

# JLA Geosciences, Inc.

HYDROGEOLOGIC CONSULTANTS

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## MEMORANDUM

**To:** Shannon LaRocque, P.E.

**From:** Shelley Day, P.G.

**RE:** Village of Wellington Surficial Aquifer Well Rehabilitation – Phase 2 Recommendations

**Date:** October 10, 2018

This memorandum provides a summary of the Wellington Surficial Aquifer well rehabilitation work completed to date and provides a recommendation for the scope of well rehabilitation for fiscal year 2019.

On November 27, 2017 the Village of Wellington (VOW) issued Florida Design Drilling (FDD) the Notice to Proceed on the rehabilitation of four surficial aquifer wells, Well 18, Well R10, Well R3, and Well 24, as part of the Wellfield Rehabilitation and Maintenance Contract (Bid 017-15/DZ). Change Order No. 1, which eliminated rehabilitation of Well 24 and added rehabilitation of R-8, was issued on April 24. Change Order No. 2, which was issued on September 24, 2018, substituted the rehabilitation of R4, in place of R3. The contract price of \$320,000 and the final completion date for the work, January 12, 2019, remained unchanged. It is anticipated that after completion of rehabilitation efforts on Well R-4, approximately \$100,000 will remain in the purchase order issued to FDD.

After performing a short duration pump test to evaluate the well performance and water quality from Well 18, additional rehabilitation was not recommended due to the proximity of the well to a residence and the completion of the wellhead at land surface. A housekeeping pad was constructed around the wellhead, the well was disinfected and after passing bacteriological testing, was placed back in service. Rehabilitation efforts, including acidization and development, have increased the specific capacities of wells R8 and R10 by 37 and 39%, respectively, compared to pre-rehabilitation capacities. The post-rehabilitation specific capacities are approximately 60% and 71% of the original post-construction specific capacities (for R-8 and R-10, respectively). Rehabilitation of Well R4 remains to be completed.

For Phase 2 of the well rehabilitation program, JLA recommends replacement of fiber-glass reinforced plastic (FRP) well screens with larger slot size stainless steel well screens. Wells R2, R3, R4, R6, 22, 23, and 24 are constructed with FRP pipe and 70-slot FRP well screen. We believe that the existing well design and construction of these wells may be limiting the yield and creating additional drawdown due to well inefficiencies. If the inefficiencies could be eliminated or reduced, the pumping water level would be higher, the well would be less stressed, the need for well rehabilitation would be less frequent, and the power usage associated with a higher head would be less.

Based on the VOW's current overall budget for well rehabilitation during fiscal year 2019, JLA recommends rehabilitation of three wells, including replacement of the well screen and redevelopment of two wells, and acidization and redevelopment within another well. The 70-slot FRP well screens, which have approximately 110 square inches per lineal foot (in<sup>2</sup>/ft) of open area, would be replaced with

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larger slot stainless steel continuous slot screen. For comparison, a 90-slot stainless steel well screen, which JLA typically recommends, has 176 in<sup>2</sup>/ft of open area, which is 60% more open area than the currently installed well screen.

JLA proposes to have FDD perform a video log to determine the productive intervals within the well screen. The video also provides an opportunity to inspect the screen prior to removal. FDD would then pull the existing well screen from the well and install a 12-inch diameter continuous slot stainless steel well screen (80 slot or larger, depending upon the gravel available at the time) install the gravel pack, and develop using jetting with airlift and pump development techniques. If the approach is successful at increasing the specific capacity and available drawdown, the rehabilitation procedure could be completed on additional wells. We recommend first starting with Well R-2, and if successful, repeating the approach on Well R-3. The proposed scope of services for Wells R-2 and R-3 are attached as Exhibit A.

As mentioned above, based upon the VOW's current overall budget for rehabilitation and oversight during fiscal year 2019, JLA recommends utilizing remaining available funds for a less invasive rehabilitation, consisting of acidization and development, similar to the approach used for Well R-10. Well R-9 is recommended to be rehabilitated using this approach. On July 30, the pumping water level within R-9 was 47.21 feet below pad level when pumped at a rate of 848 gallons per minute. The reported top of screen is located 55 feet below land surface. With so little available drawdown above the top of screen and the pump intake, rehabilitation is required. The proposed scope of services for Well R-9 is attached.

The total amount of proposed work for the three wells as shown in Exhibit A is \$390,725.00. After including 15% contingency in the purchase order amount, the recommended purchase order amount is approximately \$450,000.

EXHIBIT A						
WELLINGTON SAS WELL REHABILITATION PHASE 2 - PROPOSED SERVICES						
WELL R-2						
ITEM #	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	VALUE	CONTRACT TIME (DAYS)
1	Traffic Control	1	Ea.	\$ 1,000.00	\$1,000.00	21
2	Biological Activity Reaction Test (BART'S)	0	Ea.	\$ 100.00	\$0.00	
3	Specific Capacity Test before or after rehabilitation	0	Ea.	\$ 500.00	\$0.00	1
4	Wire to Water pump efficiency test	0	Ea.	\$ 500.00	\$0.00	
5	Step Drawdown Test	1	Ea.	\$ 1,000.00	\$1,000.00	7
6	Extra Sand testing not during well development or pump testing	0	Ea.	\$ 500.00	\$0.00	
7	Silt density index test (passing only, SDI Test less than 3)	0	Ea.	\$ 500.00	\$0.00	
8	Remove and Reinstall Fencing to original condition	1	Ea.	\$ 500.00	\$500.00	
9	Remove Surficial Wellhead, column pipe, and well pump with motor and accessories	1	Ea.	\$ 2,500.00	\$2,500.00	2
10	Reinstall Surficial Wellhead column pipe, and well pump with motor and accessories	1	Ea.	\$ 2,500.00	\$2,500.00	2
11	360 Degree Color Video with triplicate DVD's including contractor pump	2	Ea.	\$ 2,500.00	\$5,000.00	1
12	Pump Motor Retrieval	0	Ea.	\$ 5,000.00	\$0.00	14
13	Chemical Treatment - Acid Descaler 55 gal.	0	Ea.	\$ 10,000.00	\$0.00	2
13A	Additional Chemical Treatmenr - Acid Descaler 55 gal.	0	Ea.	\$ 10,000.00	\$0.00	
14	Chemical Treatment - Chlorine	0	Ea.	\$ 1,500.00	\$0.00	2
15	Acidize Well - 1,000 gal. 15% HCL	0	Ea.	\$ 25,000.00	\$0.00	10
16	C02 Injection - (3-4 Tons)	0	Ea.	\$ 25,000.00	\$0.00	30
17	Clean Casing & Screen	0	Ea.	\$ 2,500.00	\$0.00	7
18	Brushing, Swabbing & Jetting - Well Development	0	Ea.	\$ 2,500.00	\$0.00	14
19	Drill Rig w/ Crew		Hour	\$ 500.00	\$0.00	
20	Two Man Crew w/ Crane		Hour	\$ 400.00	\$0.00	
21	Each Additional Crew Member		Hour	\$ 50.00	\$0.00	
22	Parts Supplies by Contractor without Contractors Markup		Lump	\$10,000	\$0.00	
22A	Contractor's markup on parts under bid item 22			\$ 0.15	\$0.00	
23	Well Abandonment	0	Ea.	\$ 5,000.00	\$0.00	
24	Neat Cement for Well Abandonment	0	CY	\$ 500.00	\$0.00	
25	Mud Well, Remove Exist. Inner Casing/ Screen, Riser & Gravel Pack	1	Ea.	\$ 40,000.00	\$40,000.00	21
26	Furnish 12" Diameter 316L SS Well Screen 30 to 100 Slot	62	Ft.	\$ 250.00	\$15,500.00	30
27	Furnish 12" Diameter Certalok Riser	60	Ft.	\$ 150.00	\$9,000.00	14
28	Install Well Screen & Riser	1	Ea.	\$ 5,000.00	\$5,000.00	7
29	Furnish & Install Gravel Pack	115	CF	\$ 25.00	\$2,875.00	7
30	Well Development Pump - 2,000 to 3,000 gpm	150	Hour	\$ 250.00	\$37,500.00	14
31	Well Development & Redevelopment - Airlift 600 - 750 CFM	100	Hour	\$ 250.00	\$25,000.00	21
32	Disposal of Development Water	1	Ea.	\$ 2,500.00	\$2,500.00	
33	Disposal of Development Solids	1	Ea.	\$ 2,500.00	\$2,500.00	
34	Furnish & Install 1" PVC Stilling Well - 60' to 80'	1	Ea.	\$ 2,500.00	\$2,500.00	
35	Furnish & Install 2 new SS Safety Cables - 60' to 80'	0	Ea.	\$ 600.00	\$0.00	
36	On Site Welding	0	Hour	\$ 125.00	\$0.00	
37	Machine Shop Welding	0	Hour	\$ 100.00	\$0.00	
38	Disassembly & Inspection of Pump	0	Ea.	\$ 1,500.00	\$0.00	1
39	Pump Maintenance	0	Hour	\$ 100.00	\$0.00	7
40	Trip Impeller	0	Ea.	\$ 500.00	\$0.00	7
41	Motor Maintenance	0	Hour	\$ 100.00	\$0.00	7
42	Disinfect Well - Health Dept. Clearance	1	Ea.	\$ 2,000.00	\$2,000.00	2
43	BACT Health Dept. Clearance	10	Ea.	\$ 150.00	\$1,500.00	20
TOTALS					\$158,375.00	169

<div>EXHIBIT A</div> <div>WELLINGTON SAS WELL REHABILITATION PHASE 2 - PROPOSED SERVICES</div>						
WELL R-3						
ITEM #	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	VALUE	CONTRACT TIME (DAYS)
1	Traffic Control	0	Ea.	\$ 1,000.00	\$0.00	
2	Biological Activity Reaction Test (BART'S)	0	Ea.	\$ 100.00	\$0.00	
3	Specific Capacity Test before or after rehabilitation	0	Ea.	\$ 500.00	\$0.00	1
4	Wire to Water pump efficiency test	0	Ea.	\$ 500.00	\$0.00	
5	Step Drawdown Test	1	Ea.	\$ 1,000.00	\$1,000.00	7
6	Extra Sand testing not during well development or pump testing	0	Ea.	\$ 500.00	\$0.00	
7	Silt density index test (passing only, SDI Test less than 3)	0	Ea.	\$ 500.00	\$0.00	
8	Remove and Reinstall Fencing to original condition	1	Ea.	\$ 500.00	\$500.00	
9	Remove Surficial Wellhead, column pipe, and well pump with motor and accessories	1	Ea.	\$ 2,500.00	\$2,500.00	2
10	Reinstall Surficial Wellhead column pipe, and well pump with motor and accessories	1	Ea.	\$ 2,500.00	\$2,500.00	2
11	360 Degree Color Video with triplicate DVD's including contractor pump	2	Ea.	\$ 2,500.00	\$5,000.00	1
12	Pump Motor Retrieval	0	Ea.	\$ 5,000.00	\$0.00	14
13	Chemical Treatment - Acid Descaler 55 gal.	0	Ea.	\$ 10,000.00	\$0.00	2
13A	Additional Chemical Treatmenr - Acid Descaler 55 gal.	0	Ea.	\$ 10,000.00	\$0.00	
14	Chemical Treatment - Chlorine	0	Ea.	\$ 1,500.00	\$0.00	2
15	Acidize Well - 1,000 gal. 15% HCL	0	Ea.	\$ 25,000.00	\$0.00	10
16	CO2 Injection - (3-4 Tons)	0	Ea.	\$ 25,000.00	\$0.00	30
17	Clean Casing & Screen	0	Ea.	\$ 2,500.00	\$0.00	7
18	Brushing, Swabbing & Jetting - Well Development	0	Ea.	\$ 2,500.00	\$0.00	14
19	Drill Rig w/ Crew		Hour	\$ 500.00	\$0.00	
20	Two Man Crew w/ Crane		Hour	\$ 400.00	\$0.00	
21	Each Additional Crew Member		Hour	\$ 50.00	\$0.00	
22	Parts Supplies by Contractor without Contractors Markup	0.1	Lump	\$10,000	\$1,000.00	
22A	Contractor's markup on parts under bid item 22	1000		\$ 0.15	\$150.00	
23	Well Abandonment	0	Ea.	\$ 5,000.00	\$0.00	
24	Neat Cement for Well Abandonment	0	CY	\$ 500.00	\$0.00	
25	Mud Well, Remove Exist. Inner Casing/ Screen, Riser & Gravel Pack	1	Ea.	\$ 40,000.00	\$40,000.00	21
26	Furnish 12" Diameter 316L SS Well Screen 30 to 100 Slot	60	Ft.	\$ 250.00	\$15,000.00	30
27	Furnish 12" Diameter Certalok Riser	59	Ft.	\$ 150.00	\$8,850.00	14
28	Install Well Screen & Riser	1	Ea.	\$ 5,000.00	\$5,000.00	
29	Furnish & Install Gravel Pack	120	CF	\$ 25.00	\$3,000.00	7
30	Well Development Pump - 2,000 to 3,000 gpm	150	Hour	\$ 250.00	\$37,500.00	14
31	Well Development & Redevelopment - Airlift 600 - 750 CFM	100	Hour	\$ 250.00	\$25,000.00	21
32	Disposal of Development Water	1	Ea.	\$ 2,500.00	\$2,500.00	
33	Disposal of Development Solids	1	Ea.	\$ 2,500.00	\$2,500.00	
34	Furnish & Install 1" PVC Stilling Well - 60' to 80'	1	Ea.	\$ 2,500.00	\$2,500.00	
35	Furnish & Install 2 new SS Safety Cables - 60' to 80'	0	Ea.	\$ 600.00	\$0.00	
36	On Site Welding	0	Hour	\$ 125.00	\$0.00	
37	Machine Shop Welding	0	Hour	\$ 100.00	\$0.00	
38	Disassembly & Inspection of Pump	0	Ea.	\$ 1,500.00	\$0.00	1
39	Pump Maintenance	0	Hour	\$ 100.00	\$0.00	7
40	Trip Impeller	0	Ea.	\$ 500.00	\$0.00	7
41	Motor Maintenance	0	Hour	\$ 100.00	\$0.00	7
42	Disinfect Well - Health Dept. Clearance	1	Ea.	\$ 2,000.00	\$2,000.00	2
43	BACT Health Dept. Clearance	10	Ea.	\$ 150.00	\$1,500.00	20
TOTALS					\$158,000.00	141

EXHIBIT A						
WELLINGTON SAS WELL REHABILITATION PHASE 2 - PROPOSED SERVICES						
Well R9						
ITEM #	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	VALUE	CONTRACT TIME (DAYS)
3	Specific capacity test before or after rehabilitation	1	Each	\$500.00	\$500.00	1
8	Remove and reinstall fencing to original condition	0	Each	\$500.00	\$0.00	
9	Remove Surficial wellhead, column pipe, and well pump with motor and accessories	1	Each	\$2,500.00	\$2,500.00	2
10	Reinstall Surficial wellhead, column pipe, and well pump with motor and accessories	1	Each	\$2,500.00	\$2,500.00	2
11	Combined Static and Dynamic Down Hold 360 degree color video survey with triplicate DVD's including contraction pump	2	Each	\$2,500.00	\$5,000.00	2
14	Chemical treatment of well with 2,500 gallons of 1,000 ppm chlorine solution and neutralize waste	1	Each	\$1,500.00	\$1,500.00	2
15	Acidize well with 1,000 gallons of 15% HCL acid (pump removed), Neutralize and legally dispose of waste. Must use Time Retard Agent.	1	Each	\$25,000.00	\$25,000.00	10
17	Clean casing and screen with casing scraper and brush	1	Each	\$2,500.00	\$2,500.00	7
18	Brushing, swabbing and jetting to develop well	1	Each	\$2,500.00	\$2,500.00	14
19	Drill rig with crew	0	Hour	\$500.00	\$0.00	
20	Two man crew with crane for pipe modifications and small projects	0	Hour	\$400.00	\$0.00	
21	Each additional crew member	0	Hour	\$50.00	\$0.00	
22	Parts supplied by contractor without Contractor's mark up	0	Lump	\$10,000.00	\$0.00	
22 A	Contractor's mark up on parts under bid item 22	0	Decimal markup	\$0.15	\$0.00	
23	Well abandonment (does not include cost of grout)	0	Each per well	\$5,000.00	\$0.00	
24	Neat cement grout for well abandonment	0	Cubic Yards	\$500.00	\$0.00	
29	Furnish and install gravel pack for well screen	54	Cubic Feet	\$25.00	\$1,350.00	7
30	Well development by Contractors pump 2,000 to 3,000 gpm	60	Hours	\$250.00	\$15,000.00	14
31	Well development and redevelopment by airlift with 600 to 750 CFM air compressor	40	Hours	\$250.00	\$10,000.00	21
32	Disposal of development water to lake or sewer with up to 500' of lay flat hose.	1	Each	\$2,500.00	\$2,500.00	
33	Disposal of development solids that need to be containerized and properly disposed by Contractor (in excess of 1 yd3)	0	Each	\$2,500.00	\$0.00	
34	Furnish and install new 1" PVC stilling well 60' to 80' deep	0	Each	\$2,500.00	\$0.00	
35	Furnish and install 2 new well S.S motor safety cables and appurtenances 60' to 80' deep	0	Each	\$600.00	\$0.00	
36	On-site Welding	0	Hours	\$125.00	\$0.00	
37	Machine Shop Welding	0	Hours	\$100.00	\$0.00	
38	Disassembly and inspection of pump in shop	0	Each	\$1,500.00	\$0.00	0
39	Pump Maintenance in shop	0	Hours	\$100.00	\$0.00	0
40	Trim impeller in shop	0	Each impeller	\$500.00	\$0.00	0
41	Motor maintenance	0	Hours	\$100.00	\$0.00	0
42	Disinfect well for Health Department clearance	1	Each	\$2,000.00	\$2,000.00	2
43	Bacteriological testing for Health Department clearance	10	Each	\$150.00	\$1,500.00	20
TOTALS					\$74,350.00	104