

BEAR RIVER WATER CONSERVANCY DISTRICT

SOUTH WILLARD WELL CLEANING PROJECT

BIDDING DOCUMENTS

- APPROVED -

Project Engineer

**HANSEN, ALLEN, & LUCE, INC.
Consultants/Engineers
859 West South Jordan Parkway Suite 200
South Jordan, Utah 84095**

(801) 566-5599

AUGUST 2020

PROJECT HISTORY AND DESCRIPTION

This project is a well cleaning and chemical treatment to remove and control biofouling for the Bear River Water Conservancy District's South Willard Well. This well is located about 0.9 mile east of HWY 89 on the McGuire Gravel Pit Road in South Willard, Utah. The well was originally drilled to a depth of 495 feet by the cable tool method and the 12-inch casing was landed in hard quartzite rock. The well was put into service in 2011 with a 500 gpm lineshaft turbine pumping system. Static water level at the time of well completion was 294 feet below ground surface. Well casings at the time of well completion were as follows:

- a. 26-Inch Surface Casing with Perforations from 0 – 100'
- b. 20-Inch Casing from 0 to 280 ft
- c. 16-Inch Casing from 0 to 440 ft
- d. 12-Inch Casing from 430 to 493 ft

In 2014 the water level declined in the well due to drought conditions and the well began producing a lot of sand and gravel. The pump was damaged and the well could only produce about 125 gpm. The well was deepened to 702 feet in an effort to obtain more water. A new 500 gpm pump was installed in the well. New well casings after the well deepening project were as follows:

- a. 12-Inch Blank Casing from 0 to 218 ft
- b. 12-Inch Factory Slotted Casing from 218 to 333 ft
- c. 10-Inch Factory Slotted Casing from 333 to 510 ft
- d. 8-Inch PVC Factory Slotted Casing from 510 to 702 ft

Immediately after the well was deepened the District noticed bacteriological growth in the deepened part of the well. Also, the District noticed that the water was beginning to taste like iron and would sometimes produce red water. The well videos and water quality behavior of the well suggest that the source of the iron bacteria problem is in the deepened part of the well. The purpose of this project is to abandon the deepened portion of the well, clean out the original upper part of the well and put the well back in service.

Well logs are included in the Appendix to this document.

SUMMARY OF WORK

The work for this project will include the following major tasks:

- 1. Mobilize to the site including a cable tool rig, chemical mix tank(s) and other equipment as needed.
- 2. Remove the existing line shaft turbine pumping system, chemical feed tubes and water level measurement tube from the well.
- 3. Perform an initial well video to view the current condition of the well. Assess the "at rest" flow of water up or down in the well, if any exists. The purpose of this task is to assess whether or not the upper portion of the well has been receiving water from the lower part of the well.
- 4. Fill in the lower portion of the well from 702 to 505 feet with clean washed sand or pea gravel.

5. Place a 10-foot-long cement grout plug on top of the fill from 505 to 495 ft. This plug should be removeable in the future if so desired by the District.
6. Video the well to confirm placement and location of the cement grout plug.
7. Power wash & disinfect the existing pumping system and pump bowls. Inspect the first and last bowls on the pump and report their condition to the District.
8. Brush the well casing to remove loose rust and scale.
9. Bail out material from the well.
10. Apply chemicals to the well.
11. Agitate and surge the chemicals during a chemical soaking period.
12. Remove, neutralize and dispose of the waste chemicals at an approved disposal site. Chemicals may not be disposed of on site because the well is situated in an unprotected aquifer and any spilled chemicals may find their way to the aquifer.
13. Develop the well to remove sand, gravel, sediment, rust, scale and other debris from the well formations.
14. Perform a final well video to view the post treatment condition of the well.
15. Place pH-controlled disinfection chemicals in the well.
16. Replace the pumping system in the well so as to disinfect the pumping system during well disinfection. Shorten the deep chemical feed tube and reinstall it and the shallow feed tube and the water level measurement tube.
17. Complete the disinfection process with circulation using the chemical feed tubes.
18. Remove, neutralize and dispose of waste disinfection chemicals from the well. (Disposal of disinfection chemicals may be done on site through the well's flush to waste discharge system to the storage tank overflow pond.)

Note: BRWCD will furnish all chemicals to the job site in a timely manner.

BID SCHEDULE**SOUTH WILLARD WELL CLEANING PROJECT
AUGUST 2020**

	Description	Qty	Unit	Unit Bid Amount	Total Bid Amount
1	Mobilization and Demobilization	1	LS	\$	\$
2	Remove Existing Line Shaft Turbine Pump	1	LS	\$	\$
3	Well Video	1	LS	\$	\$
4	Fill Bottom of Well to Approx. 505 Feet	197	Feet	\$	\$
5	Cement Plug from 505 Feet to 495 Feet	10	Feet	\$	\$
6	Well Video	1	LS	\$	\$
7	Power Wash Pump Column & Bowls	1	LS	\$	\$
8	Examine Pump Bowls & Column & Report	1	LS	\$	\$
9	Disinfect Pump Bowls & Column	1	LS	\$	\$
10	Brush Well Casing	16	HRS	\$	\$
11	Bail Well	24	HRS	\$	\$
12	Mix & Place Chemicals in Well	1	LS	\$	\$
13	Soak, Agitate, Sample and Replenish Chemicals as Needed	1	LS	\$	\$
14	Remove & Neutralize Chemicals	1	LS	\$	\$
15	Dispose of Waste Chemicals Off Site	1	LS	\$	\$
16	Develop Well	60	HRS	\$	\$
17	Bail Well	16	HRS	\$	\$
18	Final Well Video	1	LS	\$	\$
19	Mix & Place pH Controlled Disinfection Chemicals in Well	1	LS	\$	\$
20	Replace Pumping System in Well	1	LS	\$	\$
21	Complete pH Controlled Disinfection using Chemical Feed Tubes (With District Assistance)	1	LS	\$	\$
22	Pump Out Disinfection Chemicals, Neutralize and Dispose On Site (With District Assistance)	1	LS	\$	\$
BID SCHEDULE TOTAL:				\$	

Bid submitted by _____

Bid submitted on _____, 20____

If Awarded, Proposed Mobilization Date _____, 20____

WELL CLEANING SPECIFICATIONS

The following specifications provide information and instructions for each work item listed in the Summary of Work and Bid Schedule.

REFERENCES

1. The latest edition of the following publications are relied on for rules and regulations that apply to the work:
 - a. Public Drinking Water Rules as found in R309 of the Utah Administrative Code.
 - b. Administrative Rules for Water Well Drillers as found in R655 of the Utah Administrative Code.

WELL CLEANING BID ITEMS

Task #1 – Mobilization and Demobilization - This bid item is provided to cover CONTRACTOR's cost for general and miscellaneous responsibilities and operations not normally attributed to any other single bid item within this schedule. Typical costs for this bid item include the cost for moving equipment to and from the job site and other costs that are not called out in other bid items. Accurate records of the chemical treatment and pumping test shall be kept. Copies of records shall be maintained for future operations and maintenance use. Upon completion of the project, all equipment shall be removed. The site shall be left free and clear of all material, equipment, or debris, to the original conditions or better.

Task #2 - Remove Existing Line Shaft Turbine Pump - The existing pumping system is to be removed from the well and stored on site. Pump column and bowls, transducer tubing and other pump parts shall be stored on site on supports to prevent contact with the ground. At no time shall any part of the pumping system come into contact with the ground. The Contractor shall list any parts of the pumping system that are damaged or otherwise not serviceable for continued use and provide the list to the District.

Task #3 - Well Video - Well videos shall be in color and shall include the downhole view and the sideways views. It is the Contractor's responsibility to make arrangements with the District to flood the well casing with water (provided by the District), add flocculation chemicals, or otherwise clear the water in the well so as to result in a clear video. Failure to obtain a clear video may result in the District requesting that a new video be performed at no extra cost to the District. Two DVD copies shall be provided to the OWNER.

Task #4 – Fill Bottom of Well to Approx. 505 Feet - Well backfill shall consist of clean washed sand or pea gravel. Temporary fill shall be placed up to approximately 505 feet depth in the well.

Task #5 - Cement Plug - A temporary well plug is needed to seal off the iron bacteria influenced zones in the bottom of the well from the original upper part of the well. The Contractor shall propose a method for setting the well plug for approval by the District.

1. The cement grout plug should be about 10 feet in length (from 505 ft deep to 495 feet deep) and the consistency or thickness should be thin enough in consistency to flow into the annular spaces between the 8-inch and 10-inch casings and also into perforations in the 10-inch casing in the plug interval.
2. The District may need to remove the plug in the future; therefore, the plug should be able to be easily drilled out with ordinary well drilling tools.
3. The exact length and depth of the plug will be confirmed based on the initial well video.
4. Pressure grouting is not intended or requested for this item of work.

Task #6 – Well Video - Perform a well video to document the location and condition of the cement plug.

Task #7 - Power Wash Pump Column and Bowls - The pumping system including all pump column pieces and bowls shall be pressure washed to remove any loose rust and scale.

Task #8 – Examine Pump Bowls & Column & Report - The pump bowls shall be inspected in the field by removing the top and bottom bowl caps and assessing the degree of wear for the impellers and the shaft. Full bowl teardown is not included in this bid item. The Contractor shall provide a copy of photos and field measurements between the impellers and the bowls, along with recommendations as to the bowls' suitability for further use in the well.

Task #9 – Disinfect Pump Bowls & Column - The exterior of the pump column and bowls shall be thoroughly disinfected using a 200 ppm chlorine solution.

Task #10 - Brush Well Casing - After the well fill and cement plug are completed, the well shall be brushed and bailed to remove all loose rust and scale. The brush shall be slightly larger than the inside diameter of the 12 & 10-inch diameter casings and stiff enough to effectively remove scale from the well casing including slotted zones.

Task #11 - Bail Well - The well shall be bailed to remove all debris from the bottom of the well.

Task #12 – Mix and Place Chemicals In Well - The Owner will provide chemicals delivered to the site. Thereafter, the Contractor will be responsible for proper handling of the chemicals. Working with well treatment chemicals and well equipment can pose certain safety concerns. Safety procedures and guidelines are not provided in this document. It is recommended that the Contractor obtain competent safety guidelines, procedures and equipment from qualified chemical handling professionals.

1. Mix chemicals in a suitable mixing/holding tank that has been cleaned and disinfected prior to use. The tank must be free from all debris, dirt and foreign substances. Fresh public drinking water is available at the site for the Contractor's use.

2. Place the chemical recipe into the well using a tremie pipe or dual swab tool so as to spread the chemicals throughout the zones to be treated.
3. Surge and/or agitate the chemicals in the well casing during the soak period. During the soak period, take samples of the chemical mixture and measure the pH of the chemicals. If the pH drops below 3.0, add more chemicals to result in a pH below 3.0.
4. After the soak period, remove the chemicals from the well using a dual swab tool or temporary submersible pumping system. Neutralize the chemicals in a mixing tank until the pH reaches neutral pH of approximately 7.0 and dispose.
5. Well cleaning chemicals shall consist of the following chemicals for the well treatment:

<u>Chemical</u>	<u>Quantity, Gallons</u>
Phosphoric Acid, 75%, NSF 60	210
Dispersant, NSF 60	70
<u>Water (From Tank on Site)</u>	<u>3,220</u>
Total Treatment Volume	3,500

6. Well disinfection chemicals consist of the following chemicals for the well treatment:

<u>Chemical</u>	<u>Quantity, Gallons</u>
Sodium Hypochlorite, 12.5%	4
pH Control Chemical NSF 60	2
<u>Water (From Tank on Site)</u>	<u>3,494</u>
Total Treatment Volume	3,500

7. The well treatment chemicals shall be certified and approved for their respective intended use under ANSI/NSF Standard 60 as required by R309-204-6(6)(a) and R655-4-9.2. No chemicals may be used in the well without prior approval from the ENGINEER.

Task #13 – Soak, Agitate, Sample & Replenish Chemicals as Needed – During this phase the chemicals are to be agitated or surged in the well so encourage full contact within and without the well casing. Contractor shall sample the chemical strength in the well and replenish as necessary to maintain pH of at least 3.0.

Task #14 – Remove and Neutralize Chemicals – After the chemical application is completed the chemicals shall be removed from the well and neutralized before disposal.

Task #15 - Dispose of Waste Chemicals Off Site - It is anticipated that the waste chemicals will have to be hauled off site for disposal because the aquifer has no confining layers from the surface to the water bearing zones in the well. The Contractor shall propose an acceptable disposal site for District approval.

Task #16 - Develop Well - Redevelop the well using dual swab surge block with pumping or single swab surge block and pumping. Pump shall be capable of producing between 200 to 500 gpm.

Task #17 - Develop Well - The well shall be then bailed to remove all debris from the bottom of the well.

Task #18 – Final Well Video - Perform a final well video to document the post-treatment condition of the well.

Task #19 – Mix & Place pH Controlled Disinfection Chemicals in Well – The following sequence shall be used for well disinfection:

Day 1 - Mix pH-controlled disinfection chemicals in a suitable mixing/holding tank. Place the disinfection chemicals into the well using a tremie pipe or dual swab tool so as to spread the chemicals throughout the zones to be treated.

Task #20 – Replace Pumping System In Well (Disinfection Day 2 – 3) - Re-install the pumping system and chemical feed tubes in the well while the disinfection chemicals are in the well.

Task #21 - Complete Ph-Controlled Disinfection Process Using Chemical Feed Tubes - The District will operate the pumping system at a low speed to facilitate circulation of the disinfection chemicals throughout the well.

Task #22 – Pump Out Disinfection Chemicals, Neutralize and Dispose On Site - Neutralize the disinfection chemicals in a mixing tank until the chlorine is neutralized.

It is anticipated that the waste disinfection chemicals can be disposed of on site in the overflow pond adjacent to the wellhouse via the flush to waste piping system.

After the well has been disinfected and flushed to waste, the District will collect bacteriological samples in accordance with State regulations. If the lab report comes back showing unsuccessful disinfection, the Contractor shall disinfect the well again until the bacteriological samples pass.

WELL DRILLER'S REPORT ADDITIONAL DATA FORM

State of Utah
Division of Water Rights

Page ____ of ____

Well Identification

Water Right: 29-4145

Owner

Note any changes

Bear River Water Conservancy Water District
102 West Forest Street
Brigham City UT 84302

RECEIVED

JUN 10 1993

Contact Person/Engineer: _____

WATER RIGHTS

Well Location

Note any changes

S 325 E 1600 from the NW corner of section 12, Township 7N, Range 2W, SL B&M

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Well Log		WATER	PERMEABILITY	UNCONSOLIDATED					CONSOLIDATED		ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, orodor, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
DEPTH (feet)	FROM TO			CLAY	SAND	GRAVEL	COBBLES	BOULDER					
		High	Low										
0	15			*				*					Clay, Boulders
15	63				*			*					Sandy Boulders
63	85						*	*					Cobbles, Boulders
85	105							*					Mountain Boulders Brown
105	167							*					Boulders
167	170					*							Gravel, Little Clay
170	175							*					Boulders
175	185						*						Cobbles
185	209			*			*						Clay, cobbles
209	213							*					Boulders
213	240						*						Cobbles
240	245			*		*							Gravel, Clay
245	260			*			*	*					Cobbles ,Clayish, Boulders
260	265	*		*	*	*							Gravel, cobbles, Sandy Water
265	267					*							Gravel- Brown Mt. Fine
267	270							*					Boulders
270	275				*	*							Gravels, sandy
275	285				*		*						Cobbles, Little Sandy
285	300							*					Boulders
300	335			*			*						clayish Cobbles
335	351							*					Big Boulders

WELL DRILLER'S REPORT

State of Utah

Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

RECEIVED

MAY 22 2006

WATER RIGHTS
SALT LAKE

Well Identification

Water Right: 29-4145

WIN: 34336

Owner

Note any changes

Bear River Water Conservancy Water District
102 West Forest Street
Brigham City UT 84302

RECEIVED

JUN 19 2006

Contact Person/Engineer: _____

Well Location

Note any changes

S 325 E 1600 from the NW corner of section 12, Township 7N, Range 2W, S1B&M LARF

WATER RIGHTS
SALT LAKE

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity

Start Date: 06/20/2005

Completion Date: 04/20/2006

Check all that apply: ☒ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use: _____

If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well.

DEPTH (feet) FROM TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0 100	26"	Cable Tool	None
0 280	20"	Cable Tool	None
0 440	16"	Cable Tool	None
430 493	12"	Cable Tool	None

Well Log

DEPTH (feet) FROM TO	WATER	PERMEABILITY High Low	UNCONSOLIDATED						ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistency, water bearing, order, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
			CLAY	SAND	GRAVEL	COBBLES	BOULDER	OTHER			
351 355				*	*						Sandy Gravel
355 360						*					Big cobbles
360 362	**			*	*						Big Gravel, sandy Water
362 370				*	**						cobbles, Sandy
370 386							*				Boulders
386 400						*					Big Cobbles
400 407							*				boulders
407 410											Cobbles
410 430				*	*						cobbles, Little Sandy
430 435							*				boulders

Static Water Level

Date 4/20/06

Water Level 294 feet

Flowing? ☐ Yes ☒ No

Method of Water Level Measurement Souder If Flowing, Capped Pressure _____ PSI

Point to Which Water Level Measurement was Referenced Ground to Water Elevation _____

Height of Water Level reference point above ground surface 296 feet Temperature 53 degrees ☐ C ☒ F

Well Log

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification

Water Right: 29-4145

Owner

Note any changes

Bear River Water Conservancy Water District
102 West Forest Street
Brigham City UT 84302

Contact Person/Engineer: _____

WIN: 34336

RECEIVED

JUN 19 2003

WATER RIGHTS

SALT LAKE

Well Location

Note any changes

S 325 E 1600 from the NW corner of section 12, Township 7N, Range 2W, SL B&M

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity

Start Date: _____

Completion Date: _____

Check all that apply: ☒ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use: _____

If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well.

DEPTH (feet)		BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
FROM	TO			
0	100	26"	Cable Tool	None
0	280	20"	Cable Tool	None
0	440	16"	Cable tool	None
	493	12"	Cable Tool	none

Well Log

DEPTH (feet)		WATER	PERMEABLE	UNCONSOLIDATED						CONSOLIDATED		ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, orodor, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
				CLAY	SAND	GRAVEL	COBBLES	BOULDER	OTHER					
435	445				**		*							Cobbles, Little Sandy
445	460							*						Boulders
460	463						*							Cobbles
463	468			**										Hard Sandstone Clayish
468	471					*								big Gravels
471	480							**		Brown Cemented				Brown Cemented Rock
480	488						*							Pink Quartz Cobbles
488	499						*							Pink Quartz Hard Rock

Static Water Level

Date _____ Water Level _____ feet Flowing? ☐ Yes ☐ No

Method of Water Level Measurement _____ If Flowing, Capped Pressure _____ PSI

Point to Which Water Level Measurement was Referenced _____ Elevation _____

Height of Water Level reference point above ground surface _____ feet Temperature _____ degrees ☐ C ☐ F

Construction Information

DEPTH (feet)		CASING			DEPTH (feet)		☐ SCREEN	☒ PERFORATIONS	☐ OPEN BOTTOM
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	FROM	TO	SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	100	Grade A 53 Casing	375	26"	450	470	3/8	3"	6 Cuts
0	280	Grade A 53 Casing	375	20"	260	410	3/8	3"	6 Cuts
0	440	Grade A 53 Casing	375	16"					
430	493	Grade A 53 Casing	375	12"					

Well Head Configuration: _____ Access Port Provided? ☐ Yes ☐ NoCasing Joint Type: Welded Perforator Used: Mills KnifeWas a Surface Seal Installed? ☒ Yes ☐ No Depth of Surface Seal: 100 feet Drive Shoe? ☒ Yes ☐ NoSurface Seal Material Placement Method: Trime Pipe, Cement GroutWas a temporary surface casing used? ☐ Yes ☐ No If yes, depth of casing: _____ feet diameter: _____ inches

DEPTH (feet)		SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION		
FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	100	Cement Grout	12 Yards	12 Bag Mix

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One		DRAWDOWN (ft)	TIME PUMPED (hrs & min)
			GPM	CFS		
4/28/06	Turbine pump Method	354	*		400 Ft	57 hours

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate Maximum Pumping Rate: _____ Well Disinfected upon Completion? ☐ Yes ☐ No**Comments**

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. Use additional well data form for more space.

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name AMERICAN WELL DRILLINGLicense No. 738

Signature

David Rose
(Licensed Well Driller)

Date

May 13, 06



PUMP INSTALLATION REPORT (PUMP LOG)

State of Utah Division of Water Rights

PO Box 146300, SLC, UT 84114-6300

(801) 538-7240; (801) 538-7467 fax; waterrights.utah.gov



Well Identification (e.g., Water Right or Non-production Well Number)

29-4145 W 37336

Owner Info (Name and Address):

Bea River Water Conservancy District

Well Location:

Physical Street Address

8200 S - East uphill S of Gravel Pit

Point of Diversion (Public Land Survey): North/South 325 feet, East/West 100 feet from the NW Corner of Section 12, Township 7N, Range 2W, SLB&M/USB&M

GPS (UTM or Lat-Long, incl. Map Datum): 0414795 4579424

4625'

Existing Well Details (if known)

Is a Well Driller's Report Available? ☒ Yes ☐ No; Well Depth 452 feet; Well Diameter 16 1/2 inches
Nature of Use: ☒ Dom. ☐ Irr. ☐ Stock ☐ Industrial ☐ Commercial ☐ Municipal ☐ Provisional ☐ Monitor
Casing Type: ☒ Steel ☐ Stainless Steel ☐ PVC ☐ Fiberglass ☐ ABS ☐ SR ☐ Other
Depth of Surface Seal 100; Other details (if known):

RECEIVED

Pump Installation Details:

NOV 07 2014

WATER RIGHTS
SALT LAKE

Type of Installation: [] New; [] Replacement; [☒] Repair; [] Other

Date of Installation (single date or range as applicable):

Type of Pump: [] Submersible; [☒] Lineshaft; [] Jet; [] Other

Pump Manufacturer: Flo Serve; Pump Model:

Number of Stages: 7; Riser/Discharge Pipe Type/Size: 8" X 24" X 12"; Shaft Size (in): 1 1/2

Height of Casing Above Ground Surface (inches): 19 Pump Intake Depth Below Top of Casing (ft):

Pump Size (hp): 25; Pump Capacity (gpm): 700; Static Water Level (ft below top of casing): 332

Pumping Water Level (ft below top of casing): 450; Shut-in Head for Flowing Wells (ft or psi):

Artesian Flow (gpm): -; Drawdown at End of Test (ft):

Pitless Installation: [] Yes; [☒] No Manufacturer: Model:

Pitless Type: [] Pitless Adapter; [] Pitless Unit; [] Screw On; [] Welded; [] Compression

Method of Cutting Hole in Casing: Depth of Pitless (ft BGS):

Pump Testing? [] Yes; [☒] No; Test Pumping Rate (gpm): Test Pump Duration (hrs):

Water Level Measurement Method: [] Airline; [☒] Electric Sounder; [] Steel Tape; [] Other

Discharge Measure Method: [] Bailer; [] Bucket/Barrel/Stopwatch' [] Current; [] Air Lift; [] Gauge;

[] Meter; [] Orifice; [] Volume; [] Weir - Flume; [] Other

Down-hole Camera Survey? [☒] Yes; [] No Water Quality Sample Taken? [] Yes; [☒] No

Well and Pump Works Disinfected Upon Completion in accordance with R655-4? [☒] Yes; [] No

Comments by Installer: Full Pump only - Try to Design Well

Licensee Statement

This pump work was conducted under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name: Robert Dunn / Glenns Electric
(Person, Firm, or Corporation - Print or Type)

License No. 778

Signature of Licensee:

Date 11-7-14

(Licensed Well Driller or Pump Installer)

Note: All Pump work shall be performed in accordance with the provisions of the State of Utah Administrative Rules for Water Wells (Section R655-4 UAC).

Pump Log

WELL LOG SENT
2-17-15

WIN#
34336

DRILLER (START) CARD for WATER RIGHT: 29-4145

IMPORTANT: THIS CARD MUST BE RECEIVED BY THE DIVISION OF WATER RIGHTS PRIOR TO THE BEGINNING OF WELL CONSTRUCTION. PROOF DUE/EXPIRATION DATE: April 29, 2015
OWNER/APPLICANT NAME: Bear River Water Conservancy Water District
MAILING ADDRESS: 102 West Forest Street, Brigham City UT 84302.
PHONE NUMBER: 435-723-7034
WELL LOCATION: S 325' E 1600' from NW Cor, S12, T7N, R2W, SLB&M.
WELL UTM COORDINATES: Northing: 4579412 Easting: 414759
WELL ACTIVITY: NEW () REPAIR () REPLACE () ABANDON ()
CLEAN () DEEPEN (X)

For surface seals in unconsolidated formations (clay, silt, sand, and gravel), will you be using a temporary conductor casing or other formation stabilizer (e.g., drilling mud) in the surface seal interval to maintain the required annular space?

YES or NO (Circle one).

Answering 'NO' suggests that you will be placing the surface seal in an open and unstabilized annular space, which may require onsite inspection of seal placement by the State Engineer's Office.

PROPOSED START DATE: January 1, 2015

PROJECTED COMPLETION DATE: April 30, 2015

LICENSE #: 742

LICENSEE/COMPANY: Petersen Brothers
Drilling Co Inc

Ronnie Warner

2-4-15

Licensee Signature

Date

NOTICE TO APPLICANT: THIS CARD IS TO BE GIVEN TO A UTAH LICENSED WATER WELL DRILLER FOR SUBMITTAL TO THE DIVISION OF WATER RIGHTS PRIOR TO WELL CONSTRUCTION.
STATE OF UTAH DIVISION OF WATER RIGHTS Phone No. 801-538-7416
Fax No. 801-538-7467

COMMENTS: Deepening Well from 491' to 600' feet - Setting 10" Mill Slot Casing 420' to 600' - Setting 12" Mill Slot 420' to 240' Blank 12" to Surface With SR1 Silica Gravel Pack - Test for Yield Draw-Down + Sand

RECEIVED

FEB 13 2015

WATER RIGHTS
SALT LAKE

Division of Water Rights

Well Log

Well Log

Construction Information

DEPTH (feet)		CASING			DEPTH (feet)		☐ SCREEN	☒ PERFORATIONS	☐ OPEN BOTTOM
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	FROM	TO	SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0'	218'	ASTM A53B	.375	12"	570'	702'			
218'	333'	ASTM A53B	.375	12"			.125	MUSket	
		Mill Slot .125							
333'	334'	10"x12" Honk	.500	10"x12"					
334'	510'	ASTM A53B	.312	10"			.125	MUSket	

Well Head Configuration:

3' Cement Pedestal

Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: Welded

Perforator Used: Yes

Was a Surface Seal Installed? ☒ Yes ☐ No

Depth of Surface Seal: _____ feet

Drive Shoe? ☒ Yes ☐ No

Surface Seal Material Placement Method: _____

Was a temporary surface casing used? ☐ Yes ☐ No If yes, depth of casing: _____ feet diameter: _____ inches

DEPTH (feet)		SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION		
FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	702	Premier Silica 3/16" X 1/4"	4200 C.F.	

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One		DRAWDOWN (ft)	TIME PUMPED (hrs & min)
			GPM	CFS		
9-15		500	X		460	24 Hours

Pump (Permanent)

Pump Description: 6" Line Shaft Turbine Horsepower: 500 Pump Intake Depth: 500 feet

Approximate Maximum Pumping Rate: 500 G.P.M. Well Disinfected upon Completion? ☒ Yes ☐ No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. Use additional well data form for more space.

500 G.P.M. 460 foot Pumping Level Water has Chlorine
55° Water Temp - 150 Hour Development to Clean Sand
0.2 ml Sand 500 G.P.M. 4 Hours

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name PETERSEN BROTHERS DRILLING CO INC

License No. 742

Signature: Rennie Hansen

Date 10-8-15

[illegible][illegible]

Jan. 12 2015 Original Well 16" to 421' Perforations 258' to 405'
Water running in Perforations at 310' Static Water Level at 329'
12" Reduction at 421 feet Perforations in 12" 442' to 460'
12" to 491' 3 foot open hole to 494' - Well Pump Lat.
of Sand and Water level is Dropping - That's why
Well was Deepened

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

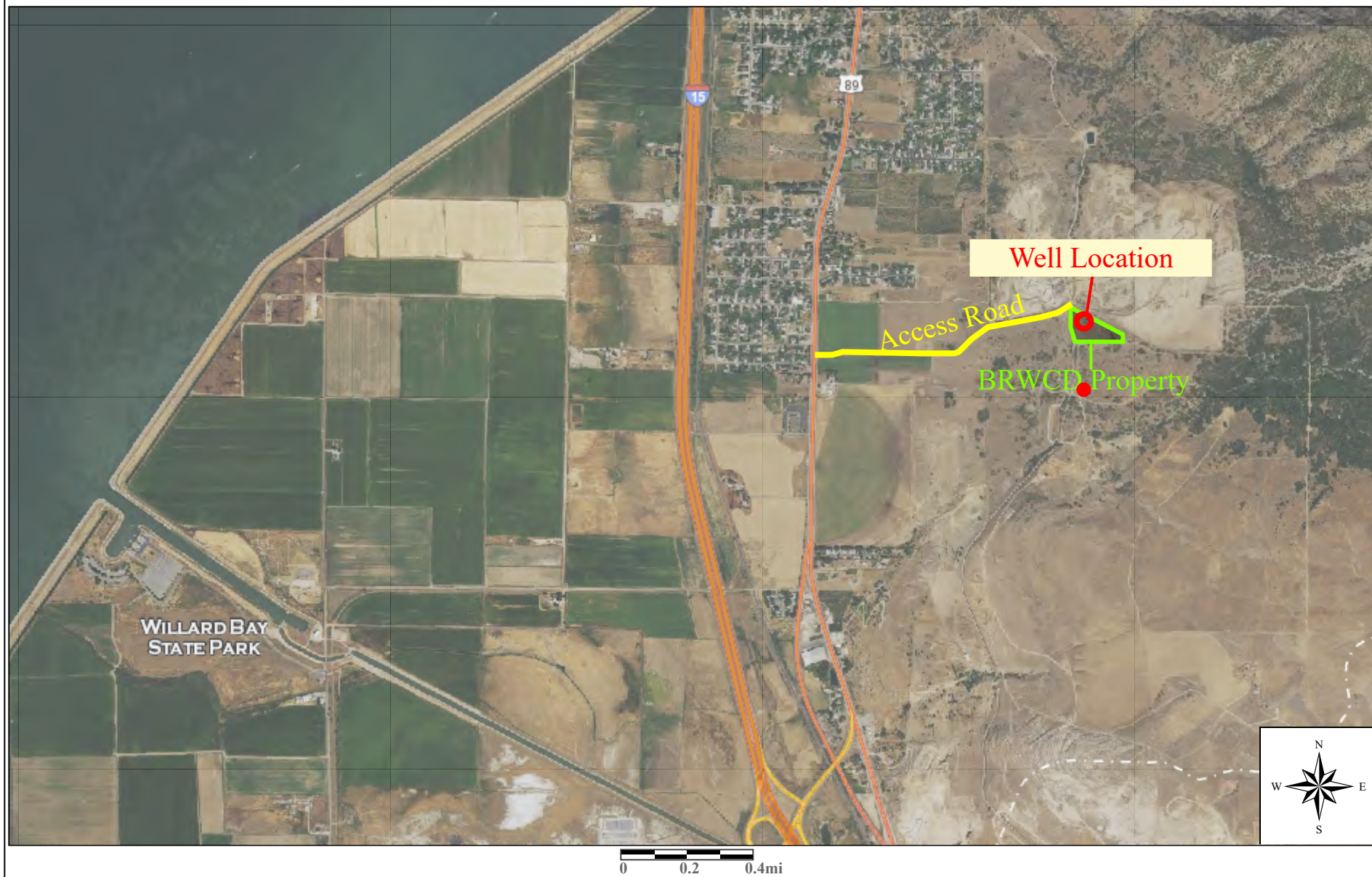
License No. 742

Signature

Date _____

10-8-15

Map to BRWCD South Willard Well



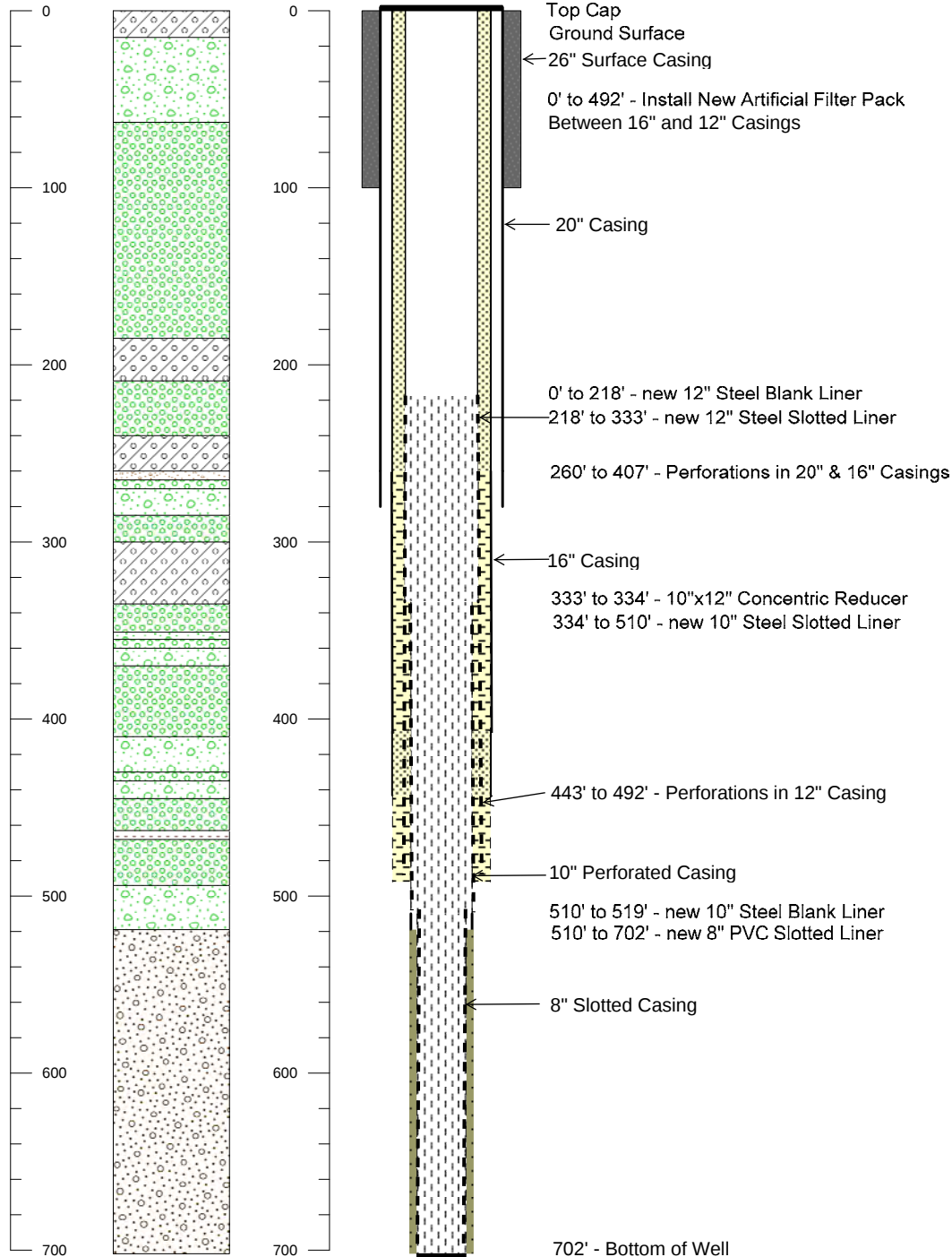
SOUTH WILLARD WELL

Well Renovation Details and Lithology



Well Renovation Date: Feb - Oct 2015

Drilling Company: Peterson Bros. Drilling



LITHOLOGIC LEGEND

Well Construction Detail Legend

**HANSEN
ALLEN
& LUCE Inc**
ENGINEERS