

AMENDMENT NO. 1  
AGREEMENT  
FOR  
ENGINEERING SERVICES

This is an amendment, AMENDMENT NO. 1, attached to and made a part of the AGREEMENT, dated February 14, 2017, between the NORMAN UTILITIES AUTHORITY (Owner) and GARVER, LLC. (Engineer) for professional engineering services as necessary to move forward with Phase 2: Field Assessment for the Norman Horizontal Well Feasibility Study.

WHEREAS, the Owner has determined engineering services associated with Phase 2 is necessary for further investigation for the potential installation of horizontal a well for the project;

WHEREAS, Engineer is prepared to provide professional services in support of the next phase of the project;

NOW THEREFORE, in consideration of the promises contained in said AGREEMENT and this AMENDMENT NO. 1, Owner and Engineer agree as follows:

ATTACHMENT A, SCHEDULE, shall be supplemented with the following:

Discounting unforeseen conditions and circumstances beyond the Engineer's control, and the time associated with Owner review, the Engineer shall complete the scope of services in accordance with the schedule below:

2. Engineer shall submit Phase II Technical Memorandum draft contract documents to the Owner within 180 calendar days of Owner obtaining access to site for the last test hole drilled.

ATTACHMENT B, SCOPE OF SERVICES, shall be supplemented with the following:

Engineer shall provide feasibility analysis and field assessment services associated with the Horizontal Well Study Phase 2: Field Assessment. The basic services include a field assessment to evaluate the potential installation of horizontal wells. More specifically, the Engineer will perform the Phase 2 services as defined below:

Phase 2 –Field Assessment:

1. Test Hole Site Verification – Engineer will verify the suitability of proposed sites for field assessment. The proposed sites must be suitable for primary test hole drilling and geophysical logging surveys for each site. In the event additional test holes or one or more of the proposed sites is not viable for field investigations, the Engineer will recommend and evaluate alternative sites to achieve the target number (up to four (4)) of primary test hole locations. Additional test holes will be authorized by the Owner prior to proceeding.

- 1.1. Primary Test Hole Drilling and Geophysical Logging Surveys – Engineer's Subconsultant will drill one (1) test hole to a depth of up to 800 feet at the selected sites and up to a total of four test holes. Owner will indicate the preferred site of those identified in Phase 1. Engineer's Subconsultant will conduct geophysical logging on the

test hole, including Gamma Ray, Spontaneous Potential, long normal resistance, short normal resistance, and single point resistance. Based on the results from this item, Engineer will make a recommendation on whether or not to continue with Items 3 and 4 associated with this site. Engineer's Subconsultant will plug all test holes unless directed otherwise by Owner.

- 1.2. Groundwater Sample Collection and Water Quality Testing – In parallel with Item 1.1 for each primary test hole, Engineer's Subconsultant will identify groundwater zones during drilling. Engineer's Subconsultant will isolate groundwater zones through the use of inflatable packers, and a water sample will be collected from each zone up to five (5) zones after stabilization. The water samples will be tested for multiple parameters:

Metals	Anions	Cations	General
Antimony	Chloride	Sodium	pH
Arsenic	Fluoride	Total	Specific
Barium	Nitrite/Nitrate	Hardness	Conductance
Beryllium	Sulfate		Total Alkalinity
Bromide			Total Dissolved
Cadmium			Solids
Calcium			Turbidity
Chromium			
Copper			
Iron			
Lead			
Magnesium			
Manganese			
Mercury			
Nickel			
Potassium			
Selenium			
Thallium			
Uranium			
Zinc			

- 1.3. Radionuclides will be tested on an as needed basis, approved by the Owner, under a testing allowance.
- 1.4. Identification of Target Zone – In parallel with Item 1.1 and 1.2 (and 1.3 when requested by Owner) for each primary test hole, Engineer will determine the target zone based on data collected from the geophysical logging surveys, groundwater chemistry data, and evaluations of samples collected from the primary test hole boring.
- 1.5. Geophysical Investigations – not included in this scope of services.
- 1.6. Secondary Test Hole Drilling, Geophysical Logging, and Water Quality Testing – not included in this scope of services.

- 1.7. Estimation of Well Production – Engineer will provide an estimated production yield for a horizontal well at each site based on updated lithological information for the site. Production yield estimates will be based on methodologies consistent with previous calculations; yield estimates are subject to change after final well construction and use.
- 1.8. Cost Analysis Update – Engineer will update cost estimates specific to completing a horizontal well at each of the test hole location sites for budgetary and planning purposes. The conceptual level cost estimates will include costs (in current dollar values) for material procurement and construction, professional services, contractor overhead and profit, and contingency. The range of accuracy for the cost estimates at this level of evaluation is -30% to +50% of the actual project. Costs will also be developed on a cost per 1,000 gallons basis.
2. Proximity of oil and gas wells - Locate the proximity and depth of oil and gas wells within a one-mile radius of each of the test hole sites. Evaluate the potential impact of any oil and gas wells found within this one-mile radius on a potential horizontal water well installation.
3. Phase 2 Recommendation– Based on the Phase 2 items above, the Engineer will provide a recommendation regarding continuing with Phase 3 and/or Phase 4 of the project. Phase 3 would include additional field data collection and detailed hydraulic modeling, and Phase 4 would include site selection and design of horizontal well(s). If a positive recommendation is given to proceed with Phase 4, the proposed location(s) for horizontal well(s) for Phase 4 will be included.
4. Technical Memorandum (TM)– Engineer will summarize the approach, findings, and recommendations associated with Phase 2 tasks in a Horizontal Well Field Assessment TM: Phase 2 Field Assessment.
5. **Project Deliverables:** The following will be submitted to the Owner, or others as indicated, by the Engineer:
  - Five copies of the Horizontal Well Feasibility TM: Phase 2 Field Assessment
  - Final presentation of the TM to the City Council
6. **Extra Work:** The following items are not included with the scope of this agreement but such services are available from Engineer and will be considered as Extra Work:
  - Submittals or deliverables in addition to those listed herein.
  - Additional desk top analysis from Phase I.
  - Geophysical Investigations at bore sites other than the geophysical logging included in Item 3.2.2
  - Drilling, geophysical logging, and water quality testing associated with a secondary test hole on each of the selected sites
  - Detailed hydraulic modeling with MODFLOW.
  - Development of a well-field scale hydraulic model.
  - Well-field scale surface geophysical survey to refine model development.

- Field pump tests.
- Drilling additional primary or secondary test holes.
- Survey of any kind.
- Material testing of any kind.
- Test well construction and field verification of anticipated yield.
- Design services of any kind.
- Well construction of any kind.
- Preparation of easement documents or land acquisition services.
- Construction phase services of any kind.
- Public Meetings
- Regulatory Meetings

The scope for Extra Work may be authorized at a later time under separate agreement.

**7. Owner’s Responsibilities:** As indicated in Master Agreement, as well as the following:

- Owner will perform property records search to confirm site access and procure access for up to four (4) pre-selected (ranked) sites for drilling of test holes.

ATTACHMENT C, COMPENSATION

For the work described under Phase 2 – Field Assessment Services, the Owner will pay the Engineer on a lump sum basis. The base Lump Sum amount to be paid for services associated with a single test hole as described under Item 1 is \$116,490.

In the event that additional test holes are required or one or more of the proposed sites are not viable for field investigations, the Owner will pay the Engineer for each additional test hole required, up three (3) additional test holes for a total of four (4) test holes under this scope of services. Additional test holes will be authorized by the Owner prior to proceeding and will be paid on an Each basis of \$55,100 per Test Hole. The not to exceed amount to be paid for services associated with additional Test Holes is estimated to be \$165,300.

For the work described under Item 1.3 and at the discretion and desire of the Owner to conduct Radionuclide Testing, the Owner will pay for testing services under a testing allowance. Engineer will coordinate testing at the direction and approval of the Owner. The not to exceed amount to be paid for services associated with Item 1.3 is \$25,000.

Description	Unit	Number	Fee	Total
Base Services (includes one Test Hole)	Lump Sum	1	\$116,490	\$116,490
Each additional Test Hole (up to three)	Each	3	\$55,100	\$165,300
Testing Allowance for Radionuclides	Lump Sum	1	\$25,000	\$25,000
			<b>Total</b>	<b>\$306,790</b>

The Owner intends to pay the Engineer and represents that funds are available, or funds will be borrowed as necessary to pay the Engineer.

If any payment due the Engineer under this agreement is not received within 60 days from date of invoice, the Engineer may elect to suspend services under this agreement without penalty or liquidated damages assessed by the Owner.

The Owner will pay the Engineer on a monthly basis, based upon statements submitted by the Engineer to the Owner indicating the estimated proportion of the work accomplished for Phase 2 Field Assessment as identified above. Payments not received within 60 days of date invoice will be subject to a one percent monthly simple interest charge unless Owner documents reasons for non-payment.

Any additional work beyond the scope of services defined herein, and authorized by the owner, shall be paid for in a subsequent agreement.

IN WITNESS WHEREOF, Owner and Engineer have executed this Amendment No. 1.

DATED this 5<sup>th</sup> day of February, 2018.

**Garver, LLC. (ENGINEER)**

By:

Title: Michael J. Graves – Vice President

ATTEST:

STATE OF OKLAHOMA            )  
  )        SS  
COUNTY OF CLEVELAND        )

This instrument was acknowledged before me on this 5<sup>th</sup> day of February 2018, by Michael J. Graves as Vice President of Garver, LLC.

Audrea Smith  
Notary Public

My Commission Expires/Commission Number:

16004753 / 5/13/2020



**Norman Utilities Authority (OWNER)**

APPROVED as to form and legality this \_\_\_\_\_ day of \_\_\_\_\_, 2018.

\_\_\_\_\_  
City Attorney

APPROVED by the Trustees of the Norman Utilities Authority this \_\_\_\_\_ day of \_\_\_\_\_, 2018.

ATTEST

By: \_\_\_\_\_  
Title: Chairperson – N.U.A.

\_\_\_\_\_  
Secretary – N.U.A.