October 25, 2023

At Aqua our mission is to protect and provide Earth's most essential resource. Being good stewards of our environment is our top priority – along with providing clean, safe, reliable water for the growing population in this region.

In 2022, Aqua Texas purchased land in Wimberley, TX outside the Jacob's Well Groundwater Management Zone (JWGMZ) with the intent to drill new wells to reduce our reliance on the water production facilities currently in the management zone and proactively address water supply challenges in the communities we serve.

As part of our due diligence to protect Jacob's Well, we commissioned groundwater specialists Wet Rock to perform a pump test to determine what impact, if any, the proposed new well site would have on the water source. Aqua worked with the Hays Trinity Groundwater Conservation District (HTGCD) and the Wimberley Watershed Association to determine the best aquifer test design that aligned with our objectives while keeping us in compliance with the HTGCD.

About the Analysis
We coordinated with five (5) entities: HTGCD, Barton Springs Edwards Aquifer Conservation District, Edwards Aquifer Authority, Wimberley Water Supply Corporation (WWSC), and the Wimberley Watershed Association to monitor groundwater levels in 17 other wells in addition to Jacob's Well. Testing included a two-week monitoring period, a 48-hour pumping test, several weeks of analyzing the data, and scientific reviews.

Key Findings

- The analysis found that the two new test wells (No. 24 and No. 25) in the proposed area outside the Jacob's Well Groundwater Management Zone will have no measurable influence on the water levels in Jacob's Well, and that using wells outside the critical management area is a positive alternative to the current wells being used to serve Aqua Texas customers.

- While the report identified that wells 24 and 25 had no meaningful impact on Jacob's Well, Well No. 22, which is inside the JWGMZ, and which was run to ensure water reliability for Aqua Texas customers, had a small measurable impact on Jacob's Well. This supports using wells 24 and 25 as a source of groundwater production for Aqua's customers to alleviate impacts on Jacob's Well caused by drought and usage from other wells inside the JWGMZ.

We would like to recognize and thank our partners for helping to run the test and analyze the data: Hays Trinity Groundwater Conservation District, Barton Springs Edwards Aquifer Conservation District, Edwards Aquifer Authority, Wimberley Watershed Association, and the Wimberley Water Supply Corporation.

We appreciate the opportunity to collaborate to better understand the aquifer science in this critical part of the Wimberley Valley, and we look forward to working to develop solutions that help to ensure clean, safe, reliable water for our customers.

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September 8, 2023

Mr. Scot Foltz
Aqua Texas, Inc.
1106 Clayton Lane, Suite 400W
Austin, Texas 78723

RE: Woodcreek Utility CO 2 Wells No. 24 & 25 – Aquifer Test (June 12, 2023)

Dear Mr. Foltz:

This letter report details an analysis by Wet Rock Groundwater Services, LLC (WRGS) of the Aqua Texas, Inc. (Aqua) Woodcreek Utility Co 2 Wells No. 24 and No. 25 (previously Test Wells No. 1 and No. 2) aquifer tests. The purpose of the aquifer test was to determine the impact, if any, to Jacob's Well and other wells in the surrounding area. The wells are located off Farm to Market (FM) 2325 in western Hays County approximately 1.56 miles west of the City of Woodcreek, Texas (Figure 1).

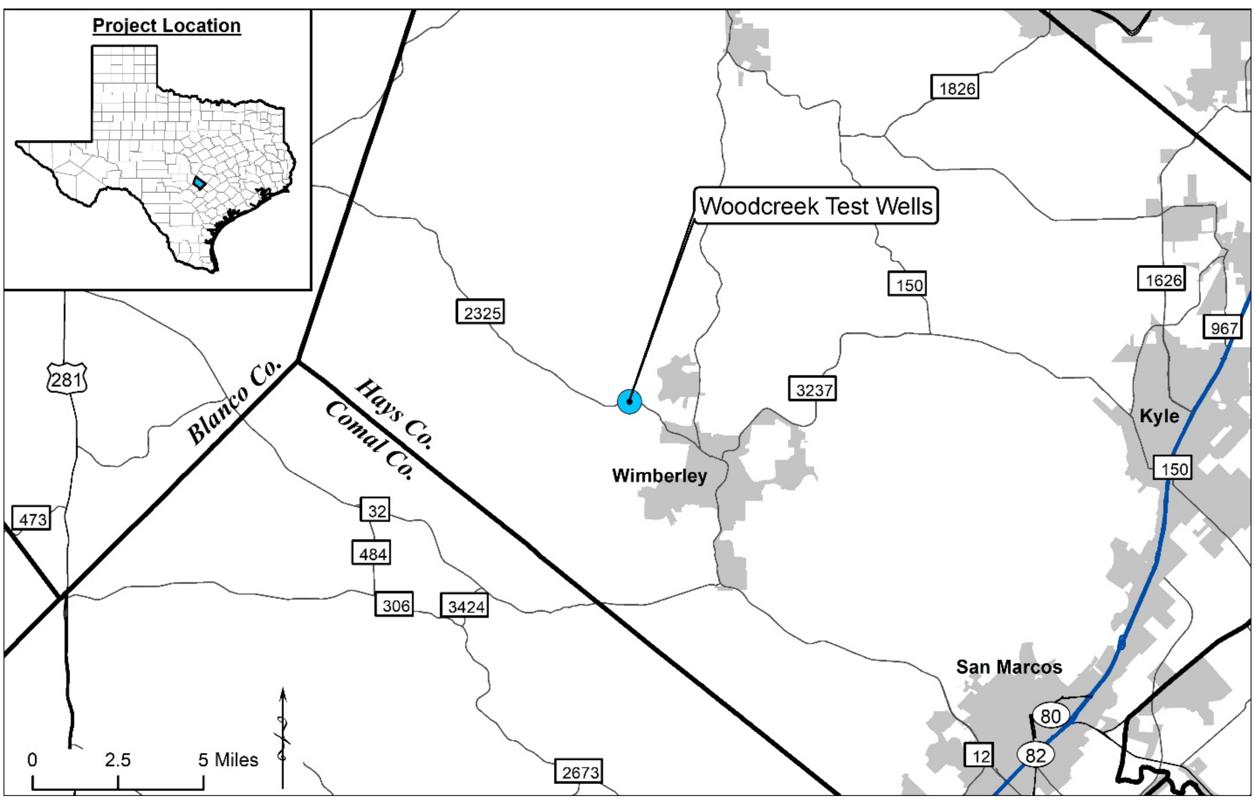


Figure 1: Location map of Well No. 24 and No. 25

Executive Summary

Aqua Woodcreek Utility Co 2 Wells No. 24 and No. 25 are completed in the Middle Trinity aquifer. The wells are approximately 1.2 miles away from the Jacob's Well spring and outside of the Hays Trinity Groundwater Conservation District's (HTGCD) Jacob's Well Groundwater Management Zone (GMZ). These new wells are intended to secure adequate water for Aqua's existing CCN and to reduce future dependence on existing wells within the Jacob's Well GMZ. The intent is to convert these wells into public supply wells and reduce the production at Woodcreek Utility Co 2 Wells No. 21 and 22; part of this process will include executing a HTGCD Rule 11 report.

The two major aquifers located within Hays County are the Edwards Aquifer and the Trinity Aquifer. The Trinity Aquifer in the Hill Country area, spans as far north as Gillespie County and as far south as Bexar, Comal, and Hays County where fresh water can be produced. As the name suggests, the Trinity is composed of three aquifers: the Upper, Middle and Lower Trinity Aquifers. In Hays County, groundwater in the Middle Trinity flows west to east and is controlled by the formation's structure, including dip and faulting (Wierman and others 2010).

Through coordination with HTGCD, a monitoring network of 17 additional wells were selected to assess any impact to the surrounding area during testing. Water level data were gathered from the monitoring network by five (5) different entities. Aqua, HTGCD, Barton Spring Edwards Aquifer Conservation District (BSEACD), EAA and the Texas Water Development Board (TWDB). Aqua was granted a variance request by the HTGCD board to perform an aquifer test during drought conditions. Aqua worked with HTGCD and the Wimberley Watershed Association (WWA) to determine the optimal aquifer test design to complete the stated purpose and to comply with HTGCD aquifer test standards and rules. The test consisted of a two week background monitoring period, a 48 hour pumping phase and a recovery phase. The pumping phase began on June 12, 2023 with both wells pumping simultaneously. There were a number of wells in the study area with unknown production volumes and pumping times which make the analyses of the dataset more complicated.

Over the monitoring period, groups of well exhibited hydraulic connection through similar water level trends. Wells up dip of Jacob's Well fault along with Section 25 well, Jacob's Well and the Graham well exhibited a hydraulic connection while the wells down dip of Jacob's Well fault, including wells down dip of Tom Creek fault but up dip of Wimberley fault, exhibited a hydraulic connection. During the pumping phase, both groups of wells and Jacob's Well displayed decreases in water level. However, the water levels began to decline before the pumping phase began and continued to drawdown after the pumping phase had been completed. We interpret the drawdown, in the wells updip of Jacob's Well fault, to be due to the increased production at Woodcreek Utility Co 2 Well No. 22 (Well No. 22). Well No. 22 is in line with the flowpath leading to Jacob's Well and distinct drops in the gauge height in Jacob's Well are seen when Well No. 22 comes online. The drawdown in Well No. 22 appears to have a greater hydraulic connection and impact to Jacob's Well than Woodcreek Utility Co 2 Well No. 21 (Well No. 21). The drawdown in the wells down dip of Jacob's Well fault but up dip of the Wimberley fault may be due to production from other wells in the area not included in the monitoring network. Production from Woodcreek Utility Co 1 Well No. 11 (Well No. 11) or Wimberley Water Supply No. 6 (Well No. 6) over this data set does not appear to have a direct impact on the gauge height at Jacobs Well. The three domestic wells (Wenger, Threeton and Milagro) displayed a strong hydraulic connection to the test wells during the pumping phase. There was a lack of impact to the Lower Trinity Well (Arapahoe) and the wells down dip of the Wimberley fault (Wimberley Water Supply No. 1 and No. 3).

The gauge height at Jacob's Well displayed a general decline throughout the pumping phase of the aquifer test. However, the trend appears to be more strongly associated with increased production from Well No. 22, as it compensated for Well No. 21 turning off, than with the test wells. No significant direct response was observed in Jacob's Well due to the starting and stopping of the pump in the test wells. The data indicate that a muted and much smaller magnitude response is observed at Jacob's Well due to pumping at Well No. 24 and No. 25 than at Well No. 21 and No. 22.

Study Area

Jacob's Well is a natural artesian spring located approximately 1.2 miles northeast from the test wells' location in Woodcreek, Texas. As development has increased in the area surrounding the spring, HTGCD created the Jacob's Well GMZ surrounding the spring with the purpose to limit impact to the spring from groundwater withdrawal. Figure 2 provides a map displaying the location of the test wells and Jacob's Well along with the GMZ and area faults. The test wells are located on a property owned by Aqua Texas, Inc. outside of the GMZ across Farm to Market Road 2325. The test wells are completed in the Middle Trinity Aquifer and in accordance with state and HTGCD's construction and permitting rules. With critical water issues facing the Wimberley Valley, this new well field is intended to secure adequate water for Aqua's existing CCN and to reduce future dependence on existing wells within the Jacob's Well GMZ. The additional wells will ensure Aqua meets the TCEQ minimum well capacity required, as stated in the approved alternative capacity requirement, of 0.34 gallons per minute (gpm)/connection at all times. Appendix A provides the state well reports for the test wells.

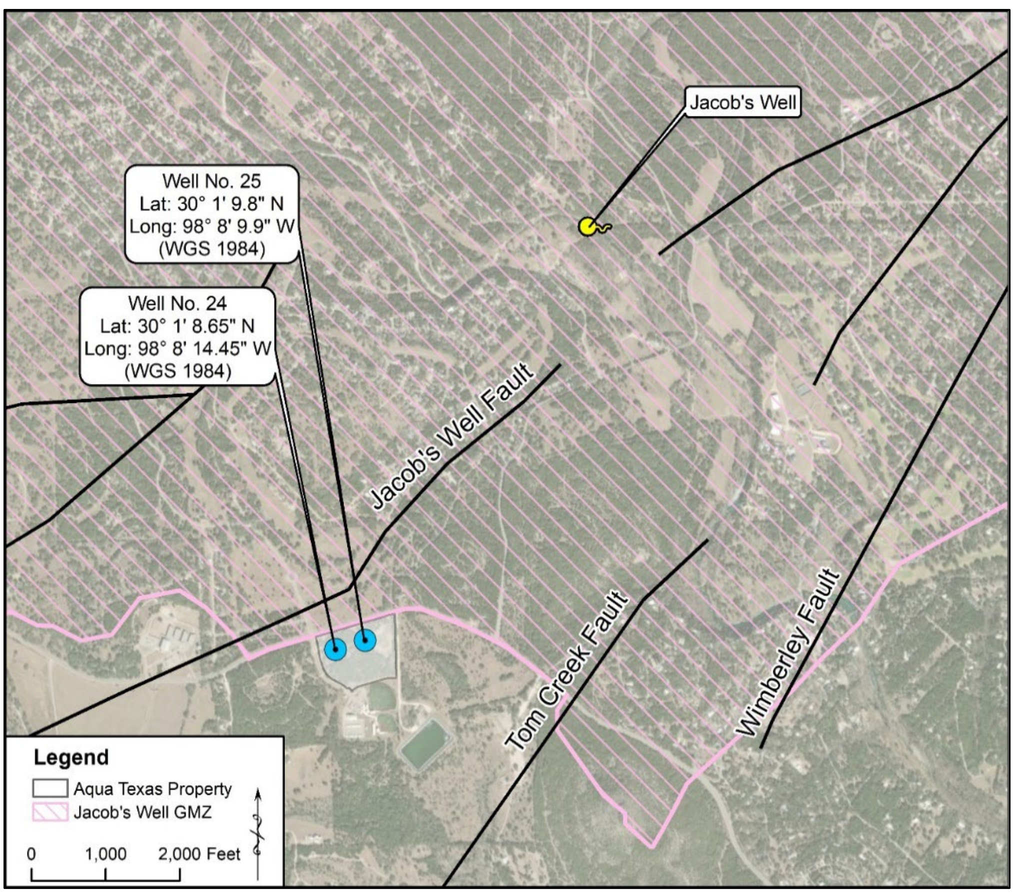


Figure 2: Study area map

Geology and Aquifer Description

The two major aquifers located within Hays County are the Edwards Aquifer and the Trinity Aquifer. These two aquifers make up a thick and regionally extensive aquifer system composed of Lower Cretaceous carbonates that were deposited throughout central Texas. The Trinity Aquifer in the Hill Country area, spans as far north as Gillespie County and as far south as Bexar, Comal, and Hays County where fresh water can be produced. As the name suggests, the Trinity is composed of three aquifers: the Upper, Middle and Lower Trinity Aquifers. The Upper Trinity Aquifer, composed of the Upper Glen Rose Limestone, is overlain by the limestone and dolomite of the Edwards Aquifer in the southeast portion of the county. The Middle Trinity Aquifer consists of the Lower Glen Rose, Hensell / Bexar Shale, and Cow Creek formations. All units of the Middle Trinity are karstic carbonates and mudstones. Separating the Middle and Lower Trinity aquifers is the Hammett Shale, which is a regional confining layer underlying the Cow Creek Member.

Figure 3 shows the location of the Trinity Aquifer with respect to other major aquifers in the area, including the Edwards Aquifer. The solid blue portion reflects the unconfined zone of the Edwards Aquifer where recharge occurs; the solid light green portion reflects the unconfined zone of the Upper Trinity Aquifer where recharge occurs; and the solid dark green portion reflects the unconfined zone of the Middle Trinity Aquifer where recharge occurs. The green diagonal hatched region reflects the confined zone of the Trinity Aquifer where the formations that make up the aquifer dip beneath the land surface, and the blue diagonal hatched region reflects the confined zone of the Edwards Aquifer (Figure 3).

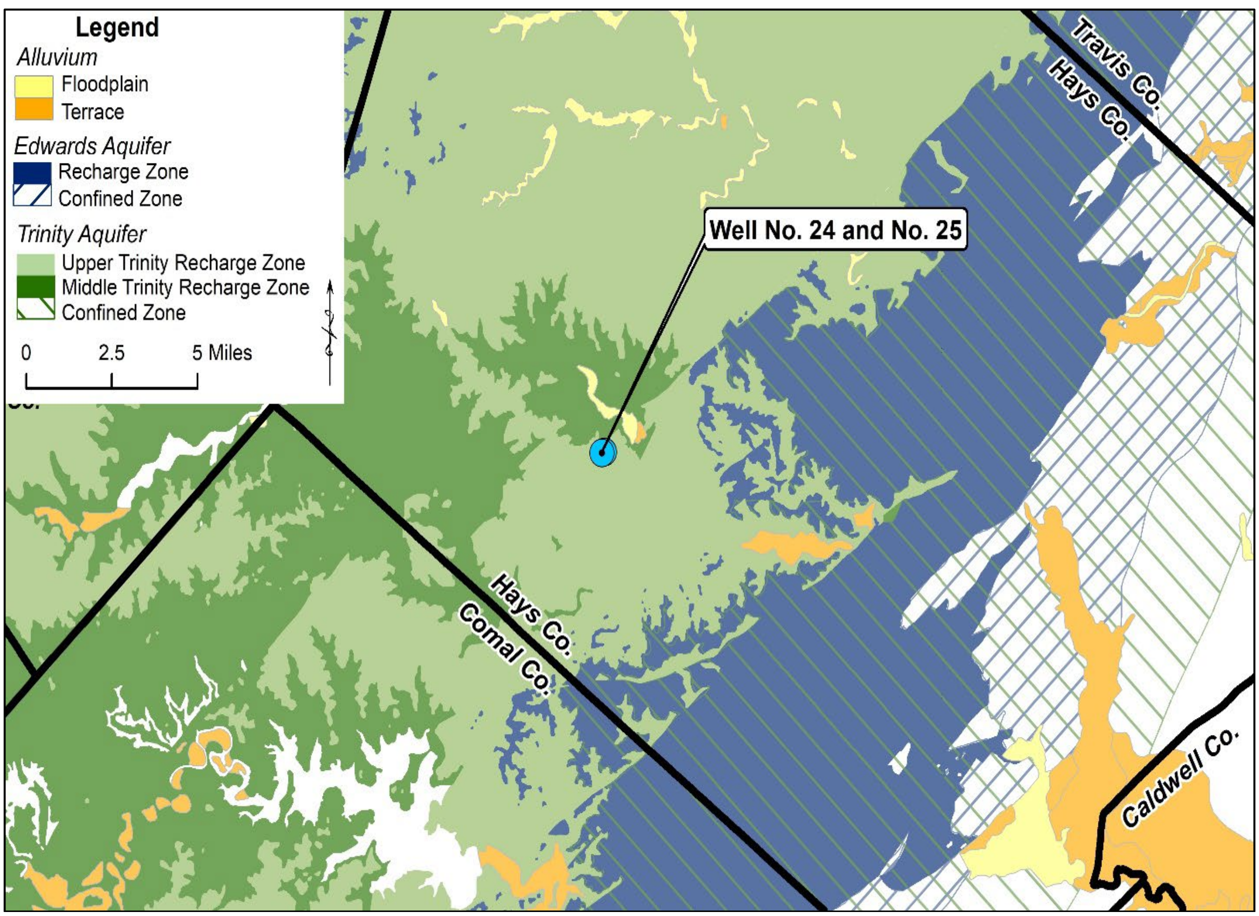


Figure 3: Aquifer map

Groundwater Flow and Local Faulting

In Hays County, groundwater in the Middle Trinity flows west to east and is controlled by the formation's structure, including dip and faulting (Wierman and others 2010). A trough in the potentiometric surface northwest of Jacob's Well likely indicates the conduit supplying the spring (Watson and others 2014, Hunt and others 2019). Watson et. al, (2014) stated that within the confined region of the Middle Trinity Aquifer downgradient of the Tom Creek and Wimberley Faults, steeper gradients were observed in potentiometric maps indicating that the faults likely act as partial barriers to groundwater flow. Figure 4 provides a regional cross section by Broun and Watson (2018) of the Blanco and Cypress Creek Basins in Wimberley displaying steeper potentiometric gradients down dip of Jacob's Well.

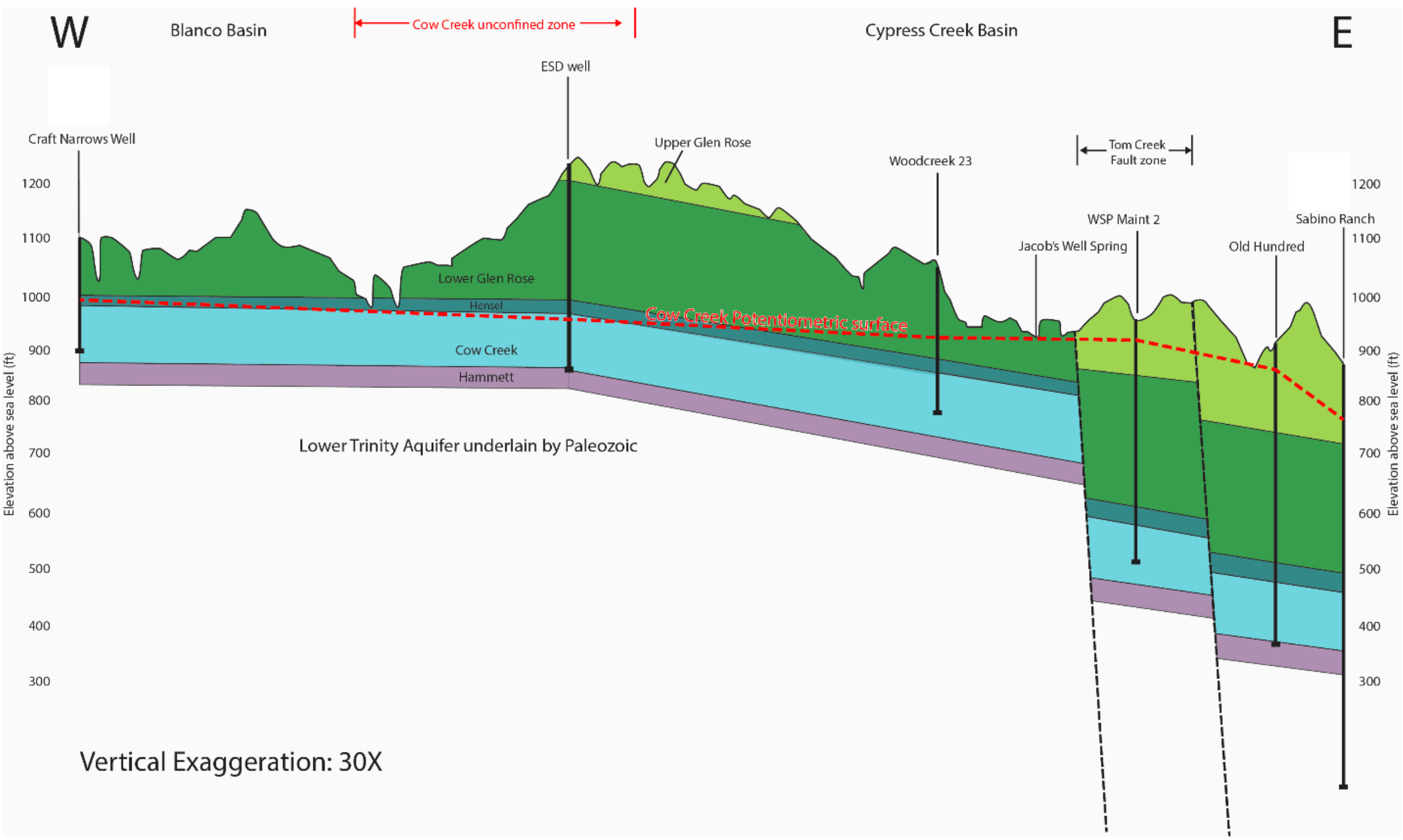


Figure 4: Structural cross section and October 2018 potentiometric surface. Figure from Broun and Watson (2018).

Precipitation and Barometric Pressure

Fluctuations in groundwater levels and spring discharge in Jacob's Well are caused by a number of natural and human factors. Some of these natural factors include atmospheric pressure changes and recharge from precipitation. Figure 5 provides daily precipitation totals along with barometric pressure during the testing and background period. Figure 6 provides the raw water level and the barometric pressure corrected water level for Jacob's Well.

Atmospheric loads directly transferred into the water column and aquifer can cause fluctuations in water level (Brassington, 1998). The barometric pressure was collected by the "Hobo" data logger installed into Jacob's Well by the Edwards Aquifer Authority (EAA). These data were then used by the EAA to correct the water level measurements recorded by the logger.

The precipitation data were taken from the EA034 rain gauge located approximately 1 mile south of Jacob's Well. A total collection of 3.54 inches of precipitation were measured during the extent of the data. Eight (8) days recorded measurable precipitation with four (4) days recording measurements over 0.2 inches.

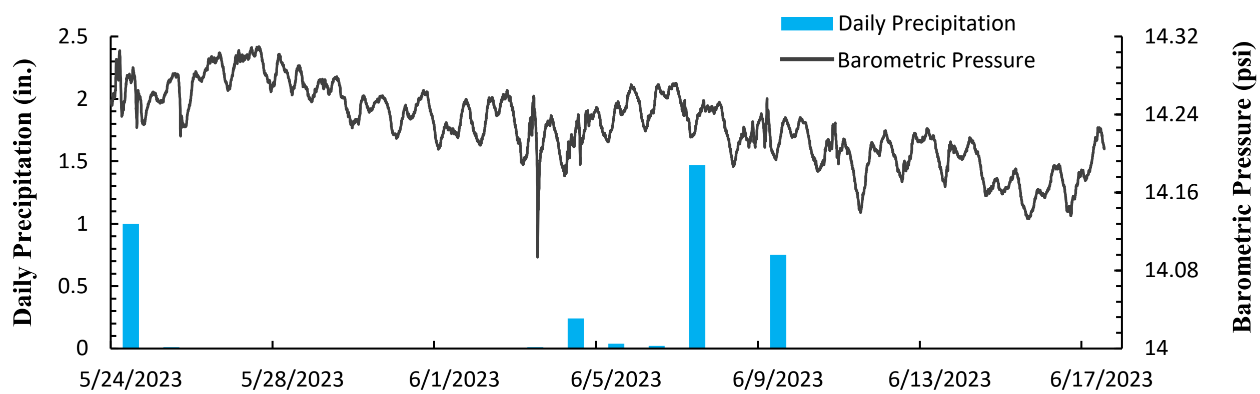


Figure 5: Daily precipitation (EA034) and barometric pressure (Hobo Logger)

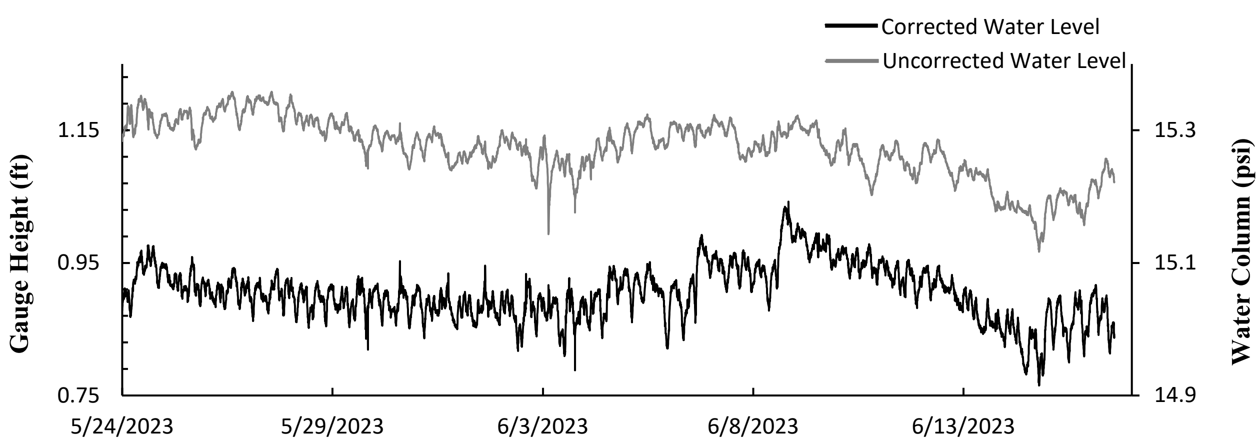


Figure 6: Corrected vs uncorrected Jacob's Well water level

Monitoring Network

Through coordination with HTGCD, a monitoring network of 17 additional wells were selected to assess any impact to the surrounding area. Figure 7 provides the locations of the observation wells used in the monitoring network and symbolized by well type. Sixteen (16) of the observation wells are completed in the Middle Trinity (Arapahoe Well was completed in the Lower Trinity Aquifer). All Middle Trinity wells are completed in the Cow Creek Limestone excluding Graham and Section 25 which are completed in the Hensell Sand and Lower Glen Rose Limestone, respectively. To asses vertical hydraulic impact, the Arapahoe well completed in the Lower Trinity Aquifer, was monitored. Table 1 provides a summary of the wells used in the monitoring network.

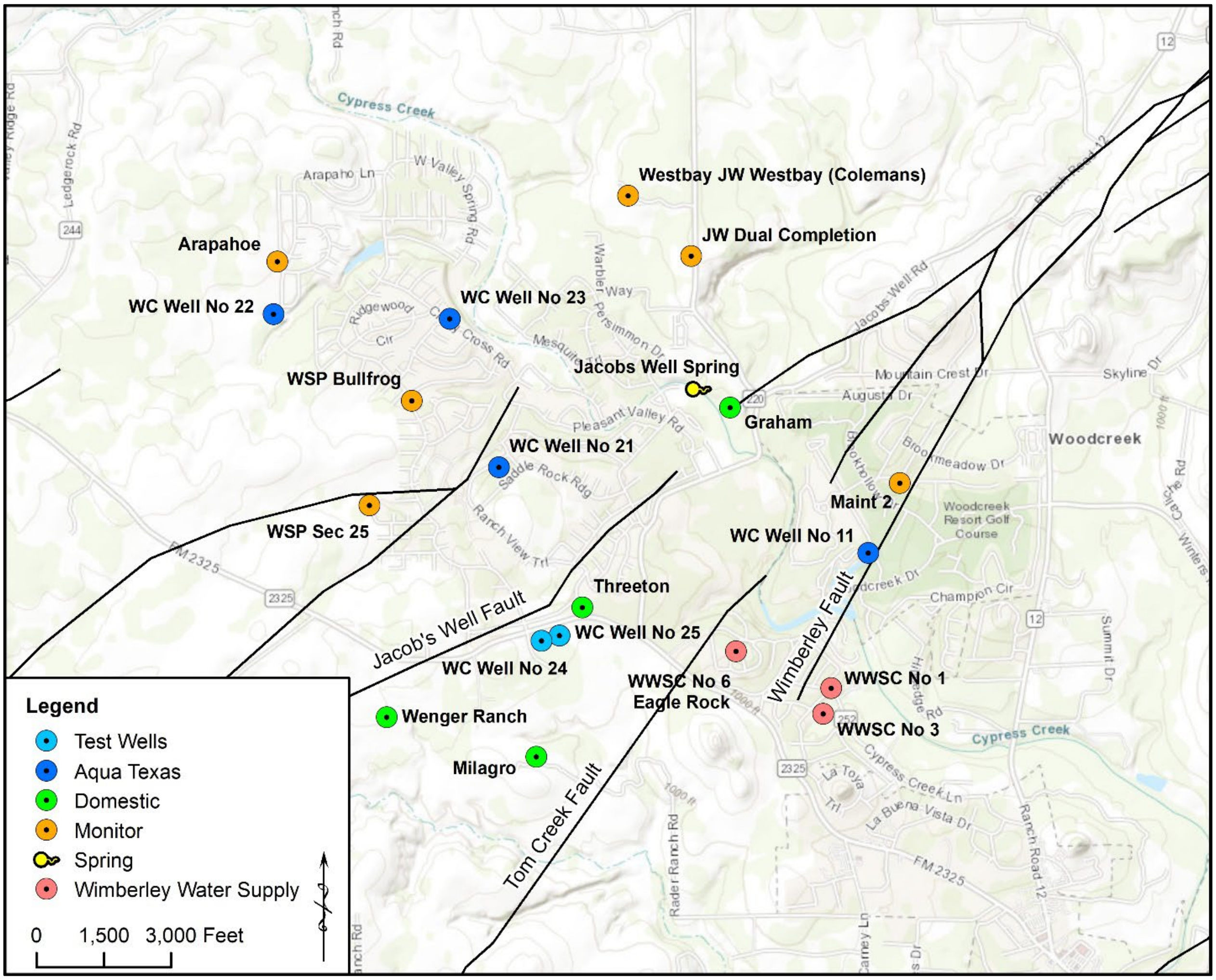


Figure 8: Monitoring network map

Table 1: Monitoring network well summary

Well	SWN or Tracking Number	Elevation (ft. MSL)	Total Depth (feet)	Aquifer (formation)	Type
Pumping Wells					
Woodcreek Utility Co. Well No. 24	620893	1,060	450	Middle Trinity (Kcc)	Test
Woodcreek Utility Co. Well No. 25	620892	1,051	450	Middle Trinity (Kcc)	Test
Observation Wells					
Woodcreek Utility Co. Well No. 22	5763907	1,041	300	Middle Trinity (Kcc)	Public Supply
Woodcreek Utility Co. Well No. 21	5763904	998	400	Middle Trinity (Kcc)	Public Supply
Woodcreek Utility Co. Well No. 11	5764702	938	400	Middle Trinity (Kcc)	Public Supply
WSP Bullfrog	5763902	1,021	370	Middle Trinity (Kcc)	Observation
Wimberley Water Supply Co. No 1	5764705	934	400	Middle Trinity (Kcc)	Public Supply
Arapahoe	5763604	1,094	680	Lower Trinity (Ksy)	Observation
Graham	5764716	955	153	Middle Trinity (Kh)	Domestic
WSP Sec 25	5763901	1,051	300	Middle Trinity (Kcc)	Irrigation
WSP Maint 2	5764703	968	450	Middle Trinity (Kcc)	Observation
Woodcreek Utility Co. Well No. 23	5763908	1,051	284	Middle Trinity (Kcc)	Observation
Milagro	340422	1,024	430	Middle Trinity (Kcc)	Domestic
Threeton	5763909	1,053	365	Middle Trinity (Kcc)	Domestic
Wenger	121536	1,083	390	Middle Trinity (Kcc)	Domestic
Wimberley Water Supply Co. 3	5764707	927	400	Middle Trinity (Kcc)	Public Supply
Wimberley Water Supply Co. 6	5764712	1,059	350	Middle Trinity (Kcc)	Public Supply
JW Dual Comp	604846	1,073	238	Middle Trinity (Kcc)	Observation
JW Westbay (Colemans)	604845	1,086	540	Middle Trinity (Kcc)	Observation

Notes: in. = inches; ft. MSL = Mean Sea Level.

Water level data were gathered from the monitoring network by five (5) different entities. Aqua, HTGCD, BSEACD, EAA and TWDB. Table 2 provides a modified Gantt chart displaying measurement entity, monitoring dates and days individual wells were producing. Pressure transducers, capable of measuring the water level and temperature at a set interval, were installed in fifteen (15) of the wells to recorded data over the extent of the aquifer test. Water levels were measured by hand (E-Line) in the three (3) private wells by HTGCD staff. The EAA installed a water level transducer (Hobo Data Logger) in Jacob's Well to gather data and to compare to the United States Geological Survey (USGS) constant water level and spring flow monitoring system. Appendix B provides hydrographs of all the wells.

Over the testing period, Well No. 22 and Well No. 11 continued uninterrupted normal pumping cycles while Well No. 21 and Wimberley Water Supply (WWSC) Wells No. 3 (Well No. 3) and Well No. 6 remained off for extend periods. Pumping from the domestic wells was noted by HTGCD staff when taking water level measurements. Production from other wells is unknown.

Table 2: Monitoring period summary

Monitor Well	May-23							Jun-23																		
	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Woodcreek 24																			X	X	X					
Woodcreek 25																			X	X	X					
Woodcreek 22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Woodcreek 21	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X				X	X	X	X	X
Woodcreek 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WSP Bullfrog																										
WWSC No 1 (Mt Baldy)																										
Arapahoe																										
Graham																										
WSP Sec 24																										
WSP Maint 2																										
Woodcreek 23																										
Milagro							X																			X
Threeton																			X							X
Wenger																										
WWSC 3								X	X	X	X	X	X	X	X											
WWSC 6															X	X	X	X	X	X	X					
JW Dual Comp																										
JW Westbay (Coleman)																										
Jacobs Well (Hobo Logger)																										

Notes: **X** denotes pumping; Blue: Aqua/WRGS; Green: HTGCD; Orange: BSEACD; Red: EAA; Purple: TWDB.

Daily Production

Figure 7 provides daily production volumes from Wells No. 11, No. 21, No. 22 and a combined total of Wells No. 21 and No. 22. Over the data set, Well No. 11 produced an average of 99,000 gallons per day (gpd) at an average production rate of 590 gpm. Well No. 21 produced an average of 133,000 gpd at an average production rate of 229 gpm. Well No. 22 produced an average of 187,000 gpd at an average production rate of 311 gpm. To meet water demand for the system, Well No. 22 increased production when Well No. 21 was turned off. Well No. 22 produced an average of 261,000 gpd from May 31 to June 2. When Well No. 21 was turned off again during the aquifer test, Well No. 22 increased production to an average of 311,000 gpd from June 12 to June 14. A 66% increase from normal daily production and a 19% increase from the May 31 to June 2 period.

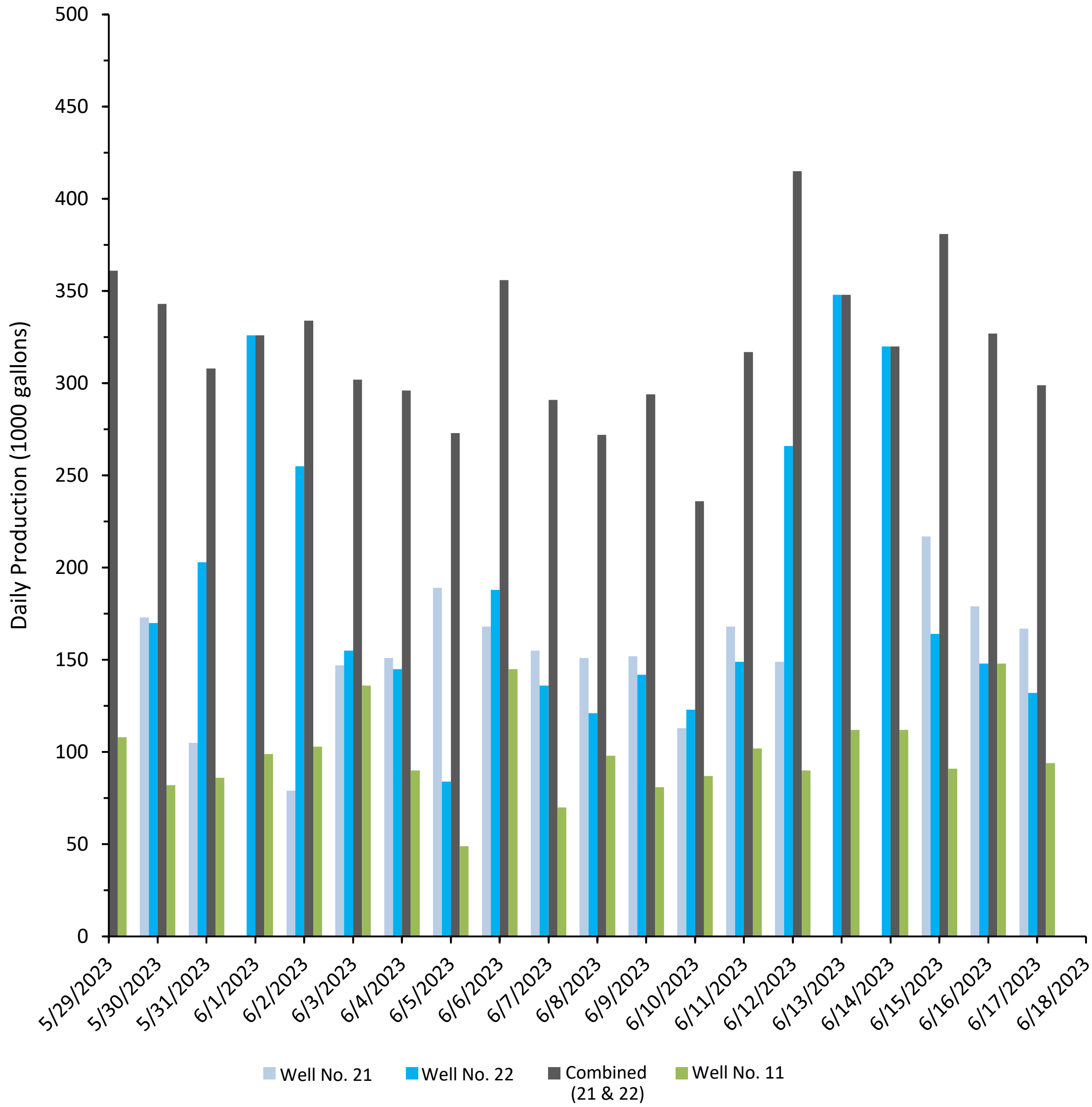


Figure 7: Daily production from Aqua Woodcreek Wells

Aquifer Test (June 12, 2023)

Aqua was granted a variance request by the HTGCD board to perform an aquifer test during drought conditions. The purpose of the aquifer test was to determine the impact, if any, to Jacob's Well or other wells in the surrounding area, from the test wells pumping. Aqua worked with HTGCD and the WWA to determine the optimal aquifer test design to complete the stated purpose and to comply with HTGCD aquifer test standards and rules. The aquifer test design consisted of a two (2) week background monitoring period (May 25, 2023 to June 11, 2023) prior to the commencement of the pumping phase. There were a number of wells in the study area with unknown production volumes and pumping times which make the analyses of the dataset more complicated. The background monitoring period assisted in understanding the natural and human factors effecting water level trends in the region. During the initial stages of the background period, Well No. 21 was shut off from production for 48-hours to further reduce factors effecting the background data. The background period was followed by a 48-hour pumping phase with both test wells pumping simultaneously and then a recovery phase. Well No. 21 was shut off again during the 48-hour pumping phase of the test. The pumping phase consisted of one rate step. After 12 hours of pumping at a specified rate (Well No. 24: 120 gpm ; Well No. 25: 80 gpm), the rates would be increased to their maximum calculated production capacity (Well No. 24: 230 gpm; Well No. 25: 160 gpm) for the remaineder of the 48-hours. Recovery was monitored until the water level returned to 90% of the measured drawdown. Appendix C contains the entirety of the aquifer test design.

On June 9, McKinley Drilling set a submersible pump within each pumping well that was capable of varying its discharge rate. A flow meter was used to measure discharge from each of the test wells. Figure 9 provides a hydrograph of both wells during the pumping and recovery phases. Appendix D provides the data from the aquifer test. The pumping phase started at 10:19 A.M. on June 12, 2023; the water level was monitored for 48.2 hours of pumping. Prior to the pumping phase of the aquifer test, the static water level in Well No. 24 was measured at 145.0 ft. bgl (915.0 ft. MSL) and 135.7 ft. bgl (915.3 ft. MSL) in Well No. 25.

Over the duration of the entire pumping phase, Well No. 24 was pumped at an average rate of 200.6 gpm and Well No. 25 pumped at an average rate of 146 gpm. For the initial 12 hours, Well No. 24 pumped at a rate of 120 gpm and Well No. 25 pumped at a rate 80 gpm. At the end of the first 12 hours a final pumping rate of 120 gpm was measured in Well No. 24 with 50.9 feet of drawdown, resulting in a specific capacity of 2.4 gpm/ft and a final measured pumping rate of 80 gpm was measured in Well No. 25 with 69.1 feet of drawdown, resulting in a specific capacity of 1.2 gpm/ft. After the first 12 hours was completed, the rates were increased to 230 gpm in Well No. 24 and 160 gpm in Well No. 25. At the end of the 48-hour pumping phase, a final pumping rate of 230 gpm was measured in Well No. 24 with 172.5 feet of drawdown, resulting in a specific capacity of 1.3 gpm/ft and a final pumping rate of 160 gpm was measured in Well No. 25 with 179.2 feet of drawdown, resulting in a specific capacity of 0.9 gpm/ft.

The pump rate increases displayed in the hydrograph during the second steps are adjustments performed by the drilling staff to keep the pumping rate at the specified rate. After the final rate adjustment, the pumping level remained stable in both wells for the remainder of the pumping phase. The water level quickly recovered reaching 90% after 9 minutes (Well No. 24) and 11 minutes (Well No. 25).

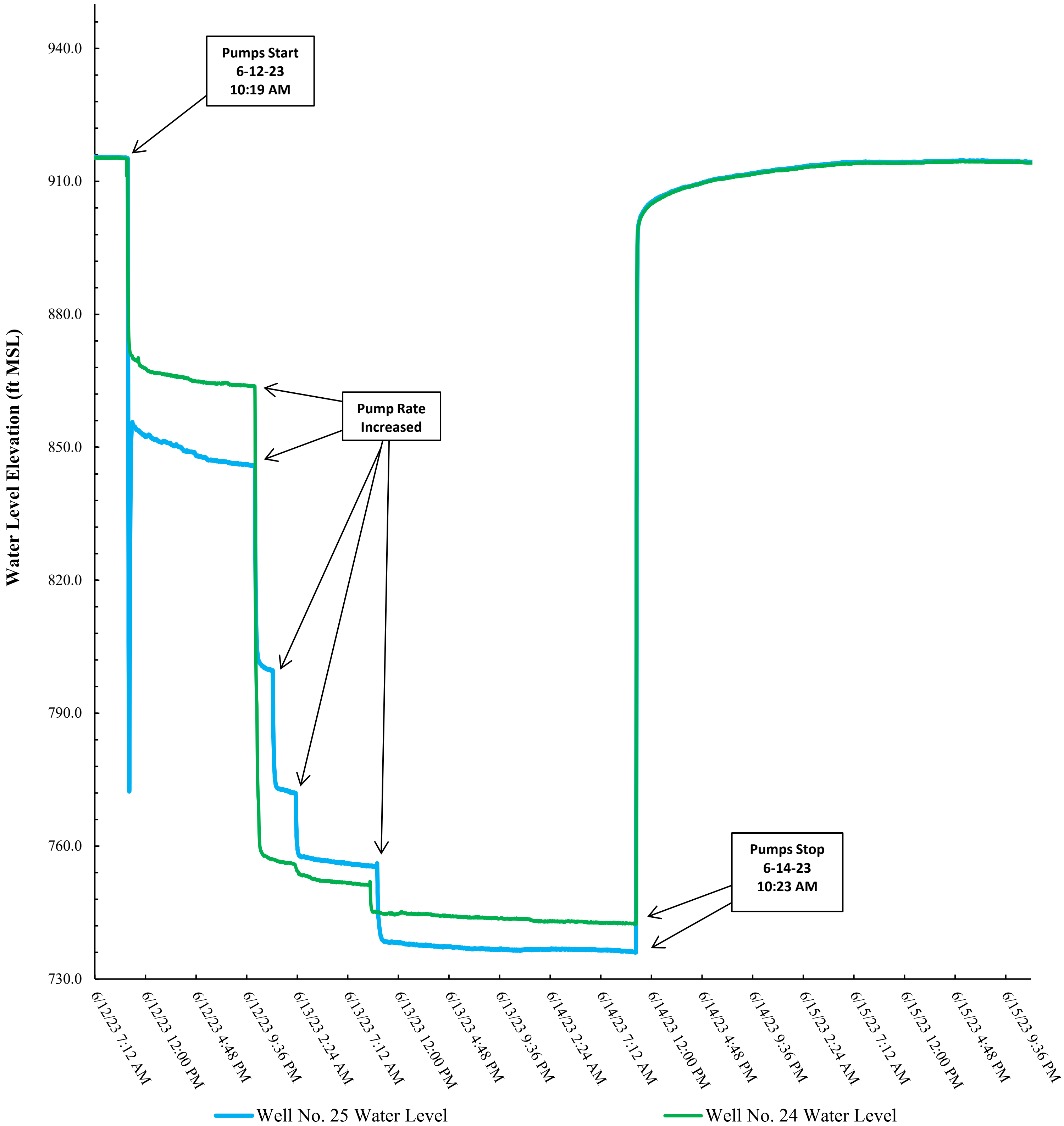


Figure 9: Aquifer test hydrograph of Well No. 24 and No. 25 (June 12, 2023)

Up Dip Well Observations

Wells up dip (northwest) of Jacob's Well fault along with Section 25 well, Jacob's Well and the Graham well displayed a hydraulic connection through similar water level trends over the monitoring period. Figure 10 provides a hydrograph of the wells and Jacob's Well with the pumping phase highlighted in grey. During the background period between May 31 and June 2, the water levels show no significant response to Well No. 21 shutting off and Well No. 22 increasing production. Rises in water levels were observed after the measured precipitation on June 7 and June 9 prior to the initiation of the pumping phase. During the pumping phase, the wells display similar decreases in water level. However, the water levels began to decline before the pumping phase began and continued to drawdown after the pumping phase had been completed. We interpret this drawdown to be primarily due to the increased production in Well No. 22. Well No. 22 is in line with the flowpath leading to Jacob's Well and distinct drops in the gauge height in Jacob's Well are seen when Well No. 22 comes online. Well No. 22 appears to have a greater hydraulic connection and impact to Jacob's Well than Well No. 21. A rise in water level was exhibited in the wells once Well No. 21 and No. 22 returned to normal pumping schedules.

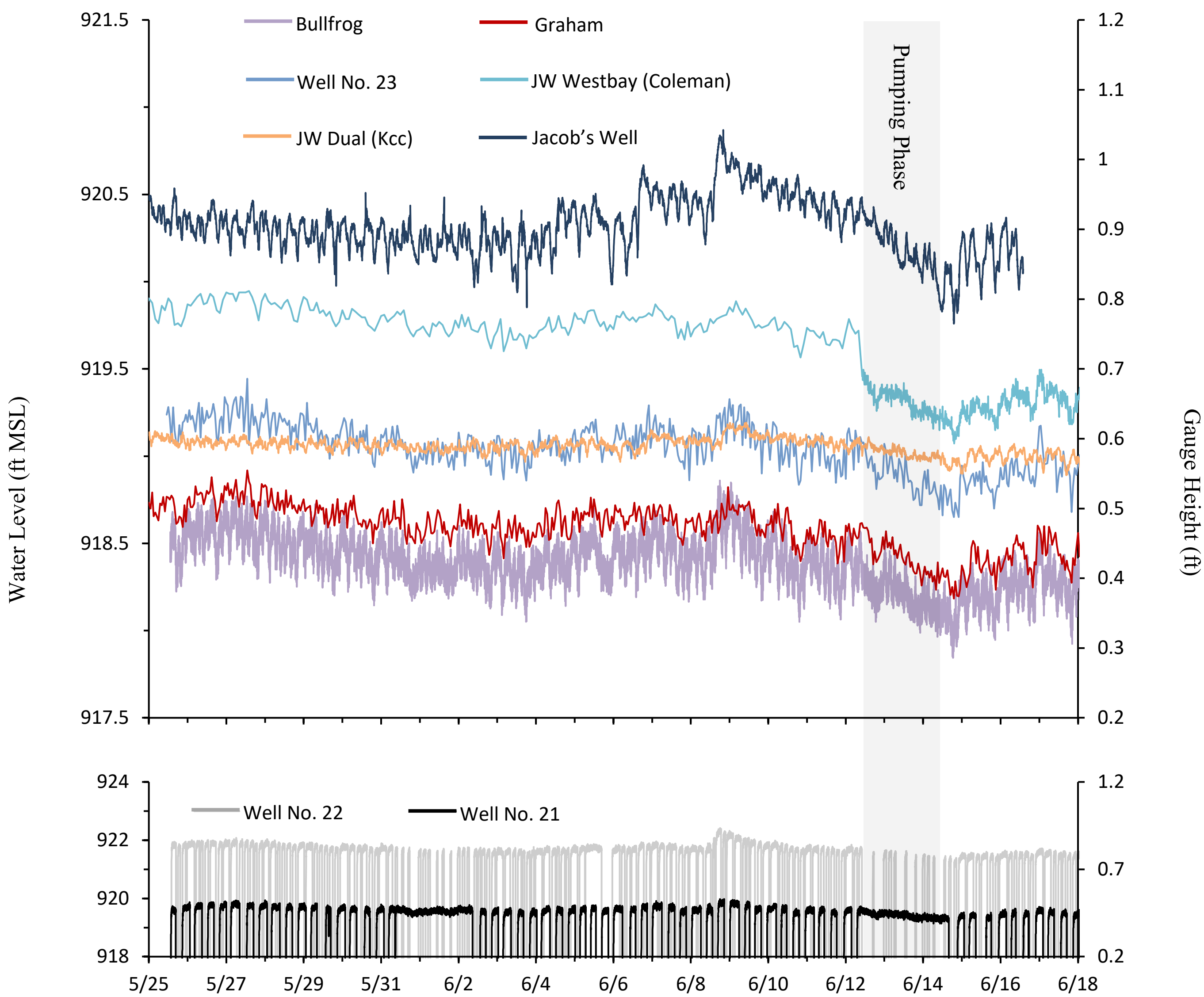


Figure 10: Up dip wells hydrographs

Down Dip Well Observations

Wells down dip (southeast) of Jacob's Well fault, including wells down dip of Tom Creek fault but up dip of Wimberley fault, exhibited a hydraulic connection through similar water level trends over the monitoring period. Figure 11 provides a hydrograph of the wells and including the test wells with the pumping phase highlighted in grey. Notable declines in water level (May 29 and May 31) were observed in each of these wells excluding the three domestic wells (Wenger, Threeton and Milagro). Well No. 6 returned to production on June 8 after remaining off and a strong connection with Well No. 11 was observed. Both wells displayed oscillating water levels due to production cycles which were also observed in Maint 2 and the tests wells. During the pumping phase, the wells down dip of Tom Creek fault (Maint 2, Wells No. 6 and No. 11) all displayed a decrease in water level. However, similar to the wells up dip of Jacob's Well fault, the water levels began to decline prior to the initiation of the pumping phase and continued to decline after the pumps in the test wells were turned off. The observed drawdown in these wells may be due to production from other wells in the area. The 3 domestic wells displayed a notable hydraulic connection to the test wells during the pumping phase. The Threeton well, the closest to the test wells, reported the most drawdown of the three wells at the end of the pumping phase (16.1 feet). The other two wells reported drawdown measurements of 12.9 feet (Wenger) and 8.0 feet (Milagro). After the pumping phase ended, all three wells responded to the pumps shutting off with a recovery in water levels. Production from Well No. 11 or Well No. 6 over this data set does not appear to have a direct impact on the gauge height at Jacobs Well.

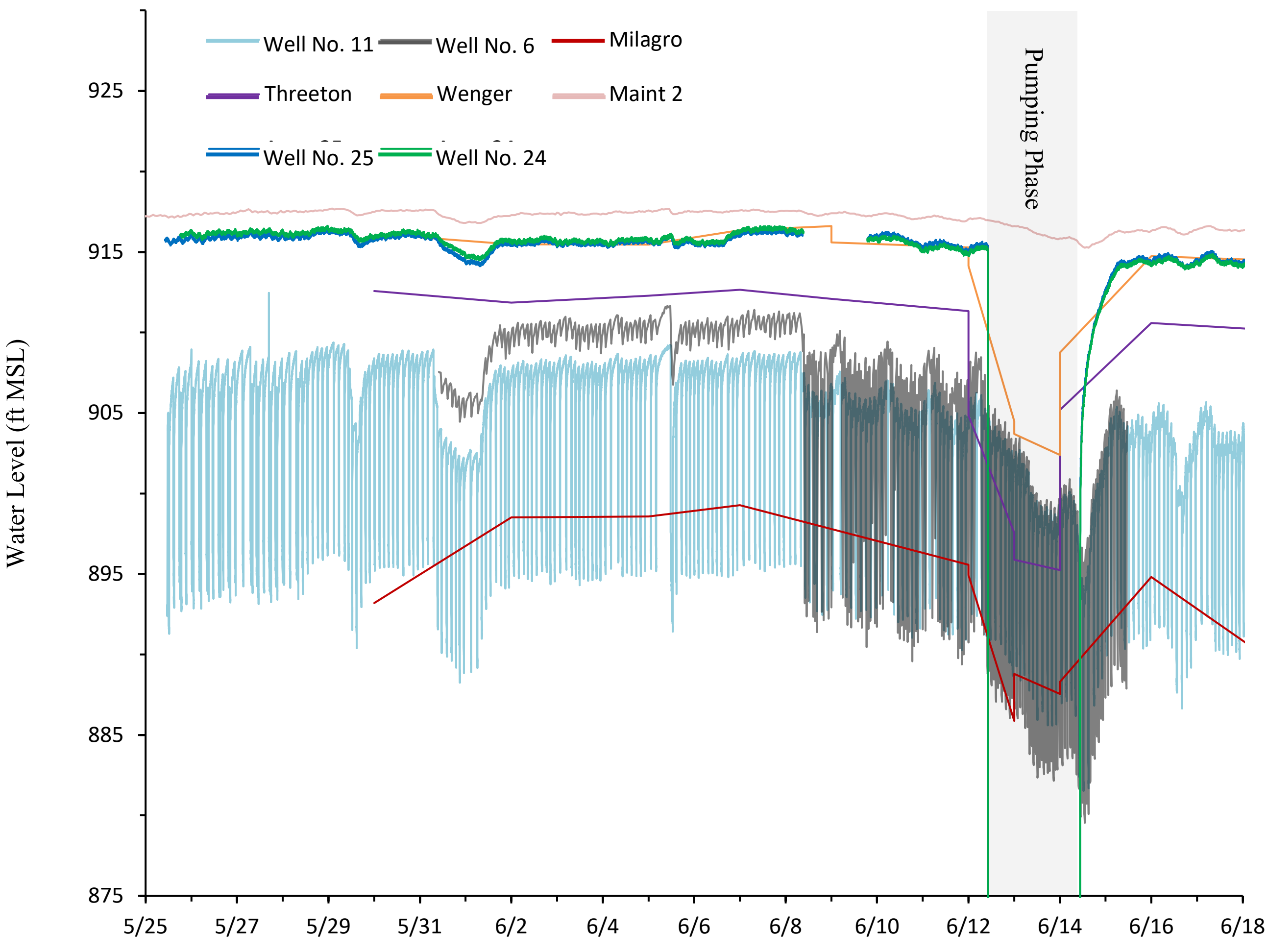


Figure 11: Down dip well hydrographs

Jacob's Well Observations

The Jacob's Well water level displayed a general decline throughout the pumping phase of the aquifer test. However, the trend appears to be more strongly associated with increased production from Well No. 22, as it compensated for Well No. 21 turning off, than with the test wells. No significant direct response was observed in Jacob's Well due to the starting and stopping of the pump in the test wells, even though the test wells withdrew approximately 69,000 gallons more than Well No. 22 over the pumping phase. Of note is the almost immediate increase and decrease in gauge height at Jacob's Well due to the pump turning on and off at Well No. 22. Increased run time in Well No. 22 also is seen to slowly lower the gauge height at Jacob's Well. It appears that a muted and smaller in magnitude response may be seen at Jacob's Well due to pumping at Well No. 24 and No. 25. A delayed increase of smaller magnitude is noted at Jacob's Well when the pumping phase ends. Shortly after the end of the pumping phase, Well No. 22 shuts off and a larger increase in gauge height is observed at Jacob's Well. Figure 13 provides a hydrograph of Jacob's Well, Wells No. 21 and No. 22 and the test wells during the pumping phase of the test. The purple highlights on Jacob's Well water level correspond to the first and second rate steps.

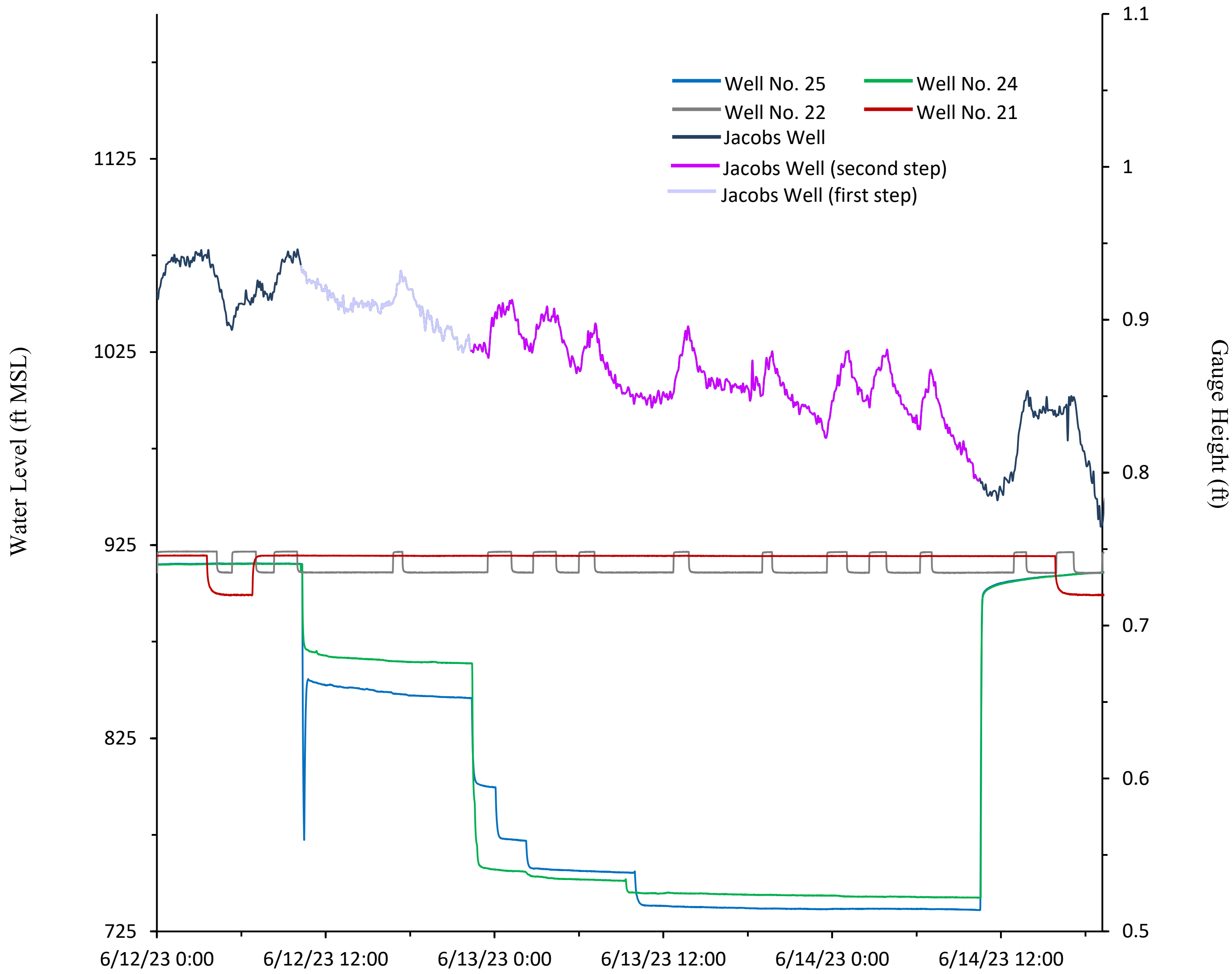


Figure 13: Aquifer test hydrograph of Well No. 24 and No. 25 (June 12, 2023)

A direct response to the Well No. 21 and No. 22 pumping cycles was observed in Jacob's Well throughout the monitoring period. Figure 14 provides a hydrograph of Wells No. 21 No. 22, Jacob's Well and the test wells at the beginning of the pumping phase with callouts corresponding to notable observations. Jacob's Well instantly responded to the pump turning on in Well No. 22 approximately 20 minutes before the start of the pumping phase (Figure 14: #1). No significant response was observed from the start of the pumps in the test wells (Figure 14: #2). An instant response was displayed in Jacob's Well from turning off the pump after Well No. 22 completed a production cycle (Figure 14: #3).

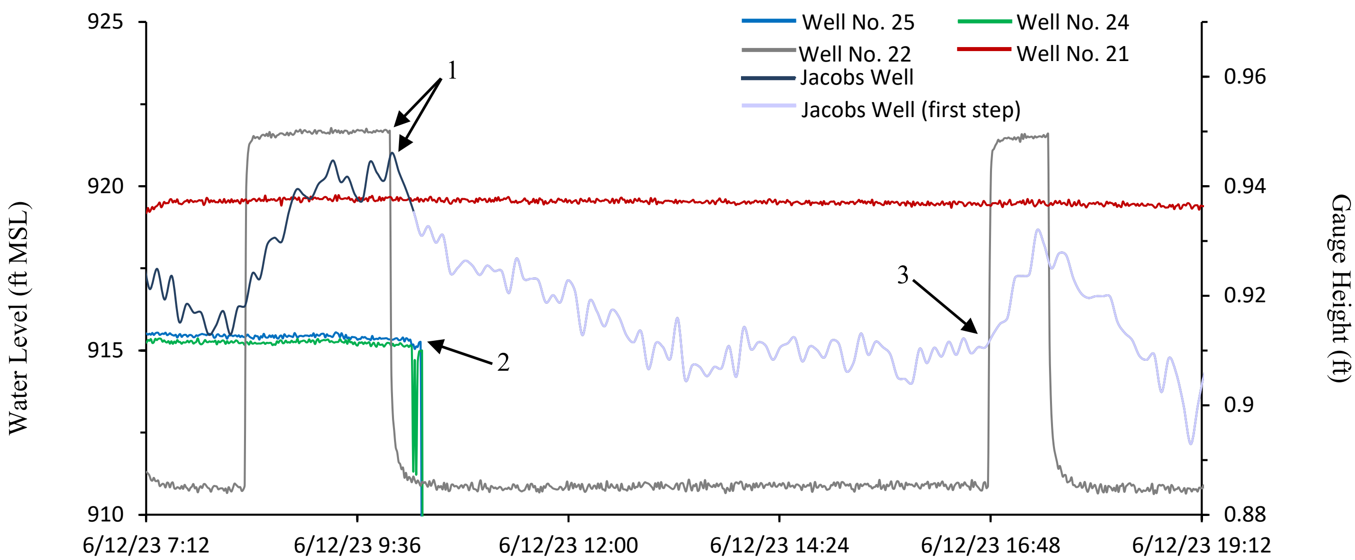


Figure 14: Beginning of pumping phase (1: Well No. 22 and Jacob's Well start to drawdown; 2: Start of pumping phase; 3: Recovery as Well No. 22 turns off)

Recovery in the gauge height can be observed throughout the pumping phase while the pumps in the test wells maintained a relatively constant rate. After the completion of the first 12 hours of the pumping phase, the test wells increased production to approximately twice the previous rate. No response was observed in Jacob's Well from the rate increase. Moreover, a steeper linear trend was observed during the first step than the second step. This could be due to Well No. 22's first two pumping cycles during the pumping phase, both exceeding 6 hours. These two cycles almost ran the entirety of the 12 hours. The average pumping cycle over the pumping phase in Well No. 22 was approximately 4.7 hours long (compared to an average of 3.3 hours over May 31 to June 2).

At the end of the pumping phase, the water level in Jacob's Well displayed no immediate response to shutting off the pumps in the test wells. However, a delayed response may have been observed. As the pumping phase ended, the water level in Jacob's Well continued to decline before stabilizing. Approximately 60 minutes after the recovery phase began, the Jacob's Well water level began to recovery. Shortly after, Well No. 22 completed a pumping cycle and the water level in Jacobs Well immediately responded by steeply recovering. Well No. 21 returned to production after the test was completed. The first cycles with Well No. 21 and No. 22 producing simultaneously, drew Jacob's Well down below any level observed during the pumping phase. Figure 15 provides a hydrograph of Wells No. 21 No. 22, Jacob's Well and the test wells at the end of the pumping phase.

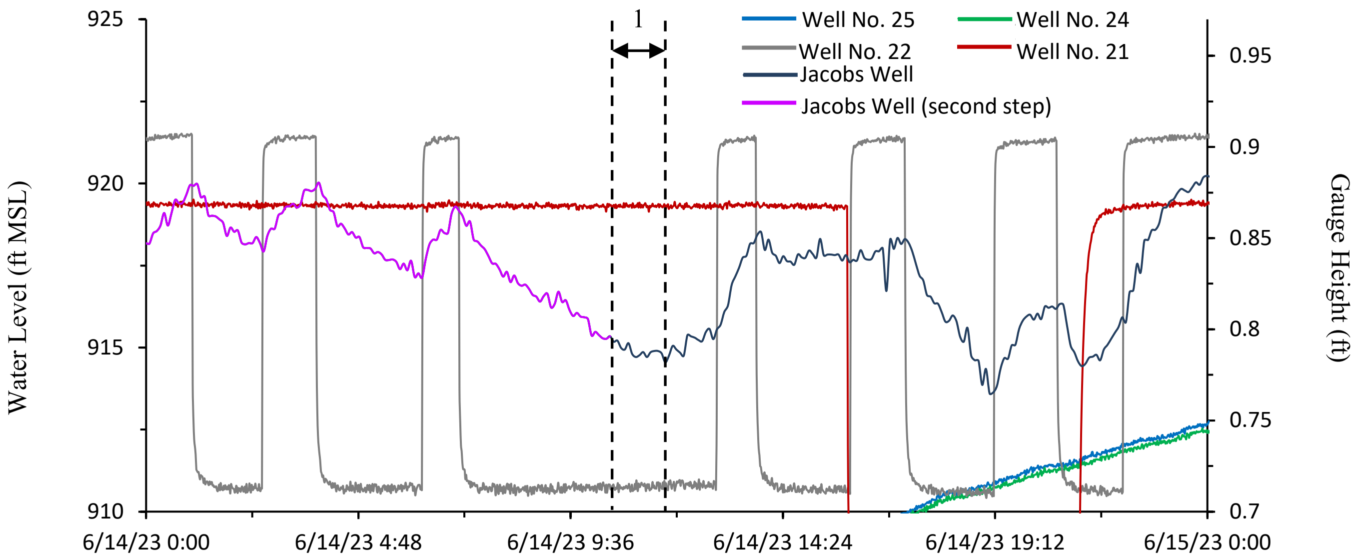


Figure 15: End of pumping phase (1: Possible delayed recovery)

Water Quality

Water quality samples were collected from each of the wells at the end of the pumping phase. The samples were collected by McKinley Drilling staff in a sealed container and stored on ice in a cooler and transported after collection to Pollution Control Services (PCS) and tested in accordance with Texas Administrative Code 230.9 (Determination of Groundwater Quality). Appendix E provides a copy of the water quality report. Table 3 provides the water quality summary of the samples. The results were compared to Texas Commission on Environmental Quality (TCEQ) Maximum Contaminant Levels (MCL) and Secondary Contaminant Levels (SCL). The results show the constituents sampled met all the TCEQ standards. The laboratory did not analyze for sulfate, aluminum, copper and zinc. Table 3 continued provides the additional constituents to meet HTGCD Rule 11.7.1.B. Figure 16 displays stiff diagrams for Well No. 24 and No. 25. Sulfate (Well 24: 18.8 mg/L; Well 25: 20.2 mg/L) and bicarbonate (Well 24: 304 mg/L; Well 25: 300 mg/L) were included from the BSEACD TWDB analysis. The stiff diagrams for Wells No. 24 and 25 indicate a Ca - HCO3- water.

Table 3: Water quality summary

		pH	**Cl**	**NO_2**	**NO_3**	**TDS**	**F**	**As**	**Fe**	**Mn**
		TCEQ MCLs & SCLs								
Well	**Sample Date**	**>7.0[2]**	**300[2]**	**1[1]**	**10[1]**	**1000**	**4[1]&2[2]**	**0.05[1]**	**0.3[2]**	**0.05[2]**
24	Jun. 14, 2023	7.3	24	<0.2	0.8	316	0.49	<0.0005	<0.010	<0.010
25	Jun. 14, 2023	7.3	23	<0.2	0.9	364	0.32	<0.0005	<0.010	<0.002

Note: 1 = TCEQ Maximum Containment Level; 2 = TCEQ Secondary Contaminant Level; Concentrations in red exceed TCEQ limits; All units expressed in mg/L (except pH).

Table 3: Water quality summary continued

Well	**Sample Date**	**Hardness**	**Carbonate**	**Conductivity**	**P**	**Alk.**	**N**	**Ca**	**Pb**	**Mg**	**K**	**Na**	**SiO_2**	**Hg**
24	Jun. 14, 2023	316	<1	648	<0.1	302	0.8	85.8	0.0016	24.8	1.44	11.3	10.6	<0.002
25	Jun. 14, 2023	311	<1	606	<0.1	298	0.9	85.2	0.0020	23.8	1.76	11.0	10.2	<0.002

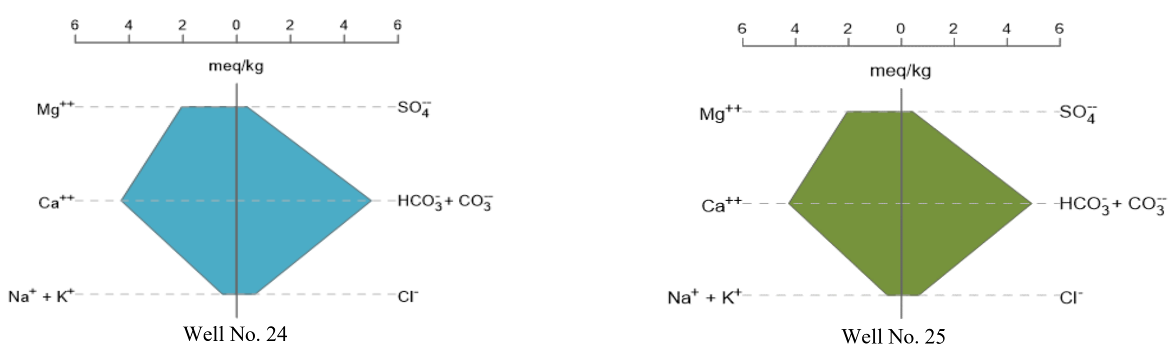


Figure 16: Stiff diagrams of Well No. 24 and No. 25

Conclusions

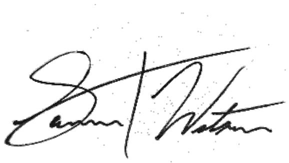
An aquifer test was performed on Woodcreek Utility Co. 2 Wells No. 24 and No. 25. The aquifer test was designed through coordination with HTGCD and consisted of background monitoring, pumping and recovery phases. Seventeen (17) additional observation wells made up the monitoring network. The pumping phase consisted of pumping the wells simultaneously at two rate steps. After 12 hours of pumping at a specified rate (Well No. 24: 120 gpm ; Well No. 25: 80 gpm), the rates were increased to their maximum calculated production capacity (Well No. 24: 230 gpm; Well No. 25: 160 gpm) for the remainder of the 48-hours. Recovery was monitored until the water level returned to 90% of the measured drawdown. The purpose of the aquifer test was to determine the impact, if any to Jacob's Well and other wells in the surrounding area. The following were the findings of our analysis:

- At the end of the 48-hour pumping phase, a final pumping rate of 230 gpm was measured in Well No. 24 with 172.5 feet of drawdown, resulting in a specific capacity of 1.3 gpm/ft and a final pumping rate of 160 gpm was measured in Well No. 25 with 179.2 feet of drawdown, resulting in a specific capacity of 0.9 gpm/ft.
- Wells up dip (northwest) of Jacob's Well fault along with Section 25 well, Jacob's Well and the Graham well, displayed a hydraulic connection through similar water level trends over the monitoring period. During the pumping phase, the wells display similar decreases in water level. However, the water levels began to decline before the pumping phase began and continued to drawdown after the pumping phase had been complete. We interpret this drawdown to be due to the increased production in Well No. 22. Well No. 22 is in line with the flowpath leading to Jacob's Well and distinct drops in the gauge height in Jacob's Well are seen when Well No. 22 comes online. Well No. 22 appears to have a greater hydraulic connection and impact to Jacob's Well than Well No. 21.
- Wells down dip (southeast) of Jacob's Well fault, including wells down dip of Tom Creek fault but up dip of Wimberley fault, exhibited a hydraulic connection through similar water level trends over the monitoring period. During the pumping phase, the wells down dip of Tom Creek fault (Maint 2, Wells No. 6 and No. 11) all displayed a decrease in water level. However, similar to the wells up dip of Jacob's Well fault, the water levels began to decline prior to the initiation of the pumping phase and continued to decline after the pumps in the test wells were turned off. Production from Well No. 11 or Well No. 6 over this data set does not appear to have a direct impact on the gauge height at Jacobs Well.
- The three domestic wells (Wenger, Threeton and Milagro) displayed a strong hydraulic connection to the test wells during the pumping phase.
- There was a lack of impact to the Lower Trinity Well (Arapahoe) and the wells down dip of the Wimberley fault (WWSC No. 1 and No. 3).
- The gauge height at Jacob's Well displayed a general decline throughout the pumping phase of the aquifer test. However, the trend appears to be more strongly associated with increased production from Well No. 22, as it compensated for Well No. 21 turning off, than with the test wells. No significant direct response was observed in Jacob's Well due to the starting and stopping of the pump in the test wells. The data indicate that a muted and much smaller magnitude response is observed at Jacob's Well due to pumping at Well No. 24 and No. 25 than at Well No. 21 and No. 22.

Thank you for allowing us to work on this project with you. If you have any questions, please feel free to call me at 817-733-8611.

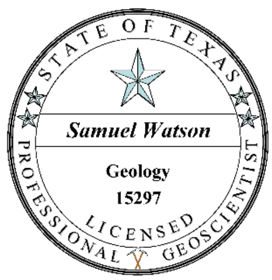
Respectfully,

Wet Rock Groundwater Services, L.L.C.



Samuel Watson, P.G.
Staff Hydrogeologist

The seal appearing on this document was authorized by Samuel Watson, P.G. License No. 15297 on September 8, 2023.



Wet Rock Groundwater Services, LLC
TBPG Firm Registration No. 50038

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