

*Item 5 – Descriptive Statement*

## **Permit Type, Nature, Purpose, and Location**

Electro Purification, LLC (EP) previously submitted seven (7) General Permit Applications to the Barton Springs/Edwards Aquifer Conservation District (BSEACD). We are submitting this updated project description because the plan has been updated to reflect testing three (3) wells (Bridges Well No. 1, Bridges Well No. 2, and Odell Well No. 2). EP plans to conduct aquifer tests under the rules and guidance of the BSEACD pursuant to the plan separately submitted for approval. The remaining test wells (Bridges Test Well No. 3, Bridges Test Well No. 4, Odell Test Well No. 1, and Odell Test Well No. 3) may be completed as monitoring wells for the District, completed as domestic wells for the landowners, or plugged and abandoned after aquifer testing is complete. All of the existing test wells were drilled to the base of the Middle Trinity Aquifer to assess a new water supply source for the Goforth Special Utility District (Goforth SUD). The attached location map shows the Goforth SUD Certificate of Convenience and Necessity (CCN) in relation to the project site.

## **Wells**

Prior to aquifer testing, Bridges Well No. 1, Bridges Well No. 2, and Odell Well No. 2 will be acidized to more fully develop their production capacities. The acidization procedure for each well will be performed by an authorized contractor in accordance with the following specifications:

- injecting a corrosion inhibitor and 10,000 gallons of 28% hydrochloric acid into the producing interval (Cow Creek Formation) via tremie pipe;
- flushing 60,000 gallons of water following acidization into the well via tremie pipe;
- allowing the mixture to remain in the well for at least 48 hours; and,
- pumping the well until the discharge contains no trace of the inhibitor or any sand, silt, or deleterious material. The water will be pumped into a holding tank (buffered using potash to neutralize the water) until the water reaches a pH of 6.5; once the water reaches a pH of 6.5, it will be released onto the ground where it will flow onto the Bridges or Odell property collecting in stock tanks and eventually reaching dry creek beds.

During the aquifer test, the pumping well will be outfitted with a Baski MD-7.5 packer designed to separate the Hensell/Bexar Shale from the Cow Creek Limestone (Figure 5.1). The packer will be outfitted with an airline below the packer to allow for manual water level measurements within the Cow Creek Limestone. The District will provide a transducer to be strapped to the bottom of the packer to measure water levels within the Cow Creek. A 1-inch PVC line will also be attached to the column pipe above the packer so that water level measurements via transducer may be taken from the Lower Glen Rose and Bexar Shale formations of the Middle Trinity Aquifer during the testing.



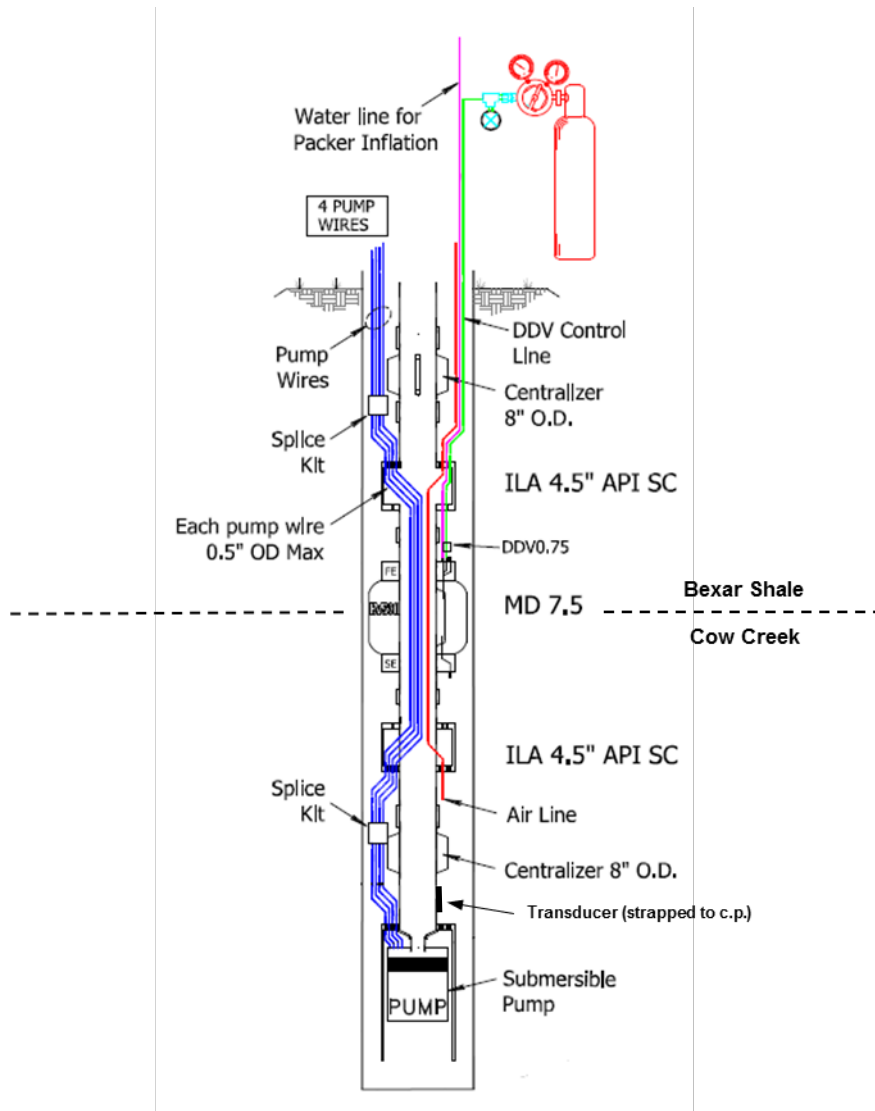


Figure 5.1: Baski MD 7.5 packer and test pump diagram

### Pumpage Volume

The requested pumping volume for the general permits will be based on the estimated production of each well after construction and acidization is completed. The wells will each be pumped over a five day period in accordance with the following specifications:

- The Bridges Well No. 1 is estimated to produce 550 gpm after acidization is complete. **Total Production Volume for General Permit = 3,960,000 gallons;**
- The Bridges Well No. 2 is estimated to produce 550 gpm after acidization is complete. **Total Production Volume for General Permit = 3,960,600 gallons;**
- The Odell Test Well No. is estimated to produce 400 gpm after acidization is complete. **Total Production Volume for General Permit = 2,880,000 gallons;** and

For a final pump test production volume, the post acidization rates were multiplied by five days of continuous production. The total production volume for all three wells is 10,800,000 gallons. Table 5.1 provides a summary of the estimated production volumes for the aquifer testing.

**Table 5.1: Summary of estimated production volume for aquifer testing**

Well	Estimated Production Capacity After Acidization (gpm)	Total Five Day Test Production Volume (gallons)
Bridges Well No. 1	550	3,960,000
Bridges Well No. 2	550	3,960,000
Odell Well No. 2	400	2,880,000
<b>Estimated Total</b>		<b>10,800,000</b>
Notes: gpm = gallons per minute		



## *Item 7 – Aquifer Test Work Plan*



## Introduction

This aquifer test work plan has been developed based upon the guidelines established by the District to fulfill the requirements for a general permit for Bridges Well Nos. 1 & 2 and Odell Well No. 2. As stated in the BSEACD guidelines (adopted May 12, 2016), hydrogeologic studies provide essential information for water-resource management for both the District and the permittee. Hydrogeologic studies and aquifer tests are essential tools to assess and document the potential influences on local wells and to understand the local aquifer characteristics. Due to the requested pumping volume of greater than 200,000,000 gallons per year, this work plan will encompass the Tier 3 requirements as established by the District's guidelines.

The aquifer test work plan will address the following guidelines as outlined in Appendix A of the BSEACD Guidelines:

1. Initiation, duration, and pumping rate;
2. Aggregate well fields;
3. Well completion;
4. Number and location of monitor wells;
5. Water level data; and,
6. Water quality data.

Upon completion of the aquifer testing and associated analyses, a hydrogeologic report will be completed as outlined in Section III of the BSEACD Guidelines.

## Aquifer Test Work Plan

### **1. Initiation, Duration, And Pumping Rate**

An aquifer test will be completed on Bridges Well No. 1, Bridges Well No. 2 and Odell Well No. 2, with a tentative start date in September 2016. Each well will be tested individually and pumped at a constant rate to produce at least three times the daily proposed regular permit volume of 2.5 million gallons, depending upon the final pumping rate of each individual well. For better results, EP plans to pump each well for approximately 5 days for each aquifer test; the total volume pumped would amount to 10,800,000 gallons:

- The Bridges Well No. 1 is estimated to produce 550 gpm after acidization is complete.  
**Total Production Volume for General Permit = 3,960,000 gallons;**
- The Bridges Well No. 2 is estimated to produce 550 gpm after acidization is complete.  
**Total Production Volume for General Permit = 3,960,600 gallons;**
- The Odell Test Well No. 2 is estimated to produce 400 gpm after acidization is complete.  
**Total Production Volume for General Permit = 2,880,000 gallons.**

### **2. Aggregate Well Fields**

The study involves three wells that will be pumped individually to measure their combined effects.



### 3. Well Completion

During the aquifer testing, the pumping well will be equipped to isolate the target production zone (Cow Creek Limestone) with a Baski MD 7.5 packer. If the requested permit is granted, EP will complete the wells to public water supply standards mandated by TCEQ regulations.

### 4. Number and Location of Monitor Wells

For the Tier 3 aquifer test work plan, a network of observation wells will be utilized during the testing. Figure 7.1 provides a map of the observation wells that will be monitored during the testing. Wells completed in the Upper Trinity Aquifer are represented by yellow circles, wells completed specifically in the Lower Glen Rose Formation are represented by green circles, wells completed specifically in the Cow Creek Formation are represented by dark blue circles, and wells completed in the Middle Trinity are represented by orange circles (Figure 7.1). During each aquifer test, there will be 18 wells available for observation. Table 7.1 provides the details of each available observation well.

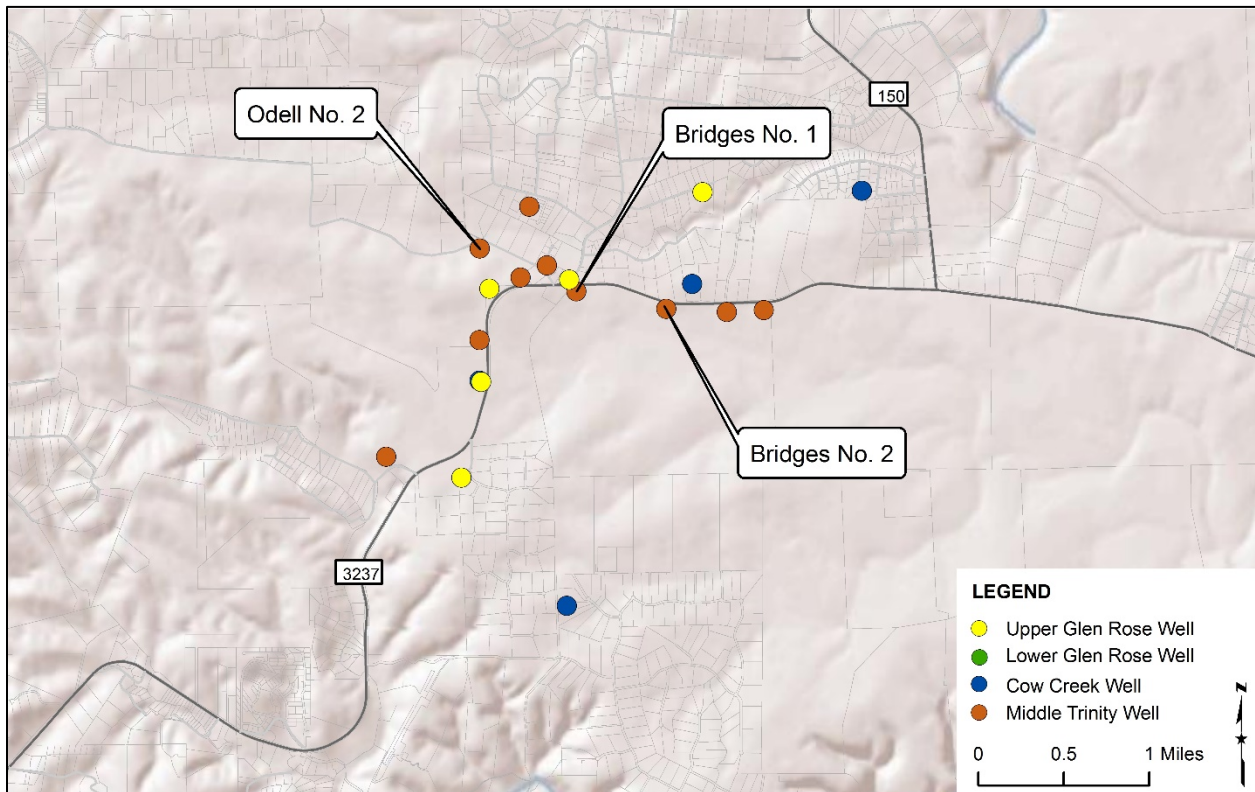


Figure 7.1: Observation wells near the EP well field

One of the goals of the aquifer testing is to determine the effect, if any, that production from the Cow Creek Limestone has on water levels in wells discretely completed within the Lower Glen Rose and Upper Glen Rose formations. After discussing the aquifer testing plans with the District, it was agreed upon that Odell Test Well No. 1 will be modified so that it is discretely completed within the Lower Glen Rose Formation. This will be accomplished by setting a cement plug within the Cow Creek Limestone

and Bexar Shale up to the base of the Lower Glen Rose Formation, leaving it open and available for observation during the aquifer tests. WRGS will provide transducers for the measurement of water levels for the area above the packer within the pumping wells and for the monitoring of the remaining six (6) EP Wells. BSEACD will be responsible for setting transducers and monitoring the water level within all other monitoring wells. All data collected from the pumping and observation wells will be shared between WRGS and BSEACD.

**Table 7.1: Well completion data for the EP well field observation wells**

Well ID	Elevation (ft. MSL)	Depth (ft. bgs)	Aquifer	Use	Measurement Type	Measured by:
Odell Test Well No. 1	1,102	903*	Lower Glen Rose	Observation	Transducer	WRGS
Odell Test Well No. 2	1,093	850	Cow Creek	Production	Transducer	WRGS
Odell Test Well No. 3	1,063	845	Middle Trinity	Observation	Transducer	WRGS
Bridges Test Well No. 1	1,040	930	Cow Creek	Production	Transducer	WRGS
Bridges Test Well No. 2	1,010	905	Cow Creek	Production	Transducer	WRGS
Bridges Test Well No. 3	1,000	940	Middle Trinity	Observation	Transducer	WRGS
Bridges Test Well No. 4	994	905	Middle Trinity	Observation	Transducer	WRGS
Las_Lomas	1069.66	n/a	Upper Trinity	Irrigation	Transducer	BSEACD
Alvarado01	1138.41	n/a	Upper Trinity	Unused	Periodic	BSEACD
Jones01	1048.38	350	Upper Trinity	Domestic	Periodic	BSEACD
Wood02	1065.59	n/a	Upper Trinity	n/a	Periodic	BSEACD
Bowman	1031.46	850	Middle Trinity (Cow Creek)	Domestic	Periodic	BSEACD
Ochoa	1071.27	810	Middle Trinity	domestic	Transducer	BSEACD
Gluesenkamp	1003.21	195	Upper Trinity	domestic	Transducer	BSEACD
Lowe	1068.91	860	Middle Trinity	domestic	Transducer	BSEACD
Wood04	1079.96	630	Middle Trinity	domestic	Transducer	BSEACD
Wood01	1086.18	790	Middle Trinity (Cow Creek)	domestic	Transducer	BSEACD
Miller_Hank	1053.35	900	Middle Trinity (Cow Creek)	domestic	Transducer	BSEACD
Sierra West	1009.06	982	Middle Trinity (Cow Creek)	Production	Periodic	BSEACD

Notes: ft. = feet; bgs = below ground surface; \*Well will be modified so that it is discretely completed within the Lower Glen Rose Formation





## 5. Water Level Data

The pumping well for each of the aquifer tests will have:

- a transducer capable of measuring water level to the nearest 0.01 foot and temperature at one minute intervals set within a PVC access tube above the packer;
- a transducer capable of measuring water level to the nearest 0.01 foot and temperature at one minute intervals strapped to the column pipe below the packer (provided by BSEACD); and,
- an airline running down the length of the well through the packer set above the pump.

Each observation well (i) will have a dedicated transducer capable of measuring the water level to the nearest 0.01 foot and temperature at one minute intervals, or (ii) will be designated to have manual recordings at specified intervals using an electric line.

The water level measurements will begin at least 2 days prior to the aquifer testing. After the pumping phase of the aquifer test is complete, water level measurements will continue through the recovery phase.

## 6. Water Quality Data

During the testing, a water quality sample will be collected for each well which will be sampled for the following constituents: pH, TDS, nitrate, nitrite, arsenic, fluoride, aluminum, copper, iron, manganese, zinc, sulfate and chloride. Field measurements (temperature, pH, and specific conductance) will also be taken.

