Results of Aquifer Test Analysis

for the

Japonica HOA Well No. 2
(HGCD Well No. 1522)

for

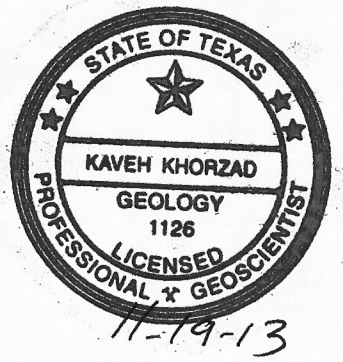
Headwaters Groundwater Conservation District
125 Lehmann Dr., Suite 100
Kerrville, TX 78028

WRGS Project No. 072-003-13

November 2013

Wet Rock Groundwater Services, L.L.C.
Groundwater Specialists
311 Ranch Road 620 South, Suite 103
Austin, Texas 78734
Phone: 512-773-3226 • www.wetrockgs.com
TBPG Firm No: 50038

The seal appearing on this document was authorized on November 19, 2013 by:



Kaveh Khorzad, P.G.
License No. 1126

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

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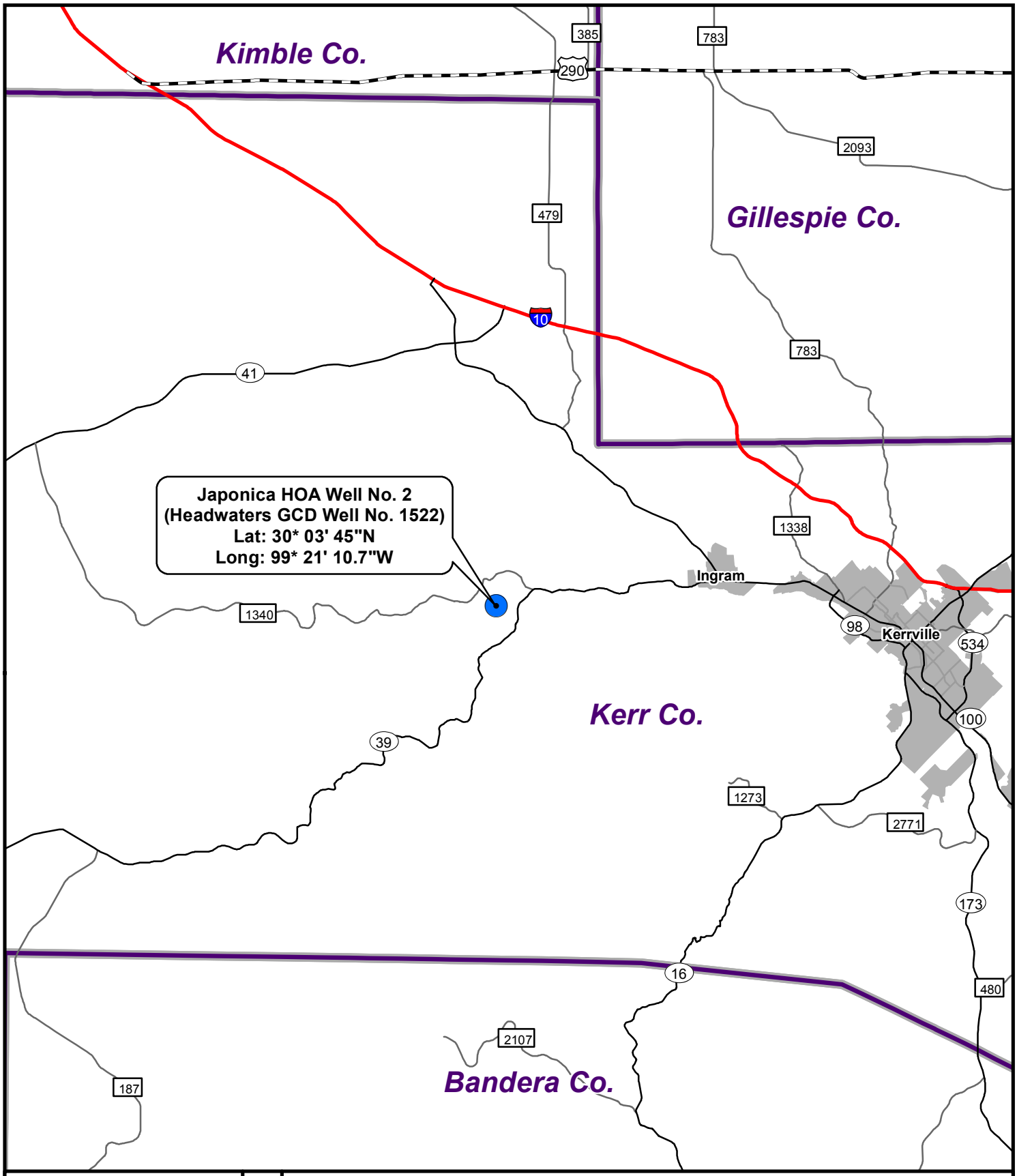
Headwaters Groundwater Conservation District
Japonica HOA Well No. 2 (HGCD Well No. 1522)
Lower Trinity Aquifer

Contents

Attachment 1

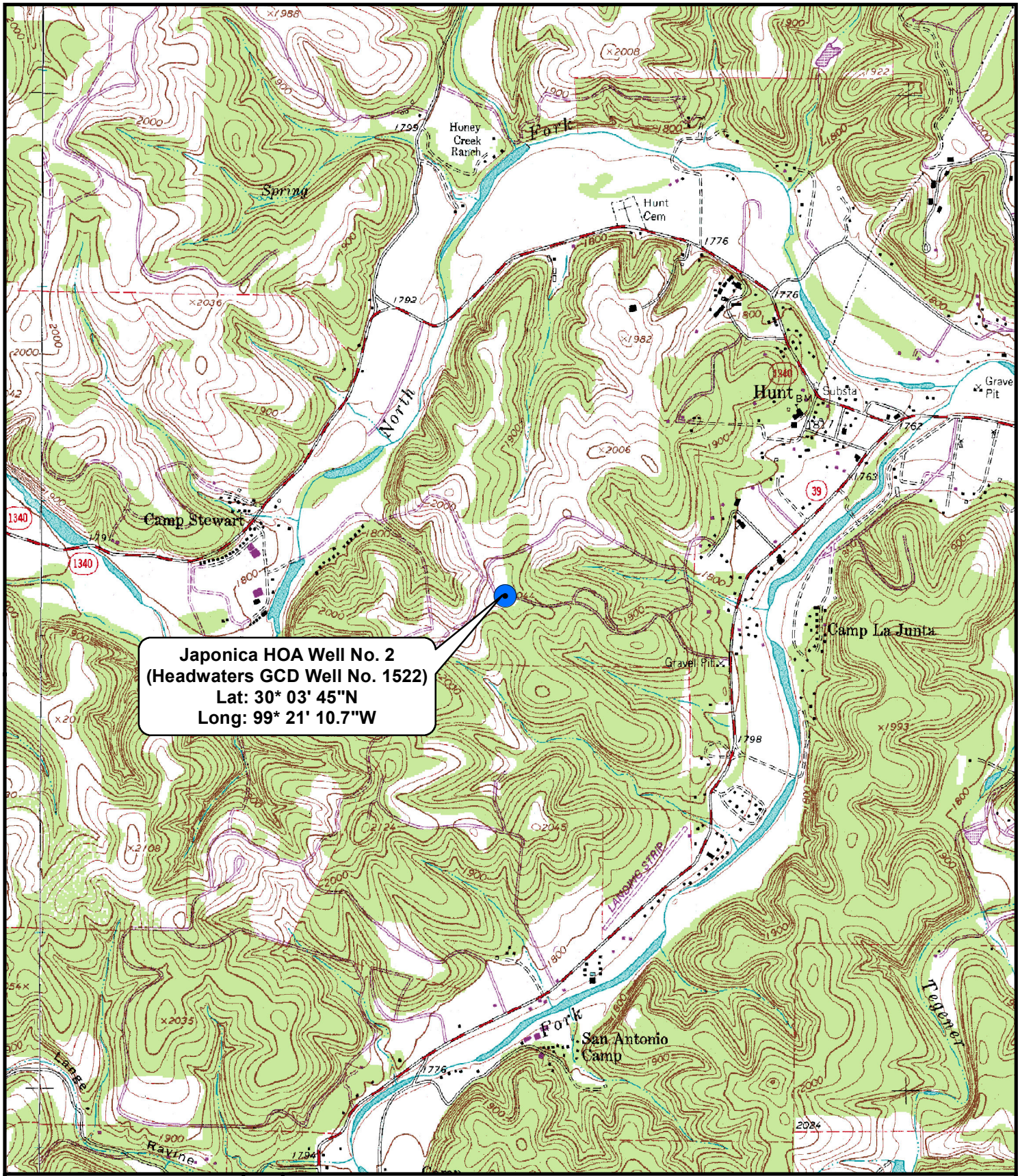
Well Location Map



Scale: 1 inch = 4 miles		Location Map
Drawn By: BB Date: 10-13	**Japonica HOA Well No. 2**	Wet Rock Groundwater Services, L.L.C.
Quad Name and No:	**Kerr County, Texas**	*Groundwater Specialists*
Projection: UTM NAD 83 Zone 14		TBPG Firm No: 50038
		311 Ranch Road 620 South, Ste. 103
		Austin, Texas 78734 Ph: 512.773.3226
		www.wetrockgs.com

Attachment 2

U.S. Geological Survey Topographic Map



Scale: 1 inch = 2,000 feet	**USGS Topographic Map**
Drawn By: BB Date: 10-13	**Japonica HOA Well No. 2**
Quad Name and No: Hunt and Bee Caves Creek, Texas 30099-A3 & 30099A4	**Kerr County, Texas**
Projection: UTM NAD 83 Zone 14	

Wet Rock Groundwater Services, L.L.C.
Groundwater Specialists
TBPG Firm No: 50038
311 Ranch Road 620 South, Ste. 103
Austin, Texas 78734 Ph: 512.773.3226
www.wetrockgs.com

Attachment 3

Log Plot: Japonica HOA Well No. 2 (HGCD Well No. 1522)

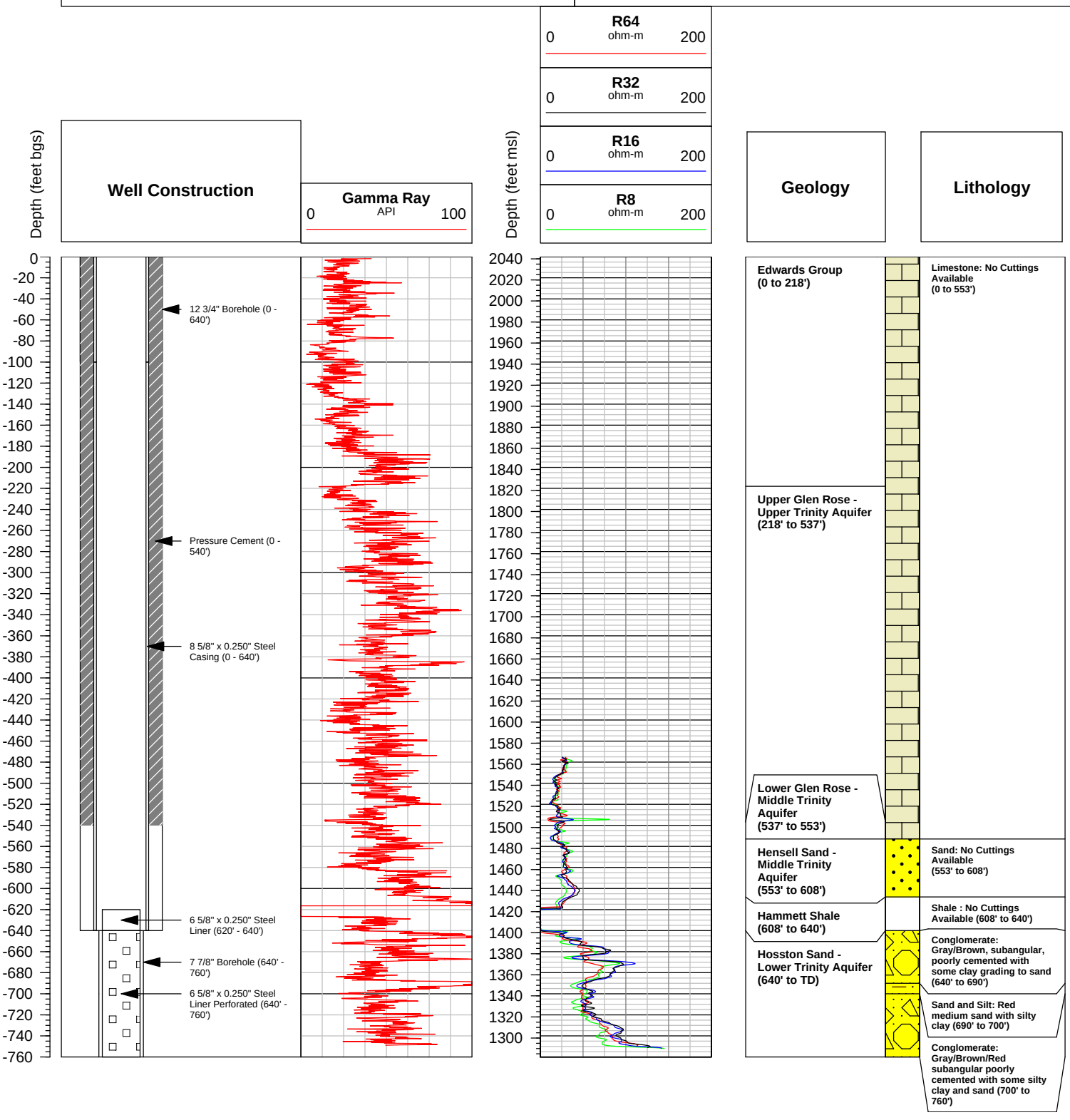
Wet Rock Groundwater Services, LLC

Groundwater Specialists

311 Ranch Rd. 620 S., Ste. 103
Austin, TX 78734
Ph: 512.773.3226 www.wetrockgs.com

Well Name: Japonica HOA Well No. 2 - Headwaters GCD Well No. 1522

Client:	**Headwaters GCD**	Elevation:	**2,042 ft MSL**
Location:	**Kerr County, Texas**	Total Depth:	**760 ft**
Drill Date:	**Oct. 28, 2013**	Latitude:	**30*03'45"N**
Drilled By:	**Edmonds Drilling**	Longitude:	**99*21'10.7"**



Attachment 4

State of Texas Well Report

on reverse side of owner's copy. P.O. Box 12157 Austin, Texas 78711 (512)463-7880 FAX (512)463-8616 Toll free (800)803-9202 and owner within 60 days upon completion of the well.

Email address: ...r.well@license.state.tx.us Web address: www.l...se.state.tx.us

WELL REPORT

A. WELL IDENTIFICATION AND LOCATION DATA

1) OWNER

Name:	Address:	City:	State:	Zip:
Japonica Hills	P.O Box 481	Hunt	TX	78024

2) WELL LOCATION

Well # or # of wells drilled	County:	Physical Address:	City:
1	Kerr	265 Japonica Rd	Hunt TX 78024

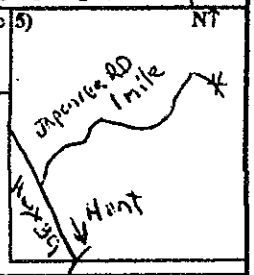
Lat.	Long.	Grid #
30-03-45.3	99-21-10.5	56-62-4

3) Type of Work

☐ New Well ☐ Reconditioning ☑ Replacement ☐ Deepening

4) Proposed Use (check) ☐ Monitor ☐ Environmental Soil Boring ☐ Domestic ☐ Extraction ☐ Frac ☐ Industrial ☐ Irrigation ☐ Injection ☐ Closed-Loop Geothermal ☐ De-watering ☐ Test well ☐ Rig Supply ☐ Stock ☑ Public Supply – If Public Supply, were plans approved? ☑ Yes ☐ No

5)



6) Drilling Date

Started 10 / 5 /2017

Completed 10 /28 /2017

Diameter of Hole

Dia.(in)	From (ft)	To (ft)
12 3/4	Surface	640
7 7/8	640	760

7) Drilling Method (check) ☐ Driven ☑ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☐ Hollow Stem Auger ☐ Reverse Circulation ☐ Other

From (ft)	To (ft)	Description and color of formation material
0	18	Limestone
18	100	no returns
100	200	Limestone
200	240	Limestone (white)
240	300	Blue Shale
300	400	Blue shale
400	600	Blue shale
600	620	Gray Sand
620	640	Red Shale
640	700	Tan Sand (Fine) H20
700	740	Tan sand H20
740	760	Coarse Tan Sand

(Use reverse side of Well Owner's copy, if necessary)

8) Borehole Completion ☐ Open Hole ☑ Straight Wall ☐ Under-reamed ☐ Gravel Packed ☐ Other

Gravel packed interval from: ft. to: ft. Size:

Casing, Blank Pipe, and Well Screen Data

Dia. (in.)	New Or Used	Steel, Plastic, etc. Perf., Slotted, etc Screen Mfg., if commercial	Setting (ft) From	Setting (ft) To	Gage Casing Screen
8 5/8	New	250 wall steel	0	640	—
6 5/8	New	250 wall steel	620	760	.020 Screen

9) Annular Seal Data: i.e. *(from 0 ft to 100 ft #sacks & material 13 cement)*

from 640 ft. to 540 ft. #sacks & material 35 sks Cmt

from 540 ft. to 300 ft. #sacks & material 35 sks Cmt

from 300 ft. to 0 ft. #sacks & material 90 sks Cmt

Method Used Tremie Performed By Drillers

Distance to septic field or other concentrated contamination 300 ft.

Distance to Property Line 500 ft

Method Verified: Approved by Variance #HCEW

13) Plugged ☑ Well plugged within 48 hour

Casing left in well: Cement/Bentonite placed in well:

From (ft)	To (ft)	From (ft)	To (ft)	# Sacks & Material used
540	0			70 sks Cmt

10) Surface Completion (If steel cased, leave blank) ☑ Surface Slab Installed ☐ Surface Sleeve Installed ☐ Pitless Adapter Used ☐ Alternative Procedure Used

11) Water Level

Static level 551 ft.below surface Date: 10 / 28 /2017

Artesian Flow gpm

12) Packers:

Type	Depth	Type	Depth

14) Type Pump

☐ Turbine ☐ Jet ☑ Submersible ☐ Cylinder ☐ Other

Depth to pump bowls, cylinder, jet, etc., ft.

15) Water Test

Type test ☐ Pump ☐ Bailer ☑ Jetted ☐ Estimated

Yield: 25 gpm with 0 ft. drawdown after 2 hrs.

16) Water Quality

Type of water Trinity Depth of Strata 660-760 Was a chemical analysis made? ☐ Yes ☑ No

Did you knowingly penetrate a strata which contains undesirable constituents? ☐ Yes ☑ No If yes, Continue:

Check One: ☐ Naturally poor-quality groundwater – type ☐ Hydrocarbons (i.e. gas, oil, etc.) ☐ Hazardous material/waste contamination encountered ☐ Other (describe)

☐ *I certify that while drilling, deepening, or otherwise altering the above described well, undesirable water or constituents was encountered and the landowner was informed that such well must be completed or plugged in such a manner as to avoid injury or pollution.*

By signing this well report, I certify that I drilled or supervised the drilling of this well and that each and all of the statements herein are true and correct.

Company & Individual's Name: (type or print)	Edmonds Drilling Co	Lic. No.:	58357w
Address: P.O. Box 1552	City: Kerrville	State: TX	Zip 78029

Signature: Licensed Driller/Pump Installer	Date: 10 / 31 /2017	Signature: Associate	H.G.C.D. Associate Reg. Number

TDLR FORM 001 WWD / 11-10 TDLR (Original) Landowner (copy) Driller/Pump Installer (copy)

NOV 17 2017

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Attachment 5

Table 1 - Well Construction Summary
Table 2 - Aquifer Testing Summary
Table 3 - Summary of Aquifer Testing Analyses

Table 1 - Well Construction Summary

Well	Hole Diameter (in)	From (ft)	To (ft)	Casing Type	Casing Diameter (in)	From (ft)	To (ft)
Japonica HOA Well No. 2 (HGCD Well No. 1522)	12 3/4	0	640	Steel	8 5/8	0	640
	7 7/8	640	760	Perforated Steel Liner	6 5/8	620	760

Table 2 - Aquifer Testing Summary

Well	Static Water Level (ft bgs)	Static Water Level (ft MSL)	Q (gpm)	Drawdown (ft)	SC (gpm/ft)	Pumping Duration (hours)
Japonica HOA Well No. 2 (HGCD Well No. 1522)	565	1,477.1	42	12.3	3.42	45.5

Notes: Q = discharge; SC = specific capacity; bgs = below ground surface; MSL = Mean Sea Level; gpm = gallons per minute; ft = feet

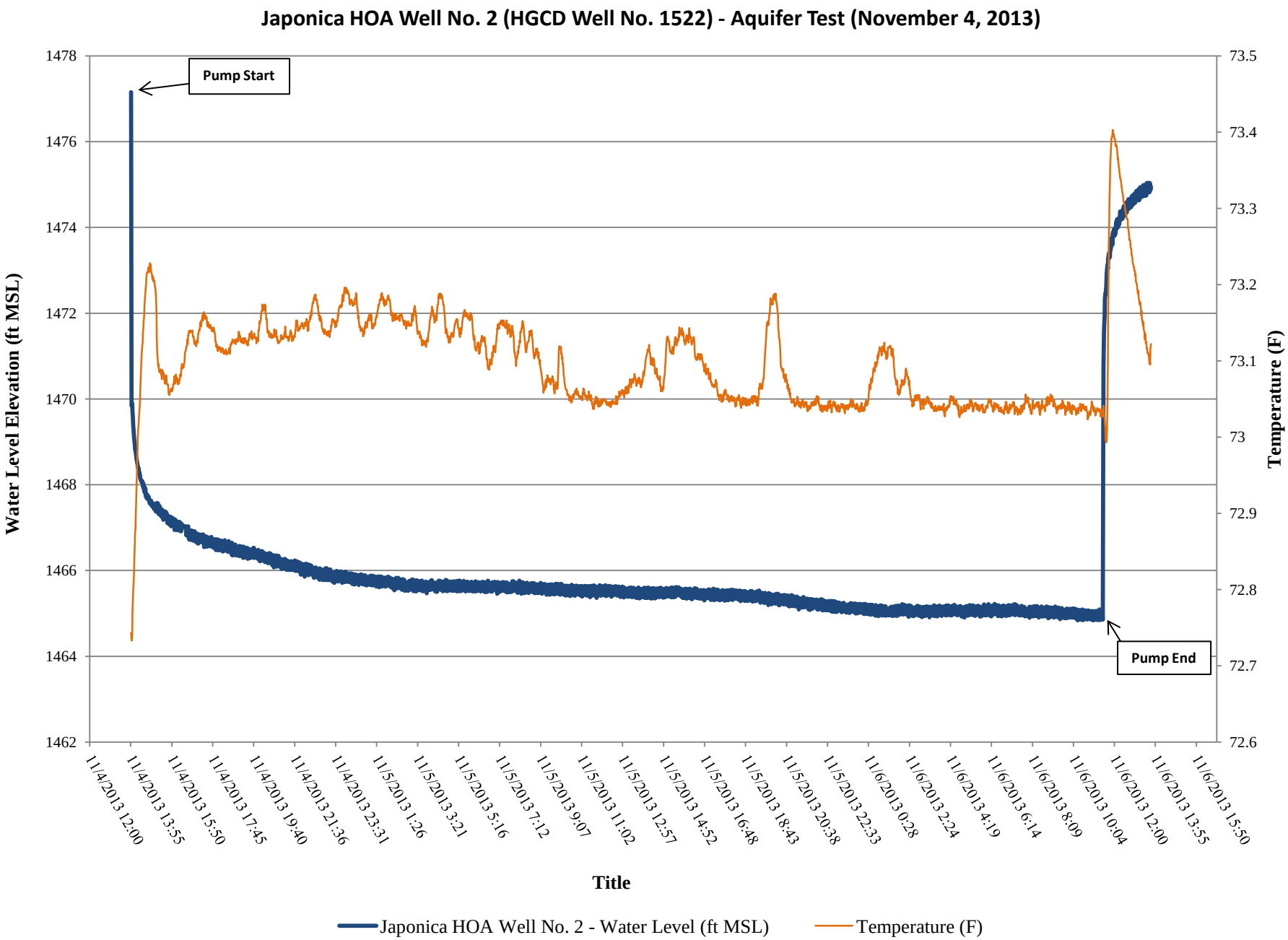
Table 3 - Summary of Aquifer Testing Analyses

Well	Analysis	b (ft)	T (ft^2/day)	K (ft/day)
Japonica HOA Well No. 2 (HGCD Well No. 1522)	Theis	120	960	8.00

Notes: b = aquifer thickness; r = distance from pumping well; T = transmissivity; S = storativity; K = hydraulic conductivity

Attachment 6

Aquifer Test Drawdown and Temperature Curves


Japonica HOA Well No. 2 (HGCD Well No. 1522) - Aquifer Test (November 4, 2013)
Pump Start
Pump End
Water Level Elevation (ft MSL)
Temperature (F)
1478
1476
1474
1472
1470
1468
1466
1464
1462
73.5
73.4
73.3
73.2
73.1
73
72.9
72.8
72.7
72.6
11/4/2013 12:00
11/4/2013 13:55
11/4/2013 15:50
11/4/2013 17:45
11/4/2013 19:40
11/4/2013 21:36
11/4/2013 23:31
11/5/2013 1:26
11/5/2013 3:21
11/5/2013 5:16
11/5/2013 7:12
11/5/2013 9:07
11/5/2013 11:02
11/5/2013 12:57
11/5/2013 14:52
11/5/2013 16:48
11/5/2013 18:43
11/5/2013 20:38
11/5/2013 22:33
11/6/2013 0:28
11/6/2013 2:24
11/6/2013 4:19
11/6/2013 6:14
11/6/2013 8:09
11/6/2013 10:04
11/6/2013 12:00
11/6/2013 13:55
11/6/2013 15:50
Title
Japonica HOA Well No. 2 - Water Level (ft MSL)
Temperature (F)

Attachment 7

Aquifer Test Analyses

Wet Rock Groundwater Services, LLC
Groundwater Specialists
311 Ranch Road 620 South, Suite 103
Austin, Texas 78734
Ph: 512.773.3226
www.wetrockgs.com

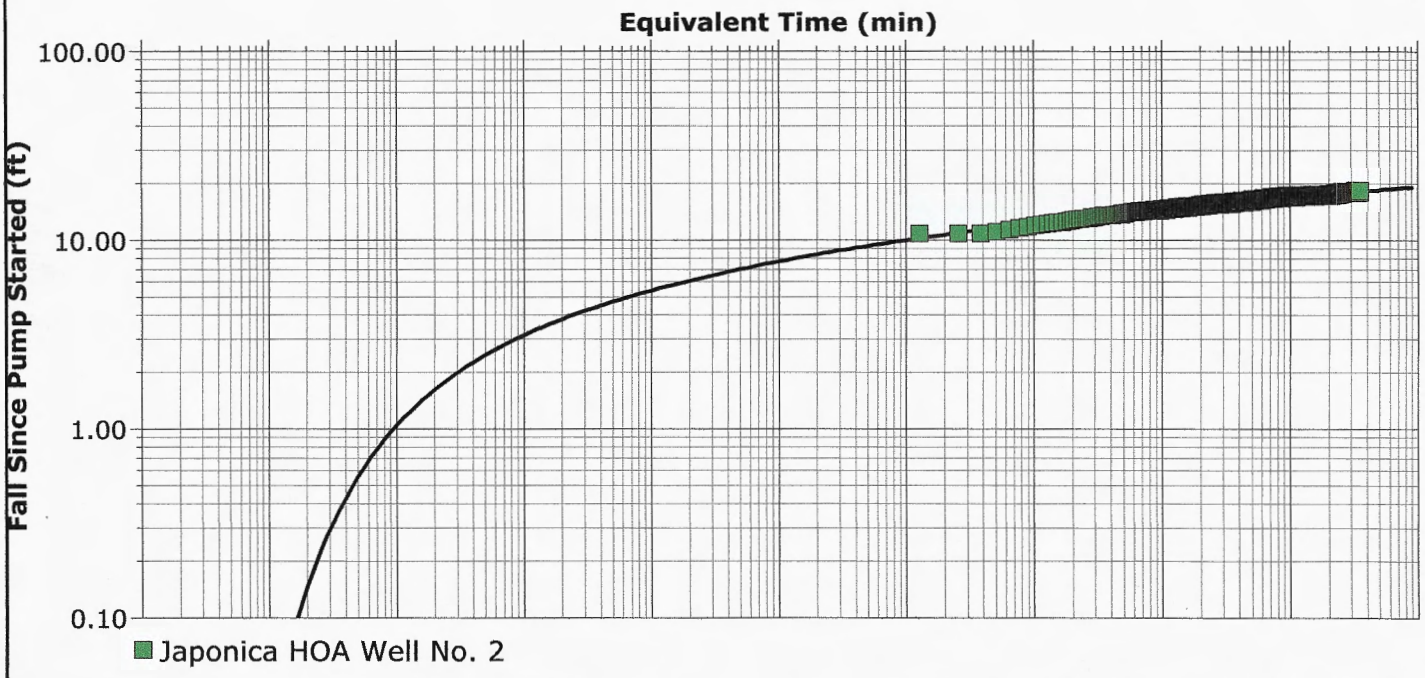
Pumping Test Analysis Report

Project: Japonica HOA

Number: 072-003-13

Client: Headwaters GCD

Location: Kerr County, Texas	Pumping Test: Japonica HOA Well No. 2	Pumping Well: Japonica HOA Well No. 2
Test Conducted by: BWB		Test Date: 11/4/2013
Analysis Performed by: BWB	Theis	Analysis Date: 11/7/2013
Aquifer Thickness: 120.00 ft	Discharge Rate: 42 [U.S. gal/min]	



Calculation after Theis

Observation Well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Storage coefficient	Radial Distance to PW [ft]	
Japonica HOA Well No. 2	9.60×10^{2}	8.00×10^{0}			

Attachment 8

Aquifer Test Data

Japonica HOA Well No. 2 (HGCD Well No. 1522) - Aquifer Test (November 4, 2013)

Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	Temperature (F)	Water Level (ft bgs)	Water Level (ft MSL)	Drawdown (ft)	Pump Rate (gpm)	Specific Capacity (gpm/ft)	Comments
11/4/2013 13:56	0		72.74	564.85	1477.15	0.00			
11/4/2013 13:57	1		72.74	572.16	1469.84	7.31	42	5.75	Water milky brown
11/4/2013 13:58	2		72.73	572.16	1469.84	7.31	42	5.75	
11/4/2013 13:59	3		72.74	572.11	1469.90	7.26	42	5.79	
11/4/2013 14:00	4		72.77	572.29	1469.71	7.44	42	5.64	
11/4/2013 14:01	5		72.79	572.46	1469.54	7.61	42	5.52	
11/4/2013 14:02	6		72.80	572.60	1469.40	7.75	42	5.42	
11/4/2013 14:03	7		72.81	572.74	1469.26	7.89	42	5.32	
11/4/2013 14:04	8		72.83	572.91	1469.09	8.06	42	5.21	
11/4/2013 14:05	9		72.84	572.96	1469.04	8.11	42	5.18	
11/4/2013 14:06	10		72.86	573.06	1468.94	8.21	42	5.12	
11/4/2013 14:07	11		72.87	573.16	1468.84	8.31	42	5.05	
11/4/2013 14:08	12		72.88	573.22	1468.78	8.37	42	5.02	
11/4/2013 14:09	13		72.90	573.23	1468.77	8.38	42	5.01	
11/4/2013 14:10	14		72.92	573.32	1468.68	8.47	42	4.96	
11/4/2013 14:11	15		72.93	573.38	1468.62	8.53	42	4.92	
11/4/2013 14:16	20		73.01	573.60	1468.40	8.75	42	4.80	Water orange-brown
11/4/2013 14:21	25		73.05	573.81	1468.19	8.96	42	4.69	
11/4/2013 14:26	30		73.11	573.94	1468.06	9.09	42	4.62	
11/4/2013 14:41	45		73.22	574.23	1467.77	9.38	42	4.48	Water cloudy-clearing
11/4/2013 14:56	60		73.21	574.44	1467.56	9.59	42	4.38	Water clearing
11/4/2013 15:11	75		73.10	574.44	1467.56	9.59	42	4.38	
11/4/2013 15:26	90		73.08	574.81	1467.19	9.96	42	4.22	Water clear
11/4/2013 15:41	105		73.06	574.74	1467.26	9.89	42	4.25	
11/4/2013 15:56	120		73.07	574.86	1467.15	10.01	42	4.20	
11/4/2013 16:56	180		73.12	575.13	1466.87	10.28	42	4.09	
11/4/2013 17:56	240		73.12	575.47	1466.53	10.62	42	3.96	
11/4/2013 18:56	300		73.13	575.45	1466.56	10.60	42	3.96	
11/4/2013 19:56	360		73.14	575.76	1466.24	10.91	42	3.85	
11/4/2013 20:56	420		73.13	575.74	1466.26	10.89	42	3.86	
11/4/2013 21:56	480		73.15	575.90	1466.10	11.05	42	3.80	
11/4/2013 22:56	540		73.14	576.22	1465.78	11.37	42	3.69	
11/4/2013 23:56	600		73.20	576.26	1465.74	11.41	42	3.68	
11/5/2013 0:56	660		73.15	576.31	1465.69	11.46	42	3.67	
11/5/2013 1:56	720		73.18	576.17	1465.83	11.32	42	3.71	
11/5/2013 2:56	780		73.15	576.41	1465.59	11.56	42	3.63	
11/5/2013 3:56	840		73.15	576.45	1465.55	11.60	42	3.62	

Note: bgs = below ground surface Column Pipe Diameter = 2-inch Horsepower = 10 HP
MSL = Mean Sea Level Pump Setting = 703 feet bgs

Japonica HOA Well No. 2 (HGCD Well No. 1522) - Aquifer Test (November 4, 2013)

Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	Temperature (F)	Water Level (ft bgs)	Water Level (ft MSL)	Drawdown (ft)	Pump Rate (gpm)	Specific Capacity (gpm/ft)	Comments
11/5/2013 4:56	900		73.14	576.47	1465.53	11.62	42	3.61	
11/5/2013 5:56	960		73.14	576.49	1465.51	11.64	42	3.61	
11/5/2013 6:56	1020		73.11	576.29	1465.71	11.44	42	3.67	
11/5/2013 7:56	1080		73.10	576.46	1465.54	11.62	42	3.62	
11/5/2013 8:56	1140		73.12	576.52	1465.48	11.67	42	3.60	
11/5/2013 9:56	1200		73.08	576.31	1465.69	11.46	42	3.66	
11/5/2013 10:56	1260		73.05	576.57	1465.43	11.72	42	3.58	
11/5/2013 11:56	1320		73.05	576.38	1465.62	11.53	42	3.64	
11/5/2013 12:56	1380		73.06	576.59	1465.41	11.74	42	3.58	
11/5/2013 13:56	1440		73.09	576.62	1465.38	11.77	42	3.57	
11/5/2013 14:56	1500		73.08	576.60	1465.41	11.75	42	3.58	
11/5/2013 15:56	1560		73.13	576.65	1465.35	11.80	42	3.56	
11/5/2013 16:56	1620		73.09	576.46	1465.54	11.61	42	3.62	
11/5/2013 17:56	1680		73.05	576.46	1465.54	11.61	42	3.62	
11/5/2013 18:56	1740		73.05	576.48	1465.52	11.63	42	3.61	
11/5/2013 19:56	1800		73.17	576.78	1465.22	11.93	42	3.52	
11/5/2013 20:56	1860		73.05	576.83	1465.17	11.98	42	3.51	
11/5/2013 21:56	1920		73.04	576.85	1465.15	12.01	42	3.50	
11/5/2013 22:56	1980		73.04	576.97	1465.03	12.12	42	3.47	
11/5/2013 23:56	2040		73.04	576.83	1465.18	11.98	42	3.51	
11/6/2013 0:56	2100		73.11	577.07	1464.94	12.22	42	3.44	
11/6/2013 1:56	2160		73.06	576.85	1465.15	12.00	42	3.50	
11/6/2013 2:56	2220		73.04	577.07	1464.93	12.22	42	3.44	
11/6/2013 3:56	2280		73.04	576.85	1465.15	12.00	42	3.50	
11/6/2013 4:56	2340		73.03	577.03	1464.98	12.18	42	3.45	
11/6/2013 5:56	2400		73.03	577.05	1464.96	12.20	42	3.44	
11/6/2013 6:56	2460		73.05	577.03	1464.97	12.18	42	3.45	
11/6/2013 7:56	2520		73.05	577.02	1464.99	12.17	42	3.45	
11/6/2013 8:56	2580		73.04	576.87	1465.13	12.02	42	3.49	
11/6/2013 9:56	2640		73.03	576.92	1465.09	12.07	42	3.48	
11/6/2013 10:56	2700		73.05	577.15	1464.85	12.30	42	3.41	
11/6/2013 11:27	2731	0	73.03	577.14	1464.86	12.30	42	3.42	
11/6/2013 11:28	2732	1	73.04	572.80	1469.20	7.95			
11/6/2013 11:29	2733	2	73.04	571.26	1470.74	6.41			
11/6/2013 11:30	2734	3	73.04	570.48	1471.52	5.63			
11/6/2013 11:31	2735	4	73.03	570.30	1471.70	5.45			
11/6/2013 11:32	2736	5	73.02	570.07	1471.93	5.22			

Note: bgs = below ground surface Column Pipe Diameter = 2-inch Horsepower = 10 HP
MSL = Mean Sea Level Pump Setting = 703 feet bgs

Japonica HOA Well No. 2 (HGCD Well No. 1522) - Aquifer Test (November 4, 2013)

Date and Time	Time Since Pump Start (min)	Time Since Pump Stop (min)	Temperature (F)	Water Level (ft bgs)	Water Level (ft MSL)	Drawdown (ft)	Pump Rate (gpm)	Specific Capacity (gpm/ft)	Comments
11/6/2013 11:33	2737	6	73.02	569.67	1472.33	4.82			
11/6/2013 11:34	2738	7	73.01	569.55	1472.45	4.70			
11/6/2013 11:35	2739	8	73.00	569.57	1472.43	4.72			
11/6/2013 11:36	2740	9	72.99	569.43	1472.57	4.58			
11/6/2013 11:37	2741	10	72.99	569.39	1472.61	4.54			
11/6/2013 11:38	2742	11	73.00	569.05	1472.95	4.20			
11/6/2013 11:39	2743	12	73.01	569.01	1473.00	4.16			
11/6/2013 11:40	2744	13	73.05	568.87	1473.13	4.02			
11/6/2013 11:41	2745	14	73.10	568.97	1473.03	4.12			
11/6/2013 11:42	2746	15	73.16	568.74	1473.27	3.89			
11/6/2013 11:47	2751	20	73.34	568.68	1473.32	3.83			
11/6/2013 11:52	2756	25	73.39	568.44	1473.57	3.59			
11/6/2013 11:57	2761	30	73.40	568.10	1473.90	3.25			
11/6/2013 12:12	2776	45	73.36	567.90	1474.10	3.05			
11/6/2013 12:27	2791	60	73.31	567.53	1474.47	2.68			
11/6/2013 12:42	2806	75	73.26	567.34	1474.66	2.49			
11/6/2013 12:57	2821	90	73.22	567.23	1474.77	2.38			
11/6/2013 13:12	2836	105	73.18	567.06	1474.94	2.21			
11/6/2013 13:27	2851	120	73.13	567.23	1474.77	2.38			
11/6/2013 13:42	2866	135	73.12	567.05	1474.95	2.20			

Note: bgs = below ground surface Column Pipe Diameter = 2-inch Horsepower = 10 HP
MSL = Mean Sea Level Pump Setting = 703 feet bgs