Report of Findings: WRGS 21-006

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Camp Verde
Groundwater Availability Certification for Platting:
Kerr County, Texas

For:
Southerland Communities
110 River Crossing Blvd.
Spring Branch, Texas 78070

Wet Rock Groundwater Services, L.L.C.
Groundwater Specialists
TBPG Firm No: 50038
317 Ranch Road 620 South, Suite 203
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www.wetrockgs.com

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The seal appearing on this document was authorized by Kaveh Khorzad, P.G. 1126 on May 14, 2021:

Kaveh Khorzad, P.G.
License No. 1126

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

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Table of Contents

Figures

Tables

Appendices

Section I: Introduction

This report details the results of a groundwater availability study for the proposed Camp Verde Subdivision (the subdivision) to meet the requirements of the Certification of Groundwater Availability for Platting Form *(Title 30, Texas Administrative Code, Chapter 230, Sections 230.2 through and including 230.11)*. Appendix A provides the completed Certification of Groundwater Availability for Platting Form.

The subdivision is located on Highway 480, approximately 3.8 miles southwest of the City of Center Point in southeastern Kerr County (Figure 1). The proposed subdivision is documented within the Kerr County Tax Assessor as Property IDs: 20742, 20847, 14962, 16970, 16604, 16961, 20227, 16962, 18319, 16604, 13678, 16972, 68531, 16971 and 16973. Southerland Communities, LLC (110 River Crossing Blvd. Spring Branch, Texas 78070) is the plat applicant.

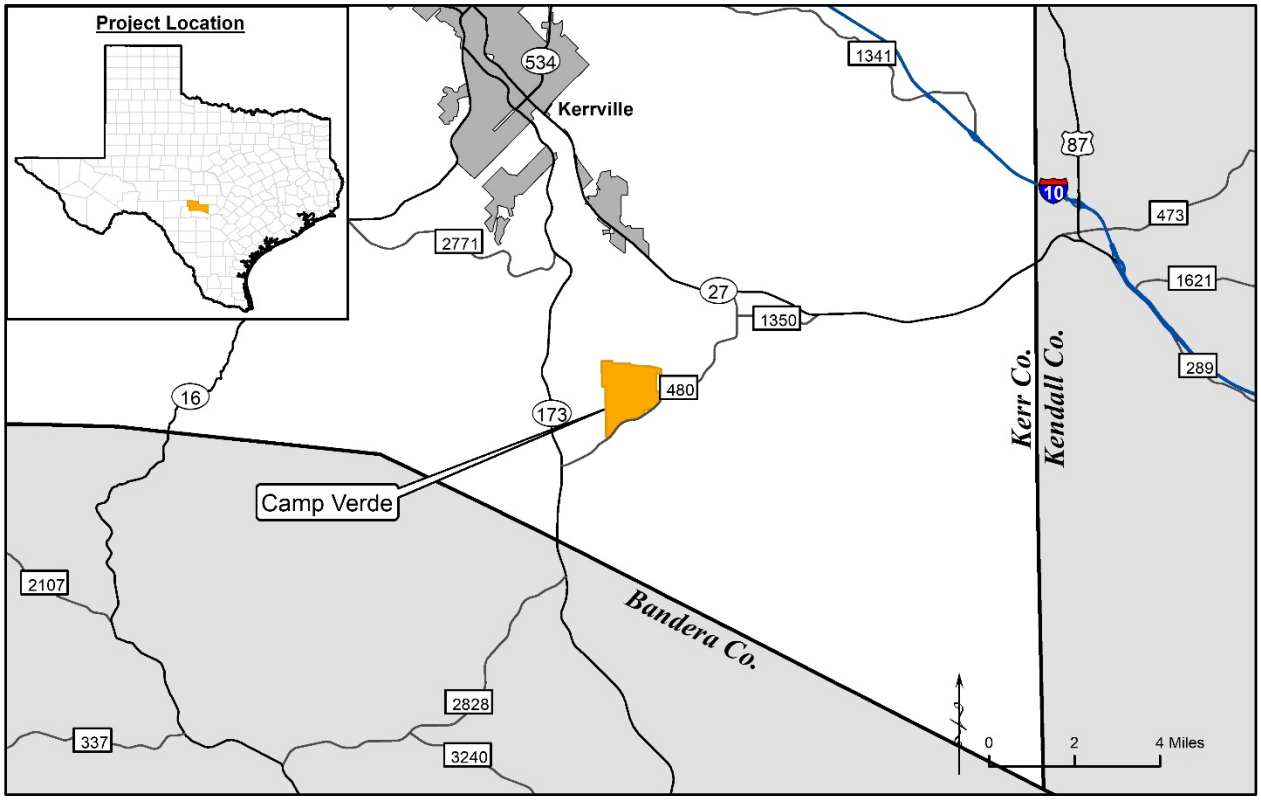


Figure 1: Location map

Southerland Communities, LLC proposes to develop the approximately 1,039 acres as a subdivision including 179 single family residential lots. The average lot size is 5.8 acres which will be served by individual water wells. The subdivision is located within the jurisdiction of the Headwaters Groundwater Conservation District (HGCD). Figure 2 provides a map showing the general location of the subdivision with the county and groundwater district boundaries.

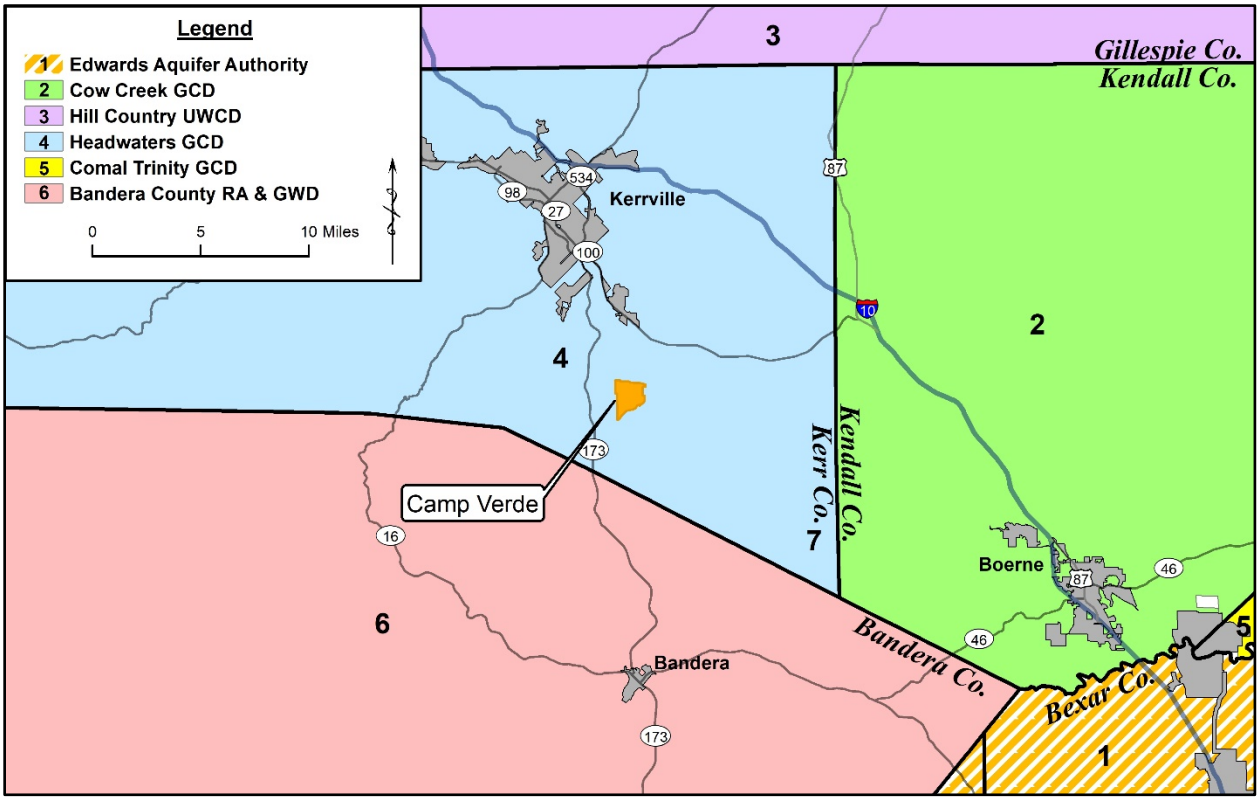


Figure 2: Groundwater Conservation District map

Section II: Projected Water Demand Estimate

To estimate the total annual water demand for the subdivision, we utilized an estimated water use approved by HGCD of 288 gallons per day per household. The following formulae were used to calculate the projected water demand for the subdivision:

Equation 1: Total Water Demand

$$Q_s = n \times 2.34 \times 123 \times 365 \text{ days} = 18{,}804{,}719.7 \text{ gallons/year or } 57.7 \text{ acre-feet/year}$$

Where:

Q_s = Total Water Demand at full build out for the subdivision;

n = Number of connections (179 lots);

2.34 = Average number of persons per household (US Census 2019); and

123 = The average per capita usage of water per day in gallons (TWDB, 2017).

Equation 2: Water Demand per Housing Unit

$$Q_h = 2.34 \times 123 \times 365 \text{ days} = 105{,}054.3 \text{ gallons/year or } 0.32 \text{ acre-feet/year}$$

Where:

Q_h = Total Water Demand per house per year

Equation 1 assumes 2.34 persons per household using 123 gallons per person per day which results in a total water demand for the subdivision of 57.7 acre-feet/year. Equation 2 results in a water demand per housing unit of 0.32 acre-feet/year. There are no planned non-residential water demands.

Section III: General Groundwater Resource Information

III.1. Introduction

According to the TWDB, there is one (1) major aquifer (Trinity Aquifer) that supplies groundwater within the study area. The TWDB classifies major aquifers as aquifers that produce large amounts of water over large areas, and minor aquifers as aquifers that produce minor amounts of water over large areas or large amounts of water over small areas. The Trinity Aquifer is a regionally extensive aquifer system made up of Cretaceous carbonates and Paleozoic carbonates and sandstones that were deposited throughout central Texas. The Trinity is affected by geologic structures which include the Llano Uplift, the San Marcos Arch, and the Balcones fault system (Ashworth, 1983).

III.2. Stratigraphy and Geologic History

The subdivision overlies the Cretaceous aged sedimentary rocks comprising the Trinity Aquifer. The Upper Member of the Glen Rose Formation covers the majority of the subdivision's surface (Figure 3). The sediments that comprise these groups were deposited approximately 140 million years ago by a Cretaceous aged sea that once dominated the interior of North America and the Gulf Coast region. For approximately 79 million years this shallow sea deposited the sediments that now make up the property and its surrounding area. Figure 3 provides a geologic map and stratigraphic column illustrating the geology surrounding the subdivision.

The Trinity Aquifer as its name implies is divided into three aquifers from oldest to youngest: the Lower, Middle and Upper Trinity Aquifers. Formations comprising the Lower Trinity Aquifer include, from oldest to youngest, the Hosston Sand Member and Sligo Limestone Member of the Travis Peak Formation (Figure 3). The Hosston consists of a conglomerate of gravel, sand and clay cemented by both calcite and quartz. The Hosston also contains sections of sandstone, siltstone, claystone, dolomite, limestone and shale. The Sligo Limestone consists of clastic sediment near the property, and becomes dominantly limestone and dolomite to the east. Surface outcrops are referred to in the literature as Sycamore; Hosston and Sligo are the subsurface equivalents.

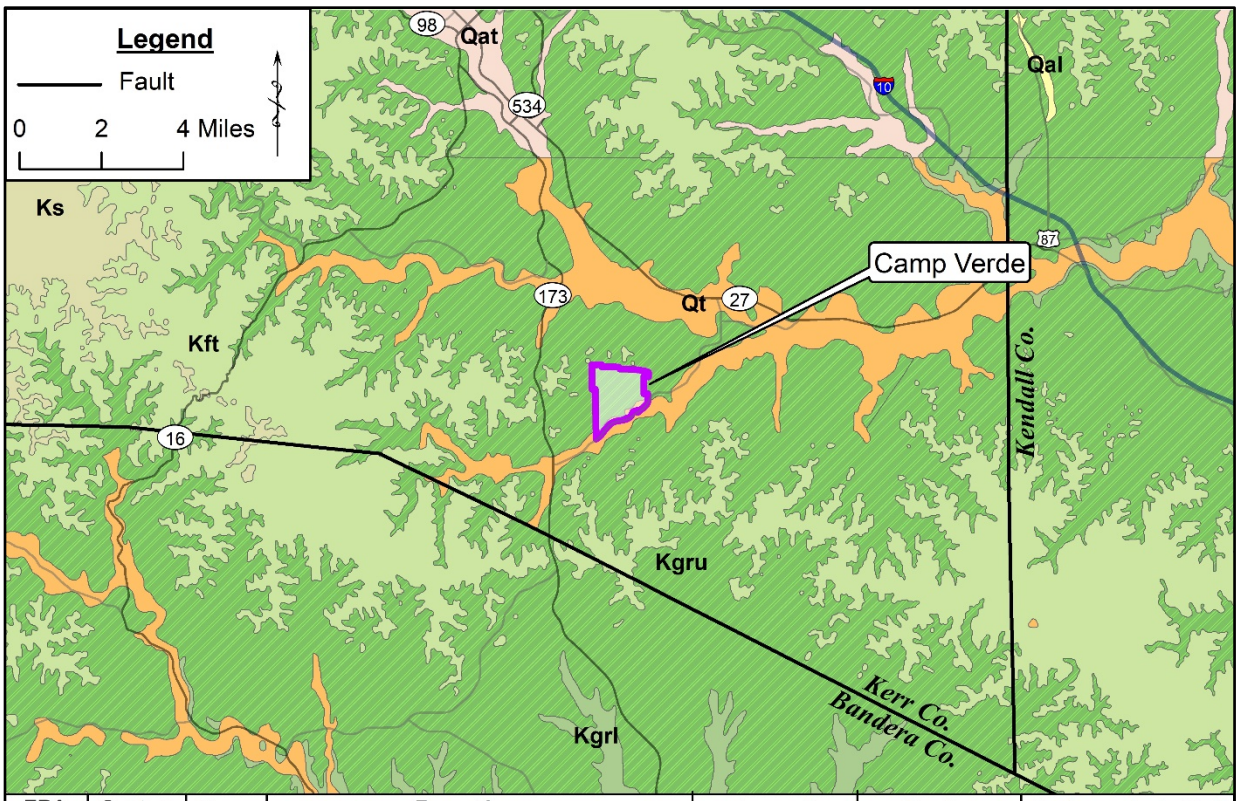
Located stratigraphically above the Hosston Sand is the Hammett Shale Member also known as the Pine Island Shale. The Hammett is a transgressive "shale" deposit that onlaps Lower Trinity Sligo and Hosston formations. The interval averages 40 feet in thickness in the central Texas area (Wierman et al., 2010). The unit is primarily a clay rich, gray-green sticky, dolomitic shale/claystone with siltstone and dolomite lenses. Color can be dark gray to black, blue, greenish gray and gray. The Hammett is a confining bed separating the Lower Trinity Aquifer from the Middle Trinity Aquifer (Figure 3).

Above the Hammett Clay lies the Middle Trinity Aquifer composed of the Cow Creek Limestone and the Bexar Shale members of the Travis Peak Formation and the Lower Glen Rose Limestone member of the Glen Rose Formation (Figure 3). The Cow Creek Limestone is a massive, fossiliferous limestone and dolomite ranging up to 100 feet in thickness and may contain some interbedded sand, clay, and evaporite minerals such as gypsum and anhydrite (Ashworth, 1983; Preston et. al, 1996; Wierman et al., 2010). The formation was subaerially exposed and subjected to meteoric water infiltration during early Hensell time, which resulted in widespread vuggy porosity (Loucks, 1977). In some areas, the Cow Creek is heavily fractured and capable of producing large well yields.

Overlying the Cow Creek is the Hensell Sand Member (Figure 3), which in the outcrop, is composed of loose sand and grades into thick continental deposits of red clay, silt, sand, and conglomerate with limestone beds in the subsurface. The Hensell is sand rich in the northern portions of the aquifer. Downdip, the Hensell grades into marine deposits of silty dolomite, marl, calcareous shale, and shaley limestone known as the Bexar Shale Member (Ashworth, 1983). Downdip, the Bexar Shale acts as a confining unit for the Cow Creek (Wierman et al., 2010).

Stratigraphically above the Hensell Sand/Bexar Shale, the Glen Rose Limestone Formation is divided into a Lower and Upper Member (Figure 3). The Glen Rose along with the Hensell Sand represents a wedge of sediments deposited in a transgressing sea. George (1952) separated the Glen Rose into upper and lower members. The boundary between the two members is identified by a thin, heavily fossfiliferous limestone bed containing *Corbula martinae* that persists throughout the study area except where erosion has lowered the land surface below the bed (Whitney, 1952; Ashworth, 1983). The separation between the two units is also distinguishable on geophysical logs where two distinct evaporite zones are found within the Upper Glen Rose; one midway through the Upper Glen Rose and another near the base shown by resistivity spikes on a geophysical log. The lower member of the Glen Rose Limestone consists of a massive, fossiliferous limestone at the base grading upward into thin beds of limestone, dolomite, marl, and shale. The top 15 to 20 feet of the lower member, designated the *Salenia texana* zone, is a highly fossiliferous, nodular marl and limestone which is capped by the Corbula bed (Ashworth, 1983). Near the top of the Lower Glen Rose, in some locations, is a reef deposit that is cavernous, heavily fractured, and can range in thickness. Where the reef deposit is encountered, the Lower Glen Rose can provide high yielding wells.

The Upper Member of the Glen Rose Formation, comprising the Upper Trinity Aquifer, consists of alternating beds of limestone and dolomite with marly sections that act as aquitards and restrict downward migration of groundwater to the Middle and Lower Trinity Aquifers (Wierman et al., 2010). The Upper Glen Rose also contains two distinct evaporite beds of gypsum or anhydrite that are easily distinguishable on geophysical logs due to high resistivity values. The lower evaporite zone occurs at the base of the Upper Glen Rose, which Ashworth (1983) describes as a "convenient correlation marker" between the Upper and Lower Glen Rose. The evaporite beds in some cases are the source of elevated sulfate concentrations in groundwater. Where present, the Upper Trinity Aquifer can yield small amounts of water to shallow wells which are often utilized for livestock and domestic use.



ERA	System	Group	Formation	Legend	Member	Hydrogeologic Unit
Cenozoic	Quaternary		Pleistocene to Recent floodplain (alluvium and fluviatile terrace deposits)	Qal / Qt, Qu		localized alluvial aquifers
			Leona	Qle		
			Uvalde Gravel	Q-Tu		
Mesozoic	Cretaceous	Navarro Taylor	Pecan Gap	Kac, Kpg		confining beds
			Anacacho Limestone			
		Austin	Austin Chalk	Kau		localized fractured limestone aquifers
		Eagle Ford	Eagle Ford Shale	Kef		confining beds
		Washita	Buda Limestone	Kbu		
			Del Rio Clay	Kdr		
			Devils River Limestone	Kdvr		
		Edwards	Segovia	Ks, Ked		Edwards Plateau Aquifer; Edwards-Trinity Aquifer
			Fort Terrett	Kft, Ked	Kirchburg evaporite / Dolomite Mbr. / Burrowed Mbr.	
					Basal Nodular Bed	confining bed
		Trinity	Glen Rose Lmst.	Kgr, Kgru	Upper Mbr.	Upper Trinity Aquifer
				Kgr, Kgrl	Lower Mbr.	Middle Trinity Aquifer; Edwards-Trinity Aquifer
			Travis Peak Equivalent: Hensell Sand / Bexar Shale	Kh		
			Travis Peak Equivalent: Cow Creek Member	Kcc, Kch		
			Travis Peak Equivalent: Hammett Shale	Kha, Kch		confining bed
			Travis Peak Equivalent: Sycamore Sand / Sligo / Hosston	Ksy		Lower Trinity Aquifer

Figure 3: Geologic map and stratigraphic column (modified from McGeehee, 1979; Preston et. al, 1996)

III.3. Hydrogeology

The major aquifer located within the subdivision is the Trinity Aquifer which encompasses the majority of eastern Kerr County. The Trinity Aquifer spans as far north as Montague County and as far south as Uvalde County where fresh water can be produced. Figure 4 provides a map of the major aquifers within the area surrounding the subdivision. The solid green portion reflects the unconfined zone of the Trinity Aquifer where recharge occurs. The hatched yellow portion reflects the unconfined zone of the Ellenburger-San Saba Aquifer where recharge occurs. The solid light green portion reflects the unconfined zone of the Edwards-Trinity (Plateau) Aquifer where recharge occurs. The hatched brown portion reflects the unconfined zone of the Hickory Aquifer where recharge occurs.

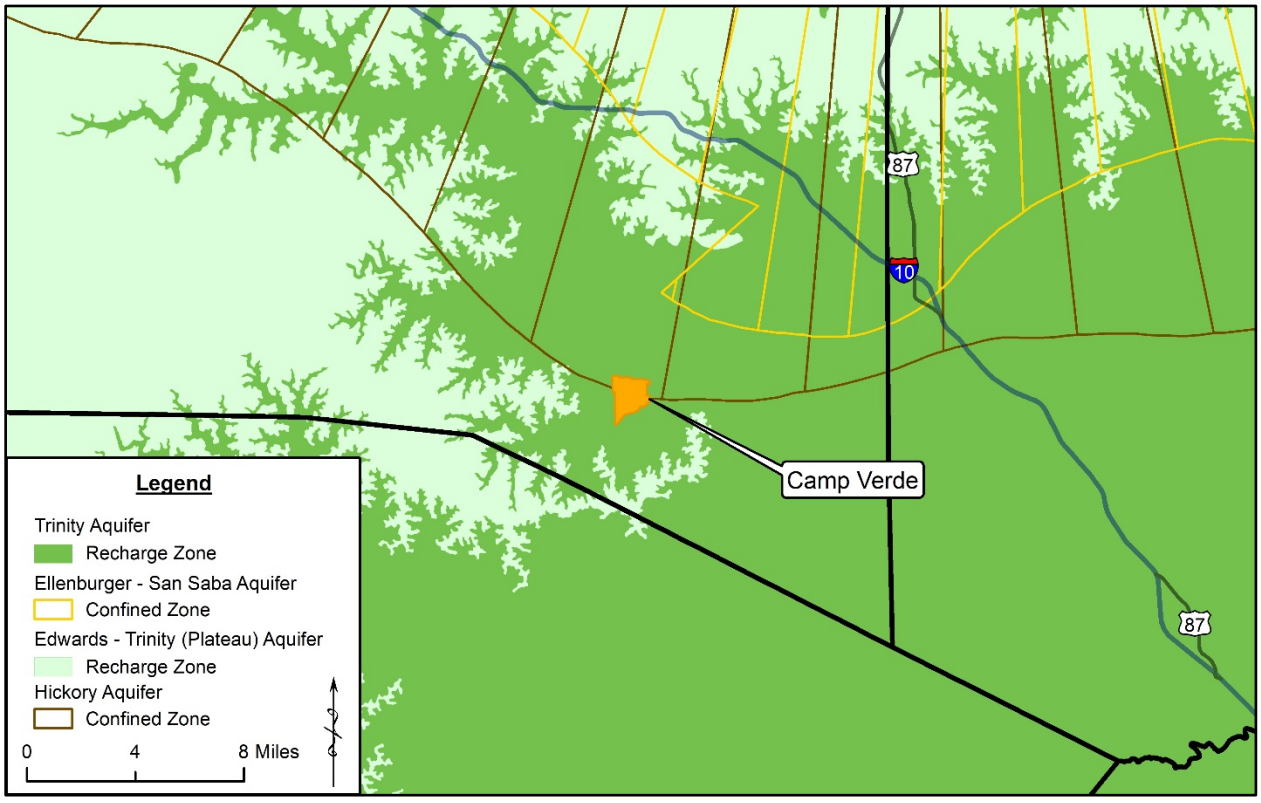


Figure 4: Aquifer map

The Upper Trinity Aquifer typically produces poor quality water due to the presence of gypsum and anhydrite layers within the Upper Glen Rose Formation and typically produces lower quantities of water. The Middle Trinity Aquifer contains the Lower Glen Rose Limestone, Hensall Sand, and Cow Creek Limestone and is separated from the Upper Trinity Aquifer by the presence of a fossil marker bed called the Corbula Bed.

The Corbula bed is a heavily fossiliferous layer that contains the small fossil clam called *Corbula martinae*. Typically, the highest yielding portion of the Trinity Aquifer is the Middle Trinity Aquifer, specifically the Lower Glen Rose Formation and the Cow Creek Limestone Member of the Travis Peak Formation. These formations are, in some localities, heavily fractured limestone, making them more productive because of their enhanced ability to transmit groundwater. In some areas, the Lower Glen Rose Formation contains the presence of a reef deposit which greatly increases the yield of a well due to its high

permeability. Well yield may be increased through acidization, with increases of two or three fold obtained in some instances. The Lower Trinity Aquifer is composed of conglomerates and sandstones that are, in some instances, heavily cemented. The degree of cementing of these sediments controls the ability of water to move through the aquifer, thereby limiting the ability to produce large yielding wells. In localized areas, wells in the Lower Trinity Aquifer may produce moderate yields, although regionally the Middle Trinity Aquifer produces higher yielding wells with better quality water as compared to the Lower Trinity Aquifer.

The water quality of a well completed within the Middle Trinity Aquifer depends upon several factors, including the degree of fracturing, the amount of time the groundwater is in contact with the rock it is flowing through, and the minerals that compose the rock. For example, groundwater that flows through gypsum and anhydrite beds, which are composed of calcium sulfate ($CaSO_4$), will typically contain elevated levels of sulfate. Additionally, groundwater that has traveled a longer distance and has had longer contact time with aquifer sediments will also typically contain higher Total Dissolved Solids (TDS) than groundwater that has been in contact with the same rock for a shorter amount of time.

Section IV: Aquifer Testing

IV.1. Well Details

There are a total of three (3) wells located within the subdivision that were used to perform aquifer tests. Wells No. 1 to No. 3 were recently constructed and completed in the Middle Trinity Aquifer. An existing (Ex) well (ID No. 12) in the property was constructed prior to the commencement of this study and was not used in the aquifer testing. Figure 5 provides a map displaying the location of the wells on the property and within 1-mile of the property boundary. Figures 6 and 7 provide well profiles displaying well construction and formation depths that were determined from the geophysical logs and discussions with HGCD staff; Appendix B provides geophysical logs performed by GeoCam on Well No. 1 (4/9/21); Appendix C provides available state well reports. Table 1 provides a summary of the existing wells according to state well data within 1-mile of the first phase of the subdivision not used in testing; Table 2 provides a well construction summary for wells used in the testing.

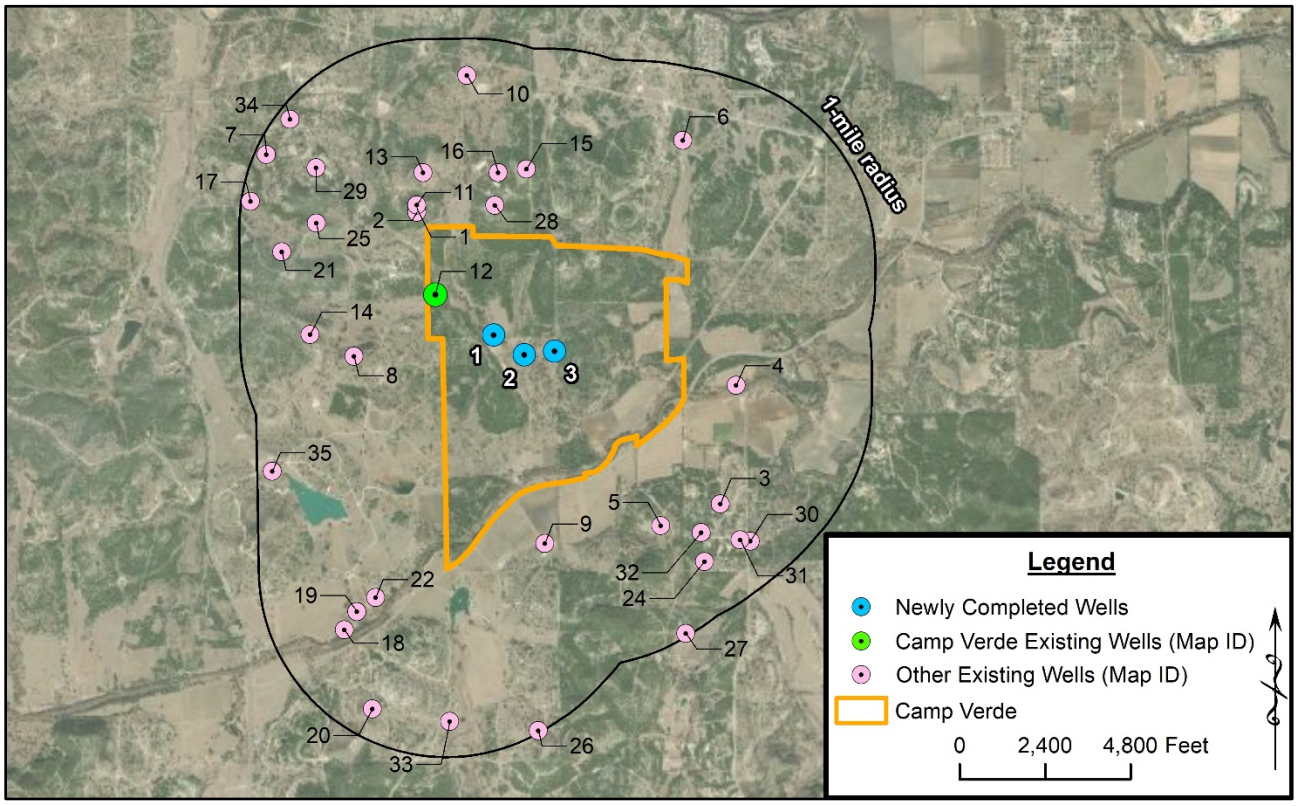


Figure 5: Well location map

Table 1: Summary of wells within 1-mile

Map ID	State Well ID	Owner	Well Depth (ft.)	Well Use
1	2796	Joe Winsky	740	Domestic
2	4296	Michael Gnuechtel	680	Domestic
3	49605	Linn Biggs	570	Domestic
4	62599	James Moorhead	820	Domestic
5	65748	Ron Cody	700	Domestic
6	67638	Fritz Family Limited Partnership	602	Domestic
7	78050	Joe Powel	580	Domestic
8	80697	Daniel Burns	780	Domestic
9	93531	Charles Forster	502	Domestic
10	144788	Hug, Douglas	600	Domestic
11	179413	Ron Kolbu	480	Domestic
12	179423	J. P. Sevedge	420	Domestic
13	194747	Greg Howard	720	Domestic
14	217153	Glenn Brooker	760	Domestic
15	217157	Pamela Crosier	760	Domestic
16	217158	Pamela Crosier	620	Domestic
17	217292	Ken Jergenson	700	Domestic
18	218838	St. Christopher Properties	585	Domestic
19	229742	St. Christopher Prop. LLC	818	Domestic
20	233279	St. Christopher Properties	585	Domestic
21	241773	Richard Frazier	750	Domestic
22	244785	St. Christopher Prop., LLC	585	Domestic
23	244821	St. Christopher Prop., LLC	818	Domestic
24	324624	Jeff Mitchell	620	Domestic
25	325037	Donald Rae	760	Domestic
26	329861	St. Christopher Prop.	787	Domestic
27	330387	Trista Naismith/Cory Keller	483	Domestic
28	333879	Richard Pace	740	Domestic
29	414291	Jody Callahan	720	Stock
30	478792	Leonard Lapham	530	Domestic
31	540519	Tony Quintanilla	563	Domestic
32	541644	Geo & Lou Ann Alvarez	580	Domestic
33	566386	St. Christopher Properties LLC	650	Domestic
34	1330149A	Silver Hills Park	600	Public Supply
35	6908701	R.B. Nowlin	21	Domestic

To meet the guidelines for the Kerr County development rules and regulations and to adequately assess the availability of groundwater within the vicinity of the proposed subdivision, two (2) aquifer tests were conducted utilizing the newly completed Middle Trinity wells. The aquifer tests consisted of pumping one well for at least 24 hours followed by a recovery phase while measuring water levels in both the pumping and observation wells throughout both phases. This is in accordance with the testing procedures of the Texas Administrative Code (TAC) Title 30 Part 1 Chapter 230.8. Based on state well reports, geophysical logs conducted by GeoCam on Well No. 1 and drill cuttings collected by Texan Water, the wells used in the tests are completed in the Middle Trinity Aquifer. The following provides a summary of the well construction for the wells used in the tests:

Well No. 1

According to the State Well Report (Tracking No. 572937), Well No. 1 was completed by Texan Water on April 8, 2021. The well was drilled to a depth of 640 feet below ground level (ft. bgl) with a 8-inch borehole from 0 to 640 ft. bgl. The well was completed with 4 1/2-inch PVC casing set from 0 to 540 ft. bgl and 4 1/2-inch PVC screen from 540 to 600 ft. bgl. Drill cuttings collected by Texan Water and a geophysical log indicate that the well was completed in the Cow Creek Limestone Member of the Middle Trinity Aquifer (Figure 6; Appendix C).

Well No. 2

According to the State Well Report (Tracking No. 572938), Well No. 2 was completed by Texan Water on April 14, 2021. The well was drilled to a depth of 580 ft. bgl with a 8-inch borehole from 0 to 580 ft. bgl. The well was completed with 4 1/2-inch PVC casing set from 0 to 490 ft. bgl and 4 1/2-inch PVC screen from 490 to 550 ft. bgl. Drill cuttings collected by Texan Water indicates that the well was completed in the Cow Creek Limestone Member of the Middle Trinity Aquifer (Figure 6; Appendix C).

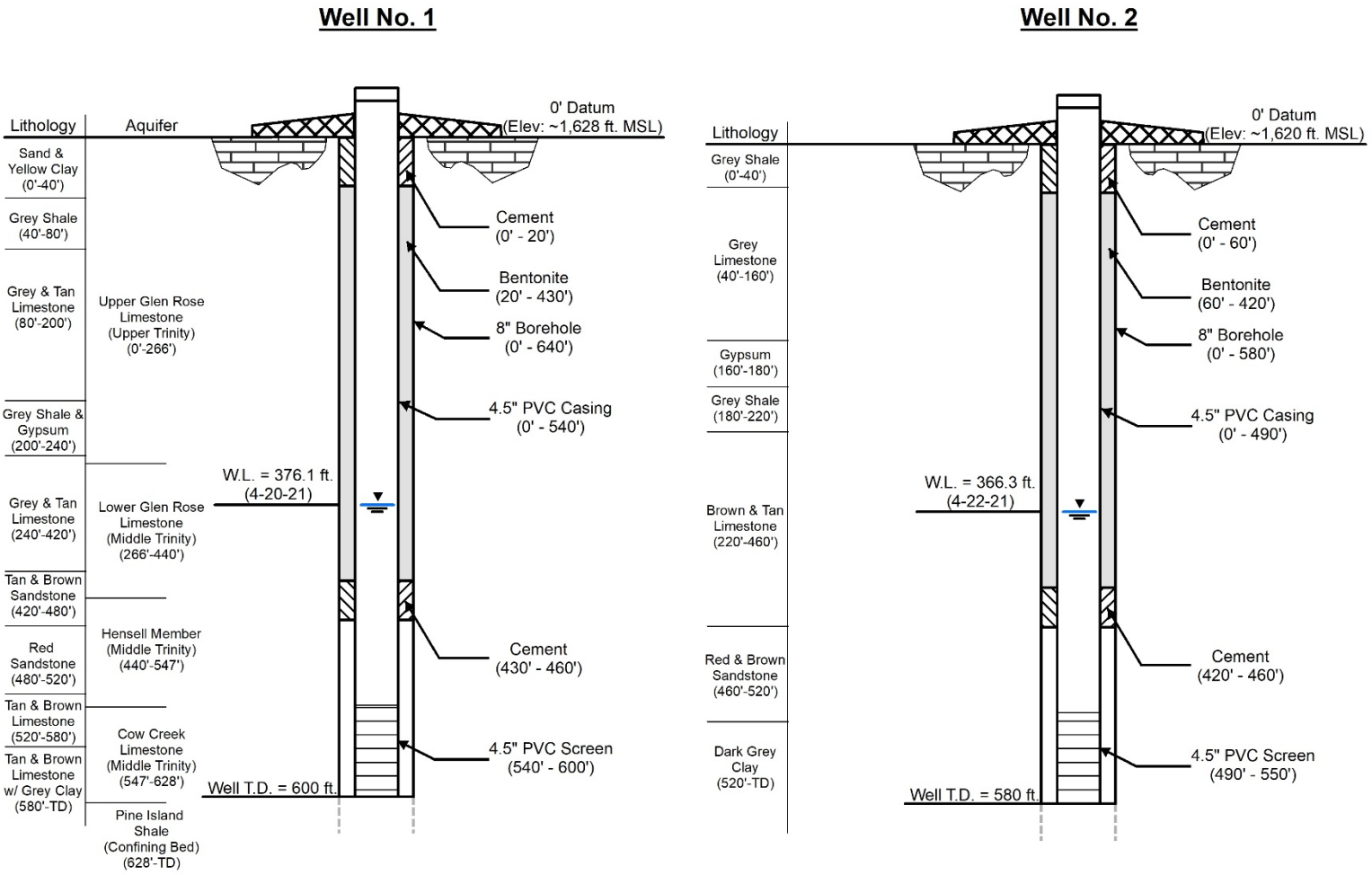
Well No. 3

According to the State Well Report (Tracking No. 572939), Well No. 3 was completed by Texan Water on April 15, 2021. The well was drilled to a depth of 580 ft. bgl with a 8-inch borehole from 0 to 580 ft. bgl. The well was completed with 4 1/2-inch PVC casing set from 0 to 520 ft. bgl and 4 1/2-inch PVC screen from 520 to 580 ft. bgl. Drill cuttings collected by Texan Water indicates that the well was completed in the Cow Creek Limestone Member of the Middle Trinity Aquifer (Figure 7; Appendix C).

Table 2: Summary of Camp Verde well construction

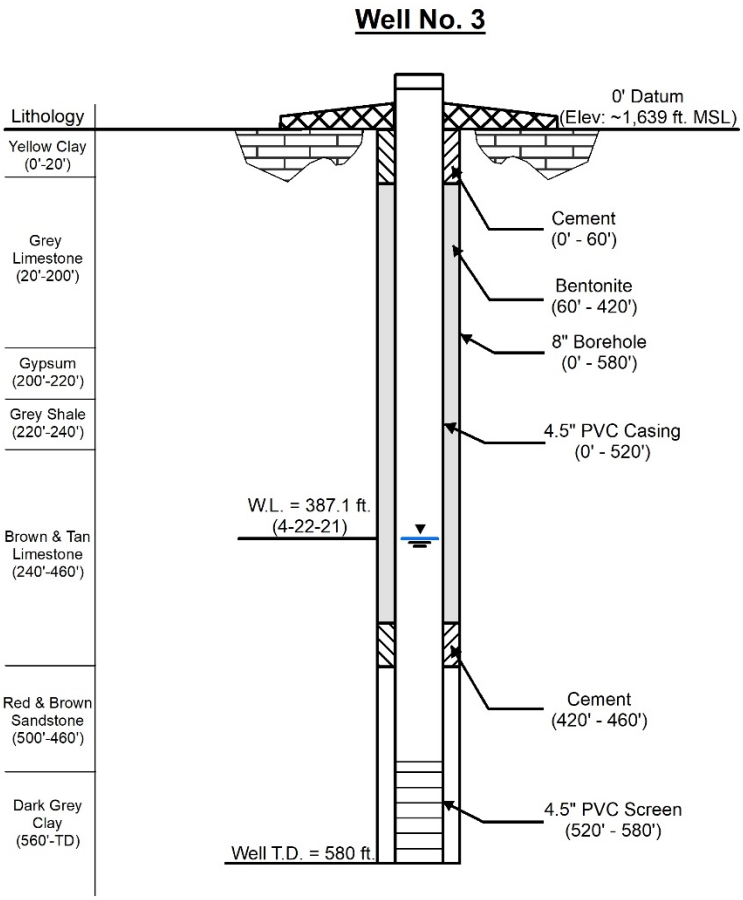
Well	Tracking No.	Latitude	Longitude	Elevation (ft. MSL)	Date Completed	Aquifer	Well Depth (ft. bgs)	Static Water Level (ft. bgs; date; ft. MSL)	Borehole (diameter; ft. bgs)	Casing (diameter; material; ft. bgs)	Screen (diameter; material; ft. bgs)
Well No. 1	572937	29° 55' 01.62" N	99° 04' 57.44" W	1,628’	4/8/2021	Middle Trinity	600’	376.1’ (4/20/21) 1,251.9’	8” (0’-640’)	4 1/2” PVC (0’-540’)	4 1/2” PVC Screen (540’-600’)
Well No. 2	572938	29° 54' 59.84" N	99° 04' 56.61" W	1,620’	4/14/2021	Middle Trinity	550’	366.3’ (4/22/21) 1,253.7’	8” (0’-580’)	4 1/2” PVC (0’-490’)	4 1/2” PVC Screen (490’-550’)
Well No. 3	572939	29° 54' 59.91" N	99° 04' 44.9" W	1,639’	4/15/2021	Middle Trinity	580’	387.1’ (4/22/21) 1251.9’	8” (0’-580’)	4 1/2” PVC (0’-520’)	4 1/2” PVC Screen (520’-580’)

Note: ft. = feet; bgl = below ground level; MSL = Mean Sea Level; N/A = not available.



Notes:
- Well profiles created with the information from State Well Reports, drill cuttings and downhole geophysical logs.
- Figure for schematic purposes; not drawn to scale.

Figure 6: Well construction profiles of Wells No. 1 and No. 2



Notes:
- Well profiles created with the information from State Well Reports, drill cuttings and downhole geophysical logs.
- Figure for schematic purposes; not drawn to scale.

Figure 7: Well construction profiles of Wells No. 3

IV.2 Aquifer Testing

Two (2) aquifer tests were performed to assess the hydrogeologic properties of the Middle Trinity Aquifer within the proposed subdivision. For each aquifer test, Texas Water set a submersible pump within the pumping well that was capable of varying its discharge rate. Prior to the start of the aquifer test, a pressure transducer capable of measuring the water level and temperature at one minute intervals was placed in the pumping well to gather data for the duration of each test. Meter readings and water levels were taken prior to, during, and at the conclusion of the tests. Each aquifer test had at least a 24-hour pumping phase followed by a recovery phase. The data from the aquifer test was analyzed using the Cooper and Jacob (1946) solution in the Aqtesolv software suite (Duffield, 2007).. Table 3 provides a summary of the aquifer testing results; Appendix D provides the results of the aquifer analysis; and Appendix E provides well efficiency calculations for each well.

IV.2.1. Aquifer Test of Well No. 1 (April 20, 2021):

The aquifer test of Well No. 1 was conducted on April 20, 2021 with Well No. 2 as the observation well approximately 1,025 feet away from the pumping well. The pumping phase started at 10:37 A.M. on April 20, 2021; the water level was monitored for 24.2 hours of pumping and for 23.1 hours of recovery. Prior to the pumping phase of the aquifer test, the static water level in Well No. 1 was measured at 376.1 ft. bgl (1,251.9 ft. MSL) and 364.3 ft. bgl (1,255.7 ft. MSL) in Well No. 2.

Well No. 1 was pumped at an average rate of 10.5 gpm with a final measured pumping rate of 10 gpm with 90.8 feet of drawdown, resulting in a specific capacity of 0.11 gpm/ft. The Cooper-Jacob analysis resulted in a calculated transmissivity of 31.75 ft^2/day, and a hydraulic conductivity of 0.09 ft./day. A maximum drawdown of 1.51 feet was observed in Well No. 2 indicating a hydraulic connection between the two wells. Due to the observed hydraulic connection, we calculated a storativity value for Well No. 2 of 9.30×10^{-5}. Figure 8 provides a hydrograph of the pumping well and temperature over the duration of the aquifer test; Figure 9 provides a hydrograph of both the pumping and observation well over the duration of the test.

After an initial drawdown, the water level remained stable while slowly reducing for the remainder of the pumping phase. The water level in the observation well showed a noticeable response directly related to starting and stopping the pump in Well No. 1 (Figure 9). After the pump was shut off, recovery was measured in both wells; the water level in the pumping well recovered 90% in approximately 18 hours. There were no aquifer boundary conditions observed during the testing.

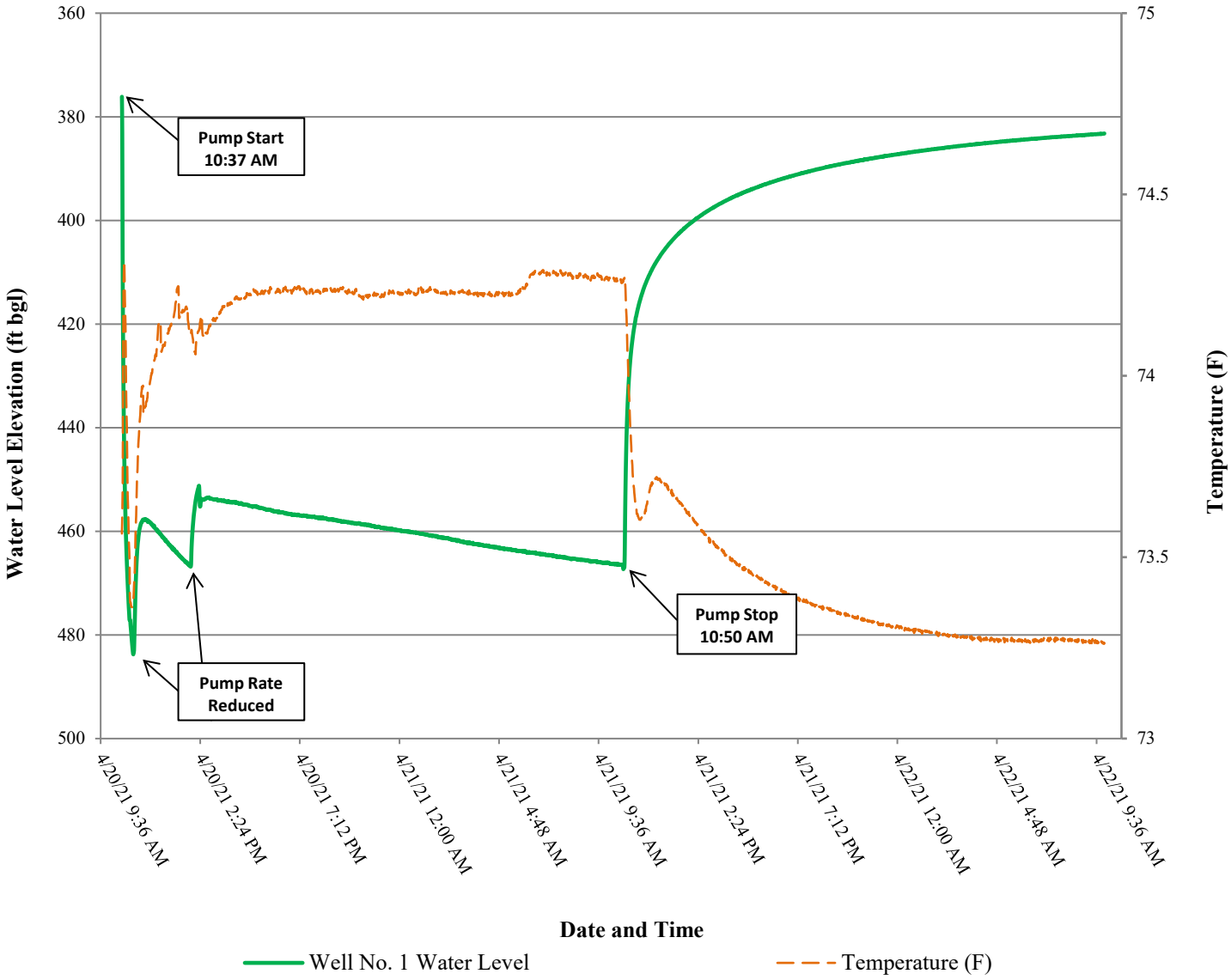


Figure 8: Aquifer test hydrograph of Well No. 1 (April 20, 2021)

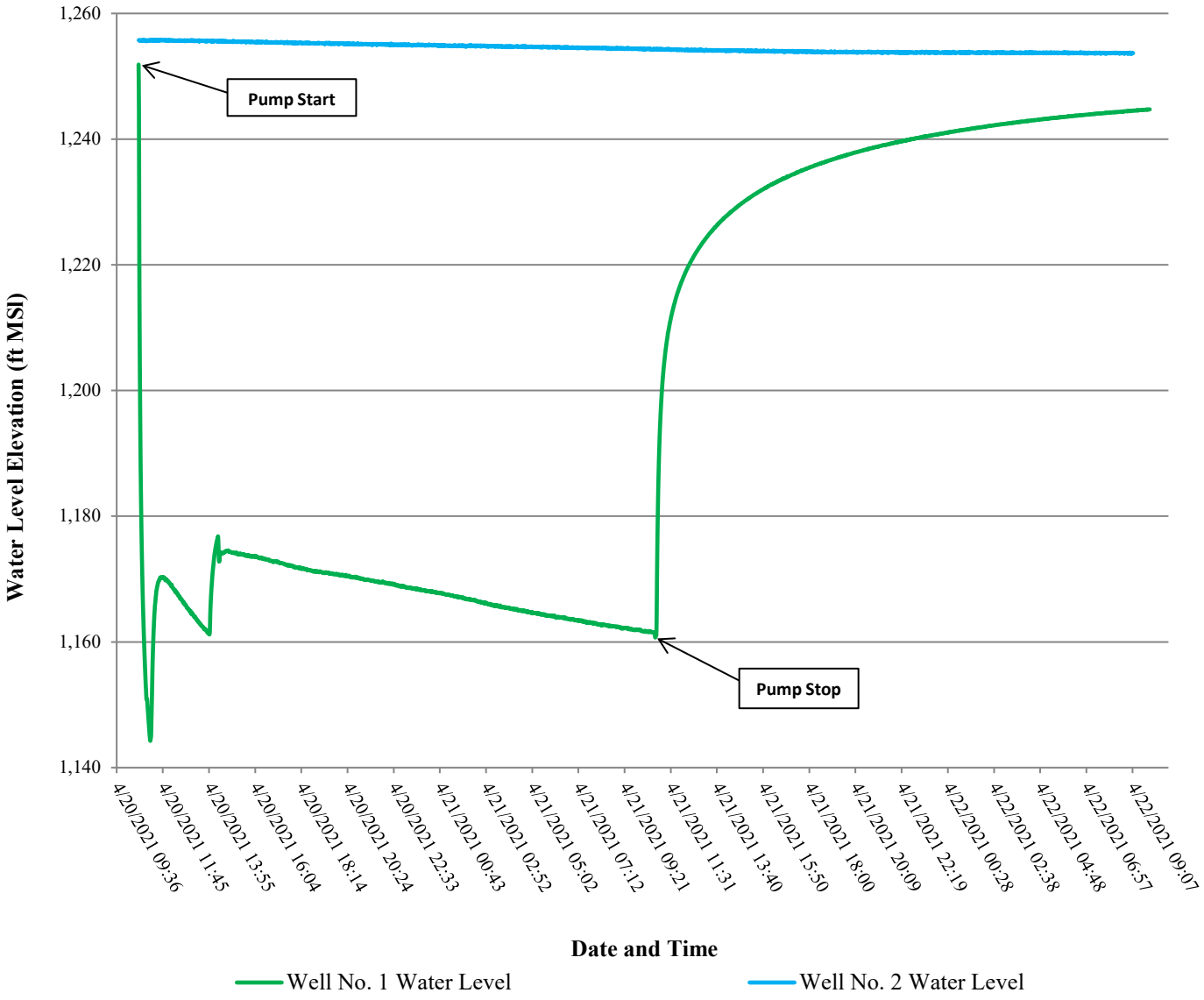


Figure 9: Aquifer test hydrograph of Well No. 1 and Observation Well No. 2 (April 20, 2021)

IV.2.2. Aquifer Test of Well No. 3 (April 22, 2021):

The aquifer test of Well No. 3 was conducted on April 22, 2021 with Well No. 2 as the observation well approximately 855 feet away from the pumping well. The pumping phase started at 10:42 A.M. on April 22, 2021; the water level was monitored for 24.2 hours of pumping and for 23.1 hours of recovery. Prior to the pumping phase of the aquifer test, the static water level in Well No. 1 was measured at 387.1 ft. bgl (1,251.9 ft. MSL) and 366.3 ft. bgl (1,253.7 ft. MSL) in Well No. 2.

Well No. 3 was pumped at an average rate of 10 gpm with a final measured pumping rate of 10 gpm with 70.7 feet of drawdown, resulting in a specific capacity of 0.14 gpm/ft. The Cooper-Jacob analysis resulted in a calculated transmissivity of 32.43 ft^2/day, and a hydraulic conductivity of 0.09 ft./day. A maximum drawdown of 7.45 feet was observed in Well No. 2 indicating a hydraulic connection between the two wells. Due to the observed hydraulic connection, we calculated a storativity value for Well No. 2 of 2.44×10^{-5}. Figure 10 provides a hydrograph of the pumping well and temperature over the duration of the aquifer test; Figure 11 provides a hydrograph of both the pumping and observation well over the duration of the test.

After an initial drawdown, the water level slowly drewdown for the remainder of the pumping phase. The water level in the observation well showed a noticeable response directly related to starting and stopping the pump in Well No. 3 (Figure 11). After the pump was shut off, recovery was measured in both wells; the water level in the pumping well recovered 90% in approximately 15 hours. There were no aquifer boundary conditions observed during the testing.

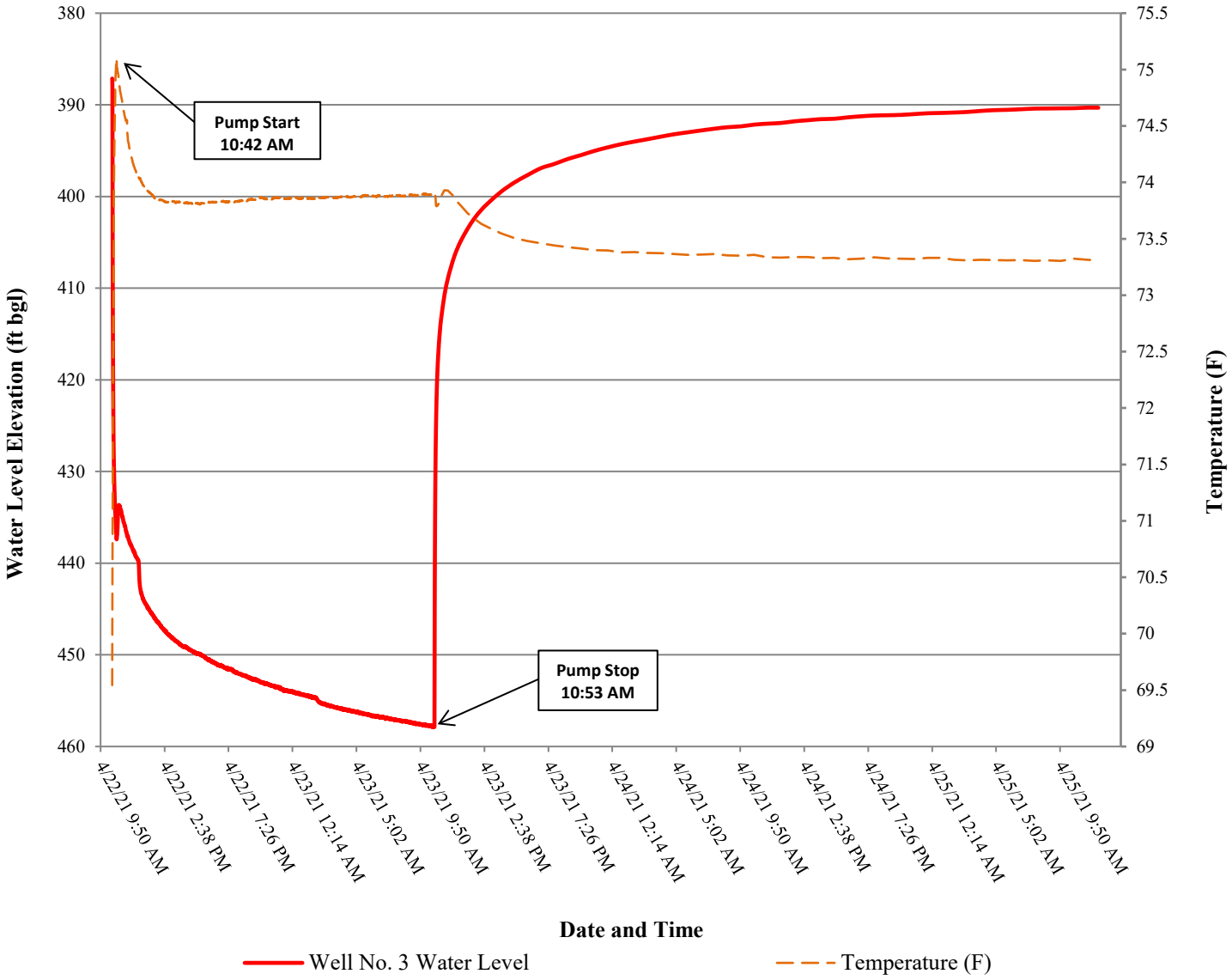


Figure 10: Aquifer test hydrograph of Well No. 3 (April 22, 2021)

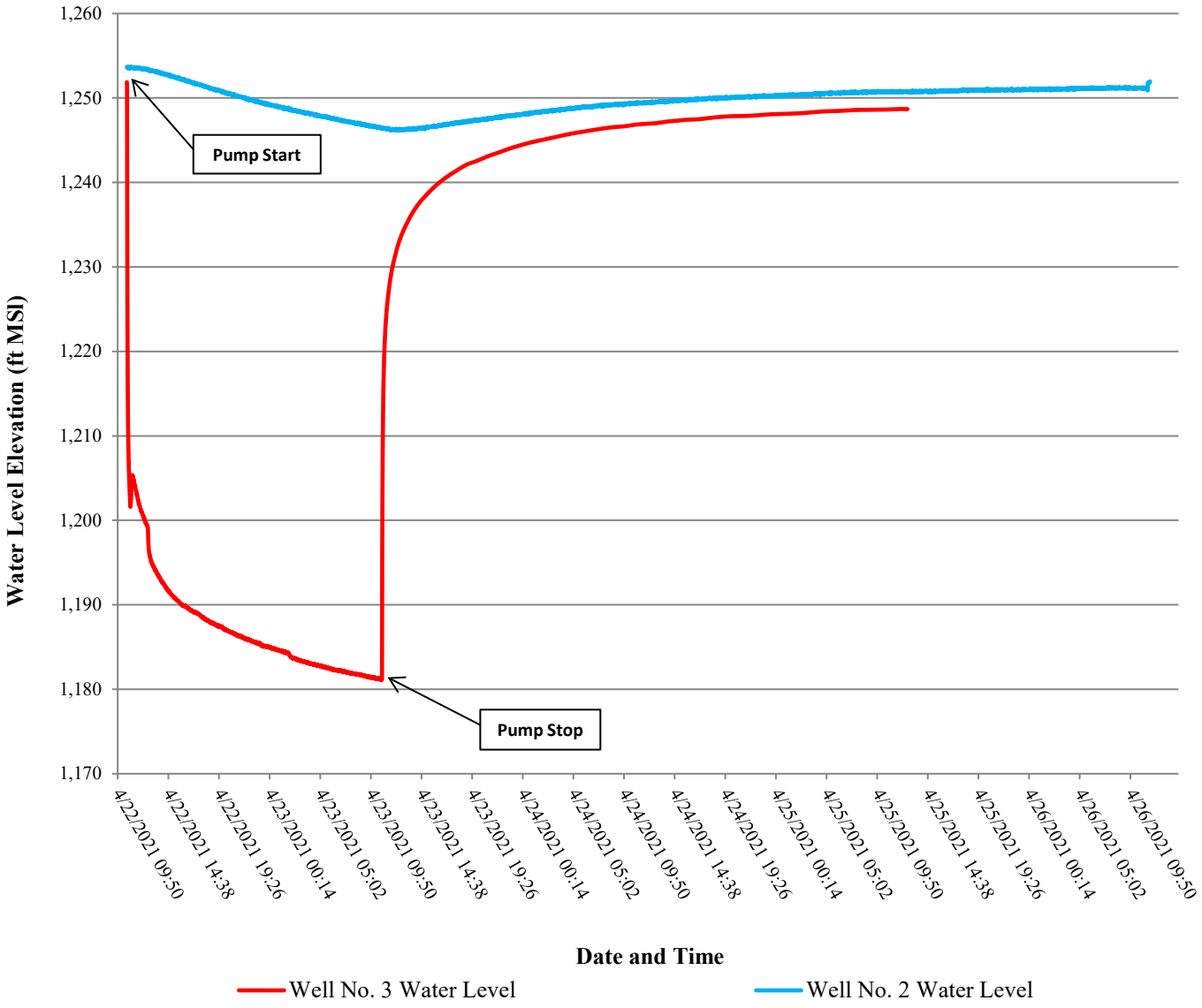


Figure 11: Aquifer test hydrograph of Well No. 3 and Observation Well No. 2 (April 22, 2021)

Table 3: Summary of aquifer test results

Test Date	Well	Average Pump Rate (gpm)	Final Pump Rate (gpm)	Drawdown (ft.)	Specific Capacity (gpm/ft.)	Transmissivity (ft^2/d)	Storativity	Hydraulic Conductivity (ft./d)	Aquifer Thickness (ft.)	Well Efficiency
Apr. 20, 2021	No. 1	10.5	10	90.80	0.11	31.75	-	0.09	362	91.7%
	No. 2	-	-	1.51	-	312.50	$9.30x10^{-5}$	0.86	362	-
Apr. 22, 2021	No. 3	10	10	70.73	0.14	32.43	-	0.09	362	116.7%
	No. 2	-	-	7.45	-	78.09	$2.44x10^{-5}$	0.22	362	-

Note: ft. = feet; gpm = gallons per minute; d = day, pumping wells are highlighted in green, aquifer thickness for Wells 2 and 3 were based upon geophysical logs of Well No. 1.

IV.3. Water Quality

A water quality sample was collected from each of the pumping wells at the end of the pumping phase. The samples were collected by Texan Water staff in a sealed container and stored on ice in a cooler. The samples were transported after collection to Pollution Control Services and tested in accordance with Texas Administrative Code 230.9 (Determination of Groundwater Quality). Appendix F provides a copy of the water quality reports.

Table 4 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 all samples met the TCEQ MCLs and SCLs.

Table 4: Summary of the water quality analysis results

Well	Sample Data	Cl	Conductivity (umhos/cm)	F	Fe	NO3	Mn	pH	SO4	Hardness (as CaCO3)	TDS	TC/E. coli
		TCEQ MCLs & SCLs										
		300[2]		4[1] & 2[2]	0.3[2]	10[1]	0.05[2]	≥7[2]	300[2]		1000[2]	Presence
No. 1	4/21/21	25	824	1.76	0.085	<0.5	<0.010	7.3	133	390	508	Absent
No. 3	4/23/21	24	876	1.77	0.086	<0.5	<0.010	7.3	151	400	508	Absent

Note: 1 = TCEQ Maximum Contaminant Level; 2 = TCEQ Secondary Contaminant Level; Concentrations in red are above TCEQ SCLs; All units expressed in mg/L (except pH & E.C.).

IV.4. Groundwater Availability

Based upon the analyses of the aquifer tests, drawdown estimates from different pumping scenarios modeling anticipated groundwater demand were made at various distances from the pumping wells after 10 years and 30 years. Figures 12 through 15 provide distance-drawdown plots for a single pumping well producing at a rate of 5 gpm for 0.96 hours a day (288 gallons per day) as well as distance-drawdown plots for a single pumping well producing at a rate of 15 gpm for 0.32 hours a day (288 gallons per day) to represent the well owners that may pump at a higher rate for a shorter duration. This represents the total water demand at full build out of the subdivision per housing unit (0.32 acre-feet/year for each housing unit).

Assumptions used in the drawdown calculations and overall groundwater availability for the proposed subdivision include inherent uncertainties such as:

- Future pumpage from the aquifer or from interconnected aquifers from area wells outside of the subdivision or any other factor that cannot be predicted that will affect the storage of water in the aquifer;
- Long-term impacts to the aquifer based on climatic variations; and
- Future impacts to usable groundwater due to unforeseen or unpredictable contamination.

Drawdown estimates were calculated using the Theis equation. The Theis equation employs the following assumptions:

1. The water bearing formation is uniform in character and the hydraulic conductivity is the same in all directions;
2. The formation is uniform in thickness and infinite in areal extent;
3. The formation receives no recharge from any source;
4. The pumped well penetrates, and receives water from, the full thickness of the water bearing formation;
5. The water removed from storage is discharges instantaneously when the head is lowered;
6. The pumping well is 100% efficient;
7. All water removed from the well comes from aquifer storage;
8. Laminar flow exists throughout the well and aquifer; and
9. The water table or potentiometric surface has no slope.

It is important to note that several of the assumptions used to derive the Theis equation are not necessarily appropriate for the Middle Trinity Aquifer. These include assumptions 1, 3, 7 and 8. The Middle Trinity Aquifer is a karst aquifer and is fractured, not uniform or homogenous in character or in its hydrogeologic properties (transmissivity and storativity). In addition, the Theis assumptions that (i) the formation receives no recharge from any source and (ii) that all water removed from the well comes from aquifer storage leads to inaccuracies in estimating drawdown. Driscoll (1986) states, "The assumption that an aquifer receives no recharge during the pumping period is one of the six fundamental conditions upon which the non-equilibrium formulas (Theis) are based. Therefore, all water discharged from a well is assumed to be taken from storage within the aquifer. It is known, however that most formations receive

recharge. Hydrographs from long-term observation wells monitored by the US Geological Survey, various state agencies, and similar data-gathering agencies in other parts of the world show that most water-bearing formations receive continual or intermittent recharge."

Furthermore, contrary to the Theis assumptions, Konikow and Leake (2014) note that with increased pumping time, (i) the fraction of pumpage derived from storage tends to decrease, and (ii) the fraction derived from capture (recharge) increases. Eventually a new equilibrium will be achieved when no more water is derived from storage and heads, or water levels in the aquifer stabilize. This result is achieved when the initial cone of depression formed by discharge reaches a new source of water, typically the recharge zone of the aquifer. The actual response time for an aquifer system to reach a new equilibrium is a function of the dimensions, hydraulic properties, and boundary conditions for each specific aquifer. For example, the response time will decrease as the hydraulic diffusivity of the aquifer increases (Theis 1940; Barlow and Leake 2012). The response time can range from days to millennia (Bredehoeft and Durbin 2009; Walton 2011).

Since the Theis equation assumes (i) that all water is derived from storage and (ii) that the aquifer receives no recharge, the Theis equation overestimates drawdown within a well that is located in an aquifer that receives recharge rapidly. For this reason, using the Theis equation to calculate drawdown over periods of time greater than when water from capture exceeds water from storage leads to an exaggerated estimate of drawdown.

Table 5 and Table 6 provides a summary of the results from the distance-drawdown calculations. Estimates of drawdown are based on the following assumptions:

- Total daily water demand (entire subdivision) = 57.7 acre-feet/year
- Total daily water demand (per housing unit) = 0.32 acre-feet/year = 288 gpd;
- The individual well will first be pumped at 5 gpm for 0.96 hours per day (Table 5) and in another scenario at 15 gpm for 0.32 hours per day (Table 6); and
- Transmissivity values calculated from each respective pumping well were used in the drawdown estimates; and
- The storativity value calculated from each respective aquifer test was used in the drawdown estimates.

The edge of the cone of depression was estimated by taking the distance from the pumped well where the drawdown flattened out or was minimal.

IV.4.1. 5 gpm Production

Based upon the average drawdown calculated from distance-drawdown projections, the drawdown after 10 years of production at 5 gpm for 0.96 hours per day with a well spacing of 100 feet results in an average of 5.6 feet of well interference. At a spacing of 250 feet, the average drawdown reduces to 2.4 feet;

at a spacing of 500 feet, the average drawdown was calculated at 1.2 feet.

The average calculated drawdown after 30 years of production at 5 gpm for 0.96 hours per day with a well spacing of 100 feet results in 5.7 feet of well interference. At a spacing of 250 feet, the average drawdown reduces to 2.5 feet; at a spacing of 500 feet, the average drawdown was calculated at 1.3 feet.

Table 5: Summary of distance-drawdown calculations (5 gpm)

	Drawdown at Pumped Well After 10-Years of Pumping	Drawdown at Pumped Well After 30-Years of Pumping	Drawdown at Nearest Property Boundary After 10-Years of Pumping		Drawdown at Nearest Property Boundary After 30-Years of Pumping		Dist. to Outer Edges of Cone of Depression - 10 years	Dist. to Outer Edges of Cone of Depression - 30 years
Well	**(ft)**	**(ft)**	**Property Boundary Distance (ft)**	**Drawdown (ft)**	**Property Boundary Distance (ft)**	**Drawdown (ft)**	**(feet)**	**(feet)**
No. 1	32.7	32.8	1,450	0.7	1,450	0.8	300	300
No. 3	35.2	35.3	3,125	0.7	3,125	0.8	400	400

IV.4.2. 15 gpm Production

Based upon the average drawdown calculated from distance-drawdown projections, the drawdown after 10 years of production at 15 gpm for 0.32 hours per day with a well spacing of 100 feet results in an average of 8.2 feet of well interference. At a spacing of 250 feet, the average drawdown reduces to 2.0 feet; at a spacing of 500 feet, the average drawdown was calculated at 0.9 feet.

The average calculated drawdown after 30 years of production at 15 gpm for 0.32 hours per day with a well spacing of 100 feet results in 8.3 feet of well interference. At a spacing of 250 feet, the average drawdown reduces to 2.1 feet; at a spacing of 500 feet, the average drawdown was calculated at 1.0 feet.

Table 6: Summary of distance-drawdown calculations (15 gpm)

	Drawdown at Pumped Well After 10-Years of Pumping	Drawdown at Pumped Well After 30-Years of Pumping	Drawdown at Nearest Property Boundary After 10-Years of Pumping		Drawdown at Nearest Property Boundary After 30-Years of Pumping		Dist. to Outer Edges of Cone of Depression - 10 years	Dist. to Outer Edges of Cone of Depression - 30 years
Well	**(ft)**	**(ft)**	**Property Boundary Distance (ft)**	**Drawdown (ft)**	**Property Boundary Distance (ft)**	**Drawdown (ft)**	**(feet)**	**(feet)**
No. 1	87.9	88.0	1,450	0.7	1,450	0.8	250	250
No. 3	95.7	95.8	3,125	0.7	3,125	0.8	300	300

IV.4.3. Summary of Distance Drawdown and Well Spacing

We recommend that the Camp Verde wells be spaced a minimum distance of 250 feet for wells pumped at rates up to 15 gpm. If possible, we recommend landowners spacing their wells as far as possible to minimize well interference. Some well interference may be more pronounced in areas of the subdivision where the aquifer units are more strongly connected; conversely, well interference may not occur in some areas where the aquifer is either disconnected or where there is high permeability.

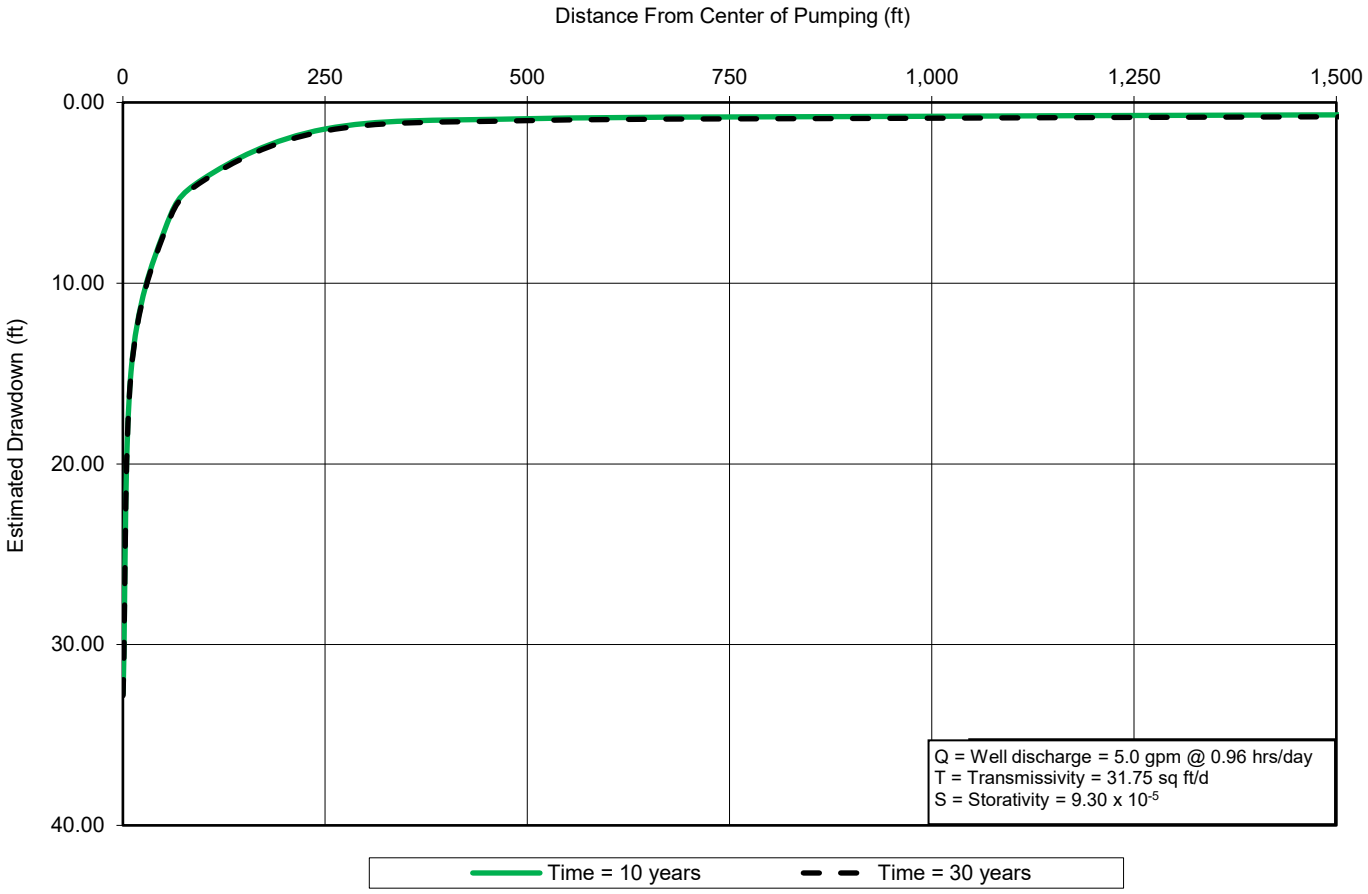


Figure 12: Distance drawdown plot for Well No. 1 (5 gpm)

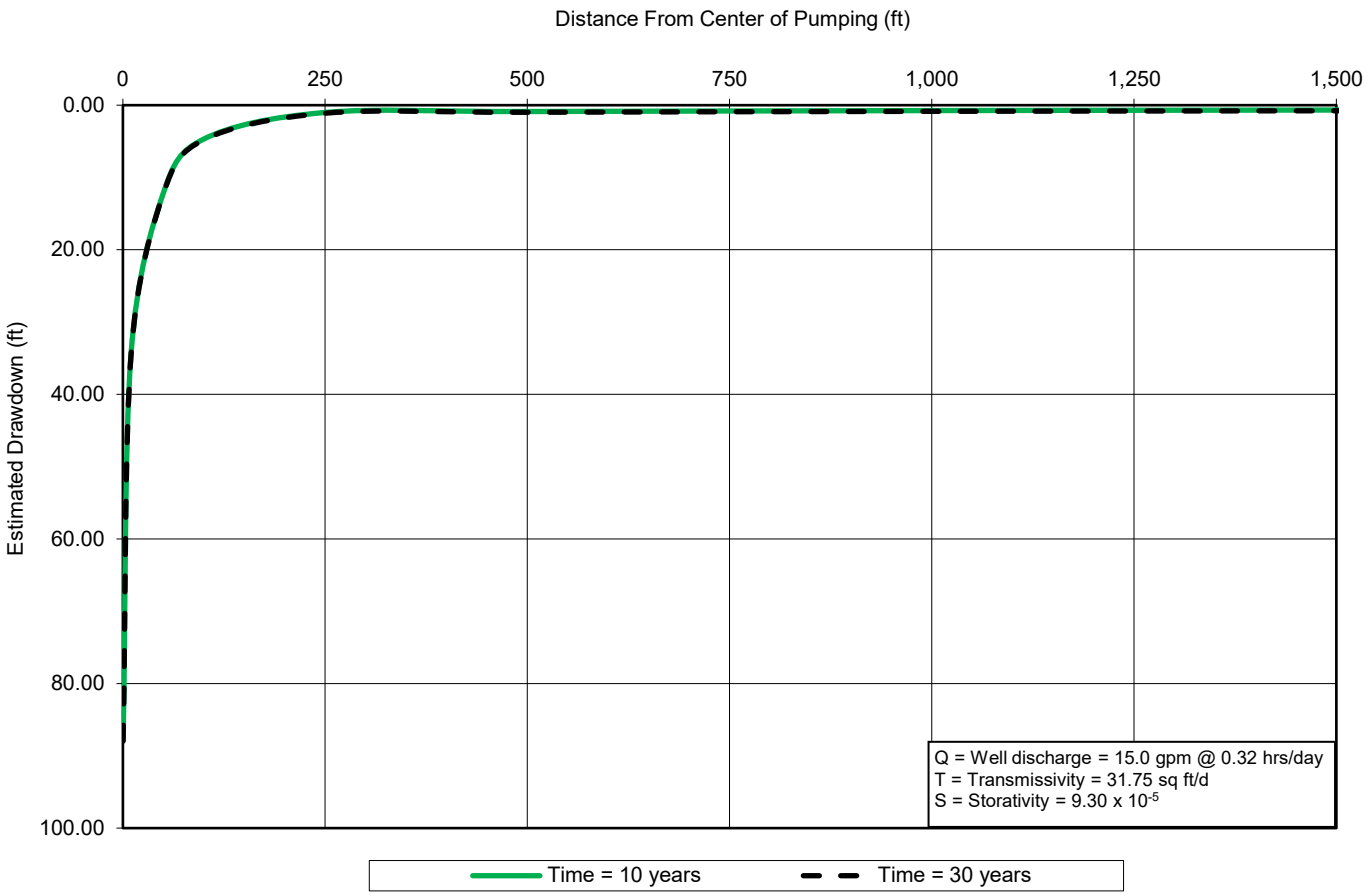


Figure 13: Distance drawdown plot for Well No. 1 (15 gpm)

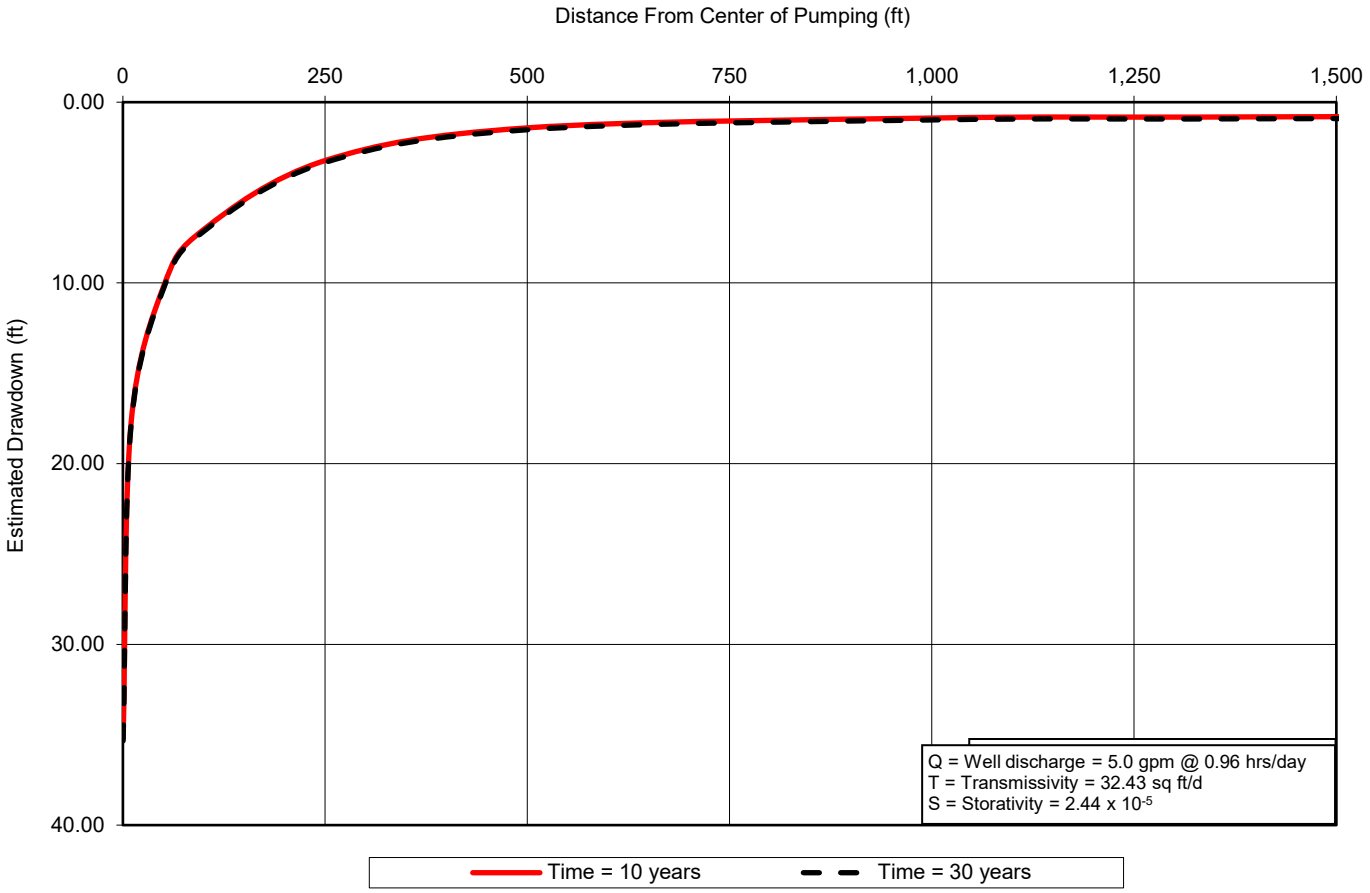


Figure 14: Distance drawdown plot for Well No. 3 (5 gpm)

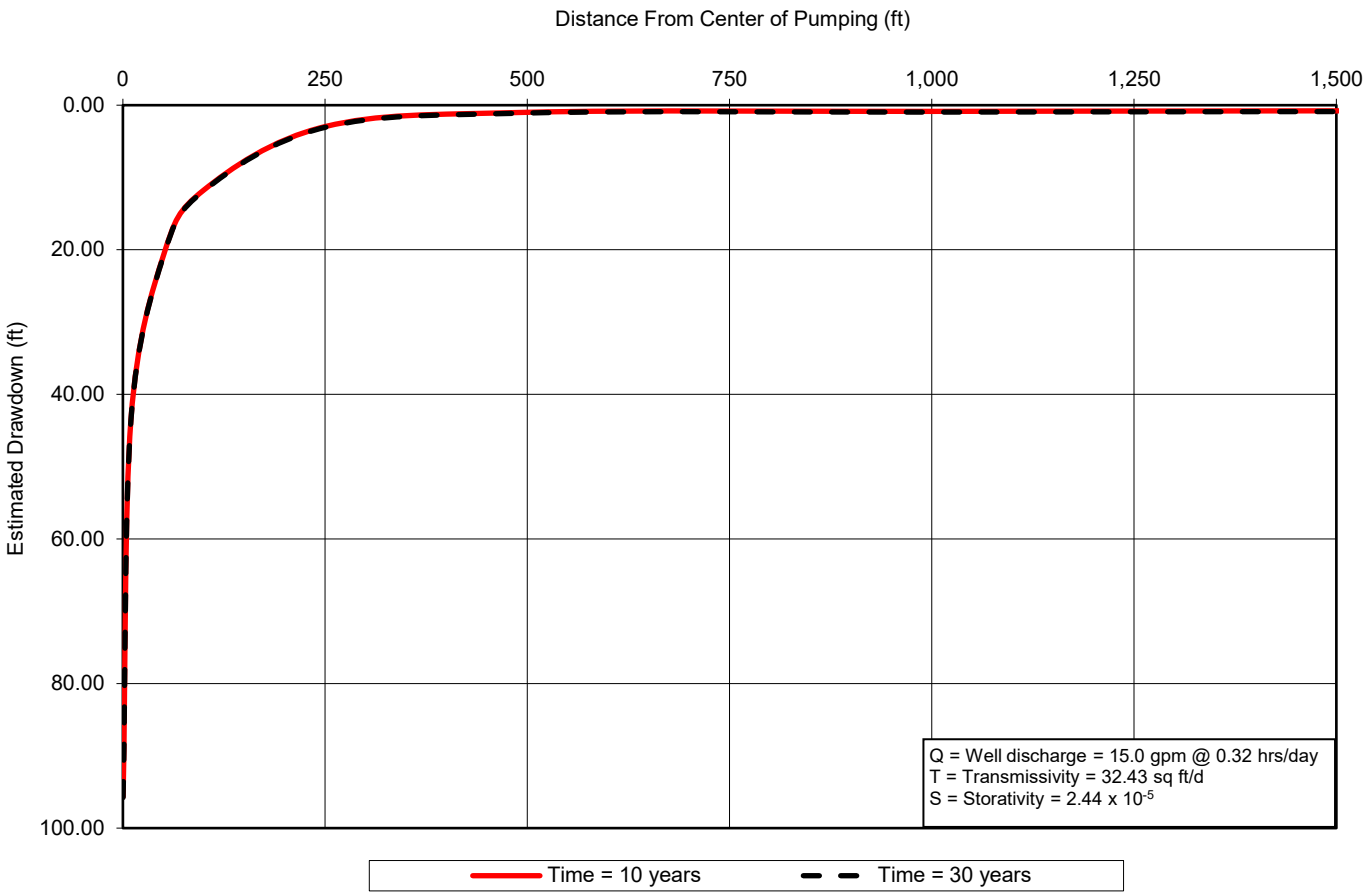


Figure 15: Distance drawdown plot for Well No. 3 (15 gpm)

Section V: Certification

I, Kaveh Khorzad, Texas Licensed Professional Geoscientist, certificate number 1126, based on best judgment, current groundwater conditions, and the information developed and presented in this form, certify that adequate groundwater is available from the underlying aquifer to supply the anticipated use of the proposed subdivision.

The Middle Trinity Aquifer at the Camp Verde Subdivision is under confined conditions, exhibits variable yield and water quality and is susceptible to reduction in yield during prolonged drought. For these reasons we recommend that i) each homeowner construct their well as deep as practical to the base of the Cow Creek Limestone Member within the Middle Trinity Aquifer to provide the maximum possible yield and; ii) set their pumps as deep as practical to protect from lowering water levels during drought.

Section VI: References

Ashworth, J. B., 1983, Ground-water availability of the Lower Cretaceous formations in the Hill Country of south-central Texas: Texas Department of Water Resources Report 273,173 p.

Barlow, P.M., and Leake, S.A., 2012. Streamflow depletion by wells—Understanding and managing the effects of groundwater pumping on streamflow. U.S. Geological Survey Circular 1376. Reston, Virginia: USGS.

Bredehoeft, J.D., and T.J. Durbin. 2009. Ground water development—The time to full capture problem. Ground Water 47, no. 4: 506–514. DOI:10.1111/j.1745-6584.2008. 00538.x

Cooper, H.H. and C.E. Jacob, 1946. A generalized graphical method for evaluating formation constants and Summarizing well field history, Am. Geophys. Union Trans., vol. 27, pp. 526-534.

Driscoll, F.G., 1986. Groundwater and Wells (2nd. Ed.): Johnson Division, St. Paul, Minnesota.

Duffield, G.M., 2007, *AQTESOLV for Windows Version 4.5--PROFESSIONAL*, HydroSOLVE, Inc., Reston, VA. <http://www.aqtesolv.com/default.htm>

George, W. O., 1952. Geology and ground-water resources of Comal County, Tex., with sections on surface-water runoff, by S. D. Breeding and Chemical character of the water, by W. W. Hastings: U.S. Geol. Survey Water-Supply Paper 1138, 126 p.

Konikow L.F. and Leake S.A., 2014, Depletion and Capture: Revisiting ‘‘The Source of Water Derived from Wells’’, Vol. 52, Groundwater–Focus Issue 2014, p. 100–111.

Loucks, R.G., 1977. Porosity Development and distribution in shoal water carbonate complexes-subsurface Pearsall Formation (Lower Cretaceous) South Texas. In D.G. Bebout, and R.G. Loucks, eds., Cretaceous Carbonates of Texas and Mexico: Applications to Subsurface Exploration, Bureau of Economic Geology, University of Texas at Austin Report of Investigations No. 89, p 97-126.

McGeehee, R.V., 1979. Precambrian Rocks of the Southeastern Llano Region, Texas. Texas Bureau of Economic Geology, Geological Circular 79-3, 36 p

Preston, R.D., Pavilcek, D.J., Bluntzer, R.L., and Derton, J., 1996. The Paleozoic and Related Aquifers of Central Texas. TWDB Report 346, 77 p.

Theis, C.V., 1940. The source of water derived from wells—Essential factors controlling the response of an aquifer to development. Civil Engineering 10: 277–280.

U.S. Census Bureau, 2019 American Community Survey 1-year estimates. Retrieved from Census Reporter Profile page for Kerr County, TX

Walton, W.C. 2011. Aquifer system response time and groundwater supply management. Ground Water 49, no. 2: 126–127.

Whitney, M. I., 1952. Some zone-marker fossils of the Glen Rose Formation of central Texas: Jour. Paleontology, v. 26, p. 65-73.

Wierman, D. A., Broun, A. S., Hunt, B. B., 2010, Hydrogeologic Atlas of the Hill Country Trinity Aquifer, Blanco, Hays, and Travis Counties, Central Texas. Hays-Trinity Groundwater Conservation District, United States.

Appendix A

Certification of Groundwater Availability for Platting Form

CERTIFICATION OF GROUNDWATER AVAILABILITY FOR PLATTING FORM

Use of this form: If required by a municipal authority pursuant to Texas Local Government Code, §212.0101, or a county authority pursuant to §232.0032, Texas Local Government Code, the plat applicant and the Texas licensed professional engineer or Texas licensed professional geoscientist shall use this form based upon the requirements of Title 30, TAC, Chapter 230 to certify that adequate groundwater is available under the land to be subdivided (if the source of water for the subdivision is groundwater under the subdivision) for any subdivision subject to platting under Texas Local Government Code, §212.004 and §232.001.The form and Chapter 230 do not replace state requirements applicable to public drinking water supply systems or the authority of counties or groundwater conservation districts under either Texas Water Code, §35.019 or Chapter 36.

Administrative Information (30 TAC §230.4)
1. Name of Proposed Subdivision: Camp Verde

Texas Commission on Environmental Quality
Chapter 230 - Groundwater Availability Certification for Platting

2. Any Previous Name Which Identifies the Tract of Land:
3. Property Owner's Name(s): Sunderland Communities, LLC
Address: 110 River Crossing Blvd. Spring Branch, Texas 78070
Phone: 214-252-9762
Fax:
4. Plat Applicant's Name: Sunderland Communities, LLC
Address: 110 River Crossing Blvd. Spring Branch, Texas 78070
Phone: 214-252-9762
Fax:
5. Licensed Professional Engineer or Geoscientist:
Name: Kaveh Khorzad, P.G.
Address: 317 Ranch Road 620 S., Suite 203, Lakeway, TX 78734
Phone: 830-228-5263
Fax:
Certificate Number: TBPG License No: 1126
6. Location and Property Description of Proposed Subdivision: The subdivision is located on Highway 480, approximately 3.8 miles southwest of the City of Center Point in southeastern Kerr County (Figure 1).
7. Tax Assessor Parcel Number(s).
Book:
Map:
Parcel: Kerr County Tax Assessor as Property IDs: 20742, 20847, 14962, 16970, 16604, 16961, 20227, 16962, 18319, 16604, 13678, 16972, 68531, 16971 and 16973

Proposed Subdivision Information (30 TAC §230.5)
8. Purpose of Proposed Subdivision (single family/multi-family residential, non-residential, commercial):
9. Size of Proposed Subdivision (acres): 1,039
10. Number of Proposed Lots: 179
11. Average Size of Proposed Lots (acres): 5.8
12. Anticipated Method of Water Distribution. Individual Water Wells to Serve Individual Lots

Texas Commission on Environmental Quality
Chapter 230 - Groundwater Availability Certification for Platting

Expansion of Existing Public Water Supply System?	Yes	No
New (Proposed) Public Water Supply System?	Yes	No
Individual Water Wells to Serve Individual Lots?	Yes	No
Combination of Methods?	Yes	No
Description (if needed):		

13. Additional Information (if required by the municipal or county authority):

Note: If public water supply system is anticipated, written application for service to existing water providers within a 1/2-mile radius should be attached to this form (30 TAC §230.5(f) of this title).

Projected Water Demand Estimate (30 TAC §230.6)
14. Residential Water Demand Estimate at Full Build Out (includes both single family and multi-family residential).
Number of Proposed Housing Units (single and multi-family): 179
Average Number of Persons per Housing Unit: 2.34 persons
Gallons of Water Required per Person per Day: 123 gallons
Water Demand per Housing Unit per Year (acre feet/year): 0.32
Total Expected Residential Water Demand per Year (acre feet/year): 57.7
15. Non-residential Water Demand Estimate at Full Build Out.
Type(s) of Non-residential Water Uses: N/A
Water Demand per Type per Year (acre feet/year):
16. Total Water Demand Estimate at Full Build Out (acre feet/year): 57.7
17. Sources of Information Used for Demand Estimates: 2.34 = Average number of persons per household (US Census 2019); and 123 = The average per capita usage of water per day in gallons (TWDB, 2017).

General Groundwater Resource Information (30 TAC §230.7)

Texas Commission on Environmental Quality
Chapter 230 - Groundwater Availability Certification for Platting

18. Identify and describe, using Texas Water Development Board names, the aquifer(s) which underlies the proposed subdivision: Trinity Aquifer

Note: Users may refer to the most recent State Water Plan to obtain general information pertaining to the state's aquifers. The State Water Plan is available on the Texas Water Development Board's Internet website at: www.twdb.state.tx.us

Obtaining Site-Specific Groundwater Data (30 TAC §230.8)		
19. Have all known existing, abandoned, and inoperative wells within the proposed subdivision been located, identified, and shown on the plat as required under §230.8(b) of this title?	(Yes)	No
20. Were the geologic and groundwater resource factors identified under §230.7(b) of this title considered in planning and designing the aquifer test required under §230.8(c) of this title?	(Yes)	No
21. Have test and observation wells been located, drilled, logged, completed, developed, and shown on the plat as required by §230.8(c)(1) - (4) of this title?	(Yes)	No
22. Have all reasonable precautions been taken to ensure that contaminants do not reach the subsurface environment and that undesirable groundwater has been confined to the zone(s) of origin (§230.8(c)(5) of this title)?	(Yes)	No
23. Has an aquifer test been conducted which meets the requirements of §230.8(c)(1) and (6) of this title?	(Yes)	No
24. Were existing wells or previous aquifer test data used?	Yes	(No)
25. If yes, did they meet the requirements of §230.8(c)(7) of this title?	Yes	No
26. Were additional observation wells or aquifer testing utilized?	Yes	(No)

Note: If expansion of an existing public water supply system or a new public water supply system is the anticipated method of water distribution for the proposed subdivision, site-specific groundwater data shall be developed under the requirements of 30 TAC, Chapter 290, Subchapter D of this title (relating to Rules and Regulations for Public Water Systems) and the applicable information and correspondence developed in meeting those requirements shall be attached to this form pursuant to §230.8(a) of this title.

Texas Commission on Environmental Quality
Chapter 230 - Groundwater Availability Certification for Platting

Determination of Groundwater Quality (30 TAC §230.9)		
27. Have water quality samples been collected as required by §230.9 of this title?	Yes	No
28. Has a water quality analysis been performed which meets the requirements of §230.9 of this title?	Yes	No

Determination of Groundwater Availability (30 TAC §230.10)		
29. Have the aquifer parameters required by §230.10(c) of this title been determined?	Yes	No
30. If so, provide the aquifer parameters as determined.		
Rate of yield and drawdown: (See attached Table 3)		
Specific capacity: (See attached Table 3 & Appendix D)		
Efficiency of the pumped well: (See attached Table 3 & Appendix E)		
Transmissivity: (See attached Table 3 & Appendix D)		
Coefficient of storage: (See attached Table 3)		
Hydraulic conductivity: (See attached Table 3 & Appendix D)		
Were any recharge or barrier boundaries detected?	Yes	No
If yes, please describe:		
Thickness of aquifer(s): (See attached Table 3)		
31. Have time-drawdown determinations been calculated as required under §230.10(d)(1) of this title?	Yes	No
32. Have distance-drawdown determinations been calculated as required under §230.10(d)(2) of this title?	Yes	No
33. Have well interference determinations been made as required under §230.10(d)(3) of this title?	Yes	No
34. Has the anticipated method of water delivery, the annual groundwater demand estimates at full build out, and geologic and groundwater information been taken into account in making these determinations?	Yes	No
35. Has the water quality analysis required under §230.9 of this title been compared to primary and secondary public drinking water standards as required under §230.10(e) of	Yes	No

this title?		
Does the concentration of any analyzed constituent exceed the standards?	Yes	No
If yes, please list the constituent(s) and concentration measure(s) which exceed standards:		

Groundwater Availability and Usability Statements (30 TAC §230.11(a) and (b))
36. Drawdown of the aquifer at the pumped well(s) is estimated to be _____ feet over a 10-year period and _____ feet over a 30-year period. See Attached Table 5 & 6
37. Drawdown of the aquifer at the property boundary is estimated to be _____ feet over a 10-year period and _____ feet over a 30-year period. See Attached Table 5 & 6
38. The distance from the pumped well(s) to the outer edges of the cone(s)-of-depression is estimated to be _____ feet over a 10-year period and _____ feet over a 30-year period. See Attached Table 5 & 6
39. The recommended minimum spacing limit between wells is 250 feet with a recommended well yield of 5 -15 gallons per minute per well.
40. Available groundwater is / is not (circle one) of sufficient quality to meet the intended use of the platted subdivision.
41. The groundwater availability determination does not consider the following conditions (identify any assumptions or uncertainties that are inherent in the groundwater availability determination): See section IV.4 & section V

Certification of Groundwater Availability (30 TAC §230.11(c)) Must be signed by a Texas Licensed Professional Engineer or a Texas Licensed Professional Geoscientist.
42. I, Kaveh Khorzad, Texas Licensed Professional Engineer or Texas Licensed Professional Geoscientist (circle which applies), certificate number 1126, based on best professional judgment, current groundwater conditions, and the information developed and presented in this form, certify that adequate groundwater is available from the underlying aquifer(s) to supply the anticipated use of the proposed subdivision.

Date:

(affix seal)

5-14-21

Adopted July 9, 2008

Effective July 31, 2008

Appendix B

Geophysical Logs

Geophysical Log

Well No. 1

GEO CAM

Borehole: CAMP VERDE WELL NO. 1

Logs: GAMMA, RESITIVITY, SPR

Water Well Logging & Video Recording Services

Geo Cam, Inc. 17118 Classen Rd. San Antonio, TX 78247 877-495-9121

Project: CAMP VERDE WELL NO. 1
Client: **TEXAN WATER WELL**
Location: N 29 55 5.95 W 99 5 2.53

Date: 04/09/2021
County: KERR
State: TX

BOREHOLE DATA

Drilling Contractor: TEXAN WATER WELL
Elevation: 1626' GPS
Depth Ref: G.L.

Driller T.D. (ft) : 650'
Logger T.D. (ft) : 635'
Date Drilled: 04/09/2021

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8"	0	TD	10" STEEL	+ 2	40'
2						
3						

Drill Method: AIR ROTARY
Hole Medium:
Viscosity:

Weight:
Mud Type:
Rm: at: Deg C

Fluid Level (ft) : 634'
Time Since Circ:

GENERAL DATA

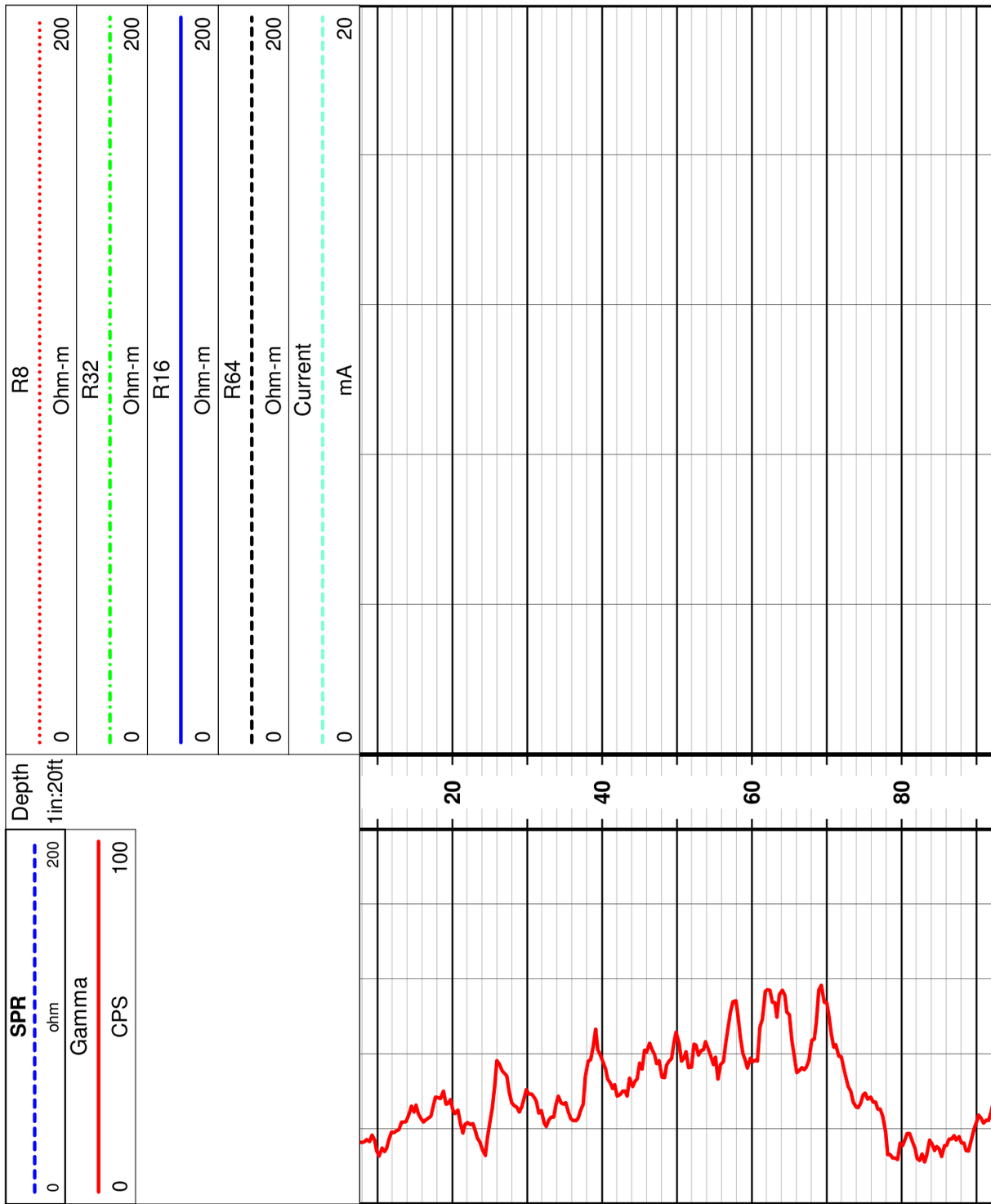
Logged by: JASON O
Witness:

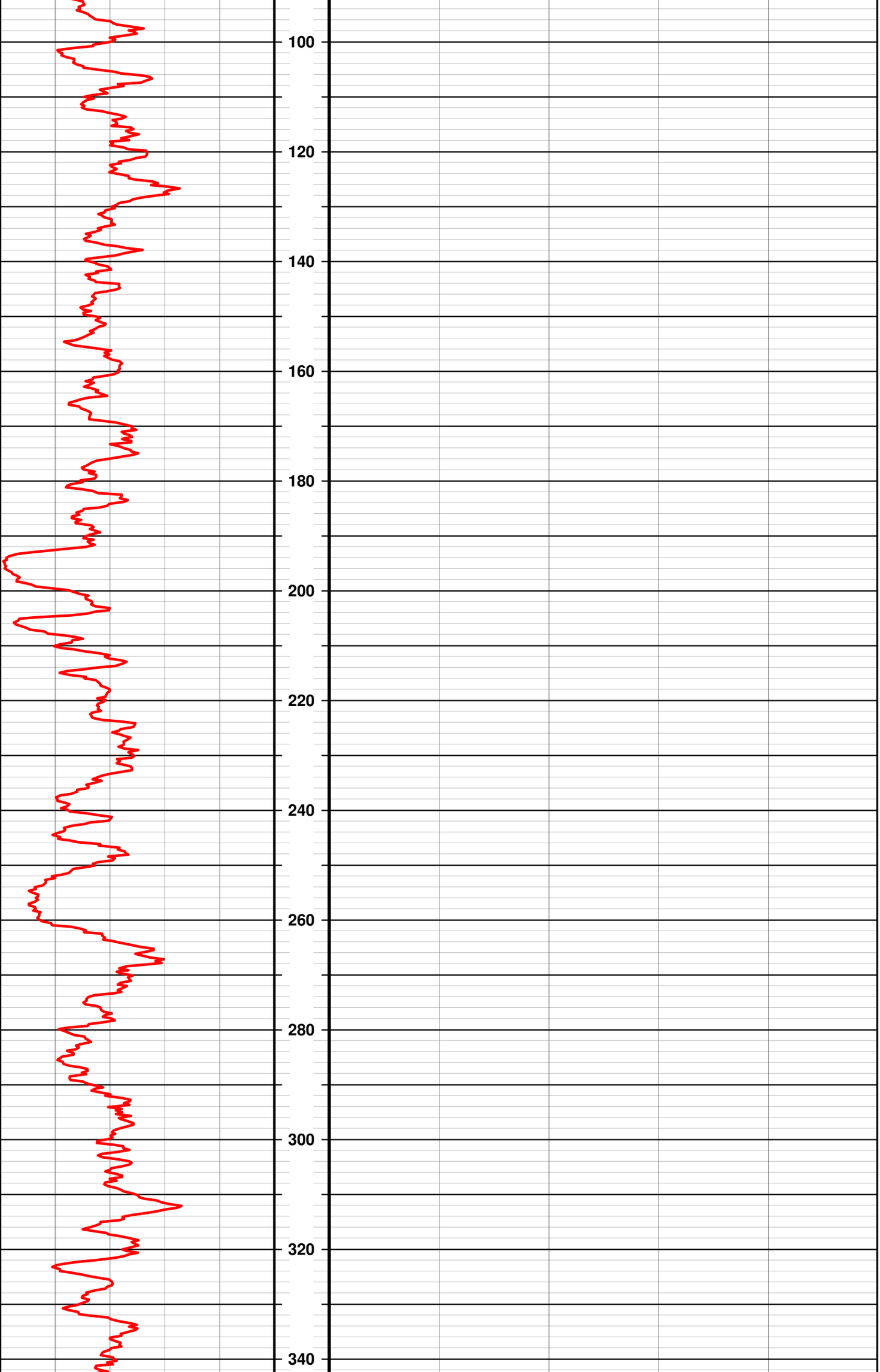
Unit/Truck: 06

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	35	630.7'	7.7'	20
RESITIVITY	1	35	634'	374'	20
SPR	1	35	634'	374'	20

ALL MEASUREMENTS TAKEN FROM GROUND LEVEL.

Comments:

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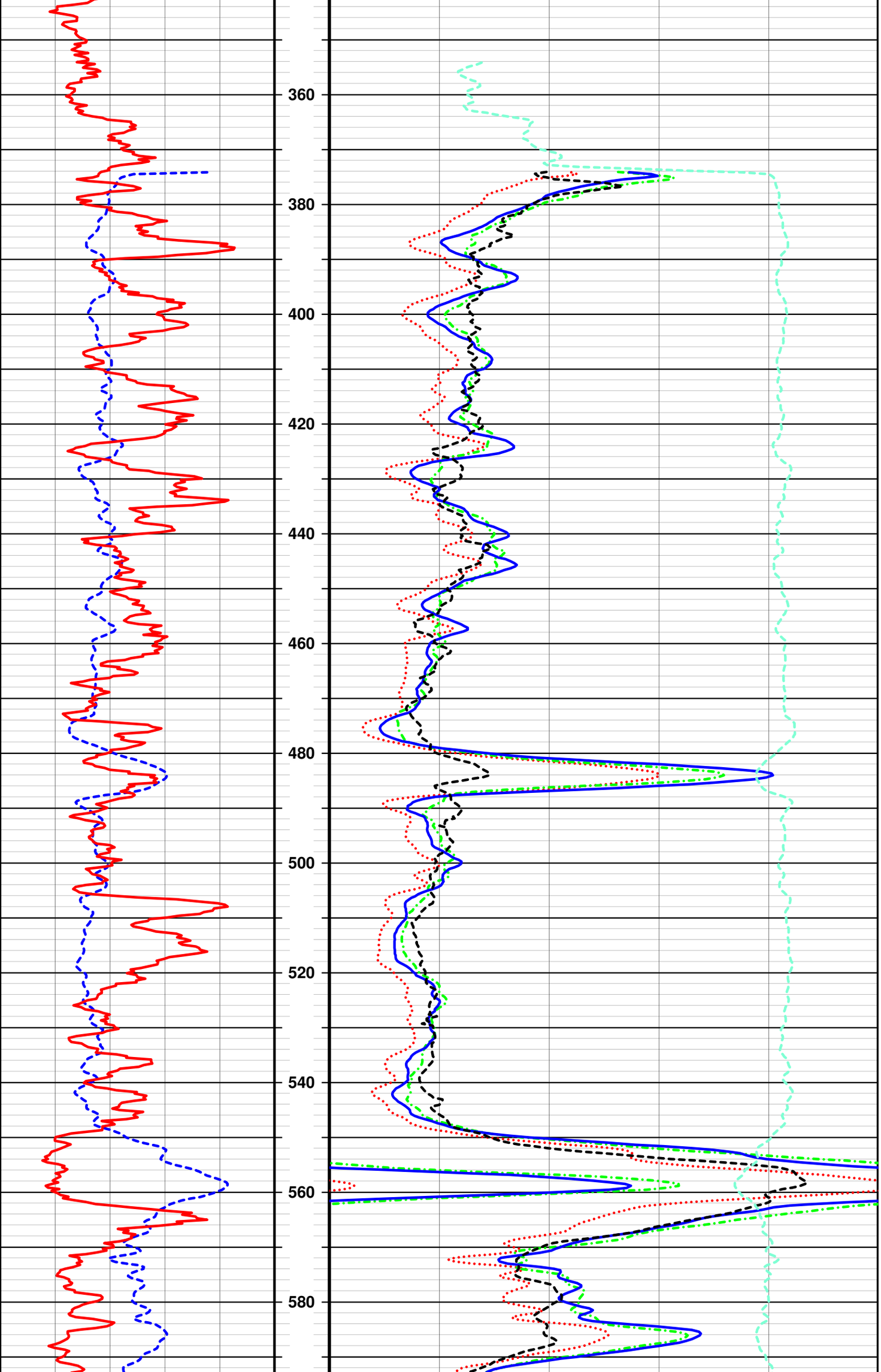
320
340


360
380
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440
460
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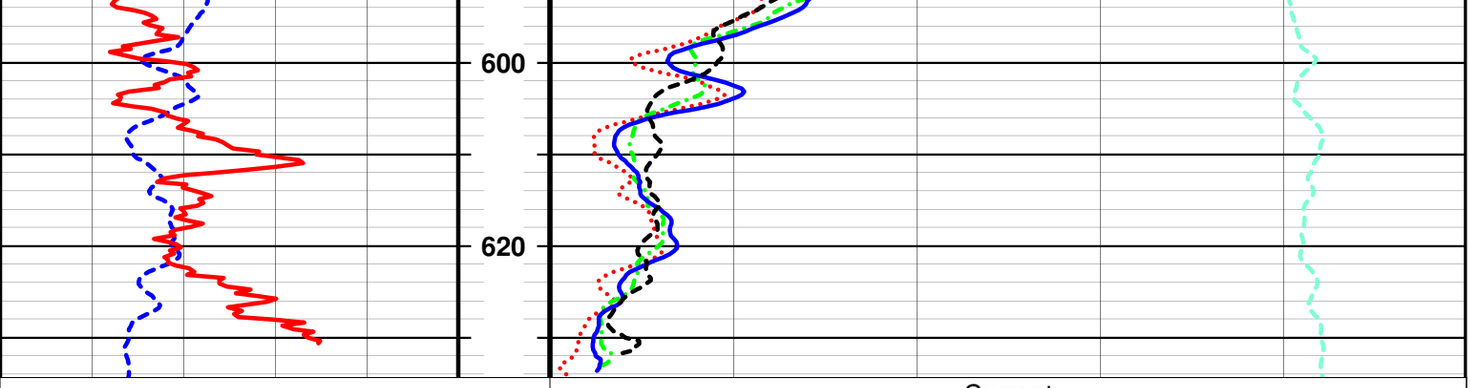
520
540
560
580



Gamma
0 CPS 100
SPR
0 ohm 200

Depth
1in:20ft

Current
0 mA 20
R64
0 Ohm-m 200
R16
0 Ohm-m 200
R32
0 Ohm-m 200
R8
0 Ohm-m 200

Appendix C

State Well Reports

Well Report

Well No. 1

STATE OF TEXAS WELL REPORT for Tracking #572937

Owner:	**Dan Mullins**	Owner Well #:	**1**
Address:	**1301 CR 480 Center Point, TX 78010**	Grid #:	**69-08-5**
Well Location:	**1301 CR 480 Center Point, TX 78010**	Latitude:	**29° 55' 01.62" N**
		Longitude:	**099° 04' 57.44" W**
Well County:	**Kerr**	Elevation:	**No Data**
Number of Wells Drilled:	**3**		
Type of Work:	**New Well**	Proposed Use:	**Test Well**

Drilling Start Date: **4/6/2021** Drilling End Date: **4/8/2021**

	Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
Borehole:	**8**	**0**	**640**

Drilling Method: **Air Rotary**

Borehole Completion: **Straight Wall**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**20**	**Cement 9 Bags/Sacks**
20	**430**	**Bentonite 29 Bags/Sacks**
430	**460**	**Cement 12 Bags/Sacks**

Seal Method: **Pressure**

Sealed By: **Driller**

Distance to Property Line (ft.): **100+**

Distance to Septic Field or other concentrated contamination (ft.): **NA**

Distance to Septic Tank (ft.): **NA**

Method of Verification: **owner**

Surface Completion: **Surface Sleeve Installed** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **Rubber at 460 ft.**
Plastic at 461 ft.
Rubber at 465 ft.
Plastic at 466 ft.
Rubber at 470 ft.
Plastic at 471 ft.

Type of Pump: **No Data**

Well Tests: **Estimated** **Yield: 20-25 GPM**

Water Quality:

Strata Depth (ft.)	Water Type
460 - 600	**good**

Chemical Analysis Made: **Yes**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Texan Water**

161 Industrial Loop
Fredericksburg, TX 78624

Driller Name: **Brice Bormann** License Number: **54855**

Apprentice Name: **Justin Bounds** Apprentice Number: **60110**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**20**	**Top soil, river gravel, sand and yellow clay**
20	**40**	**Yellow clay and gravel**
40	**80**	**Grey shale**
80	**180**	**Grey shale with limestone ledges**
180	**200**	**Gypsum with grey and tan limestone**
200	**240**	**Grey shale with streaks of gypsum**
240	**280**	**Tan limestone with brown stringers**
280	**340**	**Grey shale and limestone**
340	**360**	**Tan limestone**
360	**380**	**Tan and brown limestone**
380	**420**	**Grey and tan shaley limestone**
420	**440**	**Tan and brown sand**
440	**460**	**Tan and white sandstone**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
4.5	**Blank**	**New Plastic (PVC)**		**0**	**540**
4.5	**Screen**	**New Plastic (PVC)**	**0.032**	**540**	**600**

460	**480**	**Green, tan, and brown sandstone with clay**
480	**500**	**Firm red sandstone with red clay**
500	**520**	**Red sandstone**
520	**540**	**Firm red, tan and green sandstone**
540	**580**	**Green, tan and brown limestone**
580	**640**	**Grey and tan limestone with grey clay**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

Well Report

Well No. 2

STATE OF TEXAS WELL REPORT for Tracking #572938

Owner: **Dan Mullins**

Address: **1301 CR 480**
Center Point, TX 78010

Well Location: **1301 CR 480**
Center Point, TX 78010

Well County: **Kerr**

Number of Wells Drilled: **3**

Owner Well #: **2**

Grid #: **69-08-8**

Latitude: **29° 54' 59.84" N**

Longitude: **099° 04' 56.61" W**

Elevation: **No Data**

Type of Work: **New Well**

Proposed Use: **Test Well**

Drilling Start Date: **4/13/2021** Drilling End Date: **4/14/2021**

Borehole:

Diameter (in.)	Top Depth (ft.)	Bottom Depth (ft.)
8	0	580

Drilling Method: **Air Rotary**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

Top Depth (ft.)	Bottom Depth (ft.)	Filter Material	Size
460	550	Gravel	

Annular Seal Data:

Top Depth (ft.)	Bottom Depth (ft.)	Description (number of sacks & material)
0	60	Cement 35 Bags/Sacks
60	420	Bentonite 35 Bags/Sacks
420	460	Cement 12 Bags/Sacks

Seal Method: **Pressure**

Sealed By: **Driller**

Distance to Property Line (ft.): **100+**

Distance to Septic Field or other concentrated contamination (ft.): **NA**

Distance to Septic Tank (ft.): **NA**

Method of Verification: **owner**

Surface Completion: **Surface Sleeve Installed** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **Estimated** **Yield: 25-30 GPM**

Water Quality:

Strata Depth (ft.)	Water Type
460 - 550	**good**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Texan Water**

161 Industrial Loop
Fredericksburg, TX 78624

Driller Name: **Brice Bormann** License Number: **54855**

Apprentice Name: **Justin Bounds** Apprentice Number: **60110**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**20**	**Chalky tan and white limestone**
20	**40**	**Grey shale with streak of clay and gravel**
40	**160**	**Grey shale**
160	**180**	**Gypsum**
180	**220**	**Grey shale**
220	**240**	**Brown and tan limestone with shale**
240	**340**	**Grey shale**
340	**440**	**Dark grey shale**
440	**460**	**Green and tan limestone**
460	**480**	**Brown and red sandstone**
480	**500**	**Red sand**
500	**520**	**Green and tan limestone**
520	**540**	**Green and blue clay**
540	**580**	**Dark grey and blue clay**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
4.5	**Blank**	**New Plastic (PVC)**		**0**	**490**
4.5	**Screen**	**New Plastic (PVC)**	**0.032**	**490**	**550**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

Well Report

Well No. 3

STATE OF TEXAS WELL REPORT for Tracking #572939

Owner: **Dan Mullins**

Address: **1301 CR 480**
Center Point, TX 78010

Well Location: **1301 CR 480**
Center Point, TX 78010

Well County: **Kerr**

Number of Wells Drilled: **3**

Owner Well #: **3**

Grid #: **69-08-8**

Latitude: **29° 54' 59.91" N**

Longitude: **099° 04' 44.9" W**

Elevation: **No Data**

Type of Work: **New Well**

Proposed Use: **Test Well**

Drilling Start Date: **4/15/2021** Drilling End Date: **4/15/2021**

	Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
Borehole:	**8**	**0**	**580**

Drilling Method: **Air Rotary**

Borehole Completion: **Straight Wall**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**60**	**Cement 25 Bags/Sacks**
60	**420**	**Bentonite 30 Bags/Sacks**
420	**460**	**Cement 12 Bags/Sacks**

Seal Method: **Pressure**

Sealed By: **Driller**

Distance to Property Line (ft.): **100+**

Distance to Septic Field or other concentrated contamination (ft.): **NA**

Distance to Septic Tank (ft.): **NA**

Method of Verification: **Owner**

Surface Completion: **Surface Sleeve Installed** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **Rubber at 460 ft.**
Plastic at 461 ft.
Rubber at 465 ft.
Plastic at 466 ft.
Rubber at 470 ft.
Plastic at 471 ft.

Type of Pump: **No Data**

Well Tests: **Estimated** **Yield: 30+ GPM**

Water Quality:

Strata Depth (ft.)	Water Type
460 - 580	**good**

Chemical Analysis Made: **Yes**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Texan Water**

161 Industrial Loop
Fredericksburg, TX 78624

Driller Name: **Brice Bormann** License Number: **54855**

Apprentice Name: **Justin Bounds** Apprentice Number: **60110**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**20**	**White caliche with yellow clay**
20	**180**	**Grey shale**
180	**200**	**Gypsum**
200	**220**	**Gypsum and grey shale**
220	**240**	**Grey shale**
240	**260**	**Brown and tan shale**
260	**280**	**Dark grey shale**
280	**380**	**Grey and brown shale**
380	**420**	**Dark grey shale**
420	**440**	**Green and tan limestone**
440	**480**	**Green, tan and brown limestone**
480	**500**	**Tan and brown limestone**
500	**520**	**Green and red sandstone**
520	**540**	**Green, red and tan limestone**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
4.5	**Blank**	**New Plastic (PVC)**		**0**	**520**
4.5	**Screen**	**New Plastic (PVC)**	**0.032**	**520**	**580**

540	**560**	**Green, yellow and tan limestone with clay**
560	**580**	**Dark grey sandy limestone with grey clay**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

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Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

Appendix C

Aquifer Test Data and Analysis

Aquifer Test

Well No. 1

Camp Verde Well No. 1 - Aquifer Test (April 20, 2021)

Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	PW Well No. 1 Temperature (F)	PW Well No. 1 Water Level (ft bgs)	PW Well No. 1 Water Level (ft MSL)	PW Well No. 1 Drawdown (ft)	PW Well No. 1 Pump Rate (gpm)	PW Well No. 1 Specific Capacity (gpm/ft)	Comments	OW Well No. 2 Water Level (ft MSL)	OW Well No. 2 Drawdown (ft)
4/20/21 10:37 AM	0		73.57	376.14	1,251.86	0.00			Pump Start	1,255.73	0.00
4/20/21 10:38 AM	1		73.59	383.04	1,244.96	6.90	24.0	3.48	Meter: 45,205.2 gallons	1,255.73	0.00
4/20/21 10:39 AM	2		73.69	405.53	1,222.47	29.39				1,255.68	0.05
4/20/21 10:40 AM	3		73.89	419.19	1,208.82	43.04				1,255.66	0.07
4/20/21 10:41 AM	4		74.10	427.99	1,200.01	51.85	24.0	0.46	EC: 0.92	1,255.73	0.00
4/20/21 10:42 AM	5		74.24	435.54	1,192.46	59.40				1,255.72	0.01
4/20/21 10:43 AM	6		74.32	441.37	1,186.63	65.23				1,255.66	0.06
4/20/21 10:44 AM	7		74.31	446.02	1,181.98	69.88				1,255.71	0.02
4/20/21 10:45 AM	8		74.27	450.01	1,177.99	73.87				1,255.76	-0.04
4/20/21 10:46 AM	9		74.21	453.40	1,174.60	77.26				1,255.76	-0.03
4/20/21 10:47 AM	10		74.15	456.37	1,171.63	80.23				1,255.67	0.06
4/20/21 10:48 AM	11		74.07	459.08	1,168.92	82.94				1,255.70	0.03
4/20/21 10:49 AM	12		73.98	461.46	1,166.54	85.32				1,255.81	-0.08
4/20/21 10:50 AM	13		73.93	463.48	1,164.52	87.34				1,255.74	-0.01
4/20/21 10:51 AM	14		73.86	465.46	1,162.54	89.32				1,255.63	0.10
4/20/21 10:52 AM	15		73.79	467.26	1,160.74	91.12				1,255.72	0.01
4/20/21 10:57 AM	20		73.55	474.78	1,153.22	98.64				1,255.70	0.03
4/20/21 11:02 AM	25		73.38	478.11	1,149.89	101.97				1,255.75	-0.02
4/20/21 11:07 AM	30		73.37	482.08	1,145.92	105.94	27.0	0.25	EC: 0.96	1,255.68	0.05
4/20/21 11:22 AM	45		73.74	463.04	1,164.97	86.89	12.5	0.14	EC: 0.96	1,255.61	0.12
4/20/21 11:37 AM	60		73.97	457.83	1,170.17	81.69				1,255.71	0.01
4/20/21 11:52 AM	75		73.95	458.21	1,169.79	82.07				1,255.68	0.04
4/20/21 12:07 PM	90		74.03	458.93	1,169.08	82.78				1,255.74	-0.01
4/20/21 12:22 PM	105		74.13	460.09	1,167.91	83.95				1,255.63	0.10
4/20/21 12:37 PM	120		74.08	461.28	1,166.72	85.14	12.8	0.15	EC: 0.95	1,255.70	0.03
4/20/21 1:07 PM	150		74.16	463.42	1,164.58	87.28				1,255.65	0.08
4/20/21 1:37 PM	180		74.18	465.58	1,162.42	89.43	12.8	0.14	EC: 0.96	1,255.62	0.11
4/20/21 2:07 PM	210		74.07	455.77	1,172.23	79.63	10.0	0.13	pH: 7.06/ EC: 0.95	1,255.63	0.10
4/20/21 2:37 PM	240		74.11	453.75	1,174.25	77.61				1,255.50	0.23
4/20/21 3:37 PM	300		74.20	454.26	1,173.74	78.12				1,255.40	0.33
4/20/21 4:37 PM	360		74.22	454.86	1,173.14	78.72				1,255.36	0.37
4/20/21 5:37 PM	420		74.23	455.78	1,172.22	79.64				1,255.27	0.46
4/20/21 6:37 PM	480		74.24	456.57	1,171.44	80.42				1,255.29	0.44
4/20/21 7:37 PM	540		74.23	457.16	1,170.84	81.02				1,255.18	0.55
4/20/21 8:37 PM	600		74.24	457.75	1,170.25	81.61				1,255.15	0.58

Note: bgs = below ground surface Column Pipe Diameter = 1 1/4 inches Horsepower = 5 HP
MSL = Mean Sea Level Pump Setting = 560 ft EC=Electrical conductivity (mS/cm)

Camp Verde Well No. 1 - Aquifer Test (April 20, 2021)

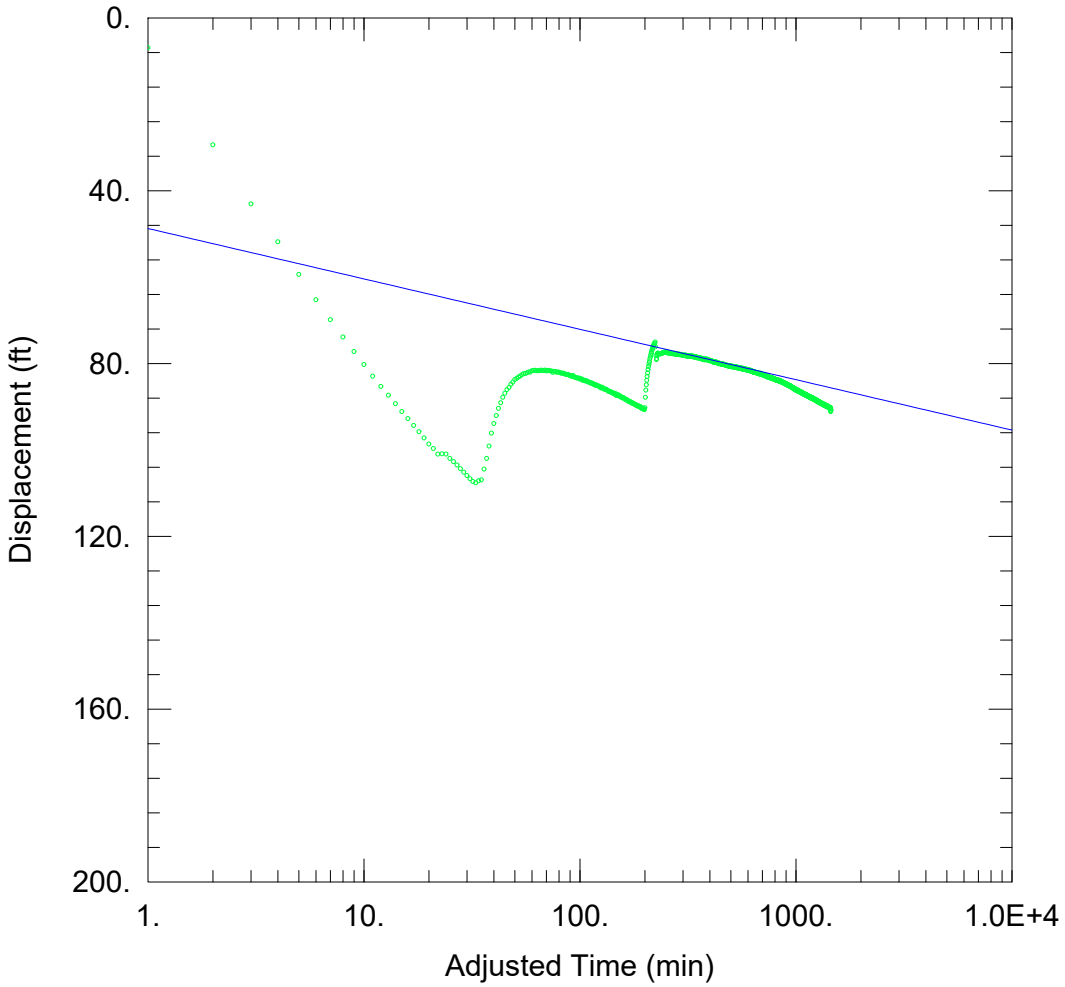
Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	PW Well No. 1 Temperature (F)	PW Well No. 1 Water Level (ft bgs)	PW Well No. 1 Water Level (ft MSL)	PW Well No. 1 Drawdown (ft)	PW Well No. 1 Pump Rate (gpm)	PW Well No. 1 Specific Capacity (gpm/ft)	Comments	OW Well No. 2 Water Level (ft MSL)	OW Well No. 2 Drawdown (ft)
4/20/21 9:37 PM	660		74.23	458.27	1,169.73	82.13				1,255.09	0.64
4/20/21 10:37 PM	720		74.22	458.87	1,169.13	82.73				1,255.03	0.69
4/20/21 11:37 PM	780		74.23	459.68	1,168.32	83.54				1,254.91	0.82
4/21/21 12:37 AM	840		74.24	460.14	1,167.86	84.00				1,254.83	0.90
4/21/21 1:37 AM	900		74.24	460.80	1,167.20	84.66				1,254.92	0.81
4/21/21 2:37 AM	960		74.23	461.63	1,166.37	85.49				1,254.73	1.00
4/21/21 3:37 AM	1,020		74.23	462.44	1,165.57	86.29				1,254.73	1.00
4/21/21 4:37 AM	1,080		74.23	463.05	1,164.95	86.91				1,254.62	1.11
4/21/21 5:37 AM	1,140		74.23	463.79	1,164.22	87.64				1,254.62	1.11
4/21/21 6:37 AM	1,200		74.28	464.29	1,163.71	88.15				1,254.55	1.18
4/21/21 7:37 AM	1,260		74.28	464.90	1,163.10	88.76				1,254.54	1.19
4/21/21 8:37 AM	1,320		74.27	465.53	1,162.47	89.39				1,254.48	1.25
4/21/21 9:37 AM	1,380		74.27	465.95	1,162.05	89.81				1,254.35	1.38
4/21/21 10:37 AM	1,440		74.26	466.44	1,161.56	90.30				1,254.29	1.43
4/21/21 10:50 AM	1,453	0	74.27	466.95	1,161.06	90.80	10.0	0.11	Pump Stop	1,254.30	1.43
4/21/21 10:51 AM	1,454	1	74.27	464.55	1,163.45	88.41			Meter: 60,498.2 gallons	1,254.40	1.33
4/21/21 10:52 AM	1,455	2	74.27	458.05	1,169.95	81.91			Avg. Pump Rate: 10.5 gpm	1,254.33	1.40
4/21/21 10:53 AM	1,456	3	74.24	452.84	1,175.16	76.70				1,254.27	1.46
4/21/21 10:54 AM	1,457	4	74.22	448.72	1,179.28	72.57				1,254.25	1.48
4/21/21 10:55 AM	1,458	5	74.19	445.24	1,182.76	69.10				1,254.28	1.45
4/21/21 10:56 AM	1,459	6	74.16	442.36	1,185.64	66.22				1,254.36	1.37
4/21/21 10:57 AM	1,460	7	74.13	439.96	1,188.05	63.81				1,254.34	1.38
4/21/21 10:58 AM	1,461	8	74.10	437.87	1,190.13	61.73				1,254.35	1.38
4/21/21 10:59 AM	1,462	9	74.07	436.08	1,191.92	59.94				1,254.24	1.49
4/21/21 11:00 AM	1,463	10	74.04	434.47	1,193.54	58.32				1,254.34	1.39
4/21/21 11:01 AM	1,464	11	74.01	433.11	1,194.89	56.97				1,254.34	1.39
4/21/21 11:02 AM	1,465	12	73.98	431.86	1,196.14	55.72				1,254.27	1.46
4/21/21 11:03 AM	1,466	13	73.95	430.70	1,197.30	54.56				1,254.27	1.46
4/21/21 11:04 AM	1,467	14	73.94	429.67	1,198.33	53.53				1,254.31	1.41
4/21/21 11:05 AM	1,468	15	73.91	428.72	1,199.28	52.58				1,254.28	1.45
4/21/21 11:10 AM	1,473	20	73.81	424.89	1,203.11	48.75				1,254.23	1.50
4/21/21 11:15 AM	1,478	25	73.72	422.15	1,205.86	46.00				1,254.28	1.45
4/21/21 11:20 AM	1,483	30	73.66	419.99	1,208.01	43.85				1,254.29	1.44
4/21/21 11:35 AM	1,498	45	73.60	415.46	1,212.54	39.32				1,254.23	1.49
4/21/21 11:50 AM	1,513	60	73.63	412.42	1,215.58	36.27				1,254.23	1.50

Note: bgs = below ground surface Column Pipe Diameter = 1 1/4 inches Horsepower = 5 HP
MSL = Mean Sea Level Pump Setting = 560 ft EC=Electrical conductivity (mS/cm)

Camp Verde Well No. 1 - Aquifer Test (April 20, 2021)

Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	PW Well No. 1 Temperature (F)	PW Well No. 1 Water Level (ft bgs)	PW Well No. 1 Water Level (ft MSL)	PW Well No. 1 Drawdown (ft)	PW Well No. 1 Pump Rate (gpm)	PW Well No. 1 Specific Capacity (gpm/ft)	Comments	OW Well No. 2 Water Level (ft MSL)	OW Well No. 2 Drawdown (ft)
4/21/21 12:05 PM	1,528	75	73.69	410.12	1,217.88	33.98				1,254.23	1.50
4/21/21 12:20 PM	1,543	90	73.72	408.25	1,219.75	32.11				1,254.10	1.63
4/21/21 12:35 PM	1,558	105	73.71	406.66	1,221.34	30.52				1,254.17	1.56
4/21/21 12:50 PM	1,573	120	73.70	405.31	1,222.69	29.17				1,254.09	1.64
4/21/21 1:20 PM	1,603	150	73.66	403.02	1,224.98	26.88				1,254.14	1.59
4/21/21 1:50 PM	1,633	180	73.62	401.11	1,226.90	24.96				1,254.05	1.68
4/21/21 2:20 PM	1,663	210	73.59	399.52	1,228.48	23.38				1,254.03	1.70
4/21/21 2:50 PM	1,693	240	73.56	398.20	1,229.80	22.06				1,254.08	1.65
4/21/21 3:50 PM	1,753	300	73.50	395.97	1,232.03	19.83				1,254.02	1.71
4/21/21 4:50 PM	1,813	360	73.46	394.25	1,233.76	18.10				1,253.94	1.79
4/21/21 5:50 PM	1,873	420	73.43	392.73	1,235.27	16.59				1,253.84	1.89
4/21/21 6:50 PM	1,933	480	73.40	391.47	1,236.53	15.33				1,253.80	1.93
4/21/21 7:50 PM	1,993	540	73.37	390.43	1,237.58	14.28				1,253.79	1.94
4/21/21 8:50 PM	2,053	600	73.35	389.49	1,238.51	13.35				1,253.81	1.92
4/21/21 9:50 PM	2,113	660	73.34	388.69	1,239.31	12.55				1,253.77	1.95
4/21/21 10:50 PM	2,173	720	73.32	387.95	1,240.05	11.81				1,253.79	1.94
4/21/21 11:50 PM	2,233	780	73.31	387.32	1,240.68	11.18				1,253.69	2.04
4/22/21 12:50 AM	2,293	840	73.30	386.77	1,241.23	10.63				1,253.75	1.98
4/22/21 1:50 AM	2,353	900	73.29	386.20	1,241.81	10.05				1,253.83	1.89
4/22/21 2:50 AM	2,413	960	73.28	385.72	1,242.28	9.58				1,253.80	1.93
4/22/21 3:50 AM	2,473	1020	73.28	385.26	1,242.74	9.12				1,253.70	2.03
4/22/21 4:50 AM	2,533	1080	73.27	384.85	1,243.15	8.71				1,253.70	2.03
4/22/21 5:50 AM	2,593	1140	73.27	384.50	1,243.50	8.36				1,253.66	2.07
4/22/21 6:50 AM	2,653	1200	73.27	384.16	1,243.84	8.02				1,253.77	1.95
4/22/21 7:50 AM	2,713	1260	73.27	383.85	1,244.15	7.71				1,253.70	2.03
4/22/21 8:50 AM	2,773	1320	73.27	383.56	1,244.44	7.42				1,253.71	2.02
4/22/21 9:50 AM	2,833	1380	73.27	383.29	1,244.71	7.15				1,253.63	2.09
4/22/21 9:58 AM	2,841	1388	73.26	383.22	1,244.78	7.08				1,253.71	2.02

Note: bgs = below ground surface Column Pipe Diameter = 1 1/4 inches Horsepower = 5 HP
MSL = Mean Sea Level Pump Setting = 560 ft EC=Electrical conductivity (mS/cm)



WELL TEST ANALYSIS

Data Set: \...\PW 1.aqt
Date: 05/13/21 Time: 17:49:41

PROJECT INFORMATION

Company: Wet Rock Groundwater Services
Location: Kerr County
Test Well: Well No. 1
Test Date: 4-20-21

AQUIFER DATA

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

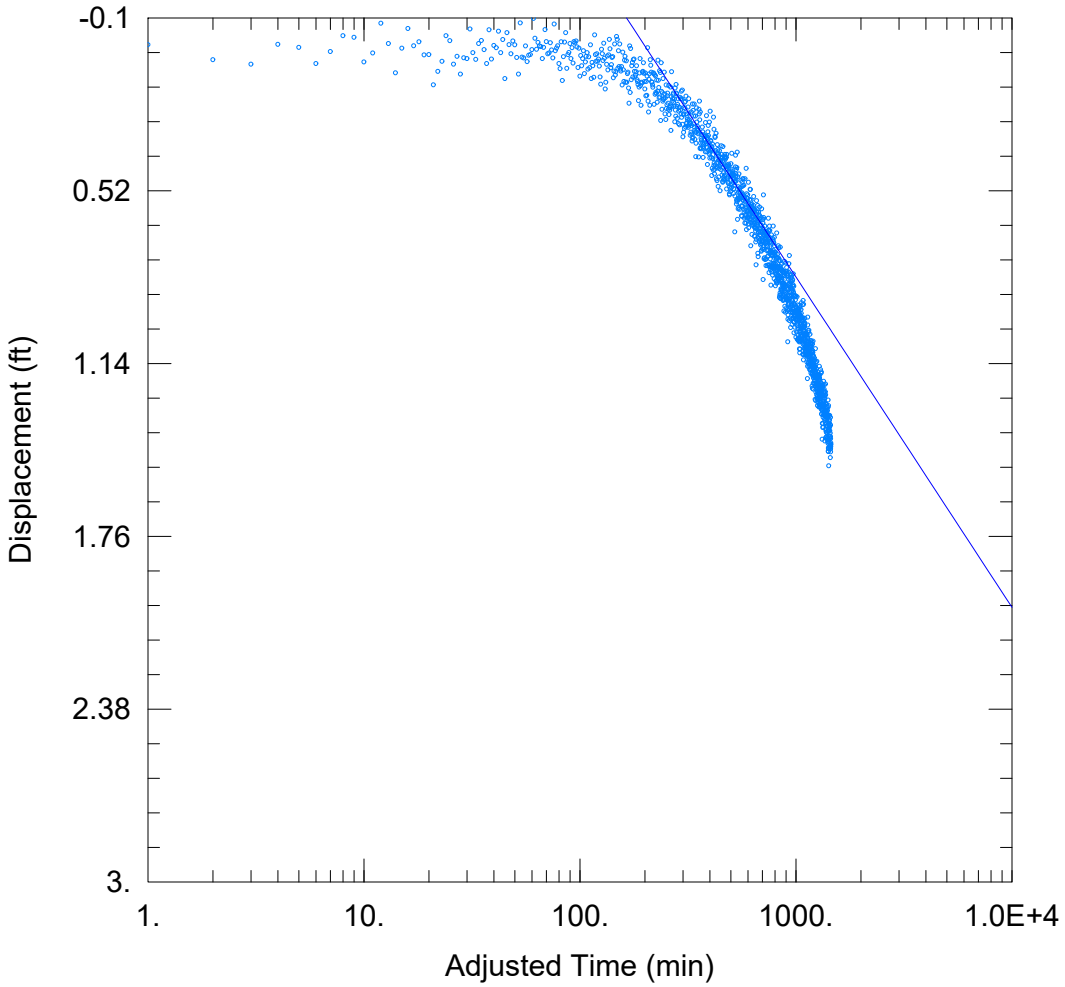
Pumping Wells

Well Name	X (ft)	Y (ft)
Well No. 1	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob

T = 31.75 ft^2/day



WELL TEST ANALYSIS

Data Set: \...\OW 2.aqt
Date: 05/13/21 Time: 17:50:09

PROJECT INFORMATION

Company: Wet Rock Groundwater Services
Location: Kerr County
Test Well: Well No. 1
Test Date: 4-20-21

AQUIFER DATA

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well No. 1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
Well No. 2	1023	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob
T = 312.5 ft^2/day
S = 9.297E-5

Aquifer Test

Well No. 3

Camp Verde Well No. 3 - Aquifer Test (April 22, 2021)

Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	PW Well No. 3 Temperature (F)	PW Well No. 3 Water Level (ft bgs)	PW Well No. 3 Water Level (ft MSL)	PW Well No. 3 Drawdown (ft)	PW Well No. 3 Pump Rate (gpm)	PW Well No. 3 Specific Capacity (gpm/ft)	Comments	OW Well No. 2 Water Level (ft MSL)	OW Well No. 2 Drawdown (ft)
4/22/21 10:42 AM	0		69.54	387.13	1,251.87	0.00			Pump Start	1,253.66	0.00
4/22/21 10:43 AM	1		70.59	388.02	1,250.98	0.89	12.0	13.48	Meter: 60,522 gallons	1,253.61	0.04
4/22/21 10:44 AM	2		71.34	403.80	1,235.20	16.67				1,253.59	0.06
4/22/21 10:45 AM	3		71.88	412.97	1,226.03	25.84				1,253.67	-0.01
4/22/21 10:46 AM	4		72.29	419.00	1,220.01	31.86				1,253.66	0.00
4/22/21 10:47 AM	5		72.70	423.20	1,215.80	36.07				1,253.63	0.03
4/22/21 10:48 AM	6		73.12	426.25	1,212.76	39.11	11.2	0.29		1,253.54	0.12
4/22/21 10:49 AM	7		73.51	428.23	1,210.77	41.10				1,253.58	0.08
4/22/21 10:50 AM	8		73.83	429.62	1,209.38	42.49				1,253.48	0.17
4/22/21 10:51 AM	9		74.10	430.80	1,208.20	43.67				1,253.65	0.01
4/22/21 10:52 AM	10		74.31	431.74	1,207.26	44.61				1,253.68	-0.03
4/22/21 10:53 AM	11		74.50	432.64	1,206.36	45.51	11.2	0.25	EC: 1.6	1,253.56	0.10
4/22/21 10:54 AM	12		74.64	433.36	1,205.64	46.22				1,253.53	0.12
4/22/21 10:55 AM	13		74.76	433.95	1,205.05	46.81				1,253.47	0.19
4/22/21 10:56 AM	14		74.86	434.53	1,204.47	47.40				1,253.57	0.09
4/22/21 10:57 AM	15		74.92	435.04	1,203.96	47.91				1,253.55	0.11
4/22/21 11:02 AM	20		75.10	437.41	1,201.60	50.27				1,253.63	0.02
4/22/21 11:07 AM	25		74.98	435.34	1,203.66	48.21				1,253.61	0.04
4/22/21 11:12 AM	30		74.90	433.68	1,205.32	46.55	10.0	0.21	EC: 1.6	1,253.56	0.10
4/22/21 11:27 AM	45		74.72	434.89	1,204.11	47.76				1,253.54	0.11
4/22/21 11:42 AM	60		74.56	436.18	1,202.82	49.05				1,253.57	0.09
4/22/21 11:57 AM	75		74.33	437.43	1,201.57	50.29				1,253.50	0.16
4/22/21 12:12 PM	90		74.20	438.34	1,200.66	51.21				1,253.43	0.23
4/22/21 12:27 PM	105		74.11	439.18	1,199.82	52.05				1,253.44	0.22
4/22/21 12:42 PM	120		74.04	440.22	1,198.78	53.09	10.0	0.19	pH: 7.34/ EC: 1.31	1,253.36	0.30
4/22/21 1:12 PM	150		73.95	444.41	1,194.59	57.27				1,253.22	0.44
4/22/21 1:42 PM	180		73.89	445.61	1,193.39	58.48				1,253.04	0.61
4/22/21 2:12 PM	210		73.84	446.57	1,192.44	59.43				1,252.87	0.78
4/22/21 2:42 PM	240		73.83	447.42	1,191.59	60.28				1,252.61	1.05
4/22/21 3:42 PM	300		73.83	448.74	1,190.26	61.60				1,252.24	1.41
4/22/21 4:42 PM	360		73.81	449.55	1,189.45	62.42				1,251.93	1.73
4/22/21 5:42 PM	420		73.82	450.25	1,188.75	63.12				1,251.54	2.11
4/22/21 6:42 PM	480		73.83	451.10	1,187.91	63.96				1,251.16	2.50
4/22/21 7:42 PM	540		73.83	451.65	1,187.35	64.52				1,250.77	2.89
4/22/21 8:42 PM	600		73.84	452.29	1,186.71	65.16				1,250.42	3.23

Note: bgs = below ground surface Column Pipe Diameter = 1 1/4 inches Horsepower = 2 HP
MSL = Mean Sea Level Pump Setting = 520 ft EC=Electrical conductivity (mS/cm)

Camp Verde Well No. 3 - Aquifer Test (April 22, 2021)

Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	PW Well No. 3 Temperature (F)	PW Well No. 3 Water Level (ft bgs)	PW Well No. 3 Water Level (ft MSL)	PW Well No. 3 Drawdown (ft)	PW Well No. 3 Pump Rate (gpm)	PW Well No. 3 Specific Capacity (gpm/ft)	Comments	OW Well No. 2 Water Level (ft MSL)	OW Well No. 2 Drawdown (ft)
4/22/21 9:42 PM	660		73.85	452.81	1,186.19	65.68				1,250.02	3.63
4/22/21 10:42 PM	720		73.85	453.36	1,185.64	66.22				1,249.68	3.97
4/22/21 11:42 PM	780		73.86	453.95	1,185.05	66.82				1,249.47	4.18
4/23/21 12:42 AM	840		73.86	454.29	1,184.71	67.15				1,249.11	4.55
4/23/21 1:42 AM	900		73.86	454.70	1,184.30	67.57				1,248.83	4.82
4/23/21 2:42 AM	960		73.87	455.45	1,183.55	68.32				1,248.47	5.19
4/23/21 3:42 AM	1,020		73.87	455.81	1,183.19	68.68				1,248.17	5.48
4/23/21 4:42 AM	1,080		73.87	456.16	1,182.84	69.03				1,248.03	5.63
4/23/21 5:42 AM	1,140		73.88	456.43	1,182.57	69.30				1,247.67	5.98
4/23/21 6:42 AM	1,200		73.89	456.70	1,182.30	69.56				1,247.42	6.23
4/23/21 7:42 AM	1,260		73.89	457.02	1,181.98	69.89				1,247.22	6.44
4/23/21 8:42 AM	1,320		73.88	457.26	1,181.74	70.13				1,246.94	6.71
4/23/21 9:42 AM	1,380		73.89	457.51	1,181.49	70.38				1,246.75	6.91
4/23/21 10:42 AM	1,440		73.90	457.88	1,181.12	70.75				1,246.52	7.14
4/23/21 10:53 AM	1,451	0	73.89	457.86	1,181.14	70.73	10.0	0.14	Pump Stop	1,246.38	7.28
4/23/21 10:54 AM	1,452	1	73.90	446.13	1,192.87	59.00			Meter: 74,951.4 gallons	1,246.44	7.21
4/23/21 10:55 AM	1,453	2	73.89	439.08	1,199.92	51.94			Avg. Pump Rate: 10 gpm	1,246.38	7.28
4/23/21 10:56 AM	1,454	3	73.89	434.43	1,204.57	47.30				1,246.40	7.26
4/23/21 10:57 AM	1,455	4	73.88	431.09	1,207.91	43.96				1,246.45	7.21
4/23/21 10:58 AM	1,456	5	73.87	428.55	1,210.45	41.42				1,246.49	7.17
4/23/21 10:59 AM	1,457	6	73.82	426.55	1,212.45	39.42				1,246.40	7.25
4/23/21 11:00 AM	1,458	7	73.79	424.93	1,214.07	37.80				1,246.41	7.24
4/23/21 11:01 AM	1,459	8	73.80	423.61	1,215.39	36.48				1,246.46	7.20
4/23/21 11:02 AM	1,460	9	73.80	422.48	1,216.52	35.35				1,246.42	7.24
4/23/21 11:03 AM	1,461	10	73.79	421.55	1,217.45	34.41				1,246.36	7.29
4/23/21 11:04 AM	1,462	11	73.79	420.68	1,218.32	33.54				1,246.35	7.31
4/23/21 11:05 AM	1,463	12	73.80	419.94	1,219.06	32.81				1,246.39	7.27
4/23/21 11:06 AM	1,464	13	73.80	419.31	1,219.69	32.18				1,246.35	7.30
4/23/21 11:07 AM	1,465	14	73.80	418.68	1,220.32	31.55				1,246.34	7.32
4/23/21 11:08 AM	1,466	15	73.80	418.15	1,220.85	31.02				1,246.36	7.30
4/23/21 11:13 AM	1,471	20	73.81	416.08	1,222.92	28.95				1,246.42	7.23
4/23/21 11:18 AM	1,476	25	73.84	414.56	1,224.44	27.42				1,246.30	7.36
4/23/21 11:23 AM	1,481	30	73.87	413.35	1,225.65	26.22				1,246.47	7.19
4/23/21 11:38 AM	1,496	45	73.93	410.76	1,228.25	23.62				1,246.24	7.42
4/23/21 11:53 AM	1,511	60	73.93	408.98	1,230.02	21.85				1,246.27	7.39

Note: bgs = below ground surface Column Pipe Diameter = 1 1/4 inches Horsepower = 2 HP
MSL = Mean Sea Level Pump Setting = 520 ft EC=Electrical conductivity (mS/cm)

Camp Verde Well No. 3 - Aquifer Test (April 22, 2021)

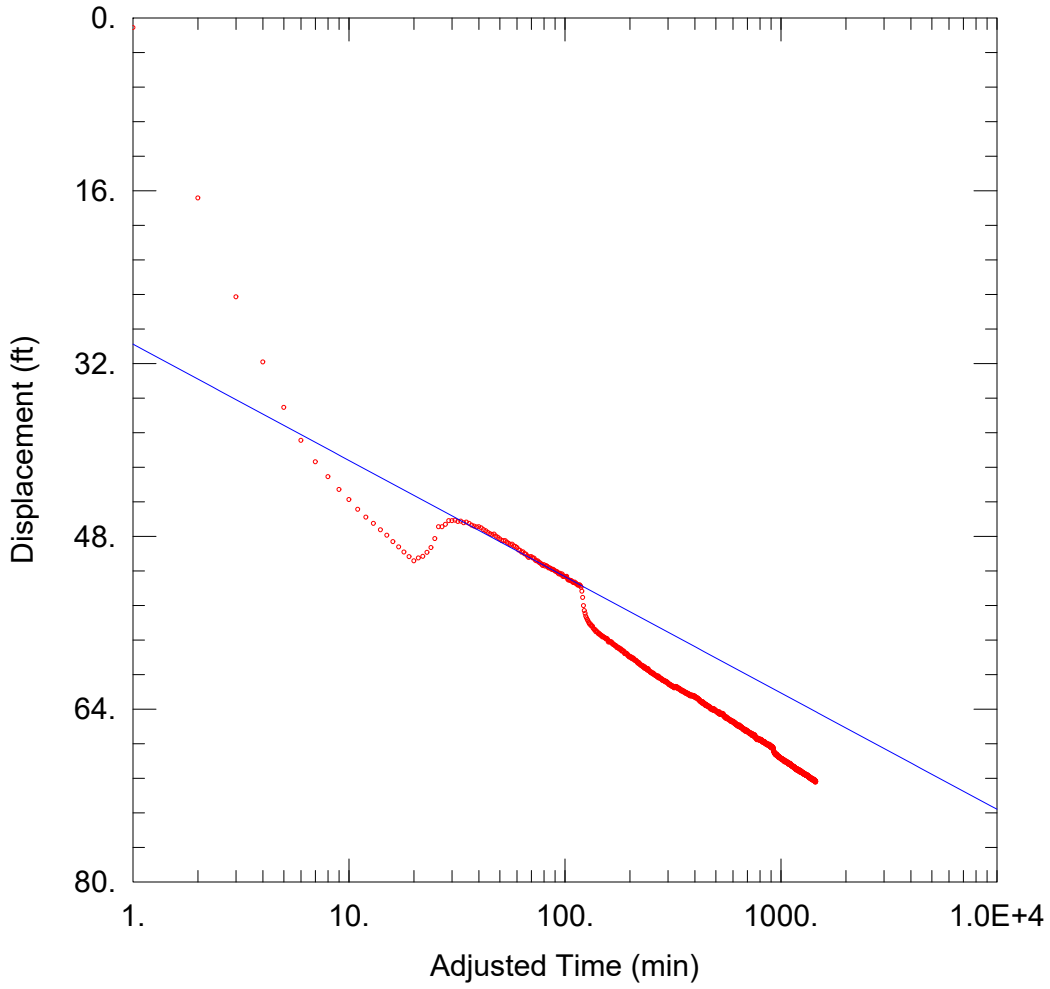
Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	PW Well No. 3 Temperature (F)	PW Well No. 3 Water Level (ft bgs)	PW Well No. 3 Water Level (ft MSL)	PW Well No. 3 Drawdown (ft)	PW Well No. 3 Pump Rate (gpm)	PW Well No. 3 Specific Capacity (gpm/ft)	Comments	OW Well No. 2 Water Level (ft MSL)	OW Well No. 2 Drawdown (ft)
4/23/21 12:08 PM	1,526	75	73.90	407.65	1,231.35	20.52				1,246.25	7.40
4/23/21 12:23 PM	1,541	90	73.87	406.48	1,232.52	19.35				1,246.26	7.40
4/23/21 12:38 PM	1,556	105	73.82	405.57	1,233.43	18.44				1,246.24	7.42
4/23/21 12:53 PM	1,571	120	73.79	404.79	1,234.22	17.65				1,246.20	7.45
4/23/21 1:23 PM	1,601	150	73.73	403.48	1,235.52	16.35				1,246.31	7.34
4/23/21 1:53 PM	1,631	180	73.68	402.38	1,236.62	15.25				1,246.30	7.36
4/23/21 2:23 PM	1,661	210	73.63	401.49	1,237.51	14.36				1,246.47	7.19
4/23/21 2:53 PM	1,691	240	73.60	400.75	1,238.25	13.62				1,246.44	7.22
4/23/21 3:53 PM	1,751	300	73.55	399.48	1,239.52	12.35				1,246.70	6.96
4/23/21 4:53 PM	1,811	360	73.51	398.47	1,240.53	11.34				1,246.74	6.92
4/23/21 5:53 PM	1,871	420	73.48	397.65	1,241.35	10.52				1,247.06	6.60
4/23/21 6:53 PM	1,931	480	73.46	396.90	1,242.10	9.77				1,247.25	6.40
4/23/21 7:53 PM	1,991	540	73.44	396.45	1,242.56	9.31				1,247.35	6.30
4/23/21 8:53 PM	2,051	600	73.43	395.91	1,243.09	8.78				1,247.62	6.04
4/23/21 9:53 PM	2,111	660	73.41	395.48	1,243.52	8.35				1,247.65	6.00
4/23/21 10:53 PM	2,171	720	73.40	395.03	1,243.97	7.89				1,247.83	5.82
4/23/21 11:53 PM	2,231	780	73.40	394.64	1,244.36	7.51				1,248.04	5.62
4/24/21 12:53 AM	2,291	840	73.38	394.30	1,244.70	7.16				1,248.17	5.49
4/24/21 1:53 AM	2,351	900	73.38	394.01	1,244.99	6.88				1,248.34	5.32
4/24/21 2:53 AM	2,411	960	73.37	393.75	1,245.26	6.61				1,248.46	5.20
4/24/21 3:53 AM	2,471	1020	73.37	393.47	1,245.53	6.34				1,248.67	4.98
4/24/21 4:53 AM	2,531	1080	73.37	393.21	1,245.79	6.08				1,248.79	4.87
4/24/21 5:53 AM	2,591	1140	73.36	393.00	1,246.00	5.87				1,248.88	4.78
4/24/21 6:53 AM	2,651	1200	73.36	392.80	1,246.20	5.66				1,248.96	4.69
4/24/21 7:53 AM	2,711	1260	73.37	392.61	1,246.39	5.47				1,249.06	4.60
4/24/21 8:53 AM	2,771	1320	73.35	392.44	1,246.56	5.31				1,249.24	4.42
4/24/21 9:53 AM	2,831	1380	73.35	392.35	1,246.65	5.21				1,249.28	4.38
4/24/21 10:53 AM	2,891	1440	73.36	392.16	1,246.84	5.03				1,249.43	4.23
4/24/21 11:53 AM	2,951	1500	73.34	392.06	1,246.95	4.92				1,249.43	4.23
4/24/21 12:53 PM	3,011	1560	73.33	391.98	1,247.02	4.85				1,249.53	4.12
4/24/21 1:53 PM	3,071	1620	73.34	391.80	1,247.20	4.67				1,249.65	4.00
4/24/21 2:53 PM	3,131	1680	73.34	391.68	1,247.32	4.55				1,249.79	3.87
4/24/21 3:53 PM	3,191	1740	73.33	391.56	1,247.44	4.43				1,249.78	3.87

Note: bgs = below ground surface Column Pipe Diameter = 1 1/4 inches Horsepower = 2 HP
MSL = Mean Sea Level Pump Setting = 520 ft EC=Electrical conductivity (mS/cm)

Camp Verde Well No. 3 - Aquifer Test (April 22, 2021)

Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	PW Well No. 3 Temperature (F)	PW Well No. 3 Water Level (ft bgs)	PW Well No. 3 Water Level (ft MSL)	PW Well No. 3 Drawdown (ft)	PW Well No. 3 Pump Rate (gpm)	PW Well No. 3 Specific Capacity (gpm/ft)	Comments	OW Well No. 2 Water Level (ft MSL)	OW Well No. 2 Drawdown (ft)
4/24/21 4:53 PM	3,251	1800	73.33	391.52	1,247.48	4.39				1,249.89	3.76
4/24/21 5:53 PM	3,311	1860	73.32	391.37	1,247.63	4.23				1,250.02	3.64
4/24/21 6:53 PM	3,371	1920	73.32	391.25	1,247.75	4.12				1,249.99	3.67
4/24/21 7:53 PM	3,431	1980	73.34	391.17	1,247.84	4.03				1,250.07	3.58
4/24/21 8:53 PM	3,491	2040	73.33	391.14	1,247.87	4.00				1,250.10	3.55
4/24/21 9:53 PM	3,551	2100	73.32	391.10	1,247.90	3.96				1,250.13	3.53
4/24/21 10:53 PM	3,611	2160	73.32	391.01	1,247.99	3.88				1,250.22	3.43
4/24/21 11:53 PM	3,671	2220	73.33	390.92	1,248.08	3.79				1,250.20	3.46
4/25/21 12:53 AM	3,731	2280	73.33	390.89	1,248.11	3.75				1,250.31	3.35
4/25/21 1:53 AM	3,791	2340	73.31	390.84	1,248.16	3.71				1,250.41	3.24
4/25/21 2:53 AM	3,851	2400	73.31	390.78	1,248.22	3.64				1,250.37	3.28
4/25/21 3:53 AM	3,911	2460	73.32	390.66	1,248.34	3.53				1,250.42	3.23
4/25/21 4:53 AM	3,971	2520	73.31	390.58	1,248.42	3.45				1,250.51	3.15
4/25/21 5:53 AM	4,031	2580	73.31	390.54	1,248.46	3.41				1,250.52	3.13
4/25/21 6:53 AM	4,091	2640	73.31	390.48	1,248.52	3.35				1,250.57	3.09
4/25/21 7:53 AM	4,151	2700	73.30	390.42	1,248.59	3.28				1,250.72	2.94
4/25/21 8:53 AM	4,211	2760	73.31	390.40	1,248.60	3.27				1,250.70	2.96
4/25/21 9:53 AM	4,271	2820	73.31	390.38	1,248.62	3.25				1,250.70	2.96
4/25/21 10:53 AM	4,331	2880	73.32	390.36	1,248.64	3.23				1,250.74	2.92
4/25/21 11:53 AM	4,391	2940	73.31	390.31	1,248.69	3.17				1,250.81	2.85
4/25/21 12:42 PM	4,440	2989	73.31	390.31	1,248.69	3.18				1,250.71	2.95

Note: bgs = below ground surface Column Pipe Diameter = 1 1/4 inches Horsepower = 2 HP
MSL = Mean Sea Level Pump Setting = 520 ft EC=Electrical conductivity (mS/cm)



WELL TEST ANALYSIS

Data Set: \...\PW 3.aqt
Date: 05/10/21 Time: 13:50:31

PROJECT INFORMATION

Company: Wet Rock Groundwater Services
Location: Kerr County
Test Well: Well No. 3
Test Date: 4-22-21

AQUIFER DATA

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

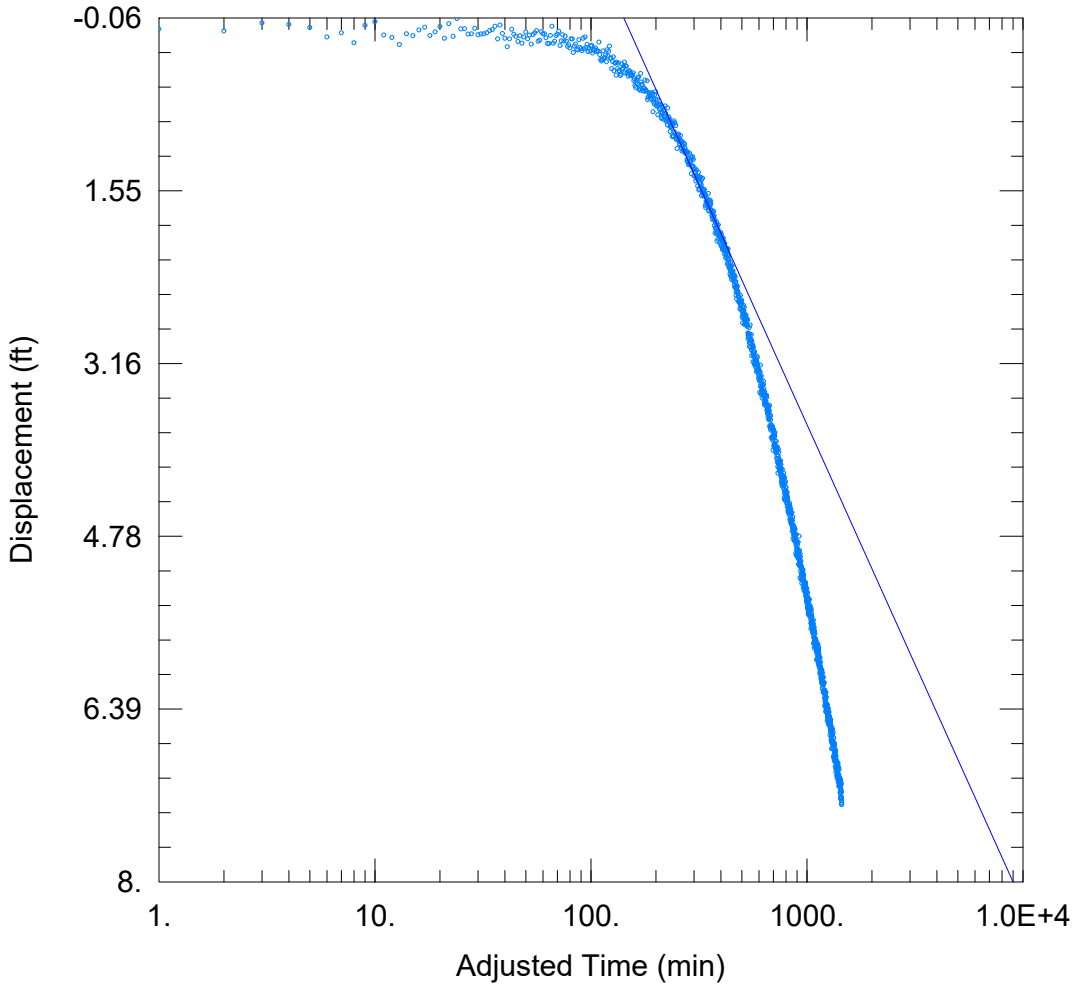
Pumping Wells

Well Name	X (ft)	Y (ft)
Well No. 3	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob

T = 32.43 ft^2/day



WELL TEST ANALYSIS

Data Set: \...\OW 2.aqt
Date: 05/10/21 Time: 13:50:43

PROJECT INFORMATION

Company: Wet Rock Groundwater Services
Location: Kerr County
Test Well: Well No. 3
Test Date: 4-22-21

AQUIFER DATA

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well No. 3	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
Well No. 2	855	0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob
T = 78.09 ft^2/day
S = 2.439E-5

Appendix D

Well Efficiency Calculation

Well Efficiency

Well No. 1

Wet Rock Groundwater Services, L.L.C.
Groundwater Specialists
TBPG Firm No: 50038
317 Ranch Road 620 South, Suite 203
Austin, Texas 78734 • Ph: 512-773-3226
www.wetrockgs.com

Well Efficiency Calculations
Well No. 1

From: *Driscoll, F.G., 1986: Groundwater and Wells: second Ed. Pp.575-579*

Well Efficiency = (Actual specific capacity / Theoretical specific capacity)

Actual Specific Capacity = Q/s

Where: Q = Discharge of well, in gpm; and
s = drawdown, in feet

Actual Specific Capacity = 10 gpm / 90.8 ft. = 0.11 gpm/ft.

Theoretical Specific Capacity = $\frac{Q}{s} = \frac{T}{264 \log \frac{0.3Tt}{r^2 S}} = \frac{T}{2000}$

Where: T = Transmissivity, in gpd/ft
t = Time of pumping, in days
S = Storage Coefficient, = 9.30 X 10^{-5}
r = radius of well, in ft.

Theoretical Specific Capacity: $\frac{237.5}{264 \log \frac{(0.3)(237.5)(1.01)}{(0.1875)^2 (0.0000930)}}$ **= 0.12**

Efficiency = Actual Specific Capacity / Theoretical Specific Capacity = 0.11 / 0.12 = **91.7%**

Well Efficiency

Well No. 3

Wet Rock Groundwater Services, L.L.C.
Groundwater Specialists
TBPG Firm No: 50038
317 Ranch Road 620 South, Suite 203
Austin, Texas 78734 • Ph: 512-773-3226
www.wetrockgs.com

Well Efficiency Calculations
Well No. 3

From: *Driscoll, F.G., 1986: Groundwater and Wells: second Ed. Pp.575-579*

Well Efficiency = (Actual specific capacity / Theoretical specific capacity)

Actual Specific Capacity = Q/s

Where: Q = Discharge of well, in gpm; and
s = drawdown, in feet

Actual Specific Capacity = 10 gpm / 70.7 ft. = 0.14 gpm/ft.

Theoretical Specific Capacity = $\frac{Q}{s} = \frac{T}{264 \log \frac{0.3Tt}{r^2 S}} = \frac{T}{2000}$

Where: T = Transmissivity, in gpd/ft
t = Time of pumping, in days
S = Storage Coefficient, = 2.44 X 10^{-5}
r = radius of well, in ft.

Theoretical Specific Capacity: $\frac{242.6}{264 \log \frac{(0.3)(242.6)(1.01)}{(0.1875)^2 (0.0000244)}}$ **= 0.12**

Efficiency = Actual Specific Capacity / Theoretical Specific Capacity = 0.14 / 0.12 = **116.7%**

Appendix E

Water Quality Report

Water Quality

Well No. 1

POLLUTION CONTROL SERVICES

Report of Sample Analysis

Client Information	Sample Information	Laboratory Information
Brice Bormann **Texan Water** **161 Industrial Loop** **Fredericksburg, TX 78624**	**Project Name: Camp Verde** **Sample ID: Camp Verde #1** **Matrix: Drinking Water** **Date/Time Taken: 4/21/2021 1045**	**PCS Sample #: 632881 Page 1 of 1** **Date/Time Received: 4/22/2021 08:35** **Report Date: 4/23/2021** **Approved by:** Chuck Wallgren, President

Test Description	Result	Units	RL	Analysis Date/Time	Method	Analyst
E. coli. (Enumeration-MPN)	0	CFU/100ml	1	4/22/2021 10:05	9223 IDEXX Quanti-Tray	CML
Total Coliform (Enumeration)	0	CFU/100ml	1	4/22/2021 10:05	9223 IDEXX Quanti-Tray	CML

Sample passed / failed criteria for bacteriological test.
Sample of satisfactory bacteriological quality should be free from Coliform organisms.
Coliform Organisms
- X Not Found
- ___ Found
  - ___ Total
  - ___ Fecal (E.Coli)
  - ___ Repeat Samples Required / Recommended (Circle One)
- ___ Unsuitable - See Below
- ___ Other reason: _____

Quality Statement: All supporting quality data adhered to data quality objectives and test results meet the requirements of NELAC unless otherwise noted as flagged exceptions or in a case narrative attachment. Reports with full quality data deliverables are abailable on request.

These analytical results relate only to the sample tested.
All data is reported on an 'As Is' basis unless designated as 'Dry Wt'.
RL = Reporting Limits

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Toll Free 800-880-4616
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Universal City, TX 78148-3318
210-340-0343
FAX # 210-658-7903

POLLUTION CONTROL SERVICES

Chain of Custody Number: 632881

MULTIPLE SAMPLE ANALYSIS REQUEST AND CHAIN OF CUSTODY FORM

Stamp 1st sample and COC as same number

CUSTOMER INFORMATION
Name: TEXAN WATER

REPORT INFORMATION
Attention: CHRIS KNOX | Phone: | Fax:

SAMPLE INFORMATION
Project Information: CAMP VERDE #1
Report "Soils" ☐ As Is ☐ Dry Wt.

Collected By:

Requested Analysis: BAC-T TCC

Instructions/Comments:

Client / Field Sample ID	Collected Date	Collected Time	Field Chlorine Residual mg/L	Composite or Grab	Matrix (DW-Drinking Water; NPW-Non-potable water; WW-Wastewater; LW-Liquid Waste)	Container Type	Container Number	Preservative	BAC-T TCC	PCS Sample Number
CAMP VERDE #1	Start: 10:43 End: 10:46 am	Start: 4/21 End: 4/21		☐C ☑G	☑ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H₂SO₄ ☐ HNO₃ ☐ H₃PO₄ ☐ NaOH ☐ ICE ☐	Y	632881 ☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:

Required Turnaround: ☐ Routine (6-10 days) | *EXPEDITE:* (See Surcharge Schedule) ☐ < 8 Hrs. ☐ < 16 Hrs. ☐ < 24 Hrs. ☐ 5 days ☐ Other: ______ ***Rush Charges Authorized by:***

Sample Archive/Disposal: ☐ Laboratory Standard ☐ Hold for client pick up | **Container Type:** P = Plastic, G = Glass, O = Other | Carrier ID:

Relinquished By:	[signature]	Date:	4/22/21	Time:	8:32	Received By:	[signature]	Date: 4/22/21	Time: 0832
Relinquished By:		Date:		Time:		Received By:		Date:	Time:

Rev. Multiple Sample COC_20180628

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Pollution Control Services
Sample Log-In Checklist

PCS Sample No(s) 632881 **COC No.** 632881

Client/Company Name: Texan H2O **Checklist Completed by:** GMR

Sample Delivery to Lab Via:
Client Drop Off ✓ Commercial Carrier: Bus ____ UPS ____ Lone Star ____ FedEx ____ USPS ____
PCS Field Services: Collection/Pick Up____ Other:____

Sample Kit/Coolers
Sample Kit/Cooler? Yes ✓ No____ Sample Kit/Cooler: Intact? Yes ✓ No ✓
Custody Seals on Sample Kit/Cooler: Not Present ✓ If Present, Intact ___ Broken ___
Sample Containers Intact; Unbroken and Not Leaking? Yes ✓ No ___
Custody Seals on Sample Bottles: Not Present ✓ If Present, Intact ___ Broken ___
COC Present with Shipment or Delivery or Completed at Drop Off? Yes ✓ No ___
Has COC sample date/time and other pertinent information been provided by client/sampler? Yes: ✓ No: ____
Has COC been properly Signed when Received/Relinquished? Yes ✓ No ___
Does COC agree with Sample Bottle Information, Bottle Types, Preservation, etc.? Yes ✓ No ___
All Samples Received before Hold Time Expiration? Yes ✓ No ___
Sufficient Sample Volumes for Analysis Requested? Yes ✓ No ___
Zero Headspace in VOA Vial if Present? Yes ___ No ___

Sample Preservation:
* *Cooling:* **Not Required** ✓ or **Required** ____
If cooling required, record temperature of submitted samples Observed/Corrected 4 / 2 °C
Is Ice Present in Sample Kit/Cooler? ✓ Yes ____ No Samples received same day as collected? ____ Yes ✓ No
Lab Thermometer Make and Serial Number: Vaughan 1807009583 Other: ____

Acid Preserved Sample - If present, is pH <2? **Yes** ____ **No** ____** ____H_2SO_4 ____HNO_3 ____H_3PO_4
Base Preserved Sample - If present, is pH >12? Yes ____ No ____ ____NaOH
Other Preservation:____ If Present, Meets Requirements? Yes____ No____
Sample Preservations Checked by:____ Date ____ Time ____
pH paper used to check sample preservation (PCS log #): ____ (HEM pH checked at analysis).

Samples Preserved/Adjusted by Lab:	Lab #	Parameters Preserved	Preservative Used	Log #

Adjusted by Tech/Analyst:____ Date :____Time:____

Client Notification/ Documentation for "No" Responses Above/ Discrepancies/ Revision Comments
Person Notified: ____ Contacted by:____
Notified Date: ____Time: ____
Method of Contact: At Drop Off:____ Phone ___ Left Voice Mail ____ E-Mail ____ Fax ____
Unable to Contact____ Authorized Laboratory to Proceed :____(Lab Director)
Regarding / Comments:____

Actions taken to correct problems/discrepancies:____

Receiving qualifier needed (*requires client notification above*) Temp. ___ Holding Time ___ Initails: ____
Receiving qualifier entered into LIMS at login Initial/Date: ____
Revision Comments: ____

** Samples submitted for Metals Analysis (except Hex Cr) or Drinking Water for Coliform Bacteria Only are not required to be iced. Samples collected prior day to receipt at the laboratory must meet method specific thermal cooling requirements, "or will be flagged accordingly". Samples delivered the same day as collected may not meet thermal criteria, but shall be considered acceptable if evidence that the chilling process has begun, such as arrival on ice (EPA 815-F-08-006, June 2008). ** Water samples for metals analysis that are not acid preserved prior to shipment may be acceptably preserved by the laboratory on receipt – however, the sample digestion procedure must be delayed for at least 24 hours after preservation by the laboratory.*

POLLUTION CONTROL SERVICES

Report of Sample Analysis

Client Information	Sample Information	Laboratory Information
Brice Bormann **Texan Water** **161 Industrial Loop** **Fredericksburg, TX 78624**	**Project Name: Camp Verde** **Sample ID: Camp Verde #1** **Matrix: Drinking Water** **Date/Time Taken: 4/21/2021 0832**	**PCS Sample #: 632880 Page 1 of 2** **Date/Time Received: 4/22/2021 08:35** **Report Date: 4/28/2021** **Approved by:** Chuck Wallgren, President

Test Description	Flag	Result	Units	RL	Analysis Date/Time	Method	Analyst
pH	!, I	7.3	S.U.	N/A	4/23/2021 14:30	SM 4500-H+ B	CML
Chloride		25	mg/L	5	4/22/2021 19:09	EPA 300.0	JAS
Conductivity, Specific		824	µmhos/cm at 25° C	1	4/22/2021 09:05	SM 2510B	CML
Nitrate-N		<0.5	mg/L	0.5	4/22/2021 19:09	EPA 300.0	JAS
Sulfate		133	mg/L	5	4/22/2021 19:09	EPA 300.0	JAS
Total Dissolved Solids		508	mg/L	10	4/27/2021 13:05	SM 2540C	CML
Total Hardness as CaCO3		390	mg/L	5	4/24/2021 07:00	SM 2340C	JAS
Fluoride		1.76	mg/L	0.50	4/22/2021 19:09	EPA 300.0	JAS

Quality Assurance Summary

Test Description	Precision	Limit	LCL	MS	MSD	UCL	LCS	LCS Limit
pH	N/A	N/A	N/A			N/A		
Chloride	<1	10	95	99	98	103	98	85 - 115
Conductivity, Specific	N/A	N/A	N/A			N/A		
Nitrate-N	<1	20	70	99	98	130		
Sulfate	<1	10	94	97	97	102		
Total Dissolved Solids	3	10	N/A	N/A	N/A	N/A		
Total Hardness as CaCO3	<1	10	70	100	100	120	100	85 - 115
Fluoride	1	10	93	99	100	109	103	85 - 115

Quality Statement: All supporting quality data adhered to data quality objectives and test results meet the requirements of NELAC unless otherwise noted as flagged exceptions or in a case narrative attachment. Reports with full quality data deliverables are abailable on request.

! Not NELAP Certifiable Parameter
I Informational purposes only - pH outside hold time

These analytical results relate only to the sample tested.
All data is reported on an 'As Is' basis unless designated as 'Dry Wt'.
RL = Reporting Limits

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Toll Free 800-880-4616
1532 Universal City Blvd, Suite 100
Universal City, TX 78148-3318
210-340-0343
FAX # 210-658-7903

POLLUTION CONTROL SERVICES

Report of Sample Analysis

Client Information	Sample Information	Laboratory Information
Brice Bormann **Texan Water** **161 Industrial Loop** **Fredericksburg, TX 78624**	**Project Name: Camp Verde** **Sample ID: Camp Verde #1** **Matrix: Drinking Water** **Date/Time Taken: 4/21/2021 0832**	**PCS Sample #: 632880 Page 2 of 2** **Date/Time Received: 4/22/2021 08:35** **Report Date: 4/28/2021**

Test Description	Result	Units	RL	Analysis Date/Time	Method	Analyst
Iron/ICP (Total)	0.085	mg/L	0.010	4/27/2021 11:43	EPA 200.7 / 6010 B	DJL
Manganese/ICP (Total)	<0.010	mg/L	0.010	4/27/2021 11:43	EPA 200.7 / 6010 B	DJL

Quality Assurance Summary

Test Description	Precision	Limit	LCL	MS	MSD	UCL	LCS	LCS Limit
Iron/ICP (Total)	12	20	75	109	97	125	100	85 - 115
Manganese/ICP (Total)	<1	20	75	96	96	125	100	85 - 115

Quality Statement: All supporting quality data adhered to data quality objectives and test results meet the requirements of NELAC unless otherwise noted as flagged exceptions or in a case narrative attachment. Reports with full quality data deliverables are abailable on request.

These analytical results relate only to the sample tested.
All data is reported on an 'As Is' basis unless designated as 'Dry Wt'.
RL = Reporting Limits

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POLLUTION CONTROL SERVICES

Chain of Custody Number: 632880

Stamp 1st sample and COC as same number

MULTIPLE SAMPLE ANALYSIS REQUEST AND CHAIN OF CUSTODY FORM

CUSTOMER INFORMATION
Name: TEXAN WATER

REPORT INFORMATION
Attention: CHRIS KNOX | Phone: | Fax:

SAMPLE INFORMATION

Project Information: CAMP VERDE

Report "Soils" ☐ As Is ☐ Dry Wt.

Collected By:

Requested Analysis: MN + Mg [?]

Instructions/Comments: per client add 5 day TAT - LMW 4.23.21 @ 13:00

Client / Field Sample ID	Collected Date	Collected Time	Field Chlorine Residual mg/L	Composite or Grab	Matrix (DW-Drinking Water; NPW-Non-potable water; WW-Wastewater; LW-Liquid Waste)	Container Type	Container Number	Preservative	Requested Analysis	PCS Sample Number
CAMP VERDE #1	Start: 4/21 End: 4/21	Start: 8:32 End: 8:32		☐C ☑G	☑DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H_2SO_4 ☐HNO_3 ☐H_3PO_4 ☐NaOH ☐ICE ☐	X	632880 ☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H_2SO_4 ☐HNO_3 ☐H_3PO_4 ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H_2SO_4 ☐HNO_3 ☐H_3PO_4 ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H_2SO_4 ☐HNO_3 ☐H_3PO_4 ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H_2SO_4 ☐HNO_3 ☐H_3PO_4 ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H_2SO_4 ☐HNO_3 ☐H_3PO_4 ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H_2SO_4 ☐HNO_3 ☐H_3PO_4 ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H_2SO_4 ☐HNO_3 ☐H_3PO_4 ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:

Required Turnaround: ☐ Routine (6-10 days) *EXPEDITE:* (See Surcharge Schedule) ☐ < 8 Hrs. ☐ < 16 Hrs. ☐ < 24 Hrs. ☒ 5 days ☐ Other: ______ ***Rush Charges Authorized by:***

Sample Archive/Disposal: ☐ Laboratory Standard ☐ Hold for client pick up **Container Type:** P = Plastic, G = Glass, O = Other Carrier ID:

Relinquished By:	[signature]	Date:	4/22/21	Time:	8:35 AM	Received By:	[signature]	Date: 4/22/21	Time: 0835
Relinquished By:		Date:		Time:		Received By:		Date:	Time:

Rev. Multiple Sample COC_20180628

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Pollution Control Services
Sample Log-In Checklist

PCS Sample No(s) 632880 **COC No.** 632880

Client/Company Name: Texan Hill **Checklist Completed by:** BLT

Sample Delivery to Lab Via:
Client Drop Off ✓ Commercial Carrier: Bus ____ UPS ____ Lone Star ____ FedEx ____ USPS ____
PCS Field Services: Collection/Pick Up____ Other:____

Sample Kit/Coolers
Sample Kit/Cooler? Yes ✓ No____ Sample Kit/Cooler: Intact? Yes ✓ No___
Custody Seals on Sample Kit/Cooler: Not Present ✓ If Present, Intact ___ Broken ___
Sample Containers Intact; Unbroken and Not Leaking? Yes ✓ No ___
Custody Seals on Sample Bottles: Not Present ✓ If Present, Intact ___ Broken ___
COC Present with Shipment or Delivery or Completed at Drop Off? Yes ✓ No ___
Has COC sample date/time and other pertinent information been provided by client/sampler? Yes: ✓ No: ____
Has COC been properly Signed when Received/Relinquished? Yes ✓ No ___
Does COC agree with Sample Bottle Information, Bottle Types, Preservation, etc.? Yes ✓ No ___
All Samples Received before Hold Time Expiration? Yes ✓ No ___
Sufficient Sample Volumes for Analysis Requested? Yes ✓ No ___
Zero Headspace in VOA Vial if Present? Yes ___ No ___

Sample Preservation:
* ***Cooling:*** **Not Required** _____ or **Required** ✓
If cooling required, record temperature of submitted samples Observed/Corrected 4 / 2 °C
Is Ice Present in Sample Kit/Cooler? ✓ Yes ____ No Samples received same day as collected? ____ Yes ✓ No
Lab Thermometer Make and Serial Number: Vaughan 1807009583 Other: _____

Acid Preserved Sample - If present, is pH <2? **Yes** ____ **No** ____** ____H_2SO_4 ____HNO_3 ____H_3PO_4
Base Preserved Sample - If present, is pH >12? Yes ____ No ____ ____NaOH
Other Preservation:_____ If Present, Meets Requirements? Yes____ No____
Sample Preservations Checked by:_____ Date _____ Time _____
pH paper used to check sample preservation (PCS log #): _____ (HEM pH checked at analysis).

Samples Preserved/Adjusted by Lab:	Lab #	Parameters Preserved	Preservative Used	Log #
		Fe, Mn	HNO_3	01517803

Adjusted by Tech/Analyst: BLT Date : 4/22/21 Time: 0850

Client Notification/ Documentation for "No" Responses Above/ Discrepancies/ RevisionComments
Person Notified: _____ Contacted by:_____
Notified Date: _____Time: _____
Method of Contact: At Drop Off:____ Phone ___ Left Voice Mail ____ E-Mail ____ Fax ____
Unable to Contact____ Authorized Laboratory to Proceed :_____(Lab Director)
Regarding / Comments:_____
_____
_____
Actions taken to correct problems/discrepancies:_____
_____
_____
Receiving qualifier needed (*requires client notification above*) Temp. ___ Holding Time ___ Initails: _____
Receiving qualifier entered into LIMS at login Initial/Date: _____
Revision Comments: _____
_____
_____

** Samples submitted for Metals Analysis (except Hex Cr) or Drinking Water for Coliform Bacteria Only are not required to be iced. Samples collected prior day to receipt at the laboratory must meet method specific thermal cooling requirements, "or will be flagged accordingly". Samples delivered the same day as collected may not meet thermal criteria, but shall be considered acceptable if evidence that the chilling process has begun, such as arrival on ice (EPA 815-F-08-006, June 2008). ** Water samples for metals analysis that are not acid preserved prior to shipment may be acceptably preserved by the laboratory on receipt – however, the sample digestion procedure must be delayed for at least 24 hours after preservation by the laboratory.*

Water Quality

Well No. 3

POLLUTION CONTROL SERVICES

Report of Sample Analysis

Client Information	Sample Information	Laboratory Information
Brice Bormann **Texan Water** **161 Industrial Loop** **Fredericksburg, TX 78624**	**Project Name: Camp Verde** **Sample ID: Well #3** **Matrix: Drinking Water** **Date/Time Taken: 4/23/2021 0732**	**PCS Sample #: 633090 Page 1 of 1** **Date/Time Received: 4/23/2021 09:13** **Report Date: 4/26/2021** **Approved by:** Chuck Wallgren, President

Test Description	Result	Units	RL	Analysis Date/Time	Method	Analyst
E. coli. (Enumeration-MPN)	0	CFU/100ml	1	4/23/2021 10:00	9223 IDEXX Quanti-Tray	CML
Total Coliform (Enumeration)	0	CFU/100ml	1	4/23/2021 10:00	9223 IDEXX Quanti-Tray	CML

Sample passed / failed criteria for bacteriological test.
Sample of satisfactory bacteriological quality should be free from Coliform organisms.
Coliform Organisms
X Not Found
___ Found
___ Total
___ Fecal (E.Coli)
___ Repeat Samples Required / Recommended (Circle One)
___ Unsuitable - See Below
___ Other reason: _____

Quality Statement: All supporting quality data adhered to data quality objectives and test results meet the requirements of NELAC unless otherwise noted as flagged exceptions or in a case narrative attachment. Reports with full quality data deliverables are abailable on request.

These analytical results relate only to the sample tested.
All data is reported on an 'As Is' basis unless designated as 'Dry Wt'.
RL = Reporting Limits

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210-340-0343
FAX # 210-658-7903

POLLUTION CONTROL SERVICES

Chain of Custody Number: 633090

MULTIPLE SAMPLE ANALYSIS REQUEST AND CHAIN OF CUSTODY FORM

Stamp 1st sample and COC as same number

CUSTOMER INFORMATION

Name: Texan Water

REPORT INFORMATION

Attention: Chris Knox | Phone: 512-943-5646 | Fax:

SAMPLE INFORMATION

Project Information: CAMP VERDE WELL #3

Report "Soils" ☐ As Is ☐ Dry Wt. Bac-T

Collected By: JOE D.

Requested Analysis: TC/EC

Instructions/Comments:

Client / Field Sample ID	Collected Date	Collected Time	Field Chlorine Residual mg/L	Composite or Grab	Matrix (DW-Drinking Water; NPW-Non-potable water; WW-Wastewater; LW-Liquid Waste)	Container Type	Container Number	Preservative	TC/EC	PCS Sample Number
Well #3	Start: 4/23/21 End: 4/23/21	Start: 7:31AM End: 7:32AM		☐C ☑G	☑ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		633090 ☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐ DW ☐ NPW ☐ WW ☐ Soil ☐ Sludge ☐ LW ☐ Other	☐P ☐G ☐O		☐ H_2SO_4 ☐ HNO_3 ☐ H_3PO_4 ☐ NaOH ☐ ICE ☐		☐S ☐B ☐N ☐HEM Other:

Required Turnaround: ☐ Routine (6-10 days) | *EXPEDITE:* (See Surcharge Schedule) ☐ < 8 Hrs. ☐ < 16 Hrs. ☐ < 24 Hrs. ☐ 5 days ☐ Other: ______ *Rush Charges Authorized by:*

Sample Archive/Disposal: ☐ Laboratory Standard ☐ Hold for client pick up | **Container Type:** P = Plastic, G = Glass, O = Other | Carrier ID:

Relinquished By:	[signature]	Date:	4/23/21	Time:	9:13AM	Received By:	[signature]	Date: 4/23/21	Time: 0913
Relinquished By:		Date:		Time:		Received By:		Date:	Time:

Rev. Multiple Sample COC_20180628

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Pollution Control Services
Sample Log-In Checklist

PCS Sample No(s) 633090 **COC No.** 633090

Client/Company Name: Texan H2O **Checklist Completed by:** BMF

Sample Delivery to Lab Via:
Client Drop Off ✓ Commercial Carrier: Bus ____ UPS ____ Lone Star ____ FedEx ____ USPS ____
PCS Field Services: Collection/Pick Up____ Other:____

Sample Kit/Coolers
Sample Kit/Cooler? Yes ✓ No____ Sample Kit/Cooler: Intact? Yes ✓ No___
Custody Seals on Sample Kit/Cooler: Not Present ✓ If Present, Intact ___ Broken ___
Sample Containers Intact; Unbroken and Not Leaking? Yes ✓ No ___
Custody Seals on Sample Bottles: Not Present ✓ If Present, Intact ___ Broken ___
COC Present with Shipment or Delivery or Completed at Drop Off? Yes ✓ No ___
Has COC sample date/time and other pertinent information been provided by client/sampler? Yes ✓ No: ___
Has COC been properly Signed when Received/Relinquished? Yes ✓ No ___
Does COC agree with Sample Bottle Information, Bottle Types, Preservation, etc.? Yes ✓ No ___
All Samples Received before Hold Time Expiration? Yes ✓ No ___
Sufficient Sample Volumes for Analysis Requested? Yes ✓ No ___
Zero Headspace in VOA Vial if Present? Yes ___ No ___

Sample Preservation:
* *Cooling:* **Not Required** ✓ or **Required** ____
If cooling required, record temperature of submitted samples Observed/Corrected 4 / 2 °C
Is Ice Present in Sample Kit/Cooler? ✓ Yes ____ No Samples received same day as collected? ✓ Yes ____ No
Lab Thermometer Make and Serial Number: Vaughan 1807009583 Other: ____

Acid Preserved Sample - If present, is pH <2? **Yes** ____ **No** ____** ____H_2SO_4 ____HNO_3 ____H_3PO_4
Base Preserved Sample - If present, is pH >12? Yes ____ No ____ ____NaOH
Other Preservation:____ If Present, Meets Requirements? Yes____ No____
Sample Preservations Checked by:____ Date ____ Time ____
pH paper used to check sample preservation (PCS log #): ____ (HEM pH checked at analysis).

Samples Preserved/Adjusted by Lab:	Lab #	Parameters Preserved	Preservative Used	Log #

Adjusted by Tech/Analyst:____ Date :____Time:____

Client Notification/ Documentation for "No" Responses Above/ Discrepancies/ RevisionComments
Person Notified: ____ Contacted by:____
Notified Date: ____Time: ____
Method of Contact: At Drop Off:____ Phone ___ Left Voice Mail ____ E-Mail ____ Fax ____
Unable to Contact____ Authorized Laboratory to Proceed :____(Lab Director)
Regarding / Comments:____
Actions taken to correct problems/discrepancies:____
Receiving qualifier needed (*requires client notification above*) Temp. ___ Holding Time ___ Initails: ____
Receiving qualifier entered into LIMS at login Initial/Date: ____
Revision Comments: ____

** Samples submitted for Metals Analysis (except Hex Cr) or Drinking Water for Coliform Bacteria Only are not required to be iced. Samples collected prior day to receipt at the laboratory must meet method specific thermal cooling requirements, "or will be flagged accordingly". Samples delivered the same day as collected may not meet thermal criteria, but shall be considered acceptable if evidence that the chilling process has begun, such as arrival on ice (EPA 815-F-08-006, June 2008). ** Water samples for metals analysis that are not acid preserved prior to shipment may be acceptably preserved by the laboratory on receipt – however, the sample digestion procedure must be delayed for at least 24 hours after preservation by the laboratory.*

POLLUTION CONTROL SERVICES

Report of Sample Analysis

Client Information	Sample Information	Laboratory Information
Brice Bormann **Texan Water** **161 Industrial Loop** **Fredericksburg, TX 78624**	**Project Name: Camp Verde** **Sample ID: Well #3** **Matrix: Drinking Water** **Date/Time Taken: 4/23/2021 0730**	**PCS Sample #: 633091 Page 1 of 2** **Date/Time Received: 4/23/2021 09:13** **Report Date: 4/28/2021** Approved by: Chuck Wallgren, President

Test Description	Flag	Result	Units	RL	Analysis Date/Time	Method	Analyst
pH	!, I	7.3	S.U.	N/A	4/23/2021 14:30	SM 4500-H+ B	CML
Chloride		24	mg/L	5	4/23/2021 13:11	EPA 300.0	JAS
Conductivity, Specific		876	µmhos/cm at 25° C	1	4/23/2021 14:25	SM 2510B	CML
Nitrate-N		<0.5	mg/L	0.5	4/23/2021 13:11	EPA 300.0	JAS
Sulfate		151	mg/L	5	4/23/2021 13:11	EPA 300.0	JAS
Total Dissolved Solids		508	mg/L	10	4/27/2021 13:05	SM 2540C	CML
Total Hardness as CaCO3		400	mg/L	5	4/24/2021 07:00	SM 2340C	JAS
Fluoride		1.77	mg/L	0.10	4/24/2021 11:22	EPA 300.0	JAS

Quality Assurance Summary

Test Description	Precision	Limit	LCL	MS	MSD	UCL	LCS	LCS Limit
pH	N/A	N/A	N/A			N/A		
Chloride	<1	10	95	99	99	103	100	85 - 115
Conductivity, Specific	N/A	N/A	N/A			N/A		
Nitrate-N	<1	20	70	99	99	130	99	85 - 115
Sulfate	1	10	94	99	99	102	104	85 - 115
Total Dissolved Solids	3	10	N/A	N/A	N/A	N/A		
Total Hardness as CaCO3	<1	10	70	100	100	120	100	85 - 115
Fluoride	1	10	93	103	102	109	104	85 - 115

Quality Statement: All supporting quality data adhered to data quality objectives and test results meet the requirements of NELAC unless otherwise noted as flagged exceptions or in a case narrative attachment. Reports with full quality data deliverables are abailable on request.

! Not NELAP Certifiable Parameter
! Informational purposes only - pH outside hold time

These analytical results relate only to the sample tested.
All data is reported on an 'As Is' basis unless designated as 'Dry Wt'.
RL = Reporting Limits

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FAX # 210-658-7903

POLLUTION CONTROL SERVICES

Report of Sample Analysis

Client Information	Sample Information	Laboratory Information
Brice Bormann **Texan Water** **161 Industrial Loop** **Fredericksburg, TX 78624**	**Project Name: Camp Verde** **Sample ID: Well #3** **Matrix: Drinking Water** **Date/Time Taken: 4/23/2021 0730**	**PCS Sample #: 633091 Page 2 of 2** **Date/Time Received: 4/23/2021 09:13** **Report Date: 4/28/2021**

Test Description	Result	Units	RL	Analysis Date/Time	Method	Analyst
Iron/ICP (Total)	0.086	mg/L	0.010	4/27/2021 11:43	EPA 200.7 / 6010 B	DJL
Manganese/ICP (Total)	<0.010	mg/L	0.010	4/27/2021 11:43	EPA 200.7 / 6010 B	DJL

Quality Assurance Summary

Test Description	Precision	Limit	LCL	MS	MSD	UCL	LCS	LCS Limit
Iron/ICP (Total)	12	20	75	109	97	125	100	85 - 115
Manganese/ICP (Total)	<1	20	75	96	96	125	100	85 - 115

***Quality Statement:** All supporting quality data adhered to data quality objectives and test results meet the requirements of NELAC unless otherwise noted as flagged exceptions or in a case narrative attachment. Reports with full quality data deliverables are abailable on request.*

These analytical results relate only to the sample tested.
All data is reported on an 'As Is' basis unless designated as 'Dry Wt'.
RL = Reporting Limits

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FAX # 210-658-7903

POLLUTION CONTROL SERVICES

Chain of Custody Number: 633091

MULTIPLE SAMPLE ANALYSIS REQUEST AND CHAIN OF CUSTODY FORM

Stamp 1st sample and COC as same number

CUSTOMER INFORMATION	REPORT INFORMATION		
Name: Texan Water	Attention: Chris Knox	Phone: 512-993-5646	Fax:

SAMPLE INFORMATION

Project Information: CAMP VERDE WELL #3 Metals & minerals

Report "Soils" ☐ As Is ☐ Dry Wt.

Collected By: JOE D.

Requested Analysis: Metals & min

Instructions/Comments: Per Client add 5 day TAT. 13:00-4.23.21-LMW

Client / Field Sample ID	Collected Date	Collected Time	Field Chlorine Residual mg/L	Composite or Grab	Matrix (DW-Drinking Water; NPW-Non-potable water; WW-Wastewater; LW-Liquid Waste)	Container Type	Container Number	Preservative	Requested Analysis: Metals & min	PCS Sample Number
WELL #3	Start: 4/23/21 End: 4/23/21	Start: 7:24Am End: 7:30Am		☐C ☑G	☑DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H₂SO₄ ☐HNO₃ ☐H₃PO₄ ☐NaOH ☐ICE ☐	✓	633091 ☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H₂SO₄ ☐HNO₃ ☐H₃PO₄ ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H₂SO₄ ☐HNO₃ ☐H₃PO₄ ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H₂SO₄ ☐HNO₃ ☐H₃PO₄ ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H₂SO₄ ☐HNO₃ ☐H₃PO₄ ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H₂SO₄ ☐HNO₃ ☐H₃PO₄ ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H₂SO₄ ☐HNO₃ ☐H₃PO₄ ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:
	Start: End:	Start: End:		☐C ☐G	☐DW ☐NPW ☐WW ☐Soil ☐Sludge ☐LW ☐Other	☐P ☐G ☐O		☐H₂SO₄ ☐HNO₃ ☐H₃PO₄ ☐NaOH ☐ICE ☐		☐S ☐B ☐N ☐HEM Other:

Required Turnaround: ☐ Routine (6-10 days) *EXPEDITE:* (See Surcharge Schedule) ☐ < 8 Hrs. ☐ < 16 Hrs. ☐ < 24 Hrs. ☒ 5 days ☐ Other: _____ *Rush Charges Authorized by:*

Sample Archive/Disposal: ☐ Laboratory Standard ☐ Hold for client pick up — Container Type: P = Plastic, G = Glass, O = Other — Carrier ID:

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
[signature]	4/23/21	9:13AM	[signature]	4/23/21	0913

Rev. Multiple Sample COC_20180628

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ReportName: rptManageClientProjects_Tests

Drop Down

Liquid: Yes SampleID: 632880 txtEditProjectID

txtEditProjectID

	Abbr	Parameter	Method	Reporting Limit
2079	Cl_IC	Chloride	EPA 300.0	1
254	SPCOND	Conductivity, Specific	SM 2510B	1
2078	F_IC	Fluoride	EPA 300.0	0.10
258	Fe/ICP	Iron/ICP (Total)	EPA 200.7 / 6010 B	0.010
230	Mn/ICP	Manganese/ICP (Total)	EPA 200.7 / 6010 B	0.010
1761	NO3N_IC	Nitrate-N	EPA 300.0	0.1
101	PH	pH	SM 4500-H+ B	N/A
2081	SO4_IC	Sulfate	EPA 300.0	1
256	TDS	Total Dissolved Solids	SM 2540C	10
271	THard	Total Hardness as CaCO3	SM 2340C	5

Count 10

Pollution Control Services
Sample Log-In Checklist

PCS Sample No(s) 633091 **COC No.** 633091

Client/Company Name: Texas H2O **Checklist Completed by:** GWF

Sample Delivery to Lab Via:
Client Drop Off ✓ Commercial Carrier: Bus ____ UPS ____ Lone Star ____ FedEx ____ USPS ____
PCS Field Services: Collection/Pick Up ____ Other: ____

Sample Kit/Coolers
Sample Kit/Cooler? Yes ✓ No ____ Sample Kit/Cooler: Intact? Yes ✓ No ____
Custody Seals on Sample Kit/Cooler: Not Present ✓ If Present, Intact ____ Broken ____
Sample Containers Intact; Unbroken and Not Leaking? Yes ✓ No ____
Custody Seals on Sample Bottles: Not Present ✓ If Present, Intact ____ Broken ____
COC Present with Shipment or Delivery or Completed at Drop Off? Yes ✓ No ____
Has COC sample date/time and other pertinent information been provided by client/sampler? Yes: ✓ No: ____
Has COC been properly Signed when Received/Relinquished? Yes ✓ No ____
Does COC agree with Sample Bottle Information, Bottle Types, Preservation, etc.? Yes ✓ No ____
All Samples Received before Hold Time Expiration? Yes ✓ No ____
Sufficient Sample Volumes for Analysis Requested? Yes ✓ No ____
Zero Headspace in VOA Vial if Present? Yes ____ No ____

Sample Preservation:
* ***Cooling:*** **Not Required** ____ or **Required** ✓
If cooling required, record temperature of submitted samples Observed/Corrected 4 / 2 °C
Is Ice Present in Sample Kit/Cooler? ____ Yes ____ No Samples received same day as collected? ✓ Yes ____ No
Lab Thermometer Make and Serial Number: Vaughan 1807009583 Other: ____

Acid Preserved Sample - If present, is pH <2? **Yes** ____ **No** ____ ** ____H_2SO_4 ____HNO_3 ____H_3PO_4
Base Preserved Sample - If present, is pH >12? Yes ____ No ____ ____NaOH
Other Preservation: ____ If Present, Meets Requirements? Yes____ No____
Sample Preservations Checked by: ____ Date ____ Time ____
pH paper used to check sample preservation (PCS log #): ____ (HEM pH checked at analysis).
Samples Preserved/Adjusted by Lab:

Lab #	Parameters Preserved	Preservative Used	Log #
____	Metals	HNO3	01S17803
____	____	____	____
____	____	____	____

Adjusted by Tech/Analyst: GWF Date: 4/23/21 Time: 0915

Client Notification/ Documentation for "No" Responses Above/ Discrepancies/ RevisionComments
Person Notified: ____ Contacted by: ____
Notified Date: ____ Time: ____
Method of Contact: At Drop Off: ____ Phone ____ Left Voice Mail ____ E-Mail ____ Fax ____
Unable to Contact ____ Authorized Laboratory to Proceed : ____ (Lab Director)
Regarding / Comments: ____
Actions taken to correct problems/discrepancies: ____
Receiving qualifier needed (*requires client notification above*) Temp. ____ Holding Time ____ Initails: ____
Receiving qualifier entered into LIMS at login Initial/Date: ____
Revision Comments: ____

** Samples submitted for Metals Analysis (except Hex Cr) or Drinking Water for Coliform Bacteria Only are not required to be iced. Samples collected prior day to receipt at the laboratory must meet method specific thermal cooling requirements, "or will be flagged accordingly". Samples delivered the same day as collected may not meet thermal criteria, but shall be considered acceptable if evidence that the chilling process has begun, such as arrival on ice (EPA 815-F-08-006, June 2008). ** Water samples for metals analysis that are not acid preserved prior to shipment may be acceptably preserved by the laboratory on receipt – however, the sample digestion procedure must be delayed for at least 24 hours after preservation by the laboratory.*