CITY OF CAMAS

WATER SYSTEM PFAS EVALUATION AND WELL 13 PFAS TREATMENT DESIGN

AMENDMENT 1 - SCOPE OF WORK

Preliminary efforts on this project identified the value of incorporating additional hydrogeologic support services into this existing contract. This Amendment shall become part of the Contract and provisions of the Contract apply.

The following sections are modified as indicated below.

SCOPE OF SERVICES

- **REPLACE sub task 1403. Hydrogeological Support Services,** with the following:

  1403. Hydrogeological Support Services

  1. Provide hydrogeologic perspective and input to early work activities to identify issues and approaches relevant to fast-track mitigation.
  2. Provide hydrogeologic perspective to interpret existing PFAS sampling data (including Task 1100 data), characterize the current extent and possible hydrogeologic mechanisms associated with known PFAS contamination, and assess the degree to which the recent contaminant source inventory (Mott MacDonald, in press) may be helpful as a preliminary means of assessing potential PFAS sources.
  3. Explore opportunities to shift the distribution of pumping among LWWF wells and/or develop new groundwater sources in known or alternative locations.
  4. Assist with water right permitting (showing of compliance) input to Department of Ecology and attend Source Protection meeting with WDOH.
  5. Provide design input for new well, possible modification of one additional well, and limited input to treatment design
  6. Perform analysis and provide input to optimize wellfield yield and pumping operations.
  7. Consultant will prepare for and host a workshop to discuss opportunities to increase Oak Park Wellfield yield, select preferred opportunities, identify logistical considerations, and assign roles for further actions.

  Task 1403 Workshop Summary

  1. Workshop 1403: Current Wellfield Opportunities.

  Task 1403 Assumptions

  1. Well 13 mitigation currently assumes drilling of one new well within the Oak Park Wellfield and modification of an existing well. The mitigation could be expanded to additional wells, but if the associated additional analysis requires significant effort, it would likely require a budget amendment.
  2. Design input for a new well and possible well modification is limited to preliminary design recommendations and associated yield estimation, including written descriptions and sketches of preliminary designs. Tasks associated with implementing these design recommendations (e.g.

preparing technical specifications, drilling, final design, testing and documenting a new well and providing detailed guidance for modifying an existing well) would occur outside this project, under direct contract between the City and Mott MacDonald.

3. Strategy development for Near Term Operations Support (Task 1108) assumes that an updated groundwater model will not be ready and available during this "early work activity" stage. Instead, this task will initially rely upon readily available existing information such as past pumping practices, historical and current well performance, water level trends, well construction and pump capacities. The City may elect to authorize a task to run a LWWF wide aquifer test under Mott's direction such that wellfield responses to various pumping combinations can be used to characterize aquifer behavior and optimize wellfield yield. Once the aquifer test is performed, Mott MacDonald will use the results of the testing to further support wellfield optimization.
4. Mott MacDonald and Carollo Engineers, Inc. will work cooperatively to complete the DOH Susceptibility Assessment form required for authorization of a new production well.
5. Analysis of near-term sampling results assumes that Carollo will maintain the data in a project database and will perform any necessary QA/QC analysis on the data.
6. Attendance of meetings by Mott MacDonald will vary between in person and virtual, as indicated by cost estimate.

Task 1403 City Deliverables

7. Review and ranking of the drilling and well modification options.

Task 1403 Consultant Deliverables

8. Preliminary design sketches and write-ups for new well design and modification of one existing well.
9. Draft "showing of compliance" form and letter to facilitate authorization of adding new Oak Park well under existing City water right.

- **ADD Task 5200 - Additional Hydrogeological Support Services**

  A need for the following additional hydrogeological support services were identified during the early execution of this contract and were added via contract amendment.

  Task 5200 Activities

  5201. Assist in Developing SCADA Data Transfer Processes

  Obtaining data downloads from the Lower Washougal Wellfield SCADA system will be critical for running the wellfield-wide pumping test (Task 5300) and is an important element for information exchange between the City's water system operator and the Mott MacDonald. Mott MacDonald will work with City Staff to arrange data extraction and transfer procedures. We will identify key information and level of detail required for hydrogeologic analysis and collaborate with City Staff and/or the City's current SCADA Contractor to generate the queries or reports needed to extract the data.

  Mott MacDonald will develop an in-house database to maintain, manage and process the SCADA data. The database will include (or be linked to) user-friendly charting capability that will allow sharing critical wellfield performance data in ways that support flexible viewing and interpretation by City Staff and Carollo.

Task 5201 Assumptions

The level of effort needed to accomplish this task will depend on the usability and flexibility of the existing SCADA system and its data outputs. Mott MacDonald assumes that the City (or their SCADA Contractor) can provide the required data without the need for Mott MacDonald to interface directly with the SCADA data files. Should Mott MacDonald need to work directly with the raw SCADA files, this may require additional time and budget.

Task 5201 Deliverables

1. Interactive charts that allow intended parties to view the SCADA data.

Task 5202 - Organize and Analyze Wellfield-Wide Aquifer Test

A wellfield-wide aquifer test will be performed on the Lower Washougal Wellfield (LWWF) to generate controlled data regarding well performance and interference drawdowns between wells. This information will allow Mott MacDonald to work with City Staff to optimize wellfield operations in their efforts to meet summer-season demands while minimizing PFAS concentration in water served to the City's customers. The test will likely occur over a 10-to-15-day period, where the City alternates pumping sources in a controlled manner. Optimally, prior to testing, Mott MacDonald and the City would meet with other neighboring water users (Georgia Pacific and City of Washougal) to: 1) coordinate pumping operations and record keeping during the testing; and 2) consider way in which data gathered from testing might be useful to cooperating stakeholders.

Mott MacDonald will develop an aquifer testing plan, based on both preferred hydrogeologic methodologies and the City's operational wellfield requirements. We will work with City staff to incorporate logistical considerations into the testing plan and support the City in coordinating with neighboring water users. Once all test procedures have been defined, Mott MacDonald will work directly with the City's water system operator during the first day of testing. This one-day field visit will support communication and standardization of field procedures to be applied during the test and confirm data transfer capabilities. Over the course of the test, Mott MacDonald will regularly update the SCADA data charts (Task 5201) and will communicate daily with the City's water system operator to jointly view the wellfield responses to pumping and modify the testing procedure as needed. Once the test is complete, Mott MacDonald will analyze the test data to characterize the performance of individual wells and interference drawdown between wells. We will document the aquifer test procedures, results and interpretations in a technical memorandum, which will be accompanied by a simple spreadsheet tool to predict drawdowns in and among LWWF wells under a variety of operating conditions.

Task 5202 Assumptions

Estimation of aquifer properties from the aquifer test will occur under calibration of the groundwater flow model (Task 3). Level of effort allocated for communication/coordination with neighboring water users is based on one or two phone calls with each water user (Georgia Pacific and Washougal) and preparation of an email outlining requested pumping operations and data recording during the Camas aquifer test. Mott MacDonald's ability to gain useful information from the pumping test may depend on the ability of participants (City, Georgia Pacific, Washougal) to collect, document, and provide pumping practices and related data.

Task 5202 Deliverables

1. Technical memorandum documenting the pumping test procedures, results and interpretation. Spreadsheet tool to predict drawdown between wells.

Task 5203 - Update Groundwater Flow Model

Mott MacDonald originally prepared a groundwater flow model of the LWWF area in 2006, and the model has been used to support water right acquisition and define wellhead protection capture zones (for both the Cities of Camas and Washougal). Over the past several years, new data and data analysis has shed more light on the dynamics of the Pleistocene Alluvial Aquifer (PAA) that supplies LWWF wells, and how it responds to groundwater withdrawals and seasonal hydrologic variations. The new information, particularly characterization of aquifer water level increases associated with reduced pumping at the neighboring Georgia Pacific wellfield, suggests that the model does not properly capture water-level responses to pumping and may over-estimate the hydraulic connection between the PAA and the Washougal River. In addition, new geologic characterization has been performed that changes how the model should represent the spatial occurrence of the PAA and the underlying Sand and Gravel Aquifer. The existing model will be updated to better represent this new information and provide a tool to support wellfield optimization, wellhead protection, acquisition of new water rights, addressing groundwater contamination, and other applications.

The model update process will begin with an assessment of model objectives and the refinements needed to support desired model applications. Mott MacDonald will meet with City Staff (and other water users, at the City's invitation) to discuss model objectives. These conversations may represent a good opportunity to request both data and cooperation from neighboring water users (Georgia Pacific and City of Washougal). Under this task, Mott MacDonald will also support City Staff in discussions with WDOH towards possible grant funding for model development.

Once the model objectives and supporting refinements have been identified, Mott MacDonald will update the extent and discretization of the model domain. The aerial extent of the model domain will be adjusted to allow development of necessary predictions of groundwater flowpaths and aquifer responses to pumping and will overlap the source areas for Georgia Pacific and City of Washougal. Model discretization (i.e. the "grid" and "layering" that defines the distribution of model "cells" in three dimensions) will be defined, and may include alternative methods such as "unstructured grids" which allow high resolution in defined subareas without affecting surrounding areas of the grid or local grid refinements where high resolution sub-grids can be turned on and off as needed for various model simulations (e.g. simulation of contaminant transport requires higher grid resolution than simulation of groundwater flow).

The model grid improvements include updating the representation of important hydrologic features (i.e., the Washougal and Columbia rivers). Both rivers play a key role in affecting local groundwater occurrence and flow and they must be defined in detail to allow accurate representation in the model. Mott MacDonald will subcontract a qualified surface-water hydrologist (River Measurement) to characterize the river-stage and thalweg elevation profiles on the Washougal River during summer (low flow), winter (high flow) and extended flooding conditions. We will use this information to define river cells within the model domain. We will also define the locations and completion depths of production wells within the model grid and compile pumping data to characterize groundwater withdrawals over time for subsequent model calibration. Mott MacDonald will also estimate

groundwater recharge from precipitation and possible subflow into the model domain from surrounding areas to define reasonable ranges to be used in model calibration.

Once the model boundary conditions (rivers, wells, recharge, subflow) have been defined, Mott MacDonald will begin the process of model calibration. During this process, the model is calibrated to actual conditions (at selected calibration targets), which are based on available current and historic data. Mott MacDonald will compile the relevant information and generate target datasets for model calibration. Mott MacDonald proposes the following calibrations, each with its own target dataset:

1. Average seasonal (summer and winter) water levels, performed as steady-state calibrations,
2. Transient calibration based on the wellfield-wide aquifer testing,
3. Change in water levels in response to reduced Georgia Pacific pumping (comparison of at least two steady-state model simulations employing different average GP pumping rates), and
4. A possible transient calibration to groundwater level responses to change in Washougal River stage (e.g., response to a high-flow event).

Once the calibration target datasets are prepared, model calibration will begin. Model calibration is an iterative process, such that any one of the calibration exercises (1 thru 4 above) may affect the other calibrations. The goal is to create a model version (realization) that best matches all of the calibration datasets. Calibration will involve sensitivity analysis (to determine which model parameters have the most influence on model results) and will likely involve inverse methods (automated computerized adjustments to best fit the calibration data within realistic guidelines specified by the modeler). Calibration success will be assessed based on published standardized statistics developed as best practices in the groundwater modeling field.

The calibrated model will be used to perform several predictive simulations, including: 1) updating wellhead protection capture zone delineations, with consideration of seasonal variation in water-level conditions due to changing pumping, recharge and river conditions; and 2) contaminant transport flowpaths for up to three sites of interest. These predictive simulations will utilize particle tracking to simulate potential contaminant transport. Ultimately (under separate scope), the model may be useful for additional predictive simulations, including:

- Wellfield optimization.
- Water right authorization:
  - » Evaluating streamflow depletion associated with new pumping,
  - » Evaluating mitigation methods to address streamflow depletion.
- Contaminant fate and transport predictions:
  - » Enhancing advective (particle tracking) prediction to fate/transport simulations, which account for contaminant concentrations,
  - » Fate/transport simulates include consideration of: dilution, advection, dispersion, adsorption and contaminant transformations/decay (i.e. natural attenuation).
- Design, operation and refinement of contaminant cleanup remediation systems.
- Changes in groundwater availability in response to climate change, land-use development.
- Predictive simulations performed for neighboring or cooperating water users (e.g., City of Washougal, Georgia Pacific).

Model design, development, calibration and predictive simulations will be documented in a model report. The report will include descriptive text, representative graphics, summary tables, and detailed appendices describing more complex analyses prepared to support the model.

Task 5203 Assumptions

Mott MacDonald anticipates use of simplified assumptions to estimate groundwater recharge based on precipitation, evapotranspiration, land cover and City stormwater management practices. Simplified methods will also be used to estimate groundwater subflow. If model sensitivity analysis shows significant sensitivity to these selected recharge/subflow assumptions, a more sophisticated approach may be warranted. This may require additional time and budget.

Task 5203 Deliverables

1. Model report.

SCHEDULE

- **ADD** the following:

Task	Name	Duration	Estimated Completion
5201	Assist in Developing SCADA Data Transfer Processes	1 month	End of August
5202	Organize and Analyze Wellfield-Wide Aquifer Test	2-4 months	Test – End of October Reporting - November
5203	Update Groundwater Flow Model	6-8 months	Draft Model – December/January Reporting – End of March 2025

BUDGET

- **REPLACE/SUPPLEMENT** with the attached.

CITY OF CAMAS

PFAS TREATMENT AND WATER SYSTEM PFAS EVALUATION AND WELL 13 PFAS TREATMENT DESIGN

AMENDMENT NO 1: CONSULTANT LEVEL OF EFFORT

TASK / DESCRIPTION		Mott MacDonald	Total Sub Markup 10%	Total Subs	TOTAL COST
TASK 1000: FAST-TRACK MITIGATION		**$ 41,694**	**$ 4,169**	**$ 45,863**	**$ 45,863**
Task 1100.	**Early Work Activities**	**$ -**	**$ -**	**$ -**	**$ -**
1101	Level of Service Goals	$ -	$ -	$ -	$ -
1102	Regional Opportunities	$ -	$ -	$ -	$ -
1103	PFAS Site Tours	$ -	$ -	$ -	$ -
1104	Bench-scale Screening	$ -	$ -	$ -	$ -
1105	Sampling and Analysis	$ -	$ -	$ -	$ -
1106	Site Utilization Planning	$ -	$ -	$ -	$ -
1107	Early DOH Coordination	$ -	$ -	$ -	$ -
1108	Near-term Operations Support	$ -	$ -	$ -	$ -
Task 1200 (Path 1 - Treatment at Well 13).	**Planning, Design, and Bidding**	**$ -**	**$ -**	**$ -**	**$ -**
1201	Preliminary Design Efforts Basis of Design CAMP®	$ -	$ -	$ -	$ -
1202	Early Procurement / Bid Packages	$ -	$ -	$ -	$ -
1203	60% Design	$ -	$ -	$ -	$ -
1204	90% Design	$ -	$ -	$ -	$ -
1205	Final Design	$ -	$ -	$ -	$ -
1206	OPCC and GMP Development Support	$ -	$ -	$ -	$ -
1207	Design-related Permitting Support	$ -	$ -	$ -	$ -
1208	O&M Manual	$ -	$ -	$ -	$ -
1209	Bid Services	$ -	$ -	$ -	$ -
Task 1300.	**Permitting and Civil/Landscape Design Support**	**$ -**	**$ -**	**$ -**	**$ -**
1301	Permitting Strategy Development	$ -	$ -	$ -	$ -
1302	Natural Resource Permitting	$ -	$ -	$ -	$ -
1303	Land Use Permitting and Design Support	$ -	$ -	$ -	$ -
1304	Cultural Resources Surveys and Permitting	$ -	$ -	$ -	$ -
Task 1400.	**Support Services**	**$ 41,694**	**$ 4,169**	**$ 45,863**	**$ 45,863**
1401	Geotechnical Services	$ -	$ -	$ -	$ -
1402	Utility Location / Mapping / Surveying	$ -	$ -	$ -	$ -
1403	Hydrogeological Support Services	$ 41,694	$ 4,169	$ 45,863	$ 45,863
TASK 2000 - SYSTEM WIDE PFAS RESPONSE PLAN		**$ -**	**$ -**	**$ -**	**$ -**
Task 2100.	**Risk Assessment**	**$ -**	**$ -**	**$ -**	**$ -**
2101	Risk Register	$ -	$ -	$ -	$ -
2102	Contaiminant Source Risk Inventory	$ -	$ -	$ -	$ -
2103	Long-Term PFAS Sampling Plan	$ -	$ -	$ -	$ -
Task 2200.	**Mitigation/Alternatives Analysis Screening**	**$ -**	**$ -**	**$ -**	**$ -**
2201	System Integration Baseline	$ -	$ -	$ -	$ -
2202	PFAS Alternatives Mitigation Screening	$ -	$ -	$ -	$ -
Task 2300.	**Response Plan**	**$ -**	**$ -**	**$ -**	**$ -**
2301	PFAS Response Plan Database Meetings	$ -	$ -	$ -	$ -
2302	PFAS Status Tracking	$ -	$ -	$ -	$ -
Task 2400.	**Hydrogeological Support Services**	**$ -**	**$ -**	**$ -**	**$ -**
2401	PFAS Source Contamination	$ -	$ -	$ -	$ -
2402	Monitoring Opportunities	$ -	$ -	$ -	$ -
2403	Mitigation Strategies	$ -	$ -	$ -	$ -
TASK 3000 - COMMUNICATIONS AND FUNDING SUPPORT		**$ -**	**$ -**	**$ -**	**$ -**
Task 3100.	**Stakeholder Engagement and Outreach Support**	**$ -**	**$ -**	**$ -**	**$ -**
3101	Kick-off Meeting	$ -	$ -	$ -	$ -
3102	Public Outreach Support	$ -	$ -	$ -	$ -
Task 3200.	**Funding Opportunity Tracking and Support**	**$ -**	**$ -**	**$ -**	**$ -**
3201	Funding Survey	$ -	$ -	$ -	$ -
TASK 4000: PROJECT MANAGEMENT ACTIVITIES		**$ -**	**$ -**	**$ -**	**$ -**
Task 4100.	**Project Management during Design**	**$ -**	**$ -**	**$ -**	**$ -**
4101	Kick-off Meeting	$ -	$ -	$ -	$ -
4102	Project Management and H&S Plans	$ -	$ -	$ -	$ -
4103	Monthly Progress Reports and Invoices	$ -	$ -	$ -	$ -
4104	Consultant Team Coordination	$ -	$ -	$ -	$ -
4105	Project Website and Document Mgmt Training	$ -	$ -	$ -	$ -
4106	Progress Meetings	$ -	$ -	$ -	$ -
4107	Project Logs	$ -	$ -	$ -	$ -
4108	Project Communications Protocol	$ -	$ -	$ -	$ -
TASK 5000: OPTIONAL SERVICES/CONTINGENCY ACTIVITIES		**$ 226,229**	**$ 22,623**	**$ 248,852**	**$ 248,852**
Task 5100.	**Cost Escalation**	**$ -**	**$ -**	**$ -**	**$ -**
5101	Cost Escalation 2025 (@5%)	$ -	$ -	$ -	$ -
5102	Cost Escalation 2026 (@5%)	$ -	$ -	$ -	$ -
Task 5200.	**Additional Hydrogeological Support Services**	**$ 226,229**	**$ 22,623**	**$ 248,852**	**$ 248,852**
5201	Assist in Developoing SCADA Data Transfer Process	$ 5,900	$ 590	$ 6,490	$ 6,490
5202	Organize and Analyze Wellfield-Wide Aquifer Test	$ 43,724	$ 4,372	$ 48,096	$ 48,096
5203	Update Groundwater Flow Model	$ 176,605	$ 17,661	$ 194,266	$ 194,266
TOTAL (TASK 1000 - 5000)		**$ 176,049**	**$ 4,169**	**$ 45,863**	**$ 294,715**