



Carollo Engineers, Inc.



City of Clearwater

CONSULTANT WORK ORDER

Date:	5/7/2026
--------------	----------

1. PROJECT INFORMATION:

Project Title:	RO1 PFAS Study		
	City Project Number:	26-0025-UT	
	Consultant Project Number:	TBD	

2. SCOPE OF SERVICES:

In April 2024, the EPA promulgated the National Primary Drinking Water Rule (NPDWR) that will regulate six types of per- and polyfluoroalkyl substances (PFAS). The planned legally enforceable maximum contaminant level (MCL) for PFOA and PFOS is 4 parts per trillion (ppt), respectively, with a non-enforceable maximum contaminant level goal (MCLG) of 0 ppt. For PFHxS, PFNA, and HFPO-DA (GenX chemicals), an MCL of 10 ppt is proposed, and for mixtures of PFHxS, PFNA, HFPO-DA, and PFBS, the EPA plans to use a Hazard Index (HI) approach. Though ongoing litigation may modify components of the PFAS NPDWR, as the regulation currently stands, initial monitoring must be completed by April 2027 with compliance required by April 2029 (expected to be extended to 2031 per May 2025 EPA press release). For many utilities, significant capital improvements will be required to achieve long-term compliance. The three treatment technologies to remove PFAS recommended by the EPA include granular activated carbon (GAC), ion exchange (IX), and high-pressure membranes (i.e., reverse osmosis (RO) and nanofiltration).

Many public water utilities, like the City of Clearwater (CITY), are seeking to comply with the rule through interim measures before long-term treatment strategies can be implemented. Therefore, Carollo Engineers, Inc. (CONSULTANT) will provide engineering services to support the CITY to evaluate the feasibility of near-term strategies to address PFAS in the water supply as well as a desktop alternatives analysis to explore long-term PFAS treatment options for Water Treatment Plant #1 (RO1).

Clearwater's supply includes a network of 44 wells (primarily Upper Floridan with some intermediate zone wells), two RO water treatment facilities (RO1 and RO2) treating brackish groundwater, and a storage/repump facility (Plant #3) that blends purchased water from Pinellas County (majority) with select wells.

CONSULTANT WORK ORDER

RO1 PFAS Study

26-0025-UT

Carollo Engineers, Inc.

City of Clearwater

RO1 treats approximately 4.5 million gallons per day of potable groundwater from brackish wells which have tested positive for various levels of PFAS constituents. Some wells have tested as high as 40 parts per trillion (ppt), with an average of 20 ppt detected at the plant influent. The existing treatment process at RO1 results in an approximate 5.9 ppt PFOS sampled in the finished water, which would need to be reduced to meet anticipated 4 ppt regulations.

Operationally, a key driver of the PFAS exceedance is RO bypass: RO1 is reported to operate with ~40% bypass (creating a substantial untreated for PFAS finished-water contribution). As such, the City seeks to better understand PFAS levels through the treatment process as part of this Work Assignment. Short-term options for mitigating PFAS in the finished water may include operational changes (blending/redistribution of sources) and selective well management; long-term options may include additional RO capacity, GAC, anion exchange, or other best-fit treatment approaches. Notably, a vessel intended for arsenic treatment onsite may be available for conversion to PFAS treatment media.

Although limited samples collected from finished water at RO2 and Plant #3 have not yielded PFAS results that exceed the PFAS MCL, the City wishes to conduct additional sampling through the process at RO2 as part of this Work Order. Since RO2 also has a bypass flow from freshwater wells that are not treated for PFAS, the goal of this sampling is to better understand PFAS levels through the process and how normal variation in operations (e.g., well in operation, process flow rates) may impact finished water PFAS levels.

The scope of work for this Work Order has been prepared in accordance with CITY requirements and is presented as follows. Though no design plans are expected to be provided as part of this planning-stage Work Order, any future design plans shall be compiled using the CITY CAD standards.

I. PROJECT MANAGEMENT

The CONSULTANT's project manager will manage the efforts of the project team members, make staffing assignments, review work progress, coordinate quality assurance and review procedures, and communicate meeting schedules and progress reporting. The CONSULTANT's project manager will develop and manage the information described in the following subtasks.

Task 1.1: Project Meetings

This subtask will include any in-person or virtual meetings with CITY personnel as well as any internal progress and coordination meetings among the CONSULTANT's staff. The CONSULTANT will coordinate the following meetings with the City during the project:

1. Project kickoff meeting (virtual),
2. Draft sampling protocol review meeting (virtual),

CONSULTANT WORK ORDER

RO1 PFAS Study

26-0025-UT

Carollo Engineers, Inc.

City of Clearwater

3. Review PFAS process sampling results (in-person),
4. Alternatives analysis review meeting (in-person),
5. Draft report review meeting (virtual).

Deliverables: Agendas, meeting minutes, and action/decision/comment review logs for up to five meetings listed above.

Task 1.2: Project Scheduling, Invoicing, and QA/QC

This subtask will include general project scheduling, monthly invoice reviews, and QA/QC review of draft and final deliverables. Project scheduling will include review of work progress and deliverables as well as schedule coordination between CITY personnel, CONSULTANT staff, contract laboratories, and optional bench testing efforts (see Task 5).

Invoices will be reviewed and submitted on a monthly basis. Percent complete status will be updated and included along with the monthly invoice. A brief progress report will be included with the monthly invoice.

The CONSULTANT's Project Manager will facilitate quality assurance and quality control (QA/QC) by the CONSULTANT on all deliverables to ensure they meet standards and requirements for the CITY and other key stakeholders.

II. BASELINE CHARACTERIZATION AND PFAS PROCESS SAMPLING

Task 2.1: Data Consolidation and Baseline Evaluation

This subtask will include compiling available PFAS datasets (wells, RO influent/effluent/entry points, purchased water) and aligning this with operational data (process flows, bypass fractions, source contributions) and existing general water quality data. This review will identify constraints on the current treatment system and will identify data gaps to be addressed by additional sampling.

Task 2.2: PFAS Process Sampling and Data Gap Resolution

Based on the baseline evaluation (Task 2.1), the CONSULTANT will develop a targeted process sampling approach intended to close key data gaps needed to evaluate interim operational strategies and long-term alternatives. This effort will focus on identifying recommended sampling locations (e.g., select wells, unit process influent/effluent, bypass streams where accessible, blending points, and concentrate), constituent lists (PFAS per current regulatory framework and any additional wet chemistry parameters to support evaluation), frequency/number of events, and relevant supporting field parameters (e.g., flow, conductivity, pH) needed to support blending and treatment evaluations.

The CONSULTANT will coordinate with the CITY regarding sampling logistics, availability of existing sampling equipment, laboratory selection/hold times, and data validation needs. Unless otherwise authorized by the CITY, field sampling will be performed by the CONSULTANT with operational assistance by the CITY (i.e., turning on wells, accessing sample locations). Laboratory analytical services will be provided by the CITY under a separate contract. Two sampling events over three days, including supply well and in-plant samples, are assumed for this task. The CONSULTANT will compile and interpret the resulting data for use in Tasks 3 and 4.

Deliverable: Draft and Final Sampling Plan for targeted PFAS process sampling approach identifying sampling locations, analytes, and event count/frequency.

III. EVALUATION OF TREATMENT ALTERNATIVES

Task 3.1: Near-Term Strategies for PFAS

This task will include a desktop evaluation of near-term operational strategies for RO1 and RO2 to reduce PFAS concentrations in finished water while maintaining required production, water quality, and operational reliability. The CONSULTANT will use available PFAS occurrence data, source flow and bypass information, and system operating constraints to estimate the PFAS contribution from individual sources and facilities and to identify practical adjustments that can be implemented prior to long-term capital improvements.

This may include:

- Develop and screen operational scenarios such as modifications to RO bypass fractions (RO1 and RO2), preferential selection of lower-PFAS sources where available, and reliance on purchased water blending as feasible.
- Perform a simplified PFAS blending/mass-balance evaluation (including PFOA, PFOS, and Hazard Index constituents where data are available) to estimate finished-water PFAS for each scenario and identify scenarios with the greatest compliance benefit.
- Identify key operational constraints and considerations (e.g., capacity, membrane/process limits, blending/storage, residuals disposal, finished water quality) and summarize implementation steps and expected limitations for recommended near-term strategies.

Task 3.2: Long-Term Treatment Alternatives Analysis

This task will include a desktop alternatives analysis to identify, screen, and compare long-term approaches for achieving and maintaining compliance with the PFAS NPDWR for RO1. Alternatives will be developed at a planning level and will consider treatment effectiveness for the regulated PFAS, residuals

CONSULTANT WORK ORDER

RO1 PFAS Study

Carollo Engineers, Inc.

26-0025-UT

City of Clearwater

management, compatibility with existing facilities, implementability within the compliance timeline, and lifecycle cost impacts.

The primary long-term alternatives will be defined as the following:

- Alternative 1: GAC treatment on the RO1 well bypass, including evaluation of converting the existing arsenic vessel to GAC.
- Alternative 2: Fixed-bed IX treatment on the RO1 well bypass, including evaluation of converting the existing arsenic vessel to fixed-bed IX.
- Alternative 3: Expand RO1 capacity to reduce or eliminate bypass volume.

In addition to the long-term treatment strategies listed above, permanent blending strategies will be evaluated where allowed by regulation. A robust comparative framework will be developed for the listed alternatives (e.g., treatment performance, reliability/operability, residuals and waste handling, permitting/regulatory considerations, O&M requirements, impacts to finished water quality, and risk/uncertainty). Planning-level (order-of-magnitude) capital and O&M cost estimates will be developed for up to three alternatives, identifying key uncertainties, anticipated permitting, procurement, and implementation milestones to support compliance planning. Treatment of RO2 supply wells and capital improvements to RO2 will not be evaluated as part of this scope.

IV. PFAS EVALUATION REPORT

The CONSULTANT will prepare a PFAS Evaluation Report documenting the baseline characterization, interim operational optimization evaluation, and long-term treatment alternatives analysis completed under this Work Order. The report will be suitable for planning and decision-making and will summarize assumptions, data sources, and key uncertainties.

Report contents are anticipated to include:

- Project background, regulatory context, and objectives.
- Summary of available data reviewed and baseline PFAS characterization (including key figures/tables).
- Interim operational optimization scenarios evaluated, results, and recommended near-term actions/data needs.
- Long-term treatment alternatives evaluated, screening/decision criteria, planning-level cost opinions, residuals considerations, and implementation roadmap.
- Conclusions and recommended next steps to support compliance planning (including identified data gaps and optional bench/pilot testing considerations).

Deliverables: Draft PFAS Evaluation Report for CITY review and one round of comment resolution, followed by a Final PFAS Evaluation Report in electronic format (PDF).

V. ALLOWANCE: BENCH-SCALE TESTING (OPTIONAL)

Task 5.1: Rapid Small Scale Column Testing (RSSCTs)

At the CITY's direction, the CONSULTANT may support optional bench-scale rapid small-scale column testing (RSSCT) to refine assumptions used in the alternatives analysis (e.g., media selection and expected performance for GAC/IX, treatment train considerations, and waste/residuals implications). Bench-scale testing is intended to be fully scoped after completion of Tasks 2 and 3, based on the technologies the CITY decides to further evaluate. Estimated costs were prepared for this Work Order assuming evaluation of baseline samples and two RSSCT columns at Carollo's in-house WaterARC® facility in Boise, Idaho. This includes shipping of source water drums, column construction, operation of columns up to 20 days, in-house laboratory analyses (estimated 30 samples), and external PFAS analysis (estimated 30 samples).

If authorized, the CONSULTANT will prepare a draft and finalized bench/RSSCT test plan (objectives, test matrix, target PFAS/analytes, sampling and analytical requirements), and coordinate sampling and analysis with the CITY and WaterARC®.

Deliverable: Draft and Final Bench-scale Test Plan.

Task 5.2: Bench-scale Testing Technical Memorandum

CONSULTANT will compile data from the bench-scale study and summarize the results in a draft and final technical memorandum, including a high-level evaluation of the implication for technology selection and planning-level design criteria.

Deliverable: Draft and final technical memorandum summarizing bench-scale test methods and results.

Task 5.3 Review Meetings

This subtask will include up to two virtual meetings with CITY personnel for Task 5. The CONSULTANT will coordinate the following meetings with the City during this task:

1. Draft bench-scale test plan review meeting (virtual), and
2. Draft bench-scale technical memorandum review meeting (virtual).

Deliverables: Agendas, meeting minutes, and action/decision/comment review logs for up to two meetings listed above.

VI. OWNER'S CONTINGENCY (OPTIONAL 10%)

A 10% contingency is included in the total fee. Activation requires written authorization from the CITY's Project Manager.

ASSUMPTIONS

- 1) The CONSULTANT shall complete the services required hereunder in accordance with the prevailing engineering standard of care by exercising the skill and ability ordinarily required of CONSULTANTS performing the same or similar services, under the same or similar circumstances, in the State of Florida.
- 2) The CITY shall furnish the CONSULTANT available studies, reports and other data pertinent to the CONSULTANT 's services; obtain or authorize the CONSULTANT to obtain or provide additional reports and data as required; furnish to the CONSULTANT services of others required for the performance of the CONSULTANT 's services hereunder, and the CONSULTANT shall be entitled to use and rely upon all such information and services provided by the CITY or others in performing the CONSULTANT's services under this Scope of Work, in accordance with the standard of care.
- 3) In providing opinions of cost, financial analyses, economic feasibility projections, and schedules for potential projects, the CONSULTANT has no control over cost or price of labor and material; unknown or latent conditions of existing equipment or structures that may affect operation and maintenance costs; competitive bidding procedures and market conditions; time or quality of performance of third parties; quality, type, management, or direction of operating personnel; and other economic and operational factors that may materially affect the ultimate project cost or schedule. Therefore, the CONSULTANT makes no warranty that the City's actual project costs, financial aspects, economic feasibility, or schedules will not vary from the CONSULTANT's opinions, analyses, projections, or estimates.
- 4) CONSULTANT shall have no liability for or arising from any decision, action, or inaction by the City relating in any way to PFAS, the EPA PFAS regulations in effect at any time during the Project, or any other federal, state or local regulatory compliance.
- 5) CITY will review draft deliverables and provide comments to the CONSULTANT within a 2-week period. City will attend all meetings and site visits as necessary to maintain progress of the project according to schedule.
- 6) CITY will pay for shipping and analytical costs for PFAS laboratory analysis for Task 2.
- 7) CITY will provide a forklift and operator to move drums of water onto a truck for shipping to Water ARC® for Task 5.

3. PROJECT GOALS:

The following work products will be submitted during the project. All deliverables will be produced in alignment with City of Clearwater's Strategic Plan and *Clearwater 2045* policy. In particular, the project will focus on improving the CITY's potable water supply in a cost-effective and sustainable manner.

- Data-Gap and Process Sampling Plan (as defined in Scope of Services, Task 2.2)
 - Draft: electronic Word file
 - Final: electronic PDF copy
- PFAS Evaluation Report (as defined in Scope of Services, Task 4.1)
 - Draft: electronic PDF copy, Word file
 - Final: electronic PDF copy
- Bench-scale Test Plan (optional; as defined in Scope of Services, Task 5.1)
 - Draft: electronic PDF copy, Word file
 - Final: electronic PDF copy
- Bench-scale Test Technical Memorandum (optional; as defined in Scope of Services, Task 5.2)
- Agenda, meeting minutes, and action / decision review logs for up to five meetings for Tasks 1-4 and up to two meetings for Task 5; electronic PDF copy
 - Kickoff meeting
 - Draft sampling protocol review meeting
 - PFAS sampling results review meeting
 - Alternatives analysis review meeting
 - Draft PFAS evaluation report meeting
 - Draft bench-scale test plan meeting
 - Draft bench-scale technical memorandum review meeting

4. FEES:

See Attachment "A"

This price includes all labor and expenses anticipated to be incurred by Carollo Engineers, Inc. for the completion of these tasks in accordance with Professional Services Method "A" – Hourly Rate, for a fee not to **exceed Two Hundred Seventy Three Thousand Eight Hundred and Four Dollars (\$273,804.00)**.

No permit application fees are required as part of this project.

5. SCHEDULE:

The project is to be completed in **10** months from issuance of notice-to-proceed. The project deliverables are to be phased as follows:

Project Management:	300 calendar days
Baseline Characterization and PFAS Process Sampling:	90 calendar days
Evaluation of Treatment Alternatives:	150 calendar days
PFAS Evaluation Report:	210 calendar days
Allowance: Bench-Scale Testing	NTP at 150 calendar days
	Completion at 300 calendar days

6. STAFF ASSIGNMENT:

Consultant's Key Staff:

Sandeep Sethi, Ph.D., P.E.

Jennifer Nyfenneger, Ph.D., P.E.

Melanie Pickett, Ph.D., P.E.

Amber Kiger, M.Sc.

City of Clearwater Staff:

Garrett Wilhelm Project Manager

Michael Flanigan Public Utilities Director

Fred Hemerick Public Utilities Manager

Kaylynn Price Utilities Engineering Manager

7. CORRESPONDENCE/REPORTING PROCEDURES:

CONSULTANT's project correspondence shall be directed to:

Amber Kiger with copies to Melanie Pickett, Ph.D., P.E.

All City project correspondence shall be directed to the Project Manager with copies to the Public Utilities Director, Public Utilities Manager, and Utilities Engineering Director.

8. INVOICING/FUNDING PROCEDURES:

City Invoicing Code: _____

For work performed, invoices shall be submitted monthly to:

**CITY OF CLEARWATER, PUBLIC UTILITIES DEPARTMENT
ATTENTION: PU ENGINEERING
1650 N. ARCTURAS AVE., BUILDING C
CLEARWATER, FLORIDA 33765-1945
PUEngineering@MyClearwater.com**

Contingency services will be billed as incurred only after written authorization provided by the City to proceed with those services.

9. INVOICING PROCEDURES:

At a minimum, in addition to the invoice amount(s) the following information shall be provided on all invoices submitted on the Work Order:

1. Purchase Order, Project and Invoice Numbers and Contract Amount.
2. The time period (begin and end date) covered by the invoice.
3. A short narrative summary of activities completed in the time period.
4. Contract billing method – Lump Sum or Hourly Rate.
5. If Lump Sum, the percent completion, amount due, previous amount earned and total earned to date for all tasks (direct costs, if any, shall be included in lump sum amount).
6. If Hourly Rate, hours, hourly rates, names of individuals being billed, amount due, previous amount earned, the percent completion, total earned to date for each task and other direct costs (receipts will be required for any single item with a cost of \$50 or greater or cumulative monthly expenses greater than \$100).
7. If the Work Order is funded by multiple funding codes, an itemization of tasks and invoice amounts by funding code.

10. CONSIDERATIONS:

Consultant acknowledges the following:

1. The Consultant named above is required to comply with Section 119.0701, Florida Statutes, where applicable.
2. All City directives shall be provided by the City Project Manager.
3. "Alternate equals" shall not be approved until City Project Manager agrees.
4. All submittals must be accompanied by evidence each has been internally checked for QA/QC before providing to City.
5. Consultants/Contractors are not permitted to use City-owned equipment (i.e., sampling equipment, etc.).

-
6. Documents posted on City website must ADA accessible.

11. ADDITIONAL CONSIDERATIONS:

All work orders should include considerations for the following:

1. Sea Level Rise and Flood Resilience, as applicable.
2. Submittal of a Critical Path Method (CPM) Schedule(s).
3. Submittal of a Project Catalog with the following items, as appropriate:
 - a. Data requests, assumptions, critical correspondence, meeting agenda, sign-in sheets, meeting minutes, document comment-response log(s), technical memorandum/reports, addenda, progress reports, regulatory correspondence, and other project-related documents.
 - b. If construction project, also include design plans, conformed plans, change orders, field orders, RFIs, work change directives, addenda, progress reports, shop drawing and progress submittals, as-builts, record drawings, and other project-related documents such as O&M manuals and warranty information.
 - c. At the conclusion of the project, ENGINEER will combine this information into a Project Catalog and submit to the City for review and comment.
4. Arc Flash labeling requirements:
 - a. All electrical designs and construction shall adhere to NFPA 70 E "Standard for Electrical Safety in the Workplace".
 - b. Updated calculations of Fault and Arc Flash, and provisions for new or updated Arc Flash equipment labeling shall be included in the contract documents.

12. SPECIAL CONSIDERATIONS:

N/A

CONSULTANT WORK ORDER

RO1 PFAS Study

26-0025-UT

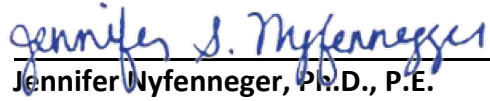
Carollo Engineers, Inc.

City of Clearwater

13. SIGNATURES:

PREPARED BY:

APPROVED BY:



Jennifer Wyfenneger, Ph.D., P.E.

Vice President

Carollo Engineers, Inc.

5/7/26

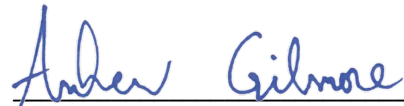
Date

Michael Flanigan

Public Utilities Director

City of Clearwater

Date



Andrew Gilmore

Vice President

Carollo Engineers, Inc.

5/7/26

Date

CONSULTANT WORK ORDER

PROJECT FEES TABLE

Task	Description	Subconsultant Services	Labor	Total
1.0	Project Management			
1.1	Project Meetings	\$0	\$16,223 (+\$300 direct costs)	\$16,523
1.2	Project Scheduling, Invoicing, and QA/QC	\$0	\$8,950	\$8,950
Total:				\$25,473
2.0	Baseline Characterization and PFAS Process Sampling			
2.1	Data Consolidation and Baseline Evaluation	\$0	\$8,584	\$8,584
2.2	PFAS Process Sampling Approach and Data Gap Resolution	\$0	\$40,984 (+\$500 direct costs)	\$41,484
Total:				\$50,068
3.0	Evaluation of Treatment Alternatives			
3.1	Near-Term Strategies for PFAS	\$0	\$19,592	\$19,592
3.2	Long-Term Treatment Alternatives Analysis	\$0	\$33,800	\$33,800
Total:				\$53,392
4.0	PFAS Evaluation Report			
4.1	PFAS Evaluation Report	\$0	\$29,764	\$29,764
Total:				\$29,764
SUBTOTAL (Tasks 1 – 4):				\$158,697
5.0	Allowance: Bench-Scale Testing			
5.1	Bench-Scale Testing Allowance (Optional)	\$43,000 (Note 1)	\$47,216	\$90,216
Total:				\$90,216
6.0	Owner’s Contingency (10%)			\$24,891
GRAND TOTAL (WITH ALLOWANCE AND CONTINGENCY):				\$273,804

Note 1: Cost for rapid small scale column tests by Carollo's Water Applied Research Center (Water ARC®).