

November 29, 2022

Neil Wadsworth
Utilities Director
Prescott Valley
7501 E Skoog Blvd
Prescott Valley, AZ 86314

Subject: Wellsite Water Treatment Systems Project Scoping and Conceptual Designs

Dear Neil,

Jacobs Engineering Group Inc. (Jacobs) is pleased to provide Prescott Valley with this proposal for engineering services related to treatment of per and polyfluoroalkyl substances (PFAS) at its well sites.

Our approach delivers the following benefits:

- **Global leaders in PFAS treatment.** Jacobs has extensive global PFAS treatment expertise, especially over the last five years. Jacobs has recently led comprehensive treatability testing for Orange County Water District, CA, and designed PFAS wellhead treatment facilities for the City of Woodbury, MN, City of Tustin, CA, Alameda County Water District, CA, and the City of Pico Rivera, CA
- **Site-specific solutions that lead to cost savings.** We have successfully developed full-scale wellhead PFAS water treatment systems for our clients. Customizing the approach with new buildings, existing building retrofits, or pre-fabricated modular systems allow the best fit for each size constraint and operational requirements.
- **Expert analysis of the latest data and research results to guide the best approach.** Through our partnerships and self-funded research, we can share the latest data and in some cases before publication. To date, this has led to better-informed decisions for technology selection for non-drinking water matrices.

If you have any questions, please do not hesitate to contact me.

Best Regards,

Jacobs Engineering Group Inc.



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Prescott Valley PFAS Consulting and Design Services

SCOPE OF SERVICES and FEE SCHEDULE

Project Background and Understanding

Prescott Valley has recently become aware of PFAS compounds in four of its drinking water wells and at the wastewater treatment plant (WWTP). It is anticipated that the US EPA will issue draft drinking water maximum contaminant levels (MCLs) for PFOA and PFOS compounds by December 20, 2022. In anticipation of these pending draft MCLs, Prescott Valley is looking to proactively identify treatment at its wellheads to a) mitigate PFAS in its drinking water supply, and b) treat wastewater effluent before groundwater recharge.

Four water production wells have tested positive for PFAS chemicals. Of these, Little Pete well is the highest producing at about 2,000 gallons per minute (gpm) and has been identified as the priority for mitigating PFAS. A second lower-capacity well (Quailwood #3) is also considered a candidate PFAS treatment.

Additionally, Prescott Valley is currently designing a groundwater injection well at Mountain Valley Park. This new well will inject treated wastewater effluent that contains PFAS. Incorporating PFAS treatment to the recharge project is desired by Prescott Valley to minimize the introduction of PFAS into the groundwater aquifer.

Project Objectives

Prescott Valley desires to maximize finished water distribution and groundwater recharge while removing targeted PFAS from drinking water and eliminating PFAS introduction to groundwater.

Specifically, the objective of this project is to provide design services and cost estimates sufficient for Prescott Valley to prepare applications to the Water Infrastructure Finance Authority of Arizona (WIFA) for funding and to the Arizona Department of Environmental Quality (ADEQ) for permitting.

Technical Approach

Based on initial discussion, Prescott Valley desires to consider several alternatives for drinking water treatment:

1. Wellhead treatment at Little Pete.
2. Wellhead treatment at Quailwood #3

3. Blending of Little Pete and the adjacent western wells supply to reduce PFAS concentrations without the need for wellhead treatment.
 4. A combination of blending and treatment around Little Pete well.
- This scope of services is separated into two phases: Phase 1 is concept-level (10%) alternatives development and cost estimation. This is specifically defined in the following tasks. Jacobs has included a contingency allowance to maintain flexibility in scope as the project progresses.
 - Phase 2 will include preliminary design of the selected alternative. Jacobs has included an allowance for 30% design, which can be further defined at the completion of Task 3.

Alternative 1 – Prescott Valley has indicated that there is limited space and no available sewer connection. Therefore, it is less desirable to consider granular activated carbon (GAC) compared to ion exchange (IX) treatment for PFAS. This is primarily due to the large volumes of water required for backwashing and rinsing at start-up/GAC changeout, as well as the potential to require operational backwashing to minimize pressure drop across the GAC filter. Alternatively, IX does not require backwashing and only requires a minimal amount of rinsing (approximately 3-5 bed volumes) during start-up. This water could be managed via tanker truck or frac tank and conveyed to the WWTP for discharge.

Additionally, IX provides higher throughput and less required contact time compared to GAC. This will allow for a smaller treatment footprint, which is important given the Little Pete wellhead parcel size.

To maximize efficiency, Prescott Valley desires a prefabricated containerized treatment system. Several manufacturers can provide these and will be the focus of this treatment approach.

Alternative 2 – this alternative will consider new piping and infrastructure to blend the little Pete discharge with the four western existing adjacent wells since PFAS has not been detected in these wells. Given existing conveyance piping at the adjacent western wells, allowable blending volumes and resulting concentrations of PFAS will be considered to provide desired concentrations without the need for treatment. This alternative will consider upsizing of existing piping, blending, and/or storage infrastructure, as required.

Groundwater Recharge - for treated wastewater effluent, treatment of PFAS with conventional drinking water technologies (both GAC and IX) is more complex due to wastewater background chemistry (elevated total organic carbon (TOC) and inorganic foulants). Although they can be applied to wastewater, preliminary testing has

demonstrated that the frequency of media changeout will result in an operationally intensive and economically less feasible treatment option.

Treatment of municipal wastewater for PFAS is not widely practiced. However, alternative treatment technologies more appropriate for wastewater have been developed. These include Foam Fractionation PFAS separation and Fluoro-sorb adsorbent. Each of these technologies will be evaluated for the groundwater recharge application. The evaluation will consist of vendor information and Jacobs' data from similar applications. However, it is recommended that the technologies be evaluated on the bench scale under an additional scope to confirm performance and better refine implementation costs.

SCOPE TASKS

1. Task 1 – Data Review (\$9,400)

Under this task Jacobs will request the following information which will be provided from the City:

- Historical well capacity and pumping data for each well.
- Individual well pump spec sheets and pump curves.
- Well water conventional quality data (Fe, Mn, SO₄, NO₃, As, Cl, Si, TOC)
- Wellhead parcel plan drawings.
- Historical well capacity and pumping data for the western wells adjacent to Little Pete well.
- Adjacent western well pumps spec sheets and pump curves.
- Recharge injection well design information.
- Recharge injection wellhead parcel plan drawing.
- Available wastewater effluent quality data.
- Existing water main sizes and drawings for Little Pete and adjacent western supply wells.

Jacobs will review this information and data in preparation of conducting subsequent tasks. Subsequent to review, Jacobs will conduct a 1 hour Workshop with Prescott Valley to review information and clarify any questions prior to initiating Task 2.

2. Task 2 – Alternatives Development and Evaluation (\$48,150)

For the wellhead drinking water treatment system, two alternatives will be developed:

- Prefabricated containerized IX system for treatment of Little Pete and Quailwood #3 water
- Blending of Little Pete water with adjacent western wells

For the treated wastewater effluent before groundwater recharge, two alternatives will be developed. Each system will be prefabricated and containerized

- Foam Fractionation
- Fluoro-Sorb Adsorbent

For each of the four alternatives identified, Jacobs will develop the following:

- General description of the treatment process

- Concept-level process flow diagram and containerized equipment footprint
- Permitting requirements
- Qualitative assessment of key aspects:
 - Operational complexity
 - Residuals generation
 - Power requirements
 - Required net steps to further design
- Budgetary capital and operating cost estimates
 - Assumed to be AACE Level 4: -30%/+50% suitable study or feasibility analysis

Jacobs will conduct up a 2-hr workshop with Prescott Valley to review the alternatives developed.

3. Task 3 – Technical Memorandum (\$21,000)

Jacobs will prepare a Technical Memorandum (TM) to document the results of Tasks 1 through 2. Jacobs will submit the Draft TM to Prescott Valley for review. A meeting (virtual and/or in person) will be coordinated by Jacobs to receive consolidated comments and discuss the path forward. The final TM will be issued within 2 weeks of the review meeting.

4. Task 4: Project Management (\$6,025)

Jacobs will hold a 1 hour kickoff and chartering meeting with the delivery team and client stakeholders to review the project elements, expectations and success factors.

Jacobs will prepare monthly progress reports in memo format for submission to the City's Project Manager along with the invoice. The report will contain progress against schedule and scope, as well as relevant budget information. The Project Manager will oversee the preparation and submission of monthly invoices.

5. Task 5 – Allowances (\$122,000)

An allowance of approximately 20% of the Phase 1 effort is included in the LOE for changes in scope or additional work as done at the direction and approval of the City. Work done under the allowances may require an adjustment to the delivery schedule.

Additionally, Jacobs has included an allowance for 30% design development, which can be further defined at the completion of Task 3, and an allowance for travel costs.

Schedule

It is anticipated that the Phase 1 tasks will require approximately 4 months to complete. A Notice to Process (NTP) is anticipated on December 15, 2022.

Compensation

The work will be done on a time and material basis with a not to exceed (without written approval from Precott valley) upper limit as indicated in the attached Level of Effort and Fee Table.

General Assumptions

The following general assumptions apply to all tasks:

- i. Budgets will be managed at the main task level; Jacobs will track task overruns and underruns and will re-allocate funds as needed for the work within the overall project budget. Any scope changes will be accommodated within the overall project budget to the extent possible; Jacobs will inform the City of any changes that may require additional funds via a change order before proceeding with the work.
- ii. To facilitate rapid distribution of information, deliverables will be furnished electronically. Unless otherwise indicated, final deliverables will be provided as native electronic files (Microsoft Word®, Microsoft Excel®, and pdf format as appropriate). Reproduction of hard copies shall be performed by the OWNER.
- iii. The ENGINEER will set up a project site as a repository for all electronic deliverables to be shared with the OWNER via file transfer protocol (FTP), SharePoint, or Microsoft® Teams.
- iv. Interactive workshops will be used to gather information, guide development, and to review draft work products.
- v. The OWNER will conduct the scheduling and coordination of necessary participants of City staff as well as contract operations staff necessary to have efficient meetings and workshops. The OWNER's Project Manager will coordinate with City's staff to ensure optimal participation at workshops and meetings.
- vi. Where draft work products are delivered to the OWNER, review comments will be furnished to the ENGINEER within 10 working days of receipt of the work product. Comments will be incorporated into the final documents and issued to the OWNER's staff within 10 business days of receiving comments.
- vii. When the OWNER reviews an ENGINEER work product, comments shall be provided as a single electronic file. Before furnishing to the ENGINEER, the OWNER shall screen and adjudicate all review comments to remove redundant or conflicting comments, or comments that are contrary to the direction of the OWNER's Project Manager.

- viii. The OWNER will provide access to facilities and will assist the ENGINEER with any necessary entry permits, scheduling, notification, and other requirements to gain access to perform work as outlined below.
- ix. In providing opinions of cost, financial analyses, economic feasibility projections, and schedules for the Project, ENGINEER has no control over the cost or price of labor and materials; unknown or latent conditions of existing equipment or structures that may affect operation or maintenance costs; competitive bidding procedures and market conditions; time or quality of performance by operating personnel or third parties; and other economic and operational factors that may materially affect the ultimate Project cost or schedule. Therefore, ENGINEER makes no warranty that actual Project costs, financial aspects, economic feasibility, or schedules will not vary from ENGINEER's opinions, analyses, projections, or estimates.
- x. It is assumed that bi-weekly (every two weeks) 30 min progress calls will be conducted. The ENGINEER PM and lead technical SME will attend.
- xi. Budgetary costing will be parametric. Discipline installation (civil/structural, process mechanical, electrical/controls) will be based on percent of capital equipment.
- xii. Operating costs for PFAS treatment will be based on ENGINEERS experience with PFAS treatment of similar water quality and PFAS concentrations, vendor input, or combination of both.
- xiii. ENGINEERS scope does not include preparation of permit or funding applications.
- xiv. ENGINEERS scope does not include ADEQ meetings or coordination.
- xv. ENGINEERS scope includes preliminary design only, if Task 5 – Allowances is authorized by the OWNER. Detailed design phase work beyond 30% would require contract language modifications as well as additional scope and fee.

FEE SCHEDULE

Task No.	Task Description	Teresa Smith-DeHesus	Scott Greico	Michael Hwang	Brent Schuster	Joesph Chang	Kevin Butcher	Various	Jacobs Subtotals			Total Cost
		PIC / Sr PM	Senior Technical Consultant	QA/QC	Sr Engineer / Deputy PM	Jr. Engineer	Cost Estimator	Admin	Labor Hours Subtotal	Labor Subtotal	Expenses Subtotal	
		\$300	\$300	\$275	\$200	\$150	\$150	\$100				
1.0	Data Review											
	Data Review	0	4	0	8	24		4	40	\$6,800	\$0	\$6,800
	Workshop 1	2	2	0	4	4	0	0	12	\$2,600	\$0	\$2,600
	Subtotal	2	6	0	12	28	0	4	52	\$9,400	\$0	\$9,400
2.0	Alternatives Development and Evaluation											
	Little Pete Treatment Alternative	0	2	2	8	32	0	2	46	\$7,750	\$0	\$7,750
	Drinking Water Blending	0	2	2	16	40	0	2	62	\$10,550	\$0	\$10,550
	Groundwater Recharge Foam Fractionation	0	4	2	8	20	0	2	36	\$6,550	\$0	\$6,550
	Groundwater Recharge Fluoro-sorb	0	4	2	8	20	0	2	36	\$6,550	\$0	\$6,550
	Workshop 2	4	4	0	8	8	0	2	26	\$5,400	\$0	\$5,400
	Cost Estimates	2	4	2	8	16	32	2	66	\$11,350	\$0	\$11,350
	Subtotal	6	20	10	56	136	32	12	272	\$48,150	\$0	\$48,150
3.0	Technical Memorandum											
	Draft TM	2	8	4	16	40	0	0	70	\$13,300	\$0	\$13,300
	Review meeting	0	4	2	2	8	0	0	16	\$3,350	\$0	\$3,350
	Final TM	2	4	2	4	8	0	0	20	\$4,350	\$0	\$4,350
	Subtotal	4	16	8	22	56	0	0	106	\$21,000	\$0	\$21,000
4.0	Project Management											
	Project Admin, Progress Reports and Invoicing	4	0	0	12	0	0	6	22	\$4,200	\$0	\$4,200
	Kickoff and Chartering Meeting	2	1	1	2	1		1	8	\$1,825	\$0	\$1,825
	Subtotal	6	1	1	14	1	0	7	30	\$6,025	\$0	\$6,025
5.0	Allowances											
	Phase 1 Conceptual (10%) Design - Scope Changes/Additional Work								0	\$0	\$20,000	\$20,000
	Phase 2 Preliminary (30%) Design - Additional Work								0	\$0	\$100,000	\$100,000
	Travel								0	\$0	\$2,000	\$2,000
	Subtotal	0	0	0	0	0	0	0	0	\$0	\$122,000	\$122,000
		18	43	19	104	221	32	23	460	\$84,575	\$122,000	\$206,575