Replacement Contract

DEC 13 2012

#42

PROJECT AGREEMENT
PURSUANT TO ANNUAL CONTRACT NO. EN1203-101

AGREEMENT NO: WW1307-101

This AGREEMENT is made this day of 2012, by and between the City of Chandler, a municipal corporation (hereinafter referred to as "CITY") and Southwest Ground-water Consultants, an Arizona corporation, (hereinafter referred to as "Annual Consultant") and is a project agreement entered into pursuant to Annual Contract No. EN1203-101.

CITY and Southwest Ground-water Consultants, in consideration of the mutual covenants herein set forth, agree as follows:

ARTICLE 1 - DESCRIPTION OF WORK:

This project is ASR Well Testing Program, Project Number WW1307-101. The scope of work consists of developing a Testing Program to include injection and pumping test, all as more particularly set forth in Exhibit A attached hereto and incorporated herein by reference.

The Annual Consultant shall not accept any change of scope, or change in contract provisions, unless issued in writing, as a contract amendment and signed by the Contract Administrator.

ARTICLE 2 - CONTRACT PRICE:

CITY shall pay Annual Consultant for completion of the Work in accordance with the Contract Documents a fee not to exceed Fifty One Thousand Three Hundred Seventy Three Dollars ($51,373) determined and payable as set forth in Annual Contract EN1203-101 and Exhibit B attached hereto and made a part hereof by reference.

ARTICLE 3 - CONTRACT TIME:

The contract time is Ninety days and Annual Consultant agrees to complete all work within Ninety (90) days of the date CITY issues a Notice to Proceed.

ARTICLE 4 – GENERAL:

This Project Agreement is entered into pursuant to Annual Contract No. EN1203-101 and the terms and conditions contained therein are incorporated herein by reference as if set forth in full.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and year first written above.

This Agreement will be effective on this _____day of_____, 2012.

CITY OF CHANDLER

_____
MAYOR DATE:

ADDRESS FOR NOTICE
City of Chandler
P.O. Box 4008, Mail Stop 407
Chandler, AZ 85244-4008
480-782-3307

APPROVED AS TO FORM:

_____
City Attorney By:
ATTEST:

_____
City Clerk

FOR THE ANNUAL:

By: Title: President

ADDRESS FOR NOTICE
Mr. Bill Greenslade
Southwest Ground-water Consultants
3033 N. 44th St., Ste. 120
Phoenix, AZ 85018

Phone: 602-955-5547
Fax: 602-955-7585

EXHIBIT A
SCOPE OF WORK

ANNUAL CONSULTANT reviewed data provided by the City of Chandler including flow and water level data from the SCADA system for each ASR well for the 36 month period November 2008 through October 2011. Data included water level, injection (recharge) volume and reuse pumping volume at three (3) minute intervals for the 36 month period. Injection and pumping specific capacity (injection/discharge divided by water level rise/drawdown) was calculated for each ASR well.

ANNUAL CONSULTANT shall develop a Testing Program, including injection and pumping test with the following goals:

1. Evaluate the precision of SCADA reported water levels under controlled test conditions.
2. Assess injection specific capacity (injection rate/water level rise) changes with increased injection rate at each ASR well. Data shall be used to design a 'maximum sustainable' recharge (injection) rate for each well.
3. If feasible, each well will then be tested at the 'maximum sustainable' design rate.
4. Assess pumping specific capacity (pumping rate/water level drawdown) changes which may indicate the presence of clogging.
5. Characterize potential short-term changes in source water quality and potential clogging material in the source water.
6. Characterize the turbidity and solids production during purge periods to identify potential clogged material cleared from the well and to optimize the purge period.

Work shall require the assistance of City staff to operate the wells and provide data collected by the SCADA system.

ANNUAL CONSULTANT shall perform work in three (3) phases, as described below:

PHASE 1.1 - VERIFICATION OF SCADA WATER LEVELS

Initial work shall include verifying the precision of the pressure transducers installed in each ASR well to monitor water levels. A manual water level meter shall be used to measure water levels in the well casings for comparison to the water level reported by the SCADA system. For consistency, the City shall provide for each well the point which represents zero depth for the transducer water level measurement such as land surface or the floor of the vault.

At each well location, ANNUAL CONSULTANT shall measure the static water level with a manual water level meter, City staff shall provide the water level reported by the SCADA system. The well will be pumped for a short period (approximately 15 minutes) followed by a short injection period (approximately 15 minutes). During this activity, manual water levels will be collected at one (1) to two (2) minute intervals for comparison to water levels reported by the SCADA system collected at one (1) minute intervals. If necessary, the pumping and injection period may be extended to verify water level measurements. It is anticipated that it will take approximately two (2) eight-hour days in the field for City and ANNUAL CONSULTANT to complete Phase 1.1.

PHASE 1.2 - CURRENT OPERATIONAL CONDITIONS

Step-Rate Injection Testing
Each ASR well will be tested over the range of current recharge (injection) rates, as recorded by the SCADA system. Three (3) steps are proposed, as given in the following table.

ASR WELL NO.	INJECTION RATE (GPM)		
	Step 1	Step 2	Step 3
Tumbleweed			
ASR 1	1,000	1,200	1,400
ASR 2	800	1,000	1,200
ASR 3	800	1,000	1,200
ASR 4	800	1,000	1,200
ASR 5	800	1,000	1,200
ASR 6	800	1,000	1,200
ASR 7	800	1,000	1,200
ASR 8	*	*	*
ASR 9	*	*	*
ASR 10	*	*	*
Ocotillo			
OW-ASR 1	800	1,000	1,200
OW-ASR 2	800	1,000	1,200
OW-ASR 3	900	1,200	1,500
OW-ASR 4	600	800	1,000
OW-ASR 5	800	1,000	1,200
OW-ASR 6	800	1,000	1,200

* Existing injection data are not available for ASR 8 through 10. Goal testing rates will be developed through consultation with City personnel if testing of these wells is desired.

Water level and flow rate data from the calibrated SCADA system will be used to evaluate the tests. Initially, a static water level will be recorded and the well will be purged for a 20 minute period to evaluate the pre-injection specific capacity and remove potential solids from the column pipe (such as scale or encrustation) which have the potential to clog the well. The injection period will begin immediately after purging. The injection rate for each step will be held as constant as possible for a two (2) hour period. Immediately following each step-rate period, the well will be purged for a 20 minute period to remove potential water level mounds in the aquifer which may have developed as the result of the prior injection period.

This step-rate testing procedure will require approximately eight (8) hours to test each well plus time to set-up, calibrate, and remove the water quality testing equipment. If clogging is identified during testing, it may take additional time to clear the well prior to further testing; this is discussed below.

Analysis of Data and Re-Testing of Select Wells

Water level data from each step will be evaluated in the field by comparison to selected historic data sets (November 2008 through October 2011 SCADA data) which represent unclogged conditions. Injection testing will not be conducted under significantly clogged conditions. If any ASR well exhibits a significant decrease in specific capacity or an excessive rate of water level rise, the well will be subjected to up to three (3) 20 minute purge cycles. Then the step-rate injection period which was influenced by clogging will be repeated to evaluate improvement. If significant clogging persists, the City will be notified and additional work at the well will be discussed. Additional work may include purging cycles separated by short-term injection cycles to remove potential clogs prior to additional testing.

Water Quality Testing

Source water quality and pumped water quality will be measured with instruments in the field. Source water will be tested to evaluate for changes in water quality and for the presence of entrained solids or air which may result in development of clogging conditions. Pumped water quality will be tested to evaluate removal of potential clogs and to optimize the duration of the purge period based on well specific observations such as turbidity and sand content. It is not necessary to test the source water at each well, source water quality will be tested at one well per day during the step-rate testing activities. However, the pumped water quality will be tested at each well.

During injection and purging, the following water quality parameters will be measured with field equipment:

- Temperature
- Conductivity
- pH
- Dissolved oxygen
- Oxidation/reduction potential
- Turbidity
- Sand content (Rossum Sand Tester)
- Entrained air
- Silt density index (measured during injection only)
- 5 µm filter observation (observed during injection only)

The City will provide ANNUAL CONSULTANT the daily source water quality data measured at the treatment plants including:

- Temperature
- pH
- Turbidity
- Total Suspended Solids
- Dissolved oxygen (if available)

Testing Logistics

Work will require City staff to operate the ASR well system and provide data collected by the SCADA system (one (1) minute intervals). As noted previously, comparison of manual and SCADA water level measurements will be conducted over a two (2) day period prior additional testing. Once the transducer water levels have been verified or corrected, water levels from the SCADA system will be used to evaluate the additional tests. This will allow more than one ASR well to step-tested per day, decreasing the time and man-hours required to perform the testing program.

SGC ANNUAL CONSULTANT shall generally work at one well location to collect water quality data and evaluate water levels during testing; in addition, ANNUAL CONSULTANT shall be in contact with the operator to evaluate the performance of the other well being tested. Based on evaluation of well performance during testing, the step-rate testing procedure may be changed from what is specified herein in response to a specific condition such as potential clogging.

Testing of injection water quality will represent the water quality of the injection water at the site for the day, it is not required to test the source water at each well, but will conducted at one well per day during step-rate testing. Testing of pumped water quality is proposed at each ASR well to assess potential well clogging material and sand production. This will required additional short-term pumping tests to evaluate the discharge water quality from the remaining ASR wells. These remaining wells would be subjected to a pump/inject/pump cycle of 20 minutes each (total time 60-70 minutes) and the discharge water sampled.

Estimated City and ANNUAL CONSULTANT field man-hours required for testing are given in the following table.

Task	City Man-hours[1]	ANNUAL CONSULTANT Man-hours
Prepare test equipment	0	16
Calibrate Water Level measurements	20 (2 - 10 hr days; 1-person)	20 (2 - 10 hr days; 1–person)
Step-rate Testing	70 - 90 (10 hr days – 7-9 days; 1-person)	100 (10 hr days; 7 – 10 days; 1-person)
Remaining Pumping Water Quality Testing (7-8 wells)	25 (10 hr days – 2.5 days)	25 (10 hr days – 2.5 days)
Maximum Sustainable Constant Injection Rate	50 (10 hr days – 5 days; 1 person)	40 (8 hr days – 5 days; 1 person)
Total	**165-185**	**201**

1. City man-hours are for the assistance of plant operators to operate the ASR well system and download SCADA results. During the first three (3) tasks, operators will be located at facility remote control stations. During the constant rate injection tests, operators can be at the central control station.

2. ANNUAL CONSULTANT man-hours are for field time only and do not include data reduction, analysis and report preparation.

3. ANNUAL CONSULTANT shall retain services of Thomas Morris, a recognized expert in ASR well performance. Mr. Morris will assist in the optimization of data collection, assist in the review of test results, and provide comments to the team based on prior testing, development and operational experience in the City of Chandler (Intel RO Facility) and at other ASR well facilities.

PHASE 2 – MAXIMUM SUSTAINABLE INJECTION RATE

ANNUAL CONSULTANT shall evaluate results of Phase 1.2 testing and a proposed maximum sustainable recharge (injection) rate for each ASR well presented. ANNUAL CONSULTANT shall work with CITY operations staff to assess the feasibility of supplying each ASR well with the proposed maximum sustainable rate for that well. Each ASR well will then be tested at the maximum feasible rate up to the proposed maximum sustainable rate.

For Phase 2 testing, ANNUAL CONSULTANT shall be onsite to monitor the initial two hour period to evaluate water level data and verify the sustainability of the selected rate. If necessary, Phase 2 testing will be modified as described herein based on site specific conditions. Prior to injection and after the injection period, the well will be purged for a 20 minute period. Water will be injected into the well at as constant a rate as possible for an eight (8) hour period. Water levels will be recorded by the SCADA system. The SCADA data will be provided by CITY to ANNUAL CONSULTANT for analysis. Water level rise will be plotted against time and compared to Phase 1.2 test results. If appropriate, the proposed maximum sustainable injection rate for each ASR well will be modified to reflect the results of the 8-hour injection test.

REPORT

On completion of Phase 2, ANNUAL CONSULTANT shall prepare a report presenting our findings, conclusions and recommendations. Results for each tested Tumbleweed and Ocotillo ASR well will be documented and recommendations will include the following:

- Maximum sustainable injection rate for each well,
- Optimized duration of the purge period,
- Procedure to allow operators to identify potential clogging conditions,
- Procedure for operators to clear potential clogs, and
- Maximum sustainable recharge capacity of each ASR facility.

The results of field water quality testing of the source water and purge water will be presented and summarized; this will also include evaluation of entrained solids and air which can potentially clog an ASR well. As appropriate, operational modifications may also be presented.

EXHIBIT B
FEE SCHEDULE

ANNUAL CONSULTANT shall provide all services as described in Exhibit A for an amount not to exceed $51,373.

Task	Labor Hours	Labor Cost	Expenses	Total
Prepare Test Equipment	16	$1,600	$253	$1,853
Calibrate Water Levels	22	$2,320	$771	$3,091
Step-rate Testing	140	$16,940	$1,650	$18,590
Remaining Pump Water Quality	27	$2,820	$853	$3,673
Evaluate Step-rate Tests	76	$9,016	$110	$9,126
Constant Rate Tests	40	$4,000	$242	$4,242
Report	90	$10,512	$286	$10,798
Total	411	$47,208	$4,222	$51,373

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Where Values Make The Difference

PURCHASING ITEM
FOR
COUNCIL AGENDA
Memo No. CA13-089

1. Agenda Item Number: 42

2. Council Meeting Date: December 13, 2012

TO: **MAYOR & COUNCIL**

THROUGH: **CITY MANAGER**

3. Date Prepared: November 27, 2012

4. Requesting Department: Municipal Utilities

5. SUBJECT: Recharge Well Testing Program

6. RECOMMENDATION: Staff recommends Council award Project Agreement to Southwest Ground-water Consultants, Inc. for the Recharge Well Testing Program, Project No. WW1307-101, in an amount not to exceed $51,373.

7. BACKGROUND/DISCUSSION: Chandler stores its unused reclaimed water underground through recharge wells. Most recharge occurs during the winter months. The stored reclaimed water will be pumped out during the summer months or during droughts. Reclaimed water is used for outside landscape or cooling towers. This project will evaluate recharge wells capacity at the Tumbleweed and Ocotillo Recharge Facilities.

The Consultant will conduct field testing of up to 16 recharge wells. The Consultant will then assess each well's short term recharge capacity, long-term sustainable recharge capacity, and optimal recharge operations. The Consultant's assessment will help Chandler manage its reclaimed water more efficiently.

8. EVALUATION: On August 16, 2012, Council approved an Annual Hydrologic Services contract to Southwest Ground-water Consultants, Inc., EN1203-101. Staff has reviewed the Project Agreement scope of work, billing rates, and total fee for this project, compared them to historical costs, and determined they are reasonable.

9. FINANCIAL IMPLICATIONS:

Cost:	$51,373
Savings:	N/A
Long Term Costs:	N/A

Fund Source:

Acct. No.:	Fund Name:	Program Name:	CIP Funded:	Amount:
611.3910.6817.6WW189	Wastewater Bond	Effluent Reuse – Aquifer Storage Recovery Wells	Yes	$51,373

10. PROPOSED MOTION: Move Council award Project Agreement to Southwest Ground-water Consultants, Inc. for the Recharge Well Testing Program, Project No. WW1307-101, in an amount not to exceed $51,373, and authorize the Mayor to sign the contract documents.

ATTACHMENTS: Location Map, Project Agreement

APPROVALS

11. Requesting Department

John Knudson, Utilities Engineering Manager

12. Transportation and Development

Bob Fortier, Capital Projects Manager

Sheina Hughes, City Engineer

13. Department Head

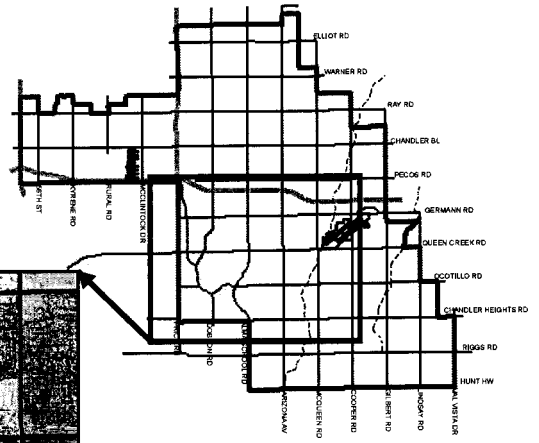
Dave Siegel, Municipal Utilities Director

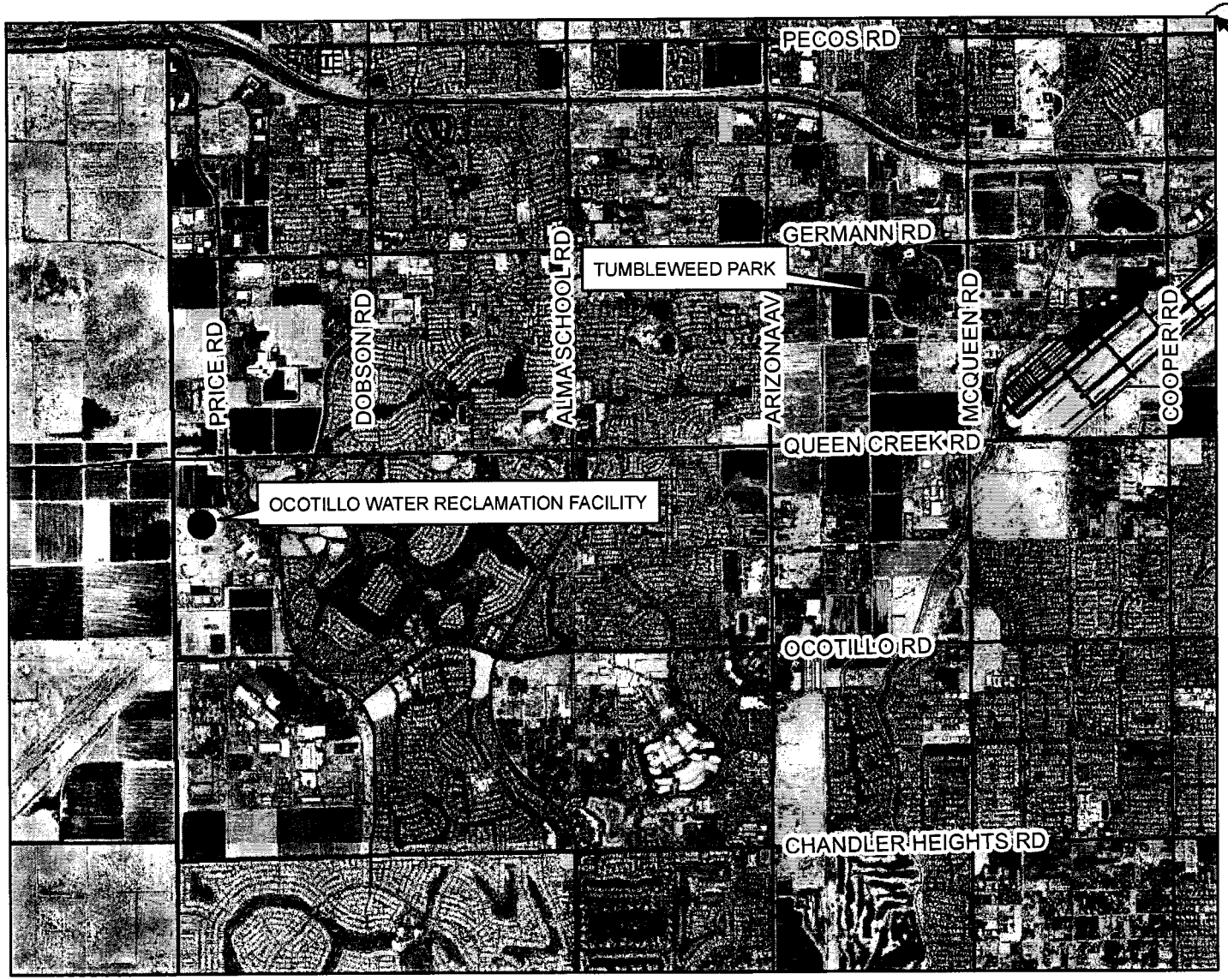
14. City Manager

Rich Dlugas

Chandler + Arizona

RECHARGE WELL TESTING PROGRAM
PROJECT NO. WW1307-101





MEMO NO. CA13-089

● PROJECT AREAS

NTS
ChanGIS

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PROJECT AGREEMENT
PURSUANT TO ANNUAL CONTRACT NO. EN1203-101

AGREEMENT NO: WA1301-451

This AGREEMENT is made this _____ day of _____, 2012, by and between the City of Chandler, a municipal corporation (hereinafter referred to as "CITY") and Southwest Ground-water Consultants, an Arizona corporation, (hereinafter referred to as "Annual Consultant") and is a project agreement entered into pursuant to Annual Contract No. EN1203-101.

CITY and Southwest Ground-water Consultants, in consideration of the mutual covenants herein set forth, agree as follows:

ARTICLE 1 - DESCRIPTION OF WORK:

This project is West Pecos Well Drilling Construction Management Services, Project Number WA1301-451. The scope of work consists of Hydrogeological services for the West Pecos Well, all as more particularly set forth in Exhibit A attached hereto and incorporated herein by reference.

The Annual Consultant shall not accept any change of scope, or change in contract provisions, unless issued in writing, as a contract amendment and signed by the Contract Administrator.

ARTICLE 2 - CONTRACT PRICE:

CITY shall pay Annual Consultant for completion of the Work in accordance with the Contract Documents a fee not to exceed Ninety Four Thousand Five Hundred Seventy One Dollars ($94,571) determined and payable as set forth in Annual Contract EN1203-101 and Exhibit B attached hereto and made a part hereof by reference.

ARTICLE 3 - CONTRACT TIME:

The contract time is two hundred forty days and Annual Consultant agrees to complete all work within Two Hundred Forty (240) days of the date CITY issues a Notice to Proceed.

ARTICLE 4 – GENERAL:

This Project Agreement is entered into pursuant to Annual Contract No. EN1203-101 and the terms and conditions contained therein are incorporated herein by reference as if set forth in full.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and year first written above.

This Agreement will be effective on this _____day of_____, 2012.

CITY OF CHANDLER

_____
MAYOR DATE:

ADDRESS FOR NOTICE
City of Chandler
P.O. Box 4008, Mail Stop 407
Chandler, AZ 85244-4008
480-782-3307

APPROVED AS TO FORM:

_____
City Attorney By:
ATTEST:

_____
City Clerk

FOR THE ANNUAL:

By: _____
Title: President

ADDRESS FOR NOTICE
Mr. Bill Greenslade
Southwest Ground-water Consultants
3033 N. 44th St., Ste. 120
Phoenix, AZ 85018

Phone: 602-955-5547
Fax: 602-955-7585

EXHIBIT A
SCOPE OF WORK

BACKGROUND
The City has determined the need to abandon the existing well, ADWR Registration Numbers 55-573657, at West Pecos Well located at 1177 S Alma School Road, Chandler, Arizona 85286. This project will abandon the existing well at these site and drill, install, and test a new well.

SCOPE OF WORK
ANNUAL CONSULTANT shall perform Hydrogeological Professional Services for the West Pecos Well as more specifically described below:

TASK 1.0 - BIDDING ASSISTANCE

Sub-task 1.1 - Kick-off Meeting
ANNUAL CONSULTANT will schedule a kick-off meeting with the City to review the scope and schedule for the project. Work tasks will be reviewed and a detailed timeline determined.

Sub-task 1.2 - Review and Revision of Contracting Procedures
The City's contracting procedures for well drilling contractors will be obtained and reviewed with a view toward meeting the requirements of Contracting Services and Municipal Utilities Department. If appropriate, ANNUAL CONSULTANT will provide recommended language to be included in bid documents to be issued to drilling contractors.

Sub-task 1.2 - Assistance with Contractor Selection
If requested by the City at the bid opening, ANNUAL CONSULTANT will review each contractor's bid and individual bid items to identify potential errors. After review, the Apparent Low Bidder will be identified. ANNUAL CONSULTANT will interview the Apparent Low Bidder to discuss prior experience with similar scopes of work and further investigate the bid for errors. If appropriate, a contractor may be asked to withdraw their bid. Based on review of the bids and an interview with the low bidder, ANNUAL CONSULTANT will make recommendations to the City.

TASK 2.0 - TECHNICAL SPECIFICATIONS

Technical specifications and bid tabs to be included with the contractor bid package will be prepared by ANNUAL CONSULTANT with approval from the City for the installation and testing of a new well and the abandonment of an existing well.

Sub-task 2.1 - Review Existing Technical Specification and Site Information
ANNUAL CONSULTANT will review the existing City well installation and testing technical specifications, and propose updates to the specifications to conform to the requirements of the contractor selection process as well as any proposed technical changes. The City will provide to ANNUAL CONSULTANT initial design criteria and well specific information for the existing West Pecos well designated for replacement. Based on this information and review of local hydrogeologic conditions, ANNUAL CONSULTANT will develop a preliminary well design for the new well construction and for the abandonment of the existing well. ANNUAL CONSULTANT will include preliminary abandonment designs in the Technical Specifications.

A draft technical specification and bid tab package for the well installation and abandonment shall be presented to the City for review and comment.

Sub-task 2.2 - Technical Specification Progress Meeting
The purpose of this progress meeting is to provide the City an opportunity to comment on the proposed changes to the bid package, draft technical specification, and preliminary well design (new wells and abandonments).

Sub-task 2.3 - Preparation of Final Technical Specification
The final technical specifications and bid package will be prepared by ANNUAL CONSULTANT based on the results of the Progress meeting with the City (Sub-task 2.2). This package will include an electronic version in a

format requested by the City. It is understood that the City will prepare the final bid package for distribution to contractors for bidding purposes.

Sub-task 2.4 – Preparation of New Well and Well Abandonment Permits

ANNUAL CONSULTANT will prepare and submit the replacement well drilling and existing well abandonment ADWR NOI permits. Cost of theses permits is included in the cost estimate.

TASK 3.0 - CONSTRUCTION MANAGEMENT

Construction management services provided by ANNUAL CONSULTANT will include the documentation of contractor activities for the drilling, installation, and testing of a new replacement potable well and abandonment activities for the existing well. In addition, in consultation with the City, ANNUAL CONSULTANT will also provide the contractor clarification and oversight for certain tasks which require response to evaluation of site specific conditions.

Sub-task 3.1 - Pre-Construction Meeting
Prior to drilling and well construction, ANNUAL CONSULTANT will attend one (1) on-site meeting with the City and contractor. The intent of pre-construction meeting is to develop a shared understanding between the City, ANNUAL CONSULTANT, and contractor of the requirements of the project, the expectations of the City, and to develop the lines of communication. Questions and comments regarding the scope of work, technical specification, and contracting will be addressed.

Sub-task 3.2 - Drilling and Logging
During pilot borehole drilling activities, ANNUAL CONSULTANT personnel will ensure that contractor activities are in compliance with the technical specifications. An ANNUAL CONSULTANT geologist will describe the drilled cuttings, review the drilling penetration rate log, and analyze the geophysical logs to prepare a lithologic log of the pilot borehole. These data will be used to identify the major water bearing intervals. Geophysical logging services of the pilot borehole will be subcontracted by the drilling contractor.

Sub-task 3.3 - Zonal Water Quality Sampling
The identified major water bearing intervals will be selected for zonal water quality sampling. It is anticipated that one (1) meeting with the City will be conducted to present and review the selected intervals for approval. The zonal sampling results and the lithologic logs interpretations will be used to design the screened interval of the new well.

Up to 12 zonal samples will be collected for water quality analysis. ANNUAL CONSULTANT will present the approved zonal sampling intervals to the contractor in graphical form including depths and intervals, and will assist the contractor with the design of the zonal sampling program. ANNUAL CONSULTANT will provide oversight during zone construction and purging of each zone to assure the zonal sample is representative of the targeted water bearing interval.

ANNUAL CONSULTANT will collect water samples in laboratory-supplied containers and submit the samples to the laboratory under chain-of-custody for rush analysis (48 hour turn-around). Samples will be analyzed for the following parameters:

- Total Dissolved Solids
- Nitrate as Nitrogen
- Fluoride
- Total and dissolved Arsenic
- Total and dissolved Chromium

Lab turn-around time may be extended depending on the time of sample collection and submittal (day of week/holidays) and the laboratory back-log.

The production capacity and water quality requirements of the well, lithologic log data, zonal water quality data, and local hydrogeologic conditions will be the basis for the final well design. These data and the proposed well design will be presented to the City for approval. Upon approval, the final design will be presented to the contractor for completion.

Sub-task 3.4 - Well Construction
To verify borehole diameter prior to installation of the well, the contractor will subcontract geophysical logging services for a caliper log survey of the reamed borehole. ANNUAL CONSULTANT will monitor and document the installation of the well casing, screen, and annular materials at the well to ensure compliance with the well design and technical specification. ANNUAL CONSULTANT staff will be onsite during the installation of these materials to assist the contractor with questions regarding the well design and to provide oversight in meeting the requirements of the technical specifications.

Sub-task 3.5 - Well Development
ANNUAL CONSULTANT will document and provide oversight for all well development activities. Development will be optimized in an effort to maximize well efficiency and reduce long-term pumping costs.

During swabbing and airlift development of the well, field water quality parameters including Imhoff cone sand content, specific conductance, pH, and visual turbidity measurements will be collected. This information will be evaluated by ANNUAL CONSULTANT during swab and airlift activities to assist in evaluating the need for additional development effort. An estimated 10 minutes of swab and surge development per foot of perforated interval will be conducted. However, if more development time is necessary based on the observed and measured results, ANNUAL CONSULTANT will review the data with the City for authorization to extend the development time.

Following swab and airlift development, the contractor will install temporary test pumping equipment. The maximum duration of pump and surge development is anticipated to extend no longer than 40 hours. Actual duration of pump and surge activities will be based on field analysis of Rossum sand content and specific capacity results during testing.

Sub-task 3.6 - Pumping Tests
Pumping tests at the well will include a step-rate test, a constant-rate test, and a production profile survey. Following development, a 20-hour step-rate pumping test will be conducted. The rates for the step-rate test will be selected by ANNUAL CONSULTANT based on the results of pump and surge development. Following a 20-hour recovery period, a 24-hour constant-rate test and 24-hour recovery test will be conducted. The pumping rate for the constant-rate test will be based on the results of the step test. During the constant-rate test, ANNUAL CONSULTANT will subcontract a production profile survey and collection of up to eight (8) depth specific samples. ANNUAL CONSULTANT will subcontract the laboratory analysis of the samples for the same parameters analyzed for zonal sampling. Water levels in the wells to be replaced will be monitored during testing of the new wells in order to further characterize the aquifer and the pumping impacts of the new wells.

During pumping test activities, ANNUAL CONSULTANT personnel will monitor water levels, discharge rates, Rossum sand content, and water quality parameters including pH, specific conductivity, and temperature. Water levels will be monitored with a data-logging transducer and a manual sounder. The test data will be plotted following appropriate aquifer testing methods in order to calculate the efficiency of the well (step-rate test) and the long-term yield of the well (constant-rate test). The pump contractor will be on-site during this period to ensure that the test pumping equipment functions as required. City staff will collect a ground-water sample during the constant-rate test to be analyzed by an Arizona State licensed laboratory for New Source Approval.

Sub-task 3.7 - Post-Construction Surveys
Post-construction surveys will include a final well video and plumbness and alignment surveys which will be subcontracted by the drilling contractor. ANNUAL CONSULTANT will be onsite to witness the surveys and evaluate the results for compliance to the final well design and requirements of the technical specification.

TASK 4.0 - WELL ABANDONMENT

The new well will be installed as a replacement well to the existing well at the West Pecos well site. The existing well will be abandoned before installation and testing of the new well. ANNUAL CONSULTANT staff will visit the well site with City staff to inspect the nature and condition of all above-ground facilities to be removed/demolished.

Sub-task 4.1 - Pump Removal, Video Survey, and Abandonment Design

The technical specifications will specify the disposition of existing pump and wellhead related equipment and facilities. ANNUAL CONSULTANT will facilitate communication between the City and the Contractor regarding removal, transportation, and disposal activities.

The Contractor will conduct a video survey under the oversight of ANNUAL CONSULTANT in order to document the condition of the well. Based on the results of the video survey and the preliminary abandonment design presented in the technical specifications, ANNUAL CONSULTANT will prepare a well final well abandonment design for the well to present to the City for approval.

Sub-task 4.2 - Abandonment Oversight
ANNUAL CONSULTANT will oversee the abandonment of the well and provide documentation for all field activities. Abandonment details will be provided to the City and contractor in support of the final permit submittals to ADWR.

TASK 5.0 – WELL COMPLETION REPORT

Following the completion of the above tasks, ANNUAL CONSULTANT will prepare a report for the new well and abandonment of the existing well. Each report will document contractor activities and the results of all of the tasks including new well construction and abandonment activities. Of particular importance will be the recommended production rate and estimated pumping water level for the new well and pumped water quality. Additional information to be presented in the final report includes the following:

- ADWR permits
- Pilot borehole penetration rate and lithologic logs
- Geophysical logs
- Zonal sampling water quality results
- Well completion forms and summaries
- As-built well diagrams for both new and abandoned wells
- Pumping test data and analysis
- Post-construction surveys
- Well abandonment forms and summaries
- Additional water quality data provided by the City

ASSUMPTIONS AND CLARIFICATIONS

- BasinWells Associates, PLLC (BWA) is subcontractor that shall provide assistance during Construction Management Task 3.0.

- The City will provide the following:
  1. Site access
  2. Payment of the drilling contractor
  3. Collection and analysis of the New Source Approval sample

EXHIBIT B
FEE SCHEDULE

Task	Hours	Fees	Subcontractor Cost	Total
Task 1.0 Bidding Assistance	43	$6,169	$0	$6,169
Task 2.0 Technical Specifications	62	$8,064	$0	$8,064
Task 3.0 Construction	641	$66,624	$2,557	$69,181
Task 4.0 Well Abandonment	55	$5,187	$0	$5,187
Task 5.0 Completion Reports	62	$5,970	$0	$5,970
Total	**863**	**$92,014**	$2,557	$94,571