Well Testing, Logging, and Acidization Specifications for JEA Brandy Branch Generating Station Well Nos. 1, 2, and 3

PREPARED FOR:	JEA
PREPARED BY:	CH2M HILL Engineers, Inc. (CH2M), a wholly owned subsidiary of Jacobs Engineering Group Inc.
DATE:	February 6, 2019

Introduction

This technical memorandum (TM) includes plans and specifications for JEA (Owner) to procure a qualified well contractor (Contractor) to perform video and geophysical logging of JEA Brandy Branch Generating Station (BBGS) Well Nos. 1, 2, and 3, and acid rehabilitation of Well No. 3. The following activities will be performed:

- Video and geophysical logging (Well Nos. 1, 2, and 3)
- Well acidization (Well No. 3)
- Post-acidization well development (Well No. 3)
- Post-acidization step-drawdown pumping test (Well No. 3)
- Post-acidization water quality sampling (Well No. 3)

Prospective bidders (Bidders) will submit their cost estimate to perform the work and supply all materials and equipment necessary to implement the well logging and acidization plans using the attached bid form. The Owner will provide the acid, acid storage tank, and secondary storage containment to implement the acidization of Well No. 3.

The following items are included in this TM:

1. Well Rehabilitation Qualifications
2. BBGS Wellfield Description
3. Figures
4. Specifications
5. Bid Form
6. Bidder Qualification Form

CH2M (Engineer) will provide the following professional engineering services as part of this work:

- Prepare the well testing, logging, and acidization plan and specifications for the Contractor (this document).
- Coordinate and provide field oversight services during well testing, logging, and acidization activities.
- Perform water quality sampling of Well No. 3 before and after acidization.
- Prepare a TM summarizing methods, results, and recommendations.

Well Rehabilitation Qualifications

Using the attached qualifications form, Bidders must provide evidence of successfully completing a minimum of three well rehabilitation projects in the last 5 years using the slow-rate acidization (SRA) method developed by the Owner and Engineer. If this well rehabilitation requirement is not met, Bidders may be disqualified from bidding on this project.

BBGS Wellfield Description

The JEA BBGS is located approximately 2 miles northeast of the town of Baldwin in Duval County, Florida at 15701 West Beaver Street, and includes a combined cycle power plant that uses both natural gas and steam turbines to produce electricity. Water is a critical component of the power generating process at the JEA BBGS.

The JEA BBGS currently has three in-service production wells (Well Nos. 1, 2, and 3) that supply Floridan aquifer groundwater to the power plant to replace evaporative water losses at the cooling tower. Well Nos. 1 and 2 (East and West Production Wells, respectively) were constructed in 2000 as part of the original design of the BBGS. Both wells are 12-inch production wells originally completed in the upper Floridian aquifer to a depth of approximately 840 feet below land surface (bls). Both wells were subsequently deepened to depths of 1,265 and 1,285 feet bls to increase the overall capacity of the wells. Following deepening, the specific capacity of Well Nos. 1 and 2 was measured at approximately 90 and 170 gallons per minute per foot of drawdown (gpm/ft), respectively, at the design pumping rate of 1,300 gpm.

Well No. 3 was constructed in 2002 as part of a plant expansion to provide additional water capacity. The well was constructed with a 16-inch diameter steel casing set to a depth of approximately 523 feet bls, with an open interval extending from the base of the casing to a total depth of approximately 1,300 feet bls. The specific capacity of the well following construction was measured at approximately 87 gpm/ft. The well was capable of producing more than 2,500 gpm for extended periods of time. Since 2002, the specific capacity of the well has reduced approximately 63 percent. Based on this capacity reduction, acid rehabilitation is required to increase the production capacity of the well.

The JEA BBGS wellfield also includes an upper Floridan aquifer monitoring well, a lower Floridan aquifer monitoring well, and several surficial aquifer monitoring wells. Figure 1 shows the approximate location and layout of the production wells and monitoring wells. Table 1 includes information on the current configuration of the Floridan aquifer production wells and monitoring wells at the JEA BBGS.

Table 1. JEA BBGS Wellfield[a]
Well Logging, Testing, and Acidization Specifications for JEA Brandy Branch Generating Station Well Nos. 1, 2, and 3

Well No.	Date Constructed	Casing Diameter (inches)	Casing Depth (feet bls)	Total Well Depth (feet bls)	Design Flow Rate (gpm)
Well No. 1 (East)	2000	12	538	1,285 (deepened from 840 in November 2002)	1,300
Well No. 2 (West)	2000	12	536	1,265 (deepened from 840 in June 2001)	1,300
Well No. 3	October 2002	16	523	1,250	2,600
Upper Floridan Aquifer Monitoring Well	June 2002	6	539	650	-
Lower Floridan Aquifer Monitoring Well	September 2002	6	1,156	1,250	-

[a] Information obtained from Brandy Branch summary of construction and testing titled: *Lower Floridan Aquifer Monitoring Well, Upper Floridan Aquifer Monitoring Well, Production Well No. 1 Deepening, Production Well No. 2 Deepening, and Production Well No. 3* (CH2M, 2004).

Figures

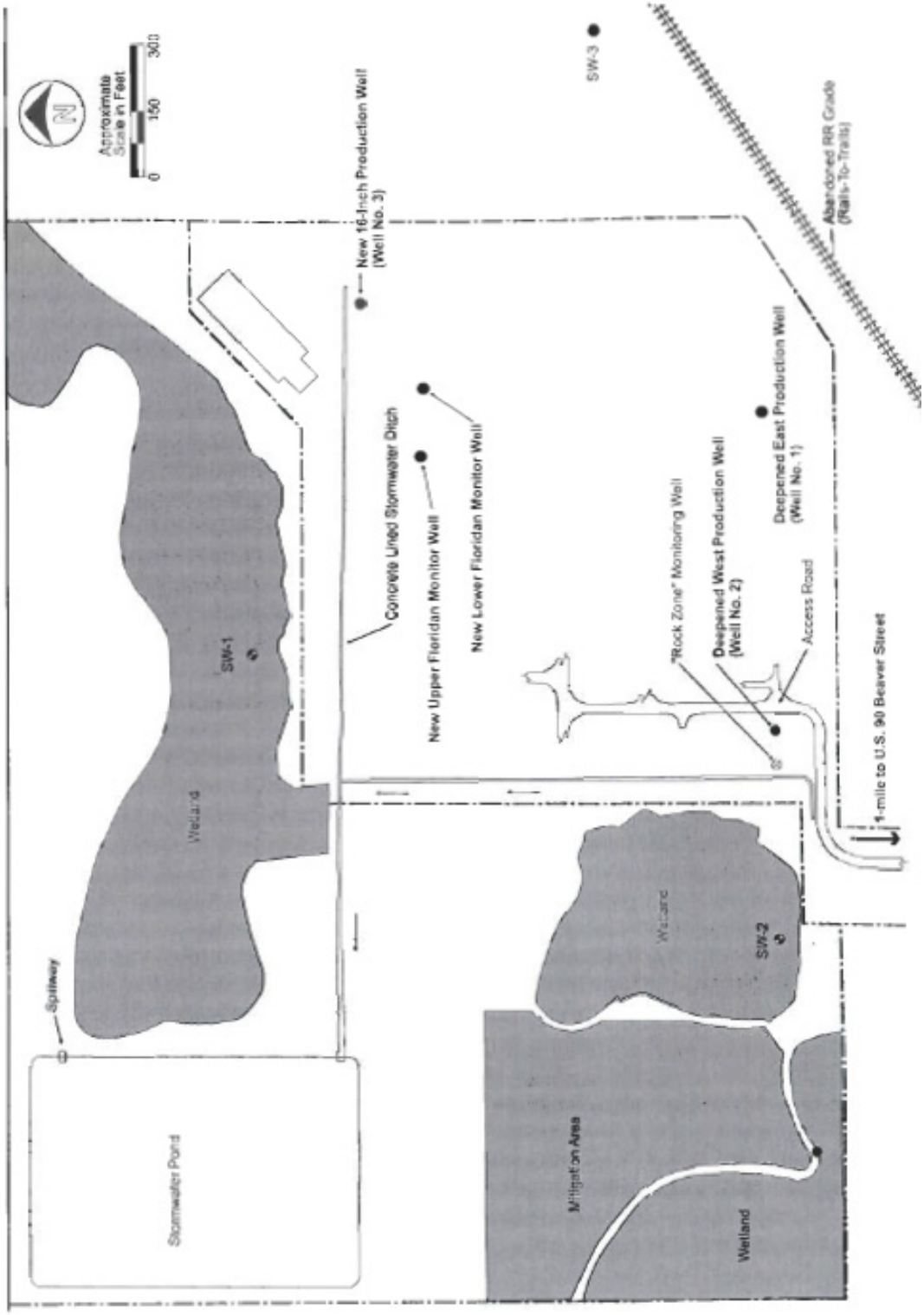
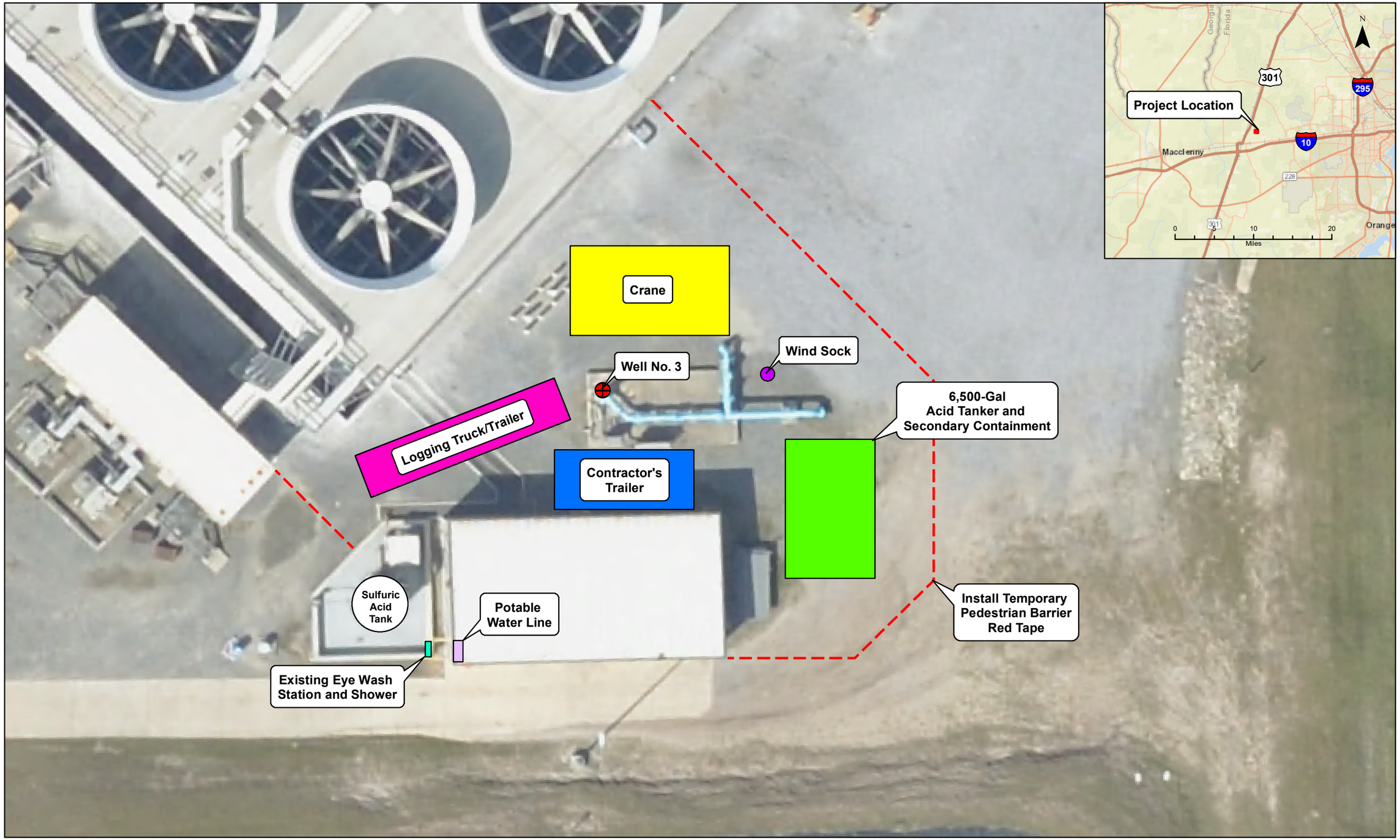


Figure 1
Brandy Branch Wells Location Map
Well Testing, Logging, and Acidization Specifications for JEA Brandy Branch Generating Station Well Nos. 1, 2, and 3



LEGEND

- Well No. 3
- Potable Water Source
- Existing Eye Wash
- Logging Trailer
- Crane
- Wind Sock
- Acid Tanker
- Contractor's Trailer
- Pedestrian Barrier Tape

N

0 12.5 25 50

Feet

Figure 2.
Brandy Branch Well No. 3 Acidization Site Plan
Well Testing, Logging, and Acidization Specifications for
JEA Brandy Branch Generating Station Well Nos. 1, 2, and 3

Last Updated: DRAFT20190204
Fig2_BB_Spec_Pkg
Source Data: FDOT APLUS 2016, Florida Geographic Library, Google Earth, JEA, ESRI, Duval County

Specifications

Well Testing, Logging, and Acidization

General Requirements

The following general requirements apply to this contract:

1. All well logging and acidization work described herein must be completed during the plant shutdown period of March 4, 2019, to April 26, 2019.
2. Prior to starting any work, confer with the Owner to develop an approved work schedule.
3. The Contractor will coordinate with and notify the Engineer 1 week in advance of any work. The Engineer contact information is as follows:

   Erik Svenson, P.G.
   CH2M
   14120 Ballantyne Corporate Place Suite 200
   Charlotte, NC 28277
   Erik.Svenson@jacobs.com
   (904) 304-6733
4. Work conducted outside normal working hours will be scheduled in advance with the Owner.
5. The Contractor is responsible for securing the well sites and all well testing, logging, and acidization equipment.
6. The Contractor will conduct all work in accordance with the Owner's safety requirements.
7. The Contractor is responsible for all site and wellhead preparation and restoration work necessary to perform the work presented herein.
8. The Contractor is responsible for managing all discharges from the wells during the course of this work and will coordinate with the Owner to identify an appropriate locations for discharge water during geophysical logging, well development, and capacity testing. This includes identifying and permitting (if required) all discharge locations and flows.

Summary of Work

This section includes a general sequence of logging and rehabilitation work to be completed at JEA BBGS Well Nos. 1, 2, and 3. Video and geophysical logging of Well Nos. 1, 2, and 3 will be completed prior to acidizing Well No. 3.

Video and Geophysical Logging

The Contractor will adhere to the following general steps to log Well Nos. 1, 2 and 3:

1. Attend one pre-construction meeting with the Owner and Engineer to discuss well logging and acidization, sequence of work, discharge locations and controls, site access or project personnel and delivery drivers, site security, and temporary water supply. The Owner will coordinate and hold the pre-construction meeting.
2. Remove existing well pumps, piping, and other wellhead appurtenances necessary to perform the logging work at all three wells. The Owner will coordinate with Owner's Operations and Maintenance staff to de-energize the pump motors before removal.

3. Conduct a video survey of each well from land surface to total depth, under static conditions in accordance with *Video Logging Requirements*.
4. Install a temporary test pump, header, valves, discharge piping, and other equipment to control flow during logging in accordance with *Geophysical Logging Requirements*.
5. Conduct a suite of geophysical logs under static (non-pumping) and pumping conditions. Geophysical logging will be conducted in accordance with *Geophysical Logging Requirements*.
6. Conduct video and geophysical logging at Well No. 3 first, followed by Well Nos. 1 and 2.

Well Acid Rehabilitation

The following acidization work will be completed at Well No. 3 only:

1. Mobilize acidization equipment and materials, barricades, field office trailer, lighting equipment, and support vehicles to the well site and set up in accordance with Figure 2.
2. Receive delivery of and set up a 6,500-gallon acid storage tank and secondary containment with equivalent volume of the primary holding tank, in the event that the stored acid must be transferred or contained.
3. Install the acid line, water line, water level indicator, eductor/rotameter assembly, centrifugal drive pump, necessary wellhead appurtenances, and the network of conveyance piping for the potable water and acid solution. A potable water line is located near the existing eye wash station (see Figure 2). Coordinate with the Owner regarding access to the potable water source.
4. Set up a safety station to include open water tub, eye wash station, and wind flag and provide emergency contacts and directions to the nearest medical facility in the field trailer. Verify all worker personal protective equipment (PPE) is available to include rubber or neoprene gloves, safety glasses, Tyvek suits, and other safety equipment as required by the Owner.
5. Conduct preliminary testing using potable water to identify any potential leaks or issues in the system and to confirm proper operation of the equipment and meters, once the SRA system has been set up. If leaks or issues are detected, repair and repeat testing. Record background water level in the well casing.
6. Stage approximately 200 pounds of soda ash adjacent to the acid storage tank and have equipment available to construct an earthen berm, if necessary. The soda ash will be used to neutralize any concentrated acid spills, if necessary.
7. Conduct and document safety tailgate meeting with Engineer, subcontractor(s), and Owner representative.
8. Receive delivery of the first batch of concentrated acid and load acid storage tank. The first batch will consist of approximately 5,000 gallons of 20 percent hydrochloric acid (HCl).
9. Notify Owner and conduct acidization in accordance with *Well Acidization Requirements*.
10. Shut-in well, receive delivery of second batch of concentrated acid, and load the acid storage tank. The second acid batch will consist of approximately 4,200 gallons of 20 percent HCl.
11. Resume acidization in accordance with *Well Acidization Requirements*.
12. Flush the system with potable water following placement of acid and allow well to remain shut-in for a minimum of 120 hours to allow completion of the reaction. Monitor wellhead pressure during static period.

13. Demobilize the SRA system, acid storage tank, and associated support equipment.
14. Install test pump and develop the well in accordance with *Well Development Requirements*.
15. Conduct a post-acidization step-drawdown pumping test with test pump installed in accordance with *Pumping Test Requirements*.
16. Complete post-acidization testing, remove the test pump, and consult with Owner regarding reinstallation of the permanent pump, wellhead, and electrical connections.
17. Demobilize and restore well site back to its original condition.

Well Acidization Requirements

The following well acidization requirements apply to this contract for Well No. 3 only:

1. Contractor will provide a Professional Engineer or Geologist licensed in the State of Florida (Professional) to oversee and manage the injection of the entire volume of acid solution. The Professional will have prior experience in managing or directing acidization of Floridan aquifer public water supply wells. The Professional will be onsite 24 hours per day throughout the duration of the injections, supervising the placement of acid and monitoring the acid strength in accordance with the requirements.
2. Contractor will provide, set up, operate, and maintain all materials and equipment required to accomplish the work as specified. Contractor will coordinate with the Owner on temporary potable water supply.
3. Contractor will install the wellhead, water lines, temporary pumps, meters, valves, and acidization line so no leaks of fluid or resulting gases occur. Contractor will submit a perforation plan for the acid line to the Engineer for review and approval prior to injection of any fluids down the well. Contractor will install and perforate the acid line in accordance with the approved plan.
4. Owner will provide the acid, acid storage tank, and secondary containment of all acid onsite. The Contractor will install and maintain the acid storage equipment and coordinate with Owner's acid source and carrier regarding delivery of acid and acid storage equipment. The Owner will also coordinate access with the JEA BBGS security officers for the acid and acid storage tank delivery drivers.
5. Contractor will stage a minimum of 200 pounds of soda ash adjacent to the acid storage tank and have equipment available to construct an earthen berm, if necessary. The soda ash will be used to neutralize any concentrated acid spills.
6. Contractor will furnish and set up a safety station to include open water tub, eye wash station, and wind flag.
7. Contractor will stimulate the well using approximately 9,200 gallons of 20 percent HCl, which will be divided and delivered to the site in two batches for placement.
8. Contractor will dilute the 20 percent HCl using potable water at a ratio of 1:3, prior to placement in the well, resulting in a strength not to exceed 6 percent unless otherwise approved by the Engineer.
9. Contractor will introduce the diluted acid into the well continuously at a rate not to exceed 8 gallons per minute unless otherwise approved by the Engineer. The diluted acid will be distributed evenly over the target acidization interval provided by the Engineer.
10. Contractor will monitor solution strength a minimum of every 15 minutes for the first 2 hours during the acidization process, and a minimum of once every hour thereafter until the entire volume of acid solution has been placed in the well.

11. Contractor will provide equipment necessary to inject potable water down the well casing at a rate of up to 50 gpm.
12. Contractor will furnish, install, and operate equipment to monitor pressure buildup at the wellhead.
13. Contractor will furnish and install a water quality monitor tube below the bottom of the well casing and temporary pumping equipment, to sample and monitor the pH and specific conductivity of the borehole water during acidization.
14. After acid placement is complete, the Contractor will start water injection for a volume to be determined by the Engineer and Professional. After water injection is complete, the Contractor will close all valves and allow the well to remain undisturbed for a minimum of 120 hours until removing the spent fluids from the well unless otherwise directed by Engineer. Contractor will monitor wellhead pressure during static period.
15. After static period is completed, the Contractor will develop the well in accordance with *Well Development Requirements*.

Submittals

The Contractor will provide the following submittals:

1. Acidization plan, drawings, and list of materials and equipment to Engineer for review and approval prior to starting work.
2. Acid line perforation plan to Engineer for review and approval prior to starting work.
3. A summary of field SRA measurements and notes to Engineer.

Geophysical Logging Requirements

Geophysical logging will be conducted on JEA BBGS Well Nos. 1, 2, and 3.

Geophysical Logging Suite

Geophysical logging will be conducted under static (non-pumping) and pumping conditions. Geophysical logs conducted under static conditions include the following:

- Gamma Ray
- Spontaneous Potential
- Formation Resistivity (16-inch and 64-inch normal) and Single Point Resistance
- X-Y Caliper
- Flow and Tool Speed (up direction)
- Flow and Tool Speed (down direction)
- Fluid Temperature
- Fluid Conductivity

Geophysical logs conducted under pumping conditions include the following:

- Flow and Tool Speed (down direction)
- Temperature
- Fluid Conductivity

Pumping Requirements

The following pump requirements are necessary to perform dynamic geophysical logging:

1. **Pump for Dynamic Geophysical Logging Well Nos. 1 and 2**: The Contractor will furnish, install, and operate a vertical line shaft turbine pump or submersible pump, complete with required column,

shafting, discharge head, and fittings, capable of pumping at a rate of 400 gpm, at an impeller bowl setting of 80 feet, with a pumping water level estimated at 70 feet bls.

2. **Pump for Dynamic Geophysical Logging Well No. 3**: The Contractor will furnish, install, and operate a vertical line shaft turbine pump or submersible pump, complete with required column, shafting, discharge head, and fittings, capable of pumping at a rate of at least 1,000 gpm, at an impeller bowl setting of 100 feet, with a pumping water level estimated at 90 feet bls.
3. **Electric Power:** The Contractor will make arrangements for obtaining electric power at each well site with the Owner

Flow Measurement and Control

The Contractor will furnish, install, and operate the following flow measurement and control equipment during dynamic logging:

1. A totalizing flowmeter will be placed in proper alignment within 50 feet of the pumped well, located downstream of the throttling valve. The flow measuring device will be capable of measuring the pump discharge for the well within ±5 percent of true flow for pumping rates specified in *Pumping Requirements*.
2. The Engineer will install a portable ultrasonic flowmeter for backup flow measurement. The Contractor will provide a minimum of 10 feet of straight polyvinyl chloride (PVC) discharge pipe to install the ultrasonic flowmeter for accurate measurement.
3. A gate valve, or equal, will be installed on the discharge side of the pump for adjustment of flow rate.

Logging Requirements

The Contractor will be responsible for the following during all logging events:

1. Conduct geophysical logging in the presence of the Engineer.
2. Use a logging interval of the total depth of the well or borehole, or as determined by the Engineer.
3. Record logs in digital format.
4. Report logs in graphic (analog) form.
5. Set vertical scale for the log at 5 inches per 100 feet of depth, or as directed by the Engineer.
6. Record logs at the highest sensitivity consistent with a minimum of off-scale deflection, or as directed by the Engineer.
7. Record scales, calibration and standardization, and other pertinent data on each log.
8. Record a duplicate (repeat) section of each log equal to 20 percent of the total logged depth for wells up to 250 feet deep, and 10 percent of the logged depth of wells deeper than 250 feet up to a maximum of 100 feet. The duplicate section will be selected by the Engineer.
9. Demonstrate calibration of geophysical logging tools in the field.
10. Run the flowmeter tool inside the well casings under static conditions at a minimum of three different tool speeds, and record tool output and corresponding tool speed.
11. Run the static flow log from the base of the final casing to total depth, and again from total depth to the base of the final casing.
12. Perform up to 10 stationary measurements during static and dynamic flow logging.

13. Maintain a tool speed of approximately 30 feet per minute (fpm) or less during static and dynamic flow logging or as directed by Engineer. The tool speed will be decreased if stationary flow measurement suggests flow production is being masked by tool movement.

Submittals

The Contractor closeout submittals for each logging event will include the following:

- Two field hard copies of the logs and electronic copies of the ASCII files of each log (LAS format) and portable document format (PDF) files of each log before leaving the site
- Final electronic copies of the ASCII and PDF files of each log

Video Logging Requirements

Video logging will be conducted on JEA BBGS Well Nos. 1, 2, and 3.

Equipment

The Contractor will be responsible for the following:

1. Provide equipment and supplies including, but not limited to, video camera with lights, power source, and cables specifically designed and constructed for underwater operation in wells, that provide a clear, focused, well-lighted image of the well, and for which there is a system for lowering and retrieving the camera from the well, a video monitor, and video recorder.
2. Record images with video recorder directly onto digital video disc (DVD).
3. Provide camera lens capable of rotating up, from truly vertical, to 90 degrees, and from side to side at 360 degrees.
4. Produce a video with an automatic on-screen depth indication to the nearest 0.01 foot. The on-screen depth indication will be accurate to within 1 foot of actual depth during the video survey.
5. Install centralizers on the video camera to prevent or minimize camera rotation during the video inspection.

Preparation

The Contractor will be responsible for the following:

1. Notify the Owner and Engineer at least 1 week prior to the start of video inspection and recording. Notify the Owner and Engineer of anticipated delays whenever they become apparent.
2. Clean and sterilize equipment and the support system with chlorine solution before lowering equipment into well.

Inspection and Recording

The Contractor will be responsible for the following:

1. Schedule video inspections of the well prior to geophysical logging.
2. Perform video inspections and recording only while well water is clear.
3. Run video inspections the full depth of the well (land surface to total depth).
4. Maintain continuous image on video monitor during inspections, and continuously record image on video.

5. Display date and numbers indicating depth of camera below top of casing (btoc) on the video monitor during the inspections. Record numbers with image on the video.

Submittals

The Contractor will provide the Engineer with the following closeout submittals:

1. One field copy of video survey file on thumb drive or DVD before leaving site
2. One final video file as permanent record of the video well inspection

Well Development Requirements

JEA BBGS Well No. 3 will be developed after acidization. The Contractor will perform the following well development requirements under this contract:

1. Coordinate with the Owner before starting and identify an appropriate location to discharge during well development. The flow of water will be controlled to prevent erosion and flooding of adjacent structures/facilities/homes.
2. Develop the well until the water is free of sand and suspended solids, and the maximum production capacity of the well is achieved. Sand content of the water will not exceed 5 milligrams per liter (mg/L) when pumping at the maximum sustainable rate, and the turbidity of the water will not exceed 5 nephelometric turbidity units (NTU) when pumping at the maximum sustainable rate.
3. Develop the well in accordance with American Water Works Association (AWWA) A100.
4. Continue development until the well is free of turbidity, sand, and no increase in capacity is observed, as directed by the Engineer.
5. Dispose of water and solids produced during the development at the location approved by Owner.
6. Monitor the discharge water quality during development using field water quality meters provided and operated by the Engineer.
7. Develop well until well water quality returns to within 10 percent of background conditions, or as directed by Engineer.
8. Allow the static water level in the well to recover overnight prior to starting the post-acid well pumping test.

Pumping Test Requirements

A pumping test will be conducted on JEA BBGS Well No 3 after the well has been acidized and developed. The following pumping test requirements apply to this contract:

1. **Test Pump for Post-Acidization Step Test at Well No. 3**: The Contractor will furnish, install, and operate a vertical line shaft turbine pump assembly, or equal, complete with required column, shafting, discharge head, and fittings capable of pumping at a rate of at least 2,500 gpm, at an impeller bowl setting of 120 feet, with a pumping water level estimated at 90 feet bls. Actual pumping requirements for the test will be determined after well capacity information is available following acidization.
2. **Electric Power:** The Contractor will make arrangements for obtaining electric power with the Owner.

Flow Measurement and Control

The Contractor will furnish, install, and operate the following flow measurement and control equipment:

1. Machined orifice plate(s) capable of measuring the pump discharge within ±5 percent of true flow. The flow measuring device will be equipped with a manometer for reading manual measurements, and a 0.25-inch threaded port to install a pressure transducer for electronic measurements.
2. A backup totalizing flowmeter will be installed within 50 feet of the pumping well. The flowmeter will be placed in proper alignment and capable of measuring the pump discharge within ±5 percent of true flow. The Contractor must provide documentation that the flowmeter has been calibrated within 6 months of testing, and the totalizing flowmeter must be fully functional.
3. A gate valve, or equal, will be installed on the discharge side of the pump for flow rate adjustment.
4. The pumping unit prime mover, controls, and appurtenances will be capable of being operated without interruption for a period of at least 12 hours.

Pumping Test

The post-acidization pumping test at Well No. 3 will include a step-drawdown pumping test. The following items will apply to the pumping test.

1. Prior to starting, the Contractor will coordinate with the Owner and identify an appropriate location to discharge during capacity testing. The flow of water will be controlled to prevent erosion and flooding of adjacent structures/facilities/homes.
2. The pumping test will be conducted at 50, 75, and 100 percent of the maximum sustainable pumping rate of the test pump that meets the pump requirements listed previously.
3. The duration of the pumping test will be approximately 8 hours. Actual durations and pumping rates will be determined in the field by the Engineer from a preliminary short-term pumping test that will precede the pumping test.
4. The Contractor will furnish and install two 1-inch diameter PVC carrier tubes to allow installation of the water level observation equipment into the pumped well. The tube will terminate approximately 5 feet above the pump and be of sufficient strength to remain open for the duration of the pumping test. The lower end of the tube will be capped, and several 3/16-inch diameter holes drilled in the upper most and lower most 10 feet of the carrier tube to allow for tube venting and accurate water level measurements.
5. Water level changes in the well will be measured before, during, and after the tests using a calibrated pressure transducer. The Engineer will furnish and operate the water level measuring device and data acquisition equipment. The Contractor will install the water level measuring device inside the 1-inch diameter PVC carrier tube.
6. The Contractor will manually measure and record the water level in the pumped well every 15 minutes throughout the duration of pumping, and every hour following the cessation of pumping. The Contractor will record the flow rate every 15 minutes during pumping.
7. The Contractor will furnish and install appropriate fittings to install data logging pressure transducers in the pumped well.
8. Flow rates during the tests will be measured using the calibrated totalizing flowmeter and orifice plate and manometer mentioned previously. Flow rates may be adjusted and controlled using valves on the pump discharge line.
9. Water level recovery measurements will be recorded following shutdown of the test pump until the static water level is within 2 percent of the pre-test measurement, or for a maximum of 24 hours.
10. Background water levels will be measured and recorded for a minimum of 12 hours prior to each test.

11. At the end of the pumping period, the Engineer will collect and deliver a water quality sample to the Owner's laboratory. The Engineer will coordinate with the Owner's laboratory to order and deliver the sample bottles.

Submittals

The Contractor submittals will include the following:

1. Pump curves and specification sheets for the test pump 5 days in advance of the pumping test
2. Flowmeter calibration certificate(s)
3. A copy of the manual water level and flow rate data

Bid Form

Brandy Branch Generating Station Well Testing, Logging, and Acidization Bid Form

ITEM #	ENTER YOUR BID HERE FOR THE FOLLOWING DESCRIBED ARTICLES OR SERVICES	UNIT PRICE	QUANTITY	PRICE
1	**Mobilization and Demobilization:** Install and remove temporary barriers and equipment, and perform all site and wellhead preparation activities.	Lump Sum	1	$_____
2	**Pump Removal and Inspection Services:** Remove existing vertical turbine well pump in preparation for logging activities.	$_____/well	3	$_____
3	**Test Pump Installation Services**: Furnish, install, and operate test pump and equipment to conduct geophysical logging activities.	$_____/well	3	$_____
4	**Video and Geophysical Logging Services**: Conduct a well video survey and a suite of geophysical logs under static (non-pumping) and dynamic (pumping) conditions.	$_____/well	3	$_____
5	**Slow-Rate Acidization Services**: Furnish, install, and operate all materials and equipment to conduct slow-rate acidization on Well No. 3 (excludes acid, acid storage tank, and secondary containment).	Lump Sum	1	$_____
6	**Test Pump Installation Services**: Furnish, install, and operate test pump, discharge piping, flowmeter, valves, and discharge controls to conduct post-acidization well development and 8-hour step test at Well No. 3.	Lump Sum	1	$_____
7	**Well Development**: Operate and maintain test pump during well development activities at Well No. 3.	$_____/day	5	$_____
8	**Step-Drawdown Pumping Test**: Operate and maintain test pump and testing equipment during 8-hour step-drawdown pumping test at Well No. 3.	$_____/hour	8	$_____
	TOTAL (Video and Geophysical Logging of Well Nos. 1, 2, and 3, and Acidization of Well No. 3, Complete)		**TOTAL**	$_____

Bidder Minimum Requirement Forms

Bidder Minimum Requirement Form
Well Rehabilitation

List a minimum of three slow-rate acidization projects successfully completed in the last 5 years.

Example Project 1

Owner Name and Phone Number:_____

_____

Project Name and Completion Date:_____

Well Diameter and Depth:_____

Total Volume, Rate, and Strength of Acid Injected:_____

_____

Slow-Rate Acidization Method Description:_____

_____

_____

_____

Well Specific Capacity (Pre- and Post-Acidization):_____

_____

Example Project 2

Owner Name and Phone Number:_____

_____

Project Name and Completion Date:_____

Well Diameter and Depth:_____

Total Volume, Rate, and Strength of Acid Injected:_____

_____

Slow-Rate Acidization Method Description:_____

_____

_____

_____

Well Specific Capacity (Pre- and Post-Acidization):_____

_____

Bidder Minimum Requirement Form
Well Rehabilitation

Example Project 3

Owner Name and Phone Number: _____

_____

Project Name and Completion Date: _____

Well Diameter and Depth: _____

Total Volume, Rate, and Strength of Acid Injected: _____

_____

Slow-Rate Acidization Method Description: _____

_____

_____

_____

Well Specific Capacity (Pre- and Post-Acidization): _____

_____