply
Landscape
Included in Histogram
13 domestic wells
53 agricultural wells
1 public supply wells
1 landscape irrigation wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

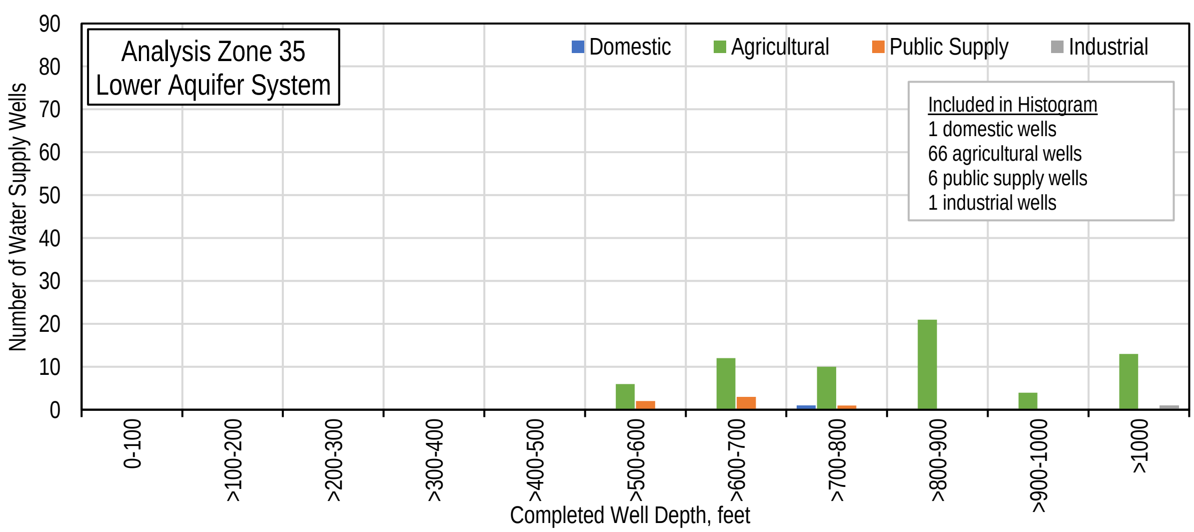

Analysis Zone 30
Lower Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
9 domestic wells
93 agricultural wells
1 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

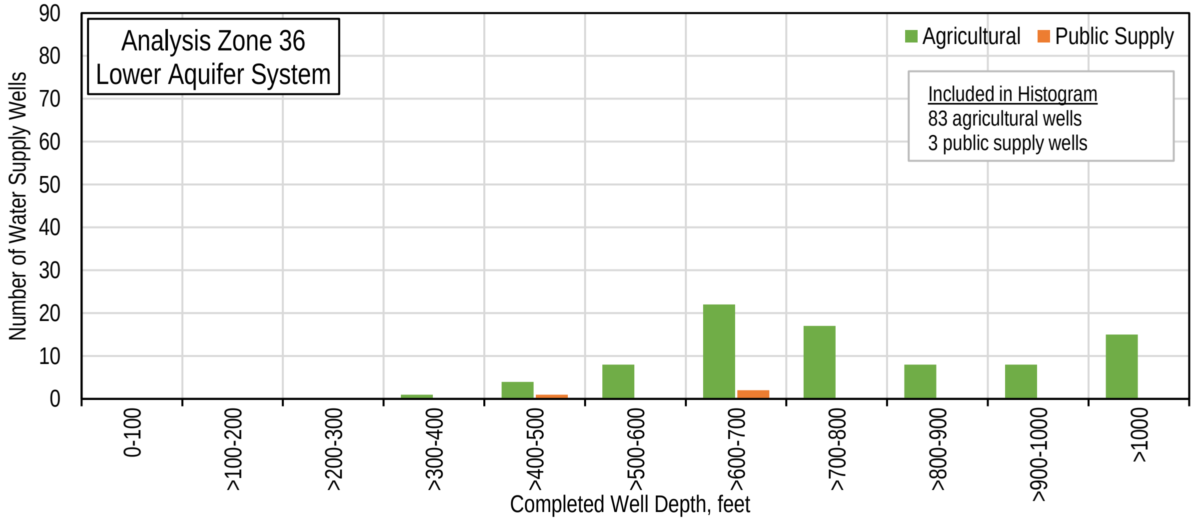

Analysis Zone 31
Lower Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
5 domestic wells
27 agricultural wells
2 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

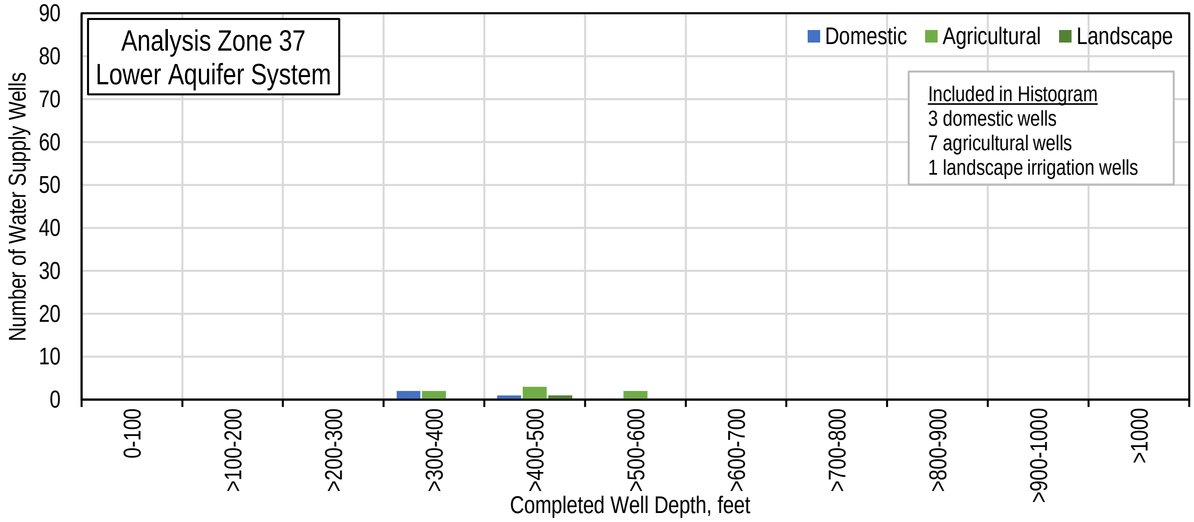

Analysis Zone 32
Lower Aquifer System
Agricultural
Public Supply
Included in Histogram
16 agricultural wells
1 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

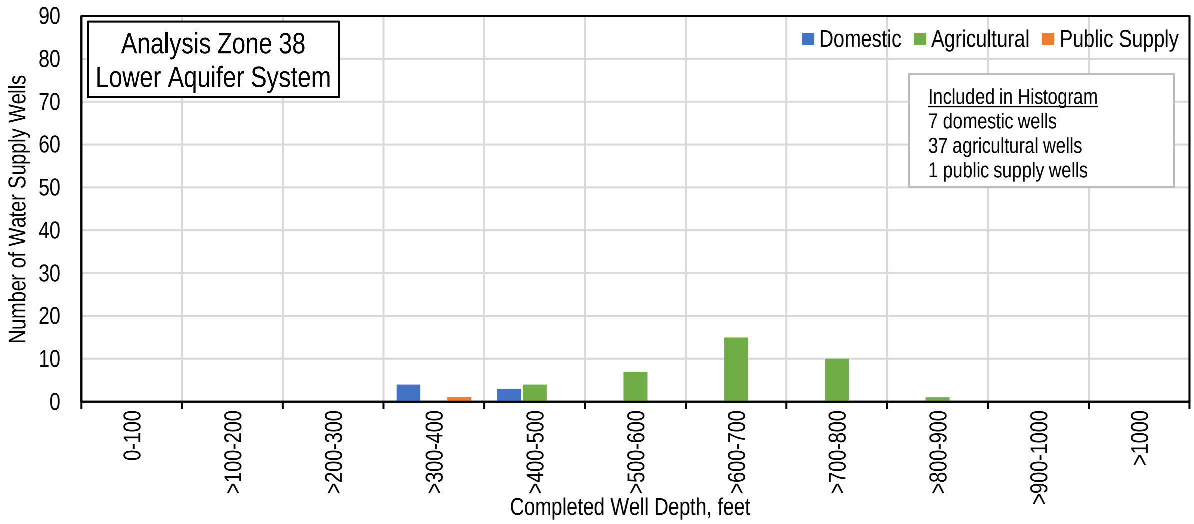

Analysis Zone 33
Lower Aquifer System
Domestic
Agricultural
Industrial
Included in Histogram
10 domestic wells
37 agricultural wells
2 industrial wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

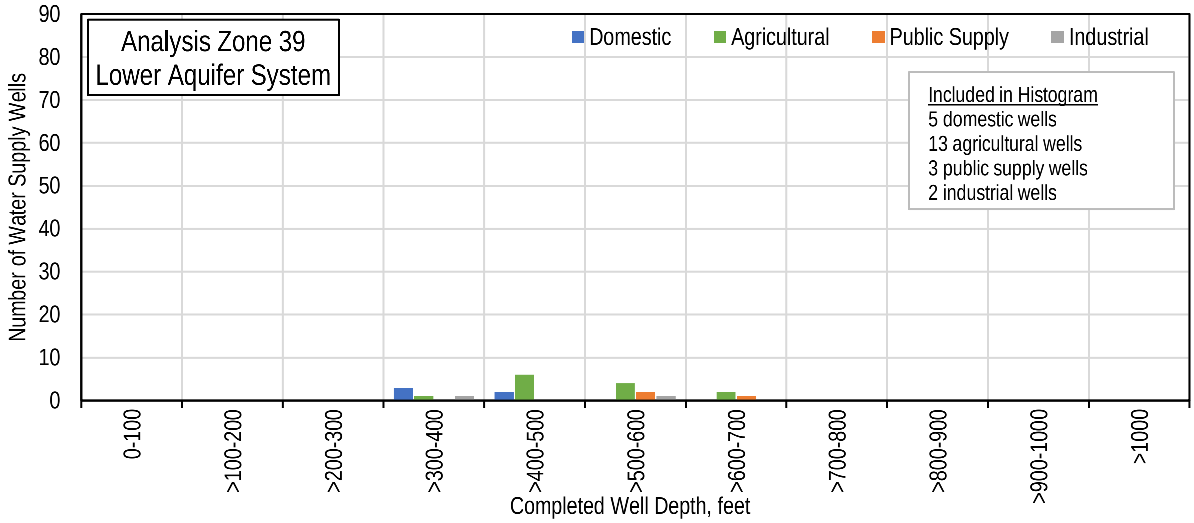

Analysis Zone 34
Lower Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
10 domestic wells
21 agricultural wells
1 public supply wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet


Analysis Zone 35
Lower Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Included in Histogram
1 domestic wells
66 agricultural wells
6 public supply wells
1 industrial wells
Number of Water Supply Wells
0
10
20
30
40
50
60
70
80
90
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet


Analysis Zone 36
Lower Aquifer System
Agricultural
Public Supply
Included in Histogram
83 agricultural wells
3 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet


Analysis Zone 37
Lower Aquifer System
Domestic
Agricultural
Landscape
Included in Histogram
3 domestic wells
7 agricultural wells
1 landscape irrigation wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet


Analysis Zone 38
Lower Aquifer System
Domestic
Agricultural
Public Supply
Included in Histogram
7 domestic wells
37 agricultural wells
1 public supply wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet


Analysis Zone 39
Lower Aquifer System
Domestic
Agricultural
Public Supply
Industrial
Included in Histogram
5 domestic wells
13 agricultural wells
3 public supply wells
2 industrial wells
Number of Water Supply Wells
90
80
70
60
50
40
30
20
10
0
0-100
>100-200
>200-300
>300-400
>400-500
>500-600
>600-700
>700-800
>800-900
>900-1000
>1000
Completed Well Depth, feet

MONTGOMERY & ASSOCIATES

Appendix C

90% Protective Elevations (Methodology 1), Groundwater Level Trend Elevations (Methodology 2), and Interpolated Minimum Threshold (Methodology 3) for Representative Monitoring Site Minimum Thresholds

90% Protective, Groundwater Level Trend, and Interpolated Minimum Threshold Elevations
for Kaweah Subbasin Representative Monitoring Sites

Unique Well ID	Local Well ID	GSA	Aquifer System	Analysis Zone	Methodology 1 90% Protective Elevation (feet)	Methodology 2 Groundwater Level Trend Projection Elevation (feet)	Methodology 3 Interpolated Minimum Threshold (feet)
16S25E36M002M	16S25E36M002M	East Kaweah	Single	2	260	292	-
16S26E30Q001M	16S26E30Q001M	East Kaweah	Single	2	285	292	-
17S25E25A001M	17S25E25A001M	East Kaweah	Single	1	124	185	-
17S25E35E001M	KSB-2107	East Kaweah	Single	1	110	185	-
17S26E04F002M	KSB-2369	East Kaweah	Single	2	276	292	-
17S26E07C001M	17S26E07C001M	East Kaweah	Single	2	233	292	-
17S26E21E001M	KSB-2354	East Kaweah	Single	2	266	292	-
17S26E29R001M	17S26E29R001M	East Kaweah	Single	2	269	292	-
18S26E02D002M	18S26E02D002M	East Kaweah	Single	2	295	292	-
18S26E06D001M	18S26E06D001M	East Kaweah	Single	1	130	185	-
18S26E24J003M	18S26E24J003M	East Kaweah	Single	4	306	365	-
18S27E17H002M	18S27E17H002M	East Kaweah	Single	4	327	365	-
18S27E29E001M	18S27E29E001M	East Kaweah	Single	4	330	365	-
18S27E30H001M	18S27E30H001M	East Kaweah	Single	4	327	365	-
19S26E03A001M	19S26E03A001M	East Kaweah	Single	5	207	244	-
19S26E11R001M	19S26E11R001M	East Kaweah	Single	5	198	244	-
19S26E13R001M	19S26E13R001M	East Kaweah	Single	9	123	145	-
19S26E23E001M	Lindsay Well 15	East Kaweah	Single	9	103	145	-
19S26E25R001M	19S26E25R001M	East Kaweah	Single	9	98	145	-
19S26E34R006M	Lindsay Well 14	East Kaweah	Single	10	43	75	-
19S26E35C001M	19S26E35C001M	East Kaweah	Single	9	88	145	-
19S27E29D001M	19S27E29D001M	East Kaweah	Single	7	197	312	-
20S26E08H001M	KSB-2333	East Kaweah	Single	10	30	75	-
20S26E11R001M	20S26E11R001M	East Kaweah	Single	9	100	145	-
20S26E12H001M	Lindsay Well 11	East Kaweah	Single	9	112	145	-
20S26E16R001M	20S26E16R001M	East Kaweah	Single	10	39	75	-
20S26E20J001M	20S26E20J001M	East Kaweah	Single	10	32	75	-
20S26E23R001M	20S26E23R001M	East Kaweah	Single	9	98	145	-
20S26E32A001M	KSB-2344	East Kaweah	Single	10	35	75	-
20S26E35H001M	20S26E35H001M	East Kaweah	Single	9	104	145	-
20S27E08A001M	20S27E08A001M	East Kaweah	Single	7	211	312	-
20S27E15R001M	20S27E15R001M	East Kaweah	Single	6	354	429	-
20S27E18R001M	20S27E18R001M	East Kaweah	Single	8	194	235	-
20S27E25N001M	20S27E25N001M	East Kaweah	Single	6	363	429	-
21S26E11H001M	21S26E11H001M	East Kaweah	Single	9	110	145	-
21S27E03B001M	21S27E03B001M	East Kaweah	Single	8	237	235	-
21S27E06F001M	21S27E06F001M	East Kaweah	Single	9	119	145	-
21S27E08F001M	21S27E08F001M	East Kaweah	Single	8	199	235	-
21S27E12F001M	21S27E12F001M	East Kaweah	Single	7	287	312	-
SCID Office	SCID Office	East Kaweah	Single	2	243	292	-

Unique Well ID	Local Well ID	GSA	Aquifer System	Analysis Zone	Methodology 1 90% Protective Elevation (feet)	Methodology 2 Groundwater Level Trend Projection Elevation (feet)	Methodology 3 Interpolated Minimum Threshold (feet)
17S23E34J001M	KSB-1161	Greater Kaweah	Upper	32	-5	67	-
17S24E34B001M	KSB-1580	Greater Kaweah	Single	11	5	78	-
17S24E36H003M	KSB-1775	Greater Kaweah	Single	12	55	73	-
17S26E36R001M	KSB-2690	Greater Kaweah	Single	4	299	288	-
18S22E24D001M	KSB-0818	Greater Kaweah	Upper	37	-38	59	-
18S23E14A001M	KSB-1222	Greater Kaweah	Upper	32	5	73	-
18S23E30D001M	KSB-0905	Greater Kaweah	Lower	36	-311	-207	-
18S23E30D901M	KSB-0903	Greater Kaweah	Upper	36	-26	71	-
18S25E05Q001M	KSB-1936	Greater Kaweah	Single	13	93	81	-
18S25E15C001M	KSB-2058	Greater Kaweah	Single	13	109	110	-
18S25E23J001M	KSB-2147	Greater Kaweah	Single	14	164	169	-
18S26E17L001M	KSB-2297	Greater Kaweah	Single	15	250	313	-
18S26E27B001M	KSB-2466	Greater Kaweah	Single	5	199	349	-
18S27E05J001M	KSB-2822	Greater Kaweah	Single	16	328	415	-
19S22E24B001M	KSB-0856	Greater Kaweah	Upper	36	-36	25	-
19S22E28D001M	KSB-0616	Greater Kaweah	Upper	35	33	19	-
19S22E31B002M	KSB-0531	Greater Kaweah	Upper	35	27	57	-
19S23E12L001M	KSB-1259	Greater Kaweah	Lower	38	-129	56	-
19S23E21C001M	KSB-1055	Greater Kaweah	Upper	29	-9	51	-
19S25E09H001M	KSB-2017	Greater Kaweah	Single	14	142	92	-
19S25E13A002M	KSB-2200	Greater Kaweah	Single	19	151	114	-
19S25E16A002M	KSB-2015	Greater Kaweah	Single	18	75	91	-
19S25E27A001M	KSB-2089	Greater Kaweah	Single	18	72	57	-
19S25E28H001M	KSB-2021	Greater Kaweah	Single	20	23	56	-
19S25E32J001M	KSB-1937	Greater Kaweah	Upper	24	82	49	-
19S25E35B002M	KSB-2139	Greater Kaweah	Single	18	66	47	-
19S26E05C001M	KSB-2291	Greater Kaweah	Single	14	171	229	-
19S26E16J002M	KSB-2411	Greater Kaweah	Single	18	106	124	-
19S26E20A001M	KSB-2322	Greater Kaweah	Single	18	92	106	-
20S22E07A003M	KSB-0550	Greater Kaweah	Upper	35	20	-28	-
20S22E24R001M	KSB-0889	Greater Kaweah	Upper	30	-73	-17	-
20S22E36A001M	KSB-0890	Greater Kaweah	Upper	30	-79	-10	-
20S24E24H001M	KSB-1783	Greater Kaweah	Upper	24	51	56	-
20S25E03R001M	KSB-2095	Greater Kaweah	Single	20	8	17	55
20S25E12A001M	KSB-2197	Greater Kaweah	Single	20	17	18	65
20S25E14F004M	KSB-2114	Greater Kaweah	Single	21	-72	2	60
20S25E24R001M	KSB-2203	Greater Kaweah	Single	21	-63	-2	65
21S24E03L001M	KSB-1535	Greater Kaweah	Upper	25	89	-24	**
21S24E08A001M	KSB-1425	Greater Kaweah	Lower	25	-262	10	-

Unique Well ID	Local Well ID	GSA	Aquifer System	Analysis Zone	Methodology 1 90% Protective Elevation (feet)	Methodology 2 Groundwater Level Trend Projection Elevation (feet)	Methodology 3 Interpolated Minimum Threshold (feet)
025-01	KSB-1696	Mid-Kaweah	Upper	39	112	13	138
036-01	KSB-1884	Mid-Kaweah	Single	22	79	27	-
047-01	KSB-1699	Mid-Kaweah	Upper	39	107	157	-
053-01	KSB-1977	Mid-Kaweah	Single	23	52	56	-
075-01	KSB-1447	Mid-Kaweah	Upper	39	81	60	-
077-01	KSB-1427	Mid-Kaweah	Upper	39	81	33	-
18S24E13N001M	KSB-1689	Mid-Kaweah	Single	22	69	75	-
18S24E22E001M	KSB-1526	Mid-Kaweah	Upper	39	103	-139	85
18S24E25D001M	KSB-1690	Mid-Kaweah	Upper	39	114	161	-
18S25E28R001M	KSB-2014	Mid-Kaweah	Single	23	54	69	-
18S25E30Q001M	KSB-1819	Mid-Kaweah	Single	22	75	34	-
19S23E20C001M	KSB-0994	Mid-Kaweah	Lower	29	-12	71	-
19S23E22H001M	KSB-1168	Mid-Kaweah	Upper	29	3	30	-
19S23E31R001M	KSB-0946	Mid-Kaweah	Upper	29	-27	-72	-
19S23E35H001M	KSB-1226	Mid-Kaweah	Upper	29	3	-101	-
19S24E08D002M	KSB-1384	Mid-Kaweah	Upper	38	47	38	-
19S24E20F001M	KSB-1408	Mid-Kaweah	Upper	28	75	Drilled after 2016	-
19S24E22E001M	KSB-1545	Mid-Kaweah	Upper	28	86	Drilled after 2016	-
19S24E25D001M	KSB-1709	Mid-Kaweah	Upper	27	2	-6	88
19S24E34D001M	KSB-1536	Mid-Kaweah	Upper	28	77	Drilled after 2016	-
19S24E35E001M	KSB-1628	Mid-Kaweah	Lower	26	-109	-92	-
19S24E36C002M	KSB-1903	Mid-Kaweah	Lower	27	-98	-43	-
19S25E06A001M	KSB-1862	Mid-Kaweah	Single	22	76	35	-
19S25E20P001M	KSB-1905	Mid-Kaweah	Upper	27	24	90	-
20S23E03L001M	KSB-1129	Mid-Kaweah	Upper	29	-9	-81	-
20S23E18R001M	KSB-0948	Mid-Kaweah	Upper	30	-66	-173	-
20S23E21B001M	KSB-1071	Mid-Kaweah	Upper	30	-66	-126	-
20S23E26C001M	KSB-1206	Mid-Kaweah	Upper	30	-64	-20	-
20S24E01H002M	KSB-1770	Mid-Kaweah	Lower	26	-289	-150	-
20S24E04K001M	KSB-1506	Mid-Kaweah	Lower	26	-123	-39	-
20S24E07C001M	KSB-1320	Mid-Kaweah	Upper	31	58	Drilled after 2016	-
20S24E11J002M	KSB-1695	Mid-Kaweah	Lower	26	-119	-121	-
20S24E16H001M	KSB-1538	Mid-Kaweah	Lower	31	-115	62	-
20S24E17P001M	KSB-1431	Mid-Kaweah	Upper	31	58	88	-
20S24E28L001M	KSB-1477	Mid-Kaweah	Upper	31	58	60	-
21S23E05A002M	KSB-0976	Mid-Kaweah	Upper	30	-84	-141	-
21S23E07J001M	KSB-0922	Mid-Kaweah	Upper	30	-36	-22	-
361856N1193313W001	KSB-1706	Mid-Kaweah	Lower	26	-136	-287	-

Note. bolded elevation indicates the minimum threshold assigned to the representative monitoring site