AGENDA
IRVINE RANCH WATER DISTRICT
ENGINEERING AND OPERATIONS COMMITTEE
TUESDAY, MAY 18, 2021

Due to COVID-19, this meeting will be conducted as a teleconference pursuant to the provisions of the Governor's Executive Orders N-25-20 and N-29-20, which suspend certain requirements of the Ralph M. Brown Act. Members of the public may not attend this meeting in person.

Participation by members of the Committee will be from remote locations. Public access and participation will only be available telephonically/electronically.

To virtually attend the meeting and to be able to view any presentations or additional materials provided at the meeting, please join online via Webex using the link and information below:

Via Web: https://irwd.webex.com/irwd/j.php?MTID=m5814487175466132ebd471d17ced4716
Meeting Number (Access Code): 146 441 0356
Meeting Password: SNe7AqEXa68

After joining the meeting, in order to ensure all persons can participate and observe the meeting, please select the "Call in" option and use a telephone to access the audio for the meeting by using the call-in information and attendee identification number provided.

As courtesy to the other participants, please mute your phone when you are not speaking.

PLEASE NOTE: Participants joining the meeting will be placed into the Webex lobby when the Committee enters closed session. Participants who remain in the "lobby" will automatically be returned to the open session of the Committee once the closed session has concluded. Participants who join the meeting while the Committee is in closed session will receive a notice that the meeting has been locked. They will be able to join the meeting once the closed session has concluded.

CALL TO ORDER 1:30 p.m.

ATTENDANCE Committee Chair: John Withers _____
Committee Member: Karen McLaughlin _____

ALSO PRESENT

Paul Cook	_____	Kevin Burton	_____	Wendy Chambers	_____
Jose Zepeda	_____	Paul Weghorst	_____	Cheryl Clary	_____
Rich Mori	_____	Eric Akiyoshi	_____	Richard Mykitta	_____
Kelly Lew	_____	Jim Colston	_____	Ken Pfister	_____
Lars Oldewage	_____	Malcolm Cortez	_____	Scott Toland	_____
John Dayer	_____	Bruce Newell	_____	Mitch Robinson	_____
Belisario Rios	_____	Jacob Moeder	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

PUBLIC COMMENT NOTICE

If you wish to address the Committee on any item, please submit a request to speak via the "chat" feature available when joining the meeting virtually. Remarks are limited to three minutes per speaker on each subject. You may also submit a public comment in advance of the meeting by emailing comments@irwd.com before 9:00 a.m. on Tuesday, May 18, 2021.

ALL VOTES SHALL BE TAKEN BY A ROLL CALL VOTE.

COMMUNICATIONS

1. Notes: Burton

2. Public Comments

3. Determine the need to discuss and/or take action on item(s) introduced that came to the attention of the District subsequent to the agenda being posted.

ACTION

4. IRWD WELL ET-1 PFAS TREATMENT SYSTEM DESIGN CONSULTANT SELECTION AND SETTLEMENT AGREEMENT – MCGEHEE / MORI / BURTON

   Recommendation: That the Board authorize the General Manager to execute a Professional Services Agreement with Tetra Tech in the amount of $316,300 for engineering design services and authorize the General Manager to execute the Fifth Amendment to the Settlement Agreement for the Marine Corps Air Station El Toro Groundwater Remediation Project for the Well ET-1 PFAS Treatment System, Project 11171.

OTHER BUSINESS

5. Directors' Comments

6. Adjourn

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Availability of agenda materials: Agenda exhibits and other writings that are disclosable public records distributed to all or a majority of the members of the above-named Committee in connection with a matter subject to discussion or consideration at an open meeting of the Committee are available for public inspection in the District's office, 15600 Sand Canyon Avenue, Irvine, California ("District Office"). If such writings are distributed to members of the Committee less than 72 hours prior to the meeting, they will be available from the District Secretary of the District Office at the same time as they are distributed to Committee Members, except that if such writings are distributed one hour prior to, or during, the meeting, they will be available electronically via the Webex meeting noted. Upon request, the District will provide for written agenda materials in appropriate alternative formats, and reasonable disability-related modification or accommodation to enable individuals with disabilities to participate in and provide comments at public meetings. Please submit a request, including your name, phone number and/or email address, and a description of the modification, accommodation, or alternative format requested at least two days before the meeting. Requests should be emailed to comments@irwd.com. Requests made by mail must be received at least two days before the meeting. Requests will be granted whenever possible and resolved in favor of accessibility.

May 18, 2021
Prepared by: J. McGehee / R. Mori
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

IRWD WELL ET-1 PFAS TREATMENT SYSTEM
DESIGN CONSULTANT SELECTION AND SETTLEMENT AGREEMENT AMENDMENT

SUMMARY:

Per-and polyfluoroalkyl substance (PFAS) compounds have emerged as "contaminants of concern" primarily due to human health impacts. Several of these compounds have been detected in significant concentrations in IRWD's Well ET-1. Well ET-1 is currently equipped with a treatment system to remove volatile organic compounds (VOCs), but that treatment system does not remove PFAS compounds. Staff completed an evaluation that identified a replacement treatment system capable of effectively removing both PFAS and VOC compounds from the water produced by this well. Operation of Well ET-1 is addressed in the 2001 Settlement Agreement and Shallow Groundwater Unit Contract with the U.S. Departments of Justice and Navy (2001 Settlement Agreement). The 2001 Settlement Agreement allows Well ET-1 to be removed from service no more than two months per year. Since construction of the treatment system will take longer than two months, an amendment to the Settlement Agreement is required to allow the well to be removed from service for an extended period during construction. To facilitate design and construction of the treatment system, staff recommends the Board:

- Authorize the General Manager to execute a Professional Services Agreement in the amount of $316,300 with Tetra Tech for engineering design services, and
- Authorize the General Manager to execute the Fifth Amendment to the Settlement Agreement for the MCAS El Toro Groundwater Remediation Project for the Well ET-1 PFAS Treatment System, Project 11171.

BACKGROUND:

IRWD operates and maintains Well ET-1 and its associated VOC treatment facilities in accordance with the 2001 Settlement Agreement. Water from Well ET-1 is treated through air stripping, and the off-gas from the air strippers is delivered to a vapor phase granular-activated carbon (GAC) treatment system where the VOCs are removed. The treated water is then delivered into the recycled water distribution system.

In summer 2018, elevated levels of PFAS compounds were detected in the well. While the existing treatment system is capable of effectively removing VOCs from the water, it is unable to remove PFAS compounds. In early 2019, staff began delivering the treated water to the Peters Canyon Channel rather than continuing to deliver it to the recycled water distribution system.

Per the 2001 Settlement Agreement, IRWD maintains a $20,000,000 pollution insurance policy to reasonably cover risks associated with the facilities included in the 2001 Settlement Agreement. In December 2018, staff submitted a claim to the insurance carrier to cover the cost

associated with implementing modifications to the well for PFAS treatment. The insurance carrier recently accepted the claim, so all costs above the $250,000 deductible associated with the design, construction, and implementation of PFAS treatment facilities at Well ET-1 will be reimbursed by the insurance carrier. It should be noted that staff also submitted a separate insurance claim associated with elevated levels of PFAS detected at the Shallow Groundwater Unit treatment facilities, and staff anticipates that the insurance carrier will also accept that claim.

In late 2020, staff contracted with Tetra Tech to identify and evaluate various treatment systems that would be capable of effectively removing both PFAS and VOC compounds from the well. The evaluation included analysis of existing water quality parameters, finished water quality goals, pretreatment requirements, evaluation of media selection options including GAC and ion exchange, and the impact to the overall site and other existing facilities based on the recommended treatment system. The evaluation concluded with a recommendation to replace the existing air stripper and vapor phase GAC treatment systems with a liquid phase GAC treatment system, which would effectively remove both VOCs and PFAS compounds.

In parallel with the Tetra Tech evaluation identified above, staff authorized Jacobs Engineering Group to conduct bench-scale treatability testing of various adsorbent products capable of effectively removing PFAS compounds. The bench testing program consists of a series of rapid small-scale column tests for each of the adsorbent products, which can simulate months to years of full-scale operations in a relatively short period of time. This reduces the time for testing, the amount of water required, and the waste produced. At the completion of the testing program, anticipated for late May 2021, Jacobs will recommend a preferred adsorbent that will be incorporated into the final design of the proposed treatment facilities for Well ET-1.

For the past several years, staff has coordinated closely with Orange County Water District (OCWD), the Department of the Navy (DON), and the Department of Justice (DOJ) to develop ways of addressing the PFAS compounds in the well. All parties have been actively involved in developing solutions and are supportive of the implementation of the proposed treatment system that will address both PFAS compounds and VOCs.

Consultant Selection:

Staff requested a proposal from Tetra Tech for engineering design services for the proposed treatment system at Well ET-1. In addition to being the design engineer for the existing treatment system at Well ET-1, Tetra Tech has extensive knowledge of the existing site, has performed several recent similar PFAS treatment improvement projects for OCWD and other local agencies, and is best suited to quickly and efficiently progress the design effort. Tetra Tech's proposal is provided as Exhibit "A" and includes scope for removal of the existing treatment system and design of the proposed treatment system and other ancillary improvements to existing infrastructure that are needed to support the proposed treatment system.

Staff reviewed Tetra Tech's scope of work and fee and recommends the Board authorize the General Manager to execute a Professional Services Agreement with Tetra Tech in the amount of $316,300 for engineering design services for the Well ET-1 PFAS Treatment System.

Fifth Amendment to the Settlement Agreement:

In accordance with the Settlement Agreement, Well ET-1 can be removed from service no more than two months per year. Since construction of the proposed treatment system will take longer than two months, a fifth amendment to the Settlement Agreement is required. The fifth amendment, which is provided as Exhibit "B", will allow for the temporary shutdown of Well ET-1 and the existing treatment system for up to 18 months while construction is underway. Staff anticipates the construction duration to be approximately 10 months, which is well within the time allowed for by the amendment.

The DON and DOJ have reviewed the amendment and are in the process of executing it. OCWD has also reviewed the amendment and is bringing a recommendation for approval to its Board later this month. IRWD's legal counsel has reviewed the amendment, and staff recommends the Board authorize the General Manager to execute the Fifth Amendment to the Settlement Agreement for the MCAS El Toro Groundwater Remediation Project for the Well ET-1 PFAS Treatment System.

This fifth amendment does not alter or modify any other provisions of the 2001 Settlement Agreement. While the proposed treatment system will remove both PFAS compounds and VOCs, IRWD will continue to only be required to comply with the VOC removal requirements identified in the 2001 Settlement Agreement since the agreement does not require removal of PFAS compounds. Since the operations and maintenance (O&M) costs of the proposed treatment system are anticipated to be similar to the O&M costs of the existing treatment system, the DON/DOJ will continue to cover all O&M costs associated with the proposed treatment system.

Anticipated Schedule:

Staff expects the project to be completed in accordance with the following schedule milestones:

Notice of Award (Design)	May 25, 2021
Kick-off Meeting	June 2021
Basis of Design Complete	July 2021
90% Design Submittal	September 2021
100% Design Submittal	November 2021
Plans Approved	December 2021
Bid Opening	January 2022
Notice of Award (Construction)	February 2022
Notice of Completion (Construction)	December 2022

FISCAL IMPACTS:

The Well ET-1 PFAS Treatment System, Project 11171, is included in the FY 2020-21 Capital Budget and will be funded through insurance reimbursement. The existing budget is sufficient to fund the recommendation presented.

ENVIRONMENTAL COMPLIANCE:

This project is subject to the California Environmental Quality Act (CEQA). OCWD is the lead agency for CEQA compliance, with IRWD as the responsible agency. In addition to the project Environmental Impact Report, which was approved by the OCWD Board of Directors on September 15, 2004, OCWD Board of Directors and IRWD approved the Settlement Agreement on September 7, 2001. Approval of the Settlement Agreement was followed by approval of the first amendment to the Settlement Agreement on January 28, 2003, approval of the second amendment on June 24, 2005, approval of the third amendment on May 22, 2012, and approval of the fourth amendment on November 28, 2017. OCWD will prepare and file a Notice of Exemption for the fifth amendment to the Settlement Agreement.

For the treatment system design, in conformance with the California Code of Regulations Title 14, Chapter 3, Section 15004, the appropriate environmental document will be prepared when "meaningful information" becomes available.

RECOMMENDATION:

That the Board authorize the General Manager to execute a Professional Services Agreement with Tetra Tech in the amount of $316,300 for engineering design services and authorize the General Manager to execute the Fifth Amendment to the Settlement Agreement for the Marine Corps Air Station El Toro Groundwater Remediation Project for the Well ET-1 PFAS Treatment System, Project 11171.

LIST OF EXHIBITS:

Exhibit "A" – Tetra Tech Scope of Work and Fee Proposal
Exhibit "B" – Fifth Amendment to the 2001 Settlement Agreement

TETRA TECH

April 14, 2021

Mr. Richard K. Mori, PE
Engineering Manager – Capital Projects
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

Reference: Proposal to Provide Design Services for Well ET-1 PFAS Water Treatment Plant

Dear Mr. Mori:

Thank you for providing Tetra Tech with the opportunity to submit our proposal for your design of the Well ET-1 PFAS Water Treatment Plant project. We have assembled an experienced, local team of water quality experts and design engineers familiar with the design of PFAS treatment plants. This team has successfully completed both Granular Activated Carbon (GAC) and Ion Exchange (IX) treatment plants in Southern California. Our team is very familiar with the requirements of these types of projects. The team has recently completed the design on three similar PFAS projects for Orange County Water District. All three projects are currently under construction.

Our team will work closely with the Irvine Ranch Water District (IRWD) throughout the design to ensure that we provide detailed design drawings and contract documents. As you know our team is very familiar with the ET-1 site from our past design projects and recently completed study.

This proposal includes information on the following:

- Scope of Work
- Qualifications
- Project Team
- Drawing Sheet Count
- Schedule
- Price Proposal

Our team is available to begin work on the project immediately upon receipt of your authorization to proceed. As outlined in our schedule we will have the project designed and ready to bid within 6 months of receiving your notice to proceed.

A detailed breakdown of tasks, labor hours and expenses are also included. Tetra Tech will provide the services listed in our Scope of Work for a not to exceed fee of $316,300.

If you have any questions regarding our proposal, please feel free to contact us.

Sincerely,

Steve Tedesco, PE
Senior Vice President

SDT/de

M:\Marketing\Proposals\FY 2021\IRWD_ET-1 Design

SCOPE OF WORK

Tetra Tech proposes to provide the following Scope of Work for the ET-1 PFAS Water Treatment Plant Design based on the preliminary study work performed by Tetra Tech. The selected layout of the plant is shown at the end of this section.

All work performed on the project will conform to the IRWD standards and requirements including but not limited to the following: IRWD Project Manual; IRWD Construction Manual; and IRWD Electrical, Instrumentation, and Control (I&C) Design Standards.

1.0 Design

1.1 Project Management

Tetra Tech will conduct project management activities to ensure adherence to scope, schedule, and budget; promote efficient communication between Tetra Tech, IRWD, and others as required; and implement an effective quality assurance/quality control (QA/QC) program.

1.1.1 Site Survey – Tetra Tech will perform a topographic survey of the site. The topographic survey will collect all site features as well as surface utilities within the project area extending to the centerline of the street. Survey will identify or set onsite horizontal and vertical control points to assist during the construction phase of the project.

1.1.2 Geotechnical Report – Our geotechnical engineer will review the existing previously completed geotechnical report for the site. They will then drill, sample and log one hollow-stem auger boring at the site to a depth of 20 to 25 feet below existing grade or auger refusal, whichever is shallower. Boring log and laboratory testing will be reviewed, and recommendations provided for the following:

1.1.2.1 Site conditions
1.1.2.2 Geologic hazards
1.1.2.3 Seismicity per 2016 California Building Code
1.1.2.4 Corrosivity of soil
1.1.2.5 Foundation design parameters
1.1.2.6 Lateral earth pressures
1.1.2.7 Pipe installation
1.1.2.8 Construction considerations

1.1.3 Quality Control/Quality Assurance (QA/QC) Plan – Tetra Tech will prepare a job specific QA/QC Plan for the project. It will include the staff responsible for QA/QC along with the method of performing and documentation.

1.1.4 Water Quality Analysis – Our water quality expert will review the water quality data provided and determine the design parameters required for pretreatment, media selection and backwashing requirements. We will also incorporate the results of the RSSCT testing being provided by Jacobs into our design criteria. A memorandum explaining our analysis of the Jacobs results and our recommendations for incorporating them into our design will be provided for IRWD review.

1.1.5 Meetings – We have included a total of ten meetings during the design phase of the project including: Kickoff Meeting, Review Meeting at 60%, 90% and 100% plus six monthly status review meeting.

1.1.6 Preparation of Project Status Reports – Tetra Tech will prepare weekly and monthly status reports. Each weekly status report shall be submitted on Monday and shall consist of a brief (one to two paragraphs) e-mail summarizing the activities completed the previous week, the activities planned for the upcoming week, and critical decisions that need to be made. Each monthly status report shall be submitted along with the billing invoice for that month and shall provide more detail, summarizing the work completed and reviewing work status relative to budget and schedule. The project schedule shall also be updated monthly for inclusion in the monthly status report.

1.2 Design Drawings – Tetra Tech will prepare detailed construction drawings for each set of Contract Documents in the latest version of AutoCAD and using NCS V4.0 layering standards, on 22-inch x 34-inch sheets utilizing IRWD's standard border template. Separate sheets with sheet index/location map/legend, general notes, index map, construction notes, phasing, and detail connections will be included. Construction notes will be used (callouts on the plans are not allowed) on all construction drawings. Existing IRWD utilities will be identified on the plan view by as-built plan set number with the pipeline material and IRWD pressure zone labeled. The index map will include sheet legend, final alignment, valve locations, surrounding streets, and significant project site locations. Construction plans will be prepared using the NAVD 88 and NAD 83 survey standards.

1.2.1 Design 60% Plans – Preliminary design level drawings will be prepared at approximately 60% complete level including:

1.2.1.1 General (3 sheets)
1.2.1.2 Civil and Demolition (5 sheets)
1.2.1.3 Mechanical Process (6 sheets)
1.2.1.4 Structural (4 sheets)
1.2.1.5 Electrical (6 sheets)
1.2.1.6 Instrumentation (6 sheets)

1.2.2 Draft Specifications – We will provide a Draft set of project specifications for review by IRWD. Draft Specifications at 60% will include Technical Specifications only.

1.3 90% Design – Tetra Tech will prepare and submit a 90% level design and specifications for the project including:

1.3.1 Address all District comments on 60% Design.

1.3.2 Design 90% Plans – Provide the following plans at a 90% level:

1.3.2.1 General (5 sheets)
1.3.2.2 Civil and Demolition (11 sheets)
1.3.2.3 Mechanical/Process (11 sheets)
1.3.2.4 Structural (7 sheets)
1.3.2.5 Electrical (8 sheets)
1.3.2.6 Instrumentation (6 sheets)

1.3.3 Specifications 90% – We will provide a 90% complete level of specifications for the project including Technical Specification, Special Provisions, Bid Descriptions and Bid Forms.

1.3.4 Cost Estimate 90% – We will provide a cost estimate based on the 90% plans and specifications. We will also provide an analysis of costs to justify the amount of contract liquidated damages.

1.4 Final Design – Tetra Tech will prepare and submit a Final Design and specifications for the project including:

1.4.1 Address all comments on 90% Design.

1.4.2 Final Design Plans – Provide the following plans at a 100% level:

1.4.2.1 General (5 sheets)
1.4.2.2 Civil and Demolition (11 sheets)
1.4.2.3 Mechanical/Process (11 sheets)
1.4.2.4 Structural (7 sheets)
1.4.2.5 Electrical (8 sheets)
1.4.2.6 Instrumentation (6 sheets)

1.4.3 Specifications – We will provide a 100% complete Technical Specifications, Special Provisions, Bid Descriptions and Bid Forms for the project.

1.4.4 Final Cost Estimate – We will provide a cost estimate based on the Final Design plans and specifications.

2.0 Additional Services

2.1 Demolition of Existing Facilities – Tetra Tech will provide a summary of onsite facilities that are recommended for demolition that may interfere with the proposed locations of any new facilities.

2.2 Project Schedule – Tetra Tech will prepare a project schedule which includes detailed schedules for both design and construction activities. The schedule will include all critical factors impacting the project schedule including implementation, permitting, and coordination activities to ensure that the project is completed in accordance with the proposed schedule. The schedule shall be prepared in Microsoft Project and submitted with the 90% and 100% design deliverables.

2.3 Additional Facility Evaluations – IRWD anticipates that through a review of background information and the execution of the work, additional onsite facilities will need to be reviewed and evaluated. We have budgeted $15,000 for evaluation of additional facilities located at the site as requested by IRWD. Work under this task will proceed only as authorized by IRWD.

2.4 Permitting and Easement Support – IRWD anticipates that through a review of background information and the execution of the work, additional permits and/or easement may be required. We have budgeted $10,000 for evaluation of additional permits and/or easements as requested by IRWD. Work under this task will proceed only as authorized by IRWD.

2.5 CEQA Documentation – IRWD will hire a CEQA consultant separately from this contract to prepare the CEQA documentation for this Project. IRWD anticipates the preparation of a Mitigated Negative Declaration or Notice of Exemption. Tetra Tech may need to review portions of the environmental document, prepare exhibits, attend meetings, and/or provide project specific information. We have budgeted $5,000 for supporting IRWD and the CEQA consultant through the CEQA documentation process.

3.0 Bid Phase Services

During the bidding period, Tetra Tech will assist with providing information and clarification of bid documents to prospective bidders. This shall include the preparation of up to three addenda including revisions to the design plans and specifications and assistance with addressing bidder questions. We have budgeted the following hours for these tasks:

3.1 Plan Revisions – Ten hours of appropriate staff time for plan revisions to the construction drawings.

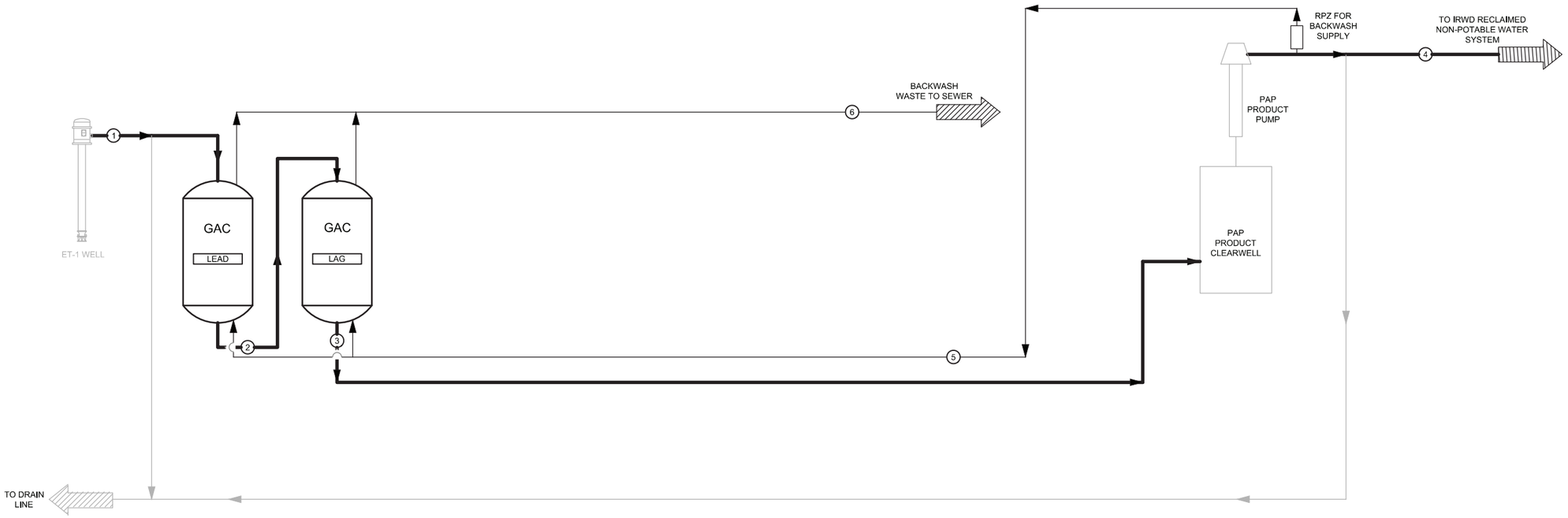
3.2 Specification Revisions – Ten hours of appropriate staff time for revisions or additions to the project specifications.

3.3 Bidder Questions – Ten hours of appropriate staff time to address and respond to bidder questions.

2/24/2021 3:37:18 PM - O:\PROJECTS\IRVINE\09368200-09368-21001\CAD\CONCEPTUAL\FIG 1-ET1_OPTION 1_PFD.DWG - MATSUMOTO, KYLE

LEGEND

- PROPOSED PRIMARY
- PROPOSED SECONDARY
- EXISTING



FLOW STREAM	①	②	③	④	⑤	⑥
DESIGN FLOW (GPM)	1,000	1,000	1,000	1,000	340 - 962	340 - 962

TETRA TECH
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Irvine, CA 92614
(914) 809-5000

IRVINE RANCH WATER DISTRICT

PFAS TREATMENT WELL ET-1

PROCESS FLOW DIAGRAM
OPTION 1
ET1 TREATMENT WITH 40K GAC

PROJ: 200-09368-21001
DATE: FEB 2021
DESN: KAB

Exhibit
Figure 1

Bar Measures 1 inch

Copyright: Tetra Tech

PROPOSED EFFLUENT PIPING

PROPOSED BACKWASH WASTE PIPING

40K LBS GAC VESSEL (TYP OF 2)

10"EFF

(E) ELECTRICAL EQUIPMENT

(E) TRANSFORMER

PROPOSED INFLUENT PIPING

10"RW

RELOCATE WELL PUMP PIPING AS SHOWN

(E) WELL PUMP

(E) BURIED CONCRETE WET WELL

10"EFF

PROPOSED 12" PIPELINE FROM BACKWASH TO SS MANHOLE

12"SS

12"SS

12"SS

10"EFF

10"EFF

10"EFF

10"EFF

10"EFF

(E) BOOSTER PUMP

EXISTING EQUIPMENT TO BE DISCONNECT AND REMOVED:

1. AIR STRIPPER
2. CARBON ABSORBERS
3. AIR STRIPPER BLOWERS
4. ELECTRICAL HEATER
5. ELECTRICAL AND CONTROL CONDUITS ASSOCIATED WITH ABOVE LISTED EQUIPMENT

0 5' 10'

SCALE: 1" = 10'

TETRA TECH

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IRVINE RANCH WATER DISTRICT

PFAS TREATMENT WELL ET-1

SITE LAYOUT
OPTION 1
ET1 TREATMENT WITH 40K GAC

PROJ:	200-09368-21001
DATE:	FEB 2021
DESN:	KAB

Exhibit

Figure 2

Bar Measures 1 inch

Copyright: Tetra Tech

2/24/2021 3:19:29 PM - O:\PROJECTS\IRVINE\09368\200-09368-21001\CAD\CONCEPTUAL\FIG 2-ET1_OPTION1.DWG - MATSUMOTO, KYLE

QUALIFICATIONS

Tetra Tech offers a full range of professional services related to groundwater contaminant characterization and remediation. We have more than 50 years of experience in the groundwater field. Our extensive groundwater knowledge covers all phases of concern, including site investigation and characterization, testing, remedial engineering, regulatory support, treatment facility design, construction management, operation, and maintenance. This section summarizes our experience on relevant projects in which proposed team members have participated on. The following project descriptions demonstrate that our team members have the experience to successfully implement the proposed project:

PFAS EXPERIENCE MATRIX

PROJECT/LOCATION	CLIENT TYPE
Drinking Water and Groundwater PFOA/PFOS at Former Pease Air Force Base, NH	Government
Nationwide PFOS and PFOA ARNG owned/operated drinking water systems, Nationwide	Government
PFAS Groundwater Testing, City of Cape Canaveral, FL	Municipal
Muskogee Mill Water PFAS Sampling, OK	Industrial
Facility Wide PFAS PA/SI, Bethpage, NY	Government
Site Investigation for PFAS Contamination, Brunswick, ME	Government
Swanson PFAS Engineering Investigation, Georgetown, Washington, D.C.	Industrial
On-Site Perfluoroalkyl Substances Investigation, Former Naval Air Station, Cecil Field, FL	Government
Land use control management, real estate support and PFAS, CNC Charleston, SC	Government
Owosso Wastewater PFAS Assessment, MI	Industrial
NAS Corpus Christi PFAS PA/SI, Corpus Christi, TX	Government
PFAS Treatment System Design, Wallops Flight Facility, VA	Government
PFAS Excavation Dewatering Fluids Treatment, Kennedy Space Center, FL	Government
PFAS Site Investigation, Kalamazoo, MI	Industrial
Martha's Vineyard/PFAS MCP Services, Marlborough, MA	Municipal
Tank Farms Groundwater PFAS Investigations (39 Wells), Newport, RI	Government

LOCAL TREATMENT PLANT EXPERIENCE MATRIX (STUDY, DESIGN & COST ESTIMATING)

PROJECT/LOCATION	CAPCITY (MGD)	CONTAMINANT REMOVAL	TREATMENT
Serrano Water PFAS WTP, Villa Park, CA	4.0	PFOA, PFOS	IX
Kimberley 1A PFAS WTP, Fullerton, CA	4.3	PFOA, PFOS	IX
Fullerton Main Plant, Fullerton, CA	12.0	PFOA, PFOS, TCE	GAC
YLWD Headquarters Plant, Placentia, CA	25.0	PFOA, PFOS	IX
PFAS Study for 5 Wells, Downey, CA	3.0 to 4.5	PFOA, PFOS	IX
Well ET-1 PFAS Study, Irvine, CA	1.4 to 4.5	PFOA, PFAS, TCE	GAC
Well #11, Huntington Park, CA	2.0	TCE	GAC
Well #9 WTP, Signal Hill, CA	2.6	Color, TOC, Benzene	NF, GAC
MTBE WTP, San Juan Capistrano, CA	5.3	MTBE	GAC
Well #11, Huntington Park, CA	2.0	TCE	GAC
Well #9 WTP, Signal Hill, CA	2.6	Color, TOC, Benzene	NF, GAC
Richardson WTP, Loma Linda, CA	6.9	TCE, Perchlorate	GAC, IX
Tippecanoe Final Expansion, Redlands, CA	3.5	TCE, Perchlorate	GAC, IX
Burbank Operable Unit, Burbank, CA	13.0	TCE, PCE, 1,2,3-TCP, 1, 4-Dioxane	GAC, UVAOP

Legend: GAC – Granular Activated Carbon IX – Ion Exchange UVAOP – Ultraviolet Light Advanced Oxidation Process

OCWD PFAS On-Call Design Contract

ORANGE COUNTY, CALIFORNIA

owner:

Orange County Water District
Chris Olsen, PE
714.378.3232

schedule:

2020 - 2021 (Design)

value:

$30M (construction)

key staff:

Steve Tedesco, PE, BCEE
Project Manager

Tom Epperson, PE
QA/QC

James Christopher, PE, BCEE
QA/QC

Kara Buttacavoli, PE
Project Team Lead

Amanda Taylor, PE
Process Engineer

Crisna Raymond, PE
Project Engineer

Victor Ramirez, PE, SE
Structural Engineer

Mazen Kassar, PE
Electrical Engineer

Astrid Fleischer, PE I&C
Engineer

The OCWD selected Tetra Tech as one of the Engineering Firms to design PFAS Systems for their groundwater producers. Tetra Tech is currently working on the following four projects:

- **Serrano Water District Well #5 and #9** (Completed Design) – This project consists of a 3,000 GPM IX System with a bag filter pre-treatment, 3,000 GPM Booster Pump Station and new chemical feed system for disinfection. Estimated Const. Cost - $6.2M.
- **Kimberley Well 1A** (Completed Design) – Located on a very small site with a single well this facility is designed to produce 3,000 GPM using an IX System with a bag filter pre-treatment and new chemical feed system for disinfection. Estimated Const. Cost - $3.7M.
- **Fullerton Main Plant** – The Fullerton Main Plant will treat six (6) onsite wells with a total capacity of 10,100 GPM. PFOS, PFOA and VOCs will be removed using 6 to 12 ft diameter, 40,000 lb. GAC vessels that will discharge into an existing forebay then pumped into the distribution system. The remaining wells will be treated with an IX system consisting of 8 vessels and bag filters for pre-treatment. Estimated Const. Cost - $26.5M.
- **Yorba Linda Water District Headquarters Plant** (Completed Design) – This system will treat water from 10 wells with a total capacity of 17,400 GPM. An IX System consisting of 11 pairs of Lead/ Lag Vessels (22 vessels total), bag filter pre-treatment, Booster Pump Station, and new Onsite Generation System for chlorine disinfection. In order to get the system on the existing site an extensive analysis of the site improvements was completed. Estimated Const. Cost - $32.5M.

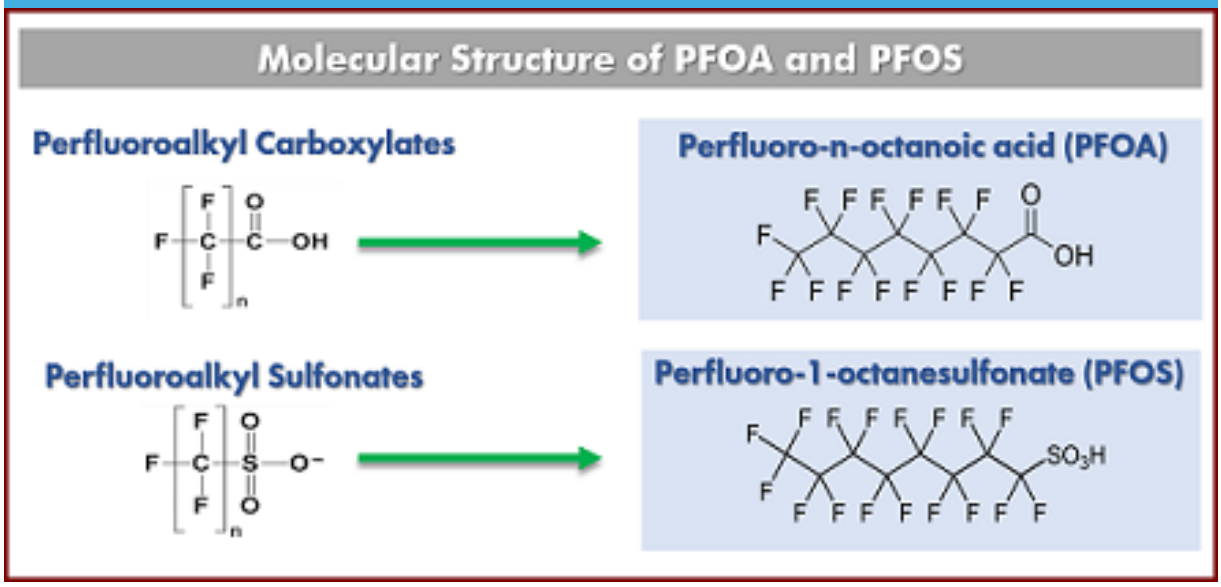
The Tetra Tech team prepared the Engineer's Report and Operating Plan for the State of California Division of Drinking Water (DDW) for each of the projects.

Innovation

- *Performed detailed operational analysis of IX and GAC usage from both RSCCT and Pilot Data.*
- *Used early submittal process to obtain DDW approvals in less than 5 months from start of the design.*
- *Performed details wells analysis to determine how to maximize well production after adding IX and GAC systems.*

PFAS Study for Five Wells

DOWNEY, CALIFORNIA



owner:

City of Downey
Dan Mueller, PE
562.904.7110

schedule:

2020 - 2021

value:

$4M (construction)

key staff:

Steve Tedesco, PE, BCEE
Principal in Charge

Kara Buttacavoli, PE
Project Engineer

Amanda Taylor, PE
Process Engineer

Crisna Raymond, PE
Project Engineer

Victor Ramirez, PE, SE
Structural Engineer

Eric Yuen, PE, SE
Structural Engineer

Mazen Kassar, PE
Electrical Engineer

Nicole Han, PE
Electrical Engineer

The City of Downey found that they had five existing groundwater wells in their system that had PFOA and PFAS higher than the new California Response Levels (RL) set in February 2020. Tetra Tech was hired to review perform a study to determine the best means for the City to continue to operate the wells.

Alternatives were analyzed including isolating certain zones in the wells that contained PFAS, blending PFAS contaminated water with other City well water, using IX or GAC wellhead treatment and/or piping PFAS contaminated water to a central location for treatment.

The scope of work of the project includes:

- Analyze Project Water Quality
- Review Well Screen Data to determine if well modifications can solve the PFAS issue
- Develop options for treating the PFAS at the Wellhead
- Develop option for treating PFAS at a Central Location
- Determine if IX or GAC treatment should be used
- Develop capital and operations cost estimates

Innovation

- *Well sites are within a highly developed urban area.*
- *All existing well sites are on very small sites.*
- *Detailed analysis of Capital and Operating Costs.*
- *Study used to supplement funding application.*

Well ET-1 PFAS Study

IRVINE, CALIFORNIA

owner:

Irvine Ranch Water District
Rich Mori, PE
949.453.5571

schedule:

2020 - 2021

value:

$4M (construction)

key staff:

Steve Tedesco, PE, BCEE
Principal in Charge

Kara Buttacavoli, PE
Project Engineer

Amanda Taylor, PE
Process Engineer

Victor Ramirez, PE, SE
Structural Engineer

Mazen Kassar, PE
Electrical Engineer

ET-1 was developed to increase utilization of the Irvine Subbasin through recovery and treatment of VOC- impaired, poor-quality groundwater. The project cleans up the contaminated VOCs, with the treated water used for non- potable purposes. Water extracted from inside the VOC plume is treated using granular activated carbon and air stripping technologies. The scope of work of the project includes:

- Analyze Project Water Quality
- Develop three options for treating the PFAS discovered at ET-1
- Develop three option to include wells ET-1 and 78 into the project if PFAS is found at those wells
- Determine if IX or GAC treatment should be used
- Develop capital and operations cost

Innovation

- *Site with VOCs and very High PFAS and PFOA levels.*
- *Existing Operating Site with small footprint.*
- *Treated water will be used in the non-potable distribution system for irrigation and industrial uses.*

Well No. 15 Water Treatment System

HUNTINGTON PARK, CALIFORNIA

owner/operator:

Water Replenishment District of Southern California
Charlene King
562.275.4252

schedule:

2018 - 2019

value:

$1.1M (construction)

role:

Lead Designer and Engineer of Record

key staff:

Steve Tedesco, PE, BCEE
Project Manager

Corey Hess, PE
Civil Engineer

Mazen Kassar, PE
Electrical Engineer

Victor Ramirez, PE, SE
Structural Engineer

Nicole Han, PE
Electrical Engineer

Astrid Fleischer, PE
I&C Engineer

The City of Huntington Park's Well 15 was drilled in 1954 at a depth of 1,582 feet and design capacity of 1,400 gpm. The current capacity is 1,050 gpm. Since 1986, this well has been affected with elevated concentrations of trichloroethylene (TCE). In 1994, a treatment system was installed using six low profile air strippers, which were no longer effective.

Tetra Tech was hired by the Water Replenishment District of Southern California to provide a preliminary design report, final design, and construction engineering services to upgrade the Wellhead Treatment system at Huntington Park Well 15. Design included removing the existing air stripping units at Well 15 and replacing with the liquid phase granular activated carbon (LPGAC) treatment system to remove contamination, particularly VOCs from the well. Tetra Tech worked closely with GAC suppliers to incorporate the new LPGAC system into the existing well, pumping and storage facilities onsite. In addition, coordination for deliveries of LPGAC was also incorporated into the design.

Innovation

- *Tetra Tech worked closely with the City and WRD to coordinate work on a very small site.*
- *Special design consideration was required for GAC delivery, backwash and will purge water discharge.*
- *Tetra Tech prepared all reports and permit applications for the DDW approvals.*

Well No. 9 NF & GAC Plant

SIGNAL HILL, CALIFORNIA

owner:

City of Signal Hill
Cecil Looney
562.989.7253

schedule:

2010 - 2011

value:

$6.8M (construction)

role:

Lead Design Report Author

key staff:

Steve Tedesco, PE, BCEE
Project Manager

Kara Buttacavoli, PE
Project Engineer

Beverly Encina, PE
Design Engineer

Crisna Raymond, PE
Resident Engineer

Mazen Kassar, PE
Electrical Engineer

Tetra Tech was contracted by City of Signal Hill to prepare a preliminary design report to treat water with high color from Well No. 9. A membrane treatment system was proposed to be used to remove color and organics from the groundwater.

The membrane system was designed to treat well water containing low salinity (less than 400 ppm TDS) and high level of color (over 50 color units). The objective of the treatment was to produce potable water with color below 5 color units without significant reduction of concentration of dissolved ions.

The NF membrane system was designed for operation at a recovery rate of 98%. Based on operation of similar units at other locations and consultations with the membrane manufacturer, operation at this level of high recovery rate was possible using a three stage configuration. The feasibility study also analyzed several different treatment capacities from 1,200 gpm to the full well capacity of 2,000 gpm. The City constructed the NF plant through a design-build project delivery method. Tetra Tech prepared the 30% design, procurement documents, and provide construction management services.

Innovation

- *During startup benzene was detected in the feed water. Tetra Tech and contractor Pascal + Ludwig then designed and built a GAC treatment system to remove the benzene, saving the city close to $300,000. The GAC system was operational within 4 months of the Notice-to-Proceed with design.*
- *City of Signal Hill being a relatively small community needed a feasibility study that could provide an accurate cost for both capital and operational costs. Tetra Tech was able to use its past experience on RO and NF projects to develop accurate cost estimates. The costs of the new NF plant were then compared to the costs for other available water sources. These detailed cost estimates were also used to help obtain funding for the project from the State of California.*

MTBE Treatment Plant

SAN JUAN CAPISTRANO, CALIFORNIA

owner/operator:

City of San Juan Capistrano
Eric Bauman
949.487.4312

schedule:

2011 - 2012

value:

$2.8M (design-build)

key staff:

Steve Tedesco, PE, BCEE
Project Manager

Steve Ellis, PE, BCEE
QA/QC Manager

Victor Ramirez, PE, SE
Structural Engineer

Beverly Encina, PE
Design Engineer

The Tetra Tech designed and built this $2.8 million modification to the Ground Water Treatment Plant to remove MTBE found in the feed water. The 5.3 MGD system includes eight 10-feet diameter granular activated carbon (GAC) vessels with feed, backwash, and effluent piping.

Located on a very constructed site, the team was challenged to find a way to design and build the facility while keeping the existing plant in service. As shown in the above picture, a concrete slab was completed first followed by installation of vessels. Due to space constraints each vessel had to be “walked” into place with a movable crane in order to complete installation. Other work on the project included:

- Relocation of Cartridge Filter
- Piping Modifications
- Replacement of Greensand Media in Fe/Mn Filters
- Obtaining Division of Drinking Water Permit
- Programming and SCADA Upgrades
- Obtaining Division of Drinking Water approvals

Innovation

- *GAC System added to an operational plant to remove MTBE.*
- *Phased construction approach to build on a constricted job site.*
- *Upgrades to existing Brackish water pre-treatment system.*

Tippecanoe Final Expansion

REDLANDS, CALIFORNIA

owner/operator:

Lockheed Martin Corporation / City of Redlands, CA
Tom Patterson
949.553.8417

schedule:

2011 - 2012

value:

$2.8M (design-build)

key staff:

Steve Tedesco, PE, BCEE
Project Manager

Steve Ellis, PE, BCEE
QA/QC Manager

Victor Ramirez, PE, SE
Structural Engineer

Beverly Encina, PE
Design Engineer

Tetra Tech prepared final design documents and acted as the general contractor to construct the Tippecanoe Regional Groundwater Treatment Facility using a Design-Build delivery process. Pascal & Ludwig constructed the facility under a subcontractor agreement. The completed facility utilizes granular activated carbon (GAC) to remove trichloroethylene (TCE) and Ion Exchange (IX) to remove perchlorate. Groundwater is pumped from three wells to the site where it is metered prior to treatment. The GAC units consist of a battery of 12 units, with each battery consisting of two (2) 20,000-pound carbon vessels. The vessel piping and valving are arranged so that each battery of carbon vessels can be operated either in series or in parallel. Treated water is discharged directly into the potable water system. The California Department of Public Health reviewed and approved the engineering design and monitoring provisions.

Tetra Tech constructed the expansion of the existing pump station that boosts water through the facility. The total pump station capacity is 10,000 gallons per minute.

Innovation

- *The backwash system utilizes treated water that has been stored in a 30,000-gallon steel holding tank. Backwash water is pumped from the tank and to the carbon vessels. After going through the vessels in an up flow direction, the waste backwash passes through a series of 25 micron, then 10 micron bag filters to remove carbon fines and returned to the holding tank for re-treatment through the carbon vessels.*

Richardson Water Treatment Plant

LOMA LINDA, CALIFORNIA

owner/operator:

Lockheed Martin Corporation / City of Loma Linda, CA
Tom Patterson
949.553.8417

schedule:

2008 - 2010

value:

$8M (construction)

key staff:

Steve Tedesco, PE, BCEE
Project Manager

Kara Buttacavoli, PE
Process Engineer

Victor Ramirez, PE, SE
Structural Engineer

Crisna Raymond, PE
Design Engineer

Mazen Kassar, PE
Electrical Engineer

The Richardson Water Treatment Plant utilizes both ion exchange (IX) and granular activated carbon (GAC) processes. The process removes VOCs, TCE, PCE, and perchlorate, from the supplied well water. Two wells supply 4,800 gpm to the process. The plant includes pre- and post-treatment filtration, an on-site product storage tank, an on-site backwash waste tank and a product water booster station. Backwash waste is allowed to settle in the tank before it is pumped to the head of the plant to be treated. Purge water from well starts are treated by a smaller 200 gpm similar system prior to discharge to the local storm drain. In addition, the project contains one on-site well and one off-site groundwater well. Project included obtaining permits from the City of San Bernardino, California Department of Drinking Water, and the Regional Water Quality Control Board. Design included mistake-proofing the design workshop required on Lockheed Martin projects.

Tetra Tech provided all design on the project and was responsible for procurement of the IX and GAC vessels. Pascal & Ludwig and Halcyon Electric were responsible for all construction efforts on the two groundwater wells.

Innovation

- *Siemens (now Evoqua) was the supplier of the IX and GAC treatment vessels. Vessel equipment and piping were pre-purchased by Tetra Tech to expedite the construction schedule. The equipment layout was designed for ease of access and operation on a relatively small site.*
- *A temporary treatment scenario was implemented to develop each of the two wells supplying the process. The project included a percolation pond to capture startup and testing water from each of the wells.*

PROJECT TEAM

Tetra Tech has assembled a local team of dedicated and experienced professionals uniquely qualified to complete your project. In order to provide the most comprehensive services possible, our team has been thoughtfully assembled to capitalize on the strengths of each team member and provide you with a team of unparalleled technical excellence. Through our past experience we fully understand how to successfully complete this type of project.

The strength of our team is that our team members have all worked on several local PFAS projects. Our experience in similar studies and in full designs will be an asset in completing this project. We have provided a biographical sketch that introduces the background and unique skill set of each of the talented key personnel of our core management team that we are committing to the project.

Project Manager, Kara Buttacavoli, PE, will serve as the Project Manager. She has recently completed the design of three other PFAS plants ranging in size from 4.0 mgd to 25.0 mgd. Kara fully understands all the tasks needed for completing this type of project. She will provide overall design direction, coordination, and technical oversight. In addition, she will make certain that the proper resources are allocated to the project to meet the desired completion schedule.

QA/QC, Steve Tedesco, PE, will provide QA/QC Management. Steve understands the ET-1 site and is well versed in design of groundwater treatment plants. He also worked with Kara on three recently completed PFAS plants in Orange County. He also understands local permitting and construction costs.

Civil & Mechanical Lead, Beverly Encina, PE, brings to the team over 18 years of experience in analysis, design, and construction management for various types of public works projects including, but not limited to, water treatment plants, wells, water booster pump stations, reservoirs, hydraulic analysis, storm drainage systems, and site improvement design. Beverly has worked on four PFAS water treatment plants and one PFAS well study.

Process Lead, Amanda Taylor, PE, brings to the team extensive experience in process engineering for water treatment facilities. In her 11 years of experience she has provided analysis, studies, design, and construction management for various types of public works projects including five PFAS projects, two advanced water treatment plants and numerous wellhead treatment plants for nitrates, iron, manganese, and TDS.

Structural Lead, Victor Ramirez, PE, SE, has over 39 years of structural engineering design experience with special emphasis in the design of water storage/water containment and water conveyance related structures. This includes reservoirs, water/wastewater treatment plants, booster pump stations, flow control facilities, pressure reducing stations and pipelines. Victor will be responsible for the design of all the structures, management and oversight of the structural design team, and interdisciplinary coordination.

Electrical Lead & Controls, Mazen Kassar, PE, is experienced in the electrical design of water and wastewater facilities, system studies, power distribution, emergency power supply, motor and instrumentation control. During his 29 years of experience his projects have included designing water and wastewater facilities, desalination plants, lift stations, pump stations, drinking water wells, pipelines, and odor control systems. Mazen will use this experience and his knowledge of the operation of water facilities and cost analysis to assist the team.

Our team knows firsthand that the key to our success is the people we have assigned to this project!

Team Availability

Tetra Tech is dedicating our project team shown to complete this project. Each of the team members will be assigned so they are available to meet the schedule for the design of this project. The following table shows our Project Teams' availability, areas of responsibility of the key team members, and percentage of time key personnel will contribute to the project:

Name	Role	Areas of Responsibility	Availability	Project Need
Kara Buttacavoli, PE	Project Manager	Project Oversight, Technical Input, Quality Control, Constructability Review	40%	30%
Steve Tedesco, PE	QA/QC Manager	Coordinate, Manage and Ensure QA/QC is Completed	10%	5%
Beverly Encina, PE	Civil & Mechanical Lead	Lead Civil & Mechanical Design, Coordinate Inter-discipline Review	50%	40%
Amanda Taylor, PE	Process Lead	Lead Process Design, Prepare P&IDs, Coordinate with Electrical & Controls	50%	40%
Victor Ramirez, PE, SE	Structural Lead	Lead Structural Design	50%	40%
Mazen Kassar, PE	Electrical & Controls Lead	Lead Electrical Design	35%	25%
H.C. Liang, PhD	Water Quality Expert	Review Water Data, Determine Treatability	15%	5%

Resumes of Key Team Members can be found on the following pages.

The strength of our team is demonstrated by our qualifications, experience, and prior completion of similar PFAS projects!

TETRA TECH

IRWD - ET-1 PFAS Water Treatment Plant
Drawing Sheet Count

Sequential Number	Subset Count	Sheet Number	Description	60% Design Planned	90% Design Planned	100% Design Planned
		General				
1	1	G-001	Title Sheet	60%	90%	100%
2	2	G-002	General Notes		90%	100%
3	3	G-003	Sheet Index, Agency Index & Abbreviations		90%	100%
4	4	G-004	Process Flow Diagram	60%	90%	100%
5	5	G-005	Horizontal Control Plan	60%	90%	100%
		Civil				
6	1	C-101	Site Demolition Plan	60%	90%	100%
7	2	C-102	Demolition Plan & Details	60%	90%	100%
8	3	C-103	Site Plan & Grading Plan	60%	90%	100%
9	4	C-104	Yard Piping Plan	60%	90%	100%
10	5	C-201	Yard Piping Profiles		90%	100%
11	6	C-202	Drain and Sewer Profiles		90%	100%
12	7	C-301	Civil Sections	60%	90%	100%
13	8	C-501	Civil Details 1		90%	100%
14	9	C-502	Civil Details 2		90%	100%
15	10	C-503	Piping Details		90%	100%
16	11	SW-101	Erosion Control Plan		90%	100%
		Structural				
17	1	S-001	General Structural Notes	60%	90%	100%
18	2	S-002	Special Inspection & Structural Observations	60%	90%	100%
19	3	S-101	GAC Vessel Foundation Plan	60%	90%	100%
20	4	S-301	Vessel Foundation Section	60%	90%	100%
21	5	S-501	Structural Details 1		90%	100%
22	6	S-502	Structural Details 2		90%	100%
23	7	S-503	Structural Details 3		90%	100%
		Mechanical/Process				
24	1	D-100	Overall Process Plan	60%	90%	100%
25	2	D-101	ET-1 Well Modifications Plan & Section	60%	90%	100%
26	3	D-103	GAC Vessel Process Plan	60%	90%	100%
27	4	D-104	Single Vessel Process Plan	60%	90%	100%
28	5	D-301	Pretreatment Filters Process Sections	60%	90%	100%
29	6	D-302	GAC Vessel Process Section	60%	90%	100%
30	7	D-303	Piping Sections		90%	100%
31	8	D-501	Process Details 1		90%	100%
32	9	D-502	Process Details 2		90%	100%
33	10	D-503	Process Details 3		90%	100%
34	11	D-901	3D Treatment Plant Perspective		90%	100%
		Electrical				
35	1	E-001	Electrical Symbols, Notes & Abbreviations	60%	90%	100%
36	2	E-101	Electrical Overall Site Plan	60%	90%	100%
37	3	E-103	Vessels Electrical Plan	60%	90%	100%
38	4	E-104	Existing MCC Modifications	60%	90%	100%
39	5	E-201	Single Line Diagram, Conduit & Panel Schedule	60%	90%	100%
40	6	E-301	Existing Control Panel & Modification Plan	60%	90%	100%
41	7	E-302	Electrical Details 1		90%	100%
42	8	E-501	Electrical Details 2		90%	100%
		Instrumentation				
43	1	I-001	Instrument Symbols, Notes & Legend	60%	90%	100%
44	2	I-101	P&ID Pre-Treatment Filters	60%	90%	100%
45	3	I-102	P&ID GAC - Train 1	60%	90%	100%
46	4	1-103	P&ID Well Pump Revisions	60%	90%	100%
47	5	I-104	P&ID Pump Station & Tank Revisions	60%	90%	100%
48	6	I-201	SCADA Block Diagram	60%	90%	100%
			Total Drawing Count	30	48	48

TETRA TECH

Irvine Ranch Water District
PFAS Treatment Systems Design for ET-1

ID	Task Mode	WBS	Task Name	Duration	Start	Finish
1		0	Start Date	0 days	Tue 4/20/21	Tue 4/20/21
2		**1.0**	**Design Phase**	**125 days**	**Tue 4/20/21**	**Mon 10/11/21**
3		**1.1**	**Project Management**	**125 days**	**Tue 4/20/21**	**Mon 10/11/21**
4		1.1.1	Site Survey	10 days	Tue 4/20/21	Mon 5/3/21
5		1.1.2	Geotechnical Report	15 days	Tue 4/20/21	Mon 5/10/21
6		1.1.3	Project Management Plan (PMP)	5 days	Tue 4/20/21	Mon 4/26/21
7		1.1.4	QA/QC Plan	20 days	Tue 4/20/21	Mon 5/17/21
8		1.1.5	Water Quality Analysis	5 days	Tue 4/20/21	Mon 4/26/21
9		**1.1.6**	**Meetings**	**125 days**	**Tue 4/20/21**	**Mon 10/11/21**
10		1.1.6.1	Kickoff	0 days	Tue 4/20/21	Tue 4/20/21
11		1.1.6.2	Monthly Meeting	0 days	Fri 5/7/21	Fri 5/7/21
12		1.1.6.3	Monthly Meeting	0 days	Fri 6/4/21	Fri 6/4/21
13		1.1.6.4	60% Design Review	0 days	Mon 6/14/21	Mon 6/14/21
14		1.1.6.5	Monthly Meeting	0 days	Tue 7/6/21	Tue 7/6/21
15		1.1.6.6	90% Design Review	0 days	Mon 8/16/21	Mon 8/16/21
16		1.1.6.7	Monthly Meeting	0 days	Tue 9/7/21	Tue 9/7/21
17		1.1.6.8	Final Design Review	0 days	Mon 10/11/21	Mon 10/11/21
18		**1.2**	**60% Design**	**40 days**	**Tue 4/20/21**	**Mon 6/14/21**
19		**1.2.1**	**Design Plans 60%**	**25 days**	**Tue 4/20/21**	**Mon 5/24/21**
20		1.2.1.1	General (3)	10 days	Tue 4/20/21	Mon 5/3/21
21		1.2.1.2	Civil (4)	15 days	Tue 4/27/21	Mon 5/17/21
22		1.2.1.3	Mechanical/Process (7)	20 days	Tue 4/27/21	Mon 5/24/21
23		1.2.1.4	Structural (7)	20 days	Tue 4/27/21	Mon 5/24/21
24		1.2.1.5	Electrical (7)	20 days	Tue 4/27/21	Mon 5/24/21
25		1.2.1.6	Instrumentation (5)	20 days	Tue 4/27/21	Mon 5/24/21
26		1.2.2	Draft Specifications	20 days	Tue 4/20/21	Mon 5/17/21
27		1.2.3	QA/QC 60% Design	5 days	Tue 5/18/21	Mon 5/24/21
28		1.2.4	Submit 60% Design	0 days	Mon 5/24/21	Mon 5/24/21
29		1.2.5	IRWD Review	15 days	Tue 5/25/21	Mon 6/14/21
30		**1.3**	**90% Design**	**45 days**	**Tue 6/15/21**	**Mon 8/16/21**
31		1.3.1	Address 60% Comments	5 days	Tue 6/15/21	Mon 6/21/21
32		**1.3.2**	**Design 90% Plans**	**25 days**	**Tue 6/15/21**	**Mon 7/19/21**
33		1.3.2.1	General (5)	15 days	Tue 6/15/21	Mon 7/5/21
34		1.3.2.2	Civil (9)	25 days	Tue 6/15/21	Mon 7/19/21
35		1.3.2.3	Mechanical/Process (13)	25 days	Tue 6/15/21	Mon 7/19/21
36		1.3.2.4	Structural (9)	25 days	Tue 6/15/21	Mon 7/19/21
37		1.3.2.5	Electrical (8)	25 days	Tue 6/15/21	Mon 7/19/21
38		1.3.2.6	Instrumentation (4)	20 days	Tue 6/15/21	Mon 7/12/21
39		1.3.3	Specifications 90%	25 days	Tue 6/15/21	Mon 7/19/21
40		1.3.4	Estimate 90%	5 days	Tue 7/20/21	Mon 7/26/21
41		1.3.5	QA/QC 90% Design	5 days	Tue 7/20/21	Mon 7/26/21
42		1.3.6	Submit 90% Design	0 days	Mon 7/26/21	Mon 7/26/21
43		1.3.7	IRWD Review	15 days	Tue 7/27/21	Mon 8/16/21
44		**1.4**	**Final Design**	**40 days**	**Tue 8/17/21**	**Mon 10/11/21**
45		1.4.1	Address District 90% Comments	5 days	Tue 8/17/21	Mon 8/23/21
46		**1.4.2**	**Final Design Plans**	**20 days**	**Tue 8/17/21**	**Mon 9/13/21**
47		1.4.2.1	General (5)	20 days	Tue 8/17/21	Mon 9/13/21
48		1.4.2.2	Civil (9)	20 days	Tue 8/17/21	Mon 9/13/21
49		1.4.2.3	Mechanical/Process (13)	20 days	Tue 8/17/21	Mon 9/13/21
50		1.4.2.4	Structural (9)	20 days	Tue 8/17/21	Mon 9/13/21
51		1.4.2.5	Electrical (8)	20 days	Tue 8/17/21	Mon 9/13/21
52		1.4.2.6	Instrumentation (4)	15 days	Tue 8/17/21	Mon 9/6/21
53		1.4.3	Specifications 100%	15 days	Tue 8/17/21	Mon 9/6/21
54		1.4.4	Final Estimate	10 days	Tue 8/24/21	Mon 9/6/21
55		1.4.5	QA/QC Final Design	10 days	Tue 9/14/21	Mon 9/27/21
56		1.4.6	Submit Final Design	0 days	Mon 9/27/21	Mon 9/27/21
57		1.4.7	IRWD Review	10 days	Tue 9/28/21	Mon 10/11/21
58		1.4.8	Project Ready for Bidding	0 days	Mon 10/11/21	Mon 10/11/21

Price Proposal

Revision Date:
Apr 14, 2021

IRWD Well ET-1 - PFAS Water Treatment Plant

Design of 1,000 GPM PFAS Treatment Plant at existing Well ET-1

Submitted to: Irvine Ranch Water District (Attn: Richard K. Mori, PE)

Contract Type: T&M

Labor Plan

12 Resource

Project Phases / Tasks	Schedule From	Schedule Thru	Schedule Months	Work Days Off	Work Days	Total Labor Hrs
Bill Rate >						
Proj Area >						
						1,931
1.0 Design	04/20/21	10/11/21	5.6	13	112	1,687
1.1 Project Management						66
1.1.1 Site Survey						2
1.1.2 Geotechnical Report						2
1.1.3 QA/QC Plan						8
1.1.4 Water Quality Analysis						14
1.1.5 Meetings (10)						24
1.1.6 Project Status Reports						16
1.2 60% Design	04/20/21	05/24/21	1.1	3	22	521
1.2.1 Design Plans 60%						393
1.2.1.1 General (3)						10
1.2.1.2 Civil & Demolition (5)						54
1.2.1.3 Mechanical/Process (6)						126
1.2.1.4 Structural (4)						52
1.2.1.5 Electrical (6)						74
1.2.1.6 Instrumentation (6)						77
1.2.2 Draft Specifications						96
1.2.3 QA/QC						20
1.2.4 Submit 60%						12
1.3 90% Design	06/15/21	07/26/21	1.3	3	27	636
1.3.1 Address 60% Comments						29
1.3.2 90% Design						425
1.3.2.1 General (5)						10
1.3.2.2 Civil (11)						100
1.3.2.3 Mechanical/Process (11)						100
1.3.2.4 Structural (7)						74
1.3.2.5 Electrical (8)						86
1.3.2.6 Instrument (6)						55
1.3.3 Specifications 90%						76
1.3.4 Estimate 90%						56
1.3.5 QA/QC						36
1.3.6 Submit 90% Design						14
1.4 Final Design	08/17/21	09/13/21	0.9	2	18	464
1.4.1 Address 90% Comments						21
1.4.2 Final Design Plans						381
1.4.2.1 General (5)						10
1.4.2.2 Civil (11)						26
1.4.2.3 Mechanical/Process (11)						146
1.4.2.4 Structural (7)						52
1.4.2.5 Electrical (8)						74
1.4.2.5 Instrumentation (6)						73
1.4.3 Final Specifications						28
1.4.4 Final Estimate						6
1.4.5 Final QA/QC						20
1.4.6 Submit Final Design						8
2.0 Additional Services	04/20/21	09/13/21	4.7	11	94	214
2.1 Demolition of Existing Facilities						3
2.2 Project Schedule						10
2.3 Additional Facility Evaluations						98
2.4 Permitting & Easement Support						69
2.5 CEQA Documentation						34
3.0 Bid Phase Services	09/14/21	10/13/21	0.9	3	18	30
3.1 Plan Revisions (10 Hours)						10
3.2 Specification Revisons (10 Hurs)						10
3.3 Bidder Questions (10 Hours)						10
Totals	04/20/21	10/13/21	5.7			1,931

Project Phases / Tasks	Project Mngt	Project Manager 2 (225.00)	Civil & Process	Sr Engineer 2 (185.00)	Sr Engineer 3 (215.00)	Engineer 3 (125.00)	Sr CAD Designer 2 (150.00)	Structural	Sr Engineer 3 (225.00)	Engineer 3 (125.00)	Sr CAD Designer 2 (145.00)	Elect & Instmt	Sr Engineer 3 (225.00)	Sr Engineer 2 (185.00)	Engineer 2 (125.00)	Administration	Sr Project Administrator (120.00)
		139		250	16	576	148		34	84	128		70	132	314		40
1.0 Design		125		172	16	424	148		34	84	128		70	132	314		40
1.1 Project Management		38		14	4	8	-		-	-	-		-	-	-		2
1.1.1 Site Survey		2															
1.1.2 Geotechnical Report		2															
1.1.3 QA/QC Plan		2				4											2
1.1.4 Water Quality Analysis		2		4	4	4											
1.1.5 Meetings (10)		14		10													
1.1.6 Project Status Reports		16															
1.2 60% Design		21		64	-	124	48		10	28	32		28	48	104		14
1.2.1 Design Plans 60%		11		40	-	96	48		6	12	32		20	40	88		-
1.2.1.1 General (3)		2				8											
1.2.1.2 Civil & Demolition (5)		2		8		20	24										
1.2.1.3 Mechanical/Process (6)		2		32		68	24										
1.2.1.4 Structural (4)		2							6	12	32						
1.2.1.5 Electrical (6)		2											8	24	40		
1.2.1.6 Instrumentation (6)		1											12	16	48		
1.2.2 Draft Specifications		4		8		24			4	16			8	8	16		8
1.2.3 QA/QC		4		12													4
1.2.4 Submit 60%		2		4		4											2
1.3 90% Design		33		48	8	160	64		16	44	60		24	36	126		17
1.3.1 Address 60% Comments		2		4		2			2	4	4		2	4	4		1
1.3.2 90% Design		11		24	-	116	64		6	12	54		14	32	92		-
1.3.2.1 General (5)		2				8											
1.3.2.2 Civil (11)		2		12		54	32										
1.3.2.3 Mechanical/Process (11)		2		12		54	32										
1.3.2.4 Structural (7)		2							6	12	54						
1.3.2.5 Electrical (8)		2											8	16	60		
1.3.2.6 Instrument (6)		1											6	16	32		
1.3.3 Specifications 90%		4		4		16			4	16			4		16		12
1.3.4 Estimate 90%		2		4		24				12					12		2
1.3.5 QA/QC		12		8	8				4				4				
1.3.6 Submit 90% Design		2		4		2					2				2		2
1.4 Final Design		33		46	4	132	36		8	12	36		18	48	84		7
1.4.1 Address 90% Comments		2		2		4			2		4		2		4		1
1.4.2 Final Design Plans		11		30	-	110	36		6	12	32		16	48	80		-
1.4.2.1 General (5)		2				8											
1.4.2.2 Civil (11)		2		6		6	12										
1.4.2.3 Mechanical/Process (11)		2		24		96	24										
1.4.2.4 Structural (7)		2							6	12	32						
1.4.2.5 Electrical (8)		2											8	24	40		
1.4.2.5 Instrumentation (6)		1											8	24	40		
1.4.3 Final Specifications		4		8		12											4
1.4.4 Final Estimate		2				4											
1.4.5 Final QA/QC		12		4	4												
1.4.6 Submit Final Design		2		2		2											2
2.0 Additional Services		10		70	-	134	-		-	-	-		-	-	-		-
2.1 Demolition of Existing Facilities		1				2											
2.2 Project Schedule		2				8											
2.3 Additional Facility Evaluations		4		40		54											
2.4 Permitting & Easement Support		2		20		47											
2.5 CEQA Documentation		1		10		23											
3.0 Bid Phase Services		4		8	-	18	-		-	-	-		-	-	-		-
3.1 Plan Revisions (10 Hours)		1		2		7											
3.2 Specification Revisons (10 Hurs)		1		2		7											
3.3 Bidder Questions (10 Hours)		2		4		4											
Totals		139		250	16	576	148		34	84	128		70	132	314		40

Price Summary / Totals

Task Pricing Totals	316,300
Specify Add'l Fees on Setup	0
Technology Use Fee	
Total Price	**316,300**

Pricing by Resource

	Labor Rate Esc.	Labor	Subs	Travel	Mat'ls & Equip	ODCs	Task Pricing Totals
	0.00%	296,070	19,717	401	-	112	316,300
1.0 Design		259,515	19,717	401	-	112	279,745
1.1 Project Management		13,240	19,717	177	-	-	33,134
1.1.1 Site Survey		450	4,077				4,527
1.1.2 Geotechnical Report		450	15,640				16,090
1.1.3 QA/QC Plan		1,190					1,190
1.1.4 Water Quality Analysis		2,550					2,550
1.1.5 Meetings (10)		5,000		177			5,177
1.1.6 Project Status Reports		3,600					3,600
1.2 60% Design		79,515	-	-	-	-	79,515
1.2.1 Design Plans 60%		59,465	-	-	-	-	59,465
1.2.1.1 General (3)		1,450					1,450
1.2.1.2 Civil & Demolition (5)		8,030					8,030
1.2.1.3 Mechanical/Process (6)		18,470					18,470
1.2.1.4 Structural (4)		7,940					7,940
1.2.1.5 Electrical (6)		11,690					11,690
1.2.1.6 Instrumentation (6)		11,885					11,885
1.2.2 Draft Specifications		14,520					14,520
1.2.3 QA/QC		3,600					3,600
1.2.4 Submit 60%		1,930					1,930
1.3 90% Design		95,275	-	112	-	112	95,499
1.3.1 Address 60% Comments		4,780					4,780
1.3.2 90% Design		62,265	-	-	-	-	62,265
1.3.2.1 General (5)		1,450					1,450
1.3.2.2 Civil (11)		14,220					14,220
1.3.2.3 Mechanical/Process (11)		14,220					14,220
1.3.2.4 Structural (7)		11,130					11,130
1.3.2.5 Electrical (8)		12,710					12,710
1.3.2.6 Instrument (6)		8,535					8,535
1.3.3 Specifications 90%		10,880					10,880
1.3.4 Estimate 90%		7,430					7,430
1.3.5 QA/QC		7,700					7,700
1.3.6 Submit 90% Design		2,220		112		112	2,444
1.4 Final Design		71,485	-	112	-	-	71,597
1.4.1 Address 90% Comments		3,420					3,420
1.4.2 Final Design Plans		57,145	-	-	-	-	57,145
1.4.2.1 General (5)		1,450					1,450
1.4.2.2 Civil (11)		4,110					4,110
1.4.2.3 Mechanical/Process (11)		20,490					20,490
1.4.2.4 Structural (7)		7,940					7,940
1.4.2.5 Electrical (8)		11,690					11,690
1.4.2.5 Instrumentation (6)		11,465					11,465
1.4.3 Final Specifications		4,360					4,360
1.4.4 Final Estimate		950					950
1.4.5 Final QA/QC		4,300					4,300
1.4.6 Submit Final Design		1,310		112			1,422
2.0 Additional Services		31,925	-	-	-	-	31,925
2.1 Demolition of Existing Facilities		475					475
2.2 Project Schedule		1,450					1,450
2.3 Additional Facility Evaluations		15,000					15,000
2.4 Permitting & Easement Support		10,000					10,000
2.5 CEQA Documentation		5,000					5,000
3.0 Bid Phase Services		4,630	-	-	-	-	4,630
3.1 Plan Revisions (10 Hours)		1,470					1,470
3.2 Specification Revisons (10 Hurs)		1,470					1,470
3.3 Bidder Questions (10 Hours)		1,690					1,690
Totals	0.00%	296,070	19,717	401	-	112	316,300

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Fifth Amendment to the
Settlement Agreement Among the Settling Federal Agencies (SFA),
Orange County Water District (OCWD), and Irvine Ranch Water District (IRWD)
in Regard to the Former Marine Corps Air Station (MCAS) El Toro
Groundwater Remediation

This Fifth Amendment to the Settlement Agreement Among the Settling Federal Agencies (SFA), Orange County Water District (OCWD), and Irvine Ranch Water District (IRWD) in Regard to the Former Marine Corps Air Station (MCAS) El Toro Groundwater Remediation ("**Fifth Amendment**") among the Settling Federal Agencies[1] ("**SFA**"), Orange County Water District ("**OCWD**"), and Irvine Ranch Water District ("**IRWD**") (collectively the "**Parties**"), is effective upon execution by all Parties.

WHEREAS the Parties entered into the Settlement Agreement Among the SFA, OCWD, and IRWD in Regard to the Former MCAS El Toro Groundwater Remediation on September 7, 2001 ("Settlement Agreement");

WHEREAS, the Settlement Agreement was amended as follows: the First Amendment dated January 28, 2003: the Second Amendment dated June 24, 2005; the Third Amendment dated May 22, 2012; and the Fourth Amendment dated November 28, 2017;

WHEREAS, capitalized terms used herein and not otherwise defined shall have the meanings given such terms in the Settlement Agreement;

WHEREAS, the Settlement Agreement, as amended, requires OCWD and IRWD to design, construct, operate, and maintain certain OCWD/IRWD groundwater treatment assets.

WHEREAS, OCWD and IRWD are required to operate and maintain the OCWD/IRWD Comprehensive Environmental Response, Compensation, and Liability Act ("**CERCLA**") Component of the Modified Irvine Desalter Project ("**IDP**") (hereinafter, the "**CCMI**"). Settlement Agreement § III.A. "OCWD and IRWD are jointly and severally responsible for and will design, construct, operate and maintain the OCWD/IRWD Assets of the CCMI in accordance with this Agreement, the ROD[2] and the requirements set forth in the Former MCAS El Toro Federal Facilities Agreement (**"FFA"**)[3] and FFA deliverables set forth in Section 8.2 of

[1] "'Settling Federal Agencies' or 'SFA' means the United States, including its agencies, departments, and instrumentalities and hence including [Department of the Navy], but excluding [U.S. Environmental Protection Agency] in its regulatory capacity." Settlement Agreement § II.
[2] The "Record of Decision" or "ROD" is defined in Section II of the Settlement Agreement. *Id*.

[3] The "Federal Facilities Agreement" or "FFA" is defined in Section II of the Settlement Agreement and attached as Appendix 1 to the Settlement Agreement. "FFA Deliverables" means the documents that the Department of the Navy is obligated to prepare pursuant to the FFA, as identified in Sections 7.3 and 7.4 of the FFA. Settlement Agreement § II.

the FFA that receive concurrence from USEPA and CALEPA[4] or otherwise become finalized pursuant to the FFA including, but not limited to, the schedules set forth therein." *Id.* ¶ III.A.1;

WHEREAS, the Settlement Agreement provides that "[e]xcept as otherwise provided in this Agreement or in connection with short term routine maintenance, the parties agree that payments made to OCWD/IRWD by the United States under this Agreement are made with the express assumption and understanding that OCWD/IRWD will provide uninterrupted operation of the OCWD/IRWD Assets of the CCMI. OCWD/IRWD will not temporarily shut down or permanently terminate operations of the OCWD/IRWD Assets of the CCMI except in accordance with the procedures set forth below," *id*. ¶ III.A.4.a;

WHEREAS, "**Temporary Shutdown**" means the temporary cessation of operation of the OCWD/IRWD Assets of the CCMI by OCWD and/or IRWD, *id*. § II;

WHEREAS, Paragraph III.A.4.a sets forth a procedure for Temporary Shutdown of the CCMI upon notice by any Party only under certain circumstances and provides that "[a]ny temporary shutdown or permanent termination that does not satisfy the terms of Paragraph III.A.4 will constitute a breach of this Agreement," *id*. ¶ III.A.4.d;

WHEREAS, the Parties intend by this Fifth Amendment to provide for a Temporary Shutdown to make modifications to OCWD/IRWD Assets of the CCMI to optimize treatment of volatile organic compounds in accordance with regulatory approvals, if required, by the USEPA and/or CALEPA;

WHEREAS, the modifications are also intended to treat various per- and polyfluoroalkyl substances in the groundwater, which are contaminants of emerging concern.

WHEREAS, a Temporary Shutdown for the purpose of making such modifications to the OCWD/IRWD Assets of the CCMI is not otherwise provided for under the Settlement Agreement;

WHEREAS, this Fifth Amendment does not modify the Shallow Groundwater Unit (**"SGU"**) Contract.[5]

WHEREAS, this Fifth Amendment does not modify the obligation of the SFA to reimburse OCWD/IRWD for future response costs relating to the design, construction, operation,

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[4] "USEPA" is the United States Environmental Protection Agency and "CALEPA" is the California Environmental Protection Agency and its departments, agencies, boards, bureaus, and other components. Settlement Agreement § II.

[5] Appendix 8 to Settlement Agreement is an offer by OCWD to enter into a contact with the Navy for SGU treatment. *See* Settlement Agreement ¶ III.B.1. Subsequently, pursuant to Paragraph III.B.2.a of the Settlement Agreement, when funds became available, the Navy issued Naval Facilities Engineering Command Contract No. N62473-06-C-2010 to OCWD on September 27, 2006 (the "SGU Contract").

and maintenance of the OCWD/IRWD Assets of the CCMI as set forth in Section IV of the Settlement Agreement.

WHEREAS, Paragraph VII.N of the Settlement Agreement provides that the "Agreement may be modified only upon the mutual agreement of the Parties reflected in a written document signed by duly authorized representatives of the Parties, which document expressly makes reference to this Agreement and the intent to modify the terms of this Agreement."

THEREFORE, the SFA, OCWD, and IRWD hereby modify the Settlement Agreement as follows:

1. Add Paragraph III.A.4.f as follows:

f. Temporary Shutdown of the CCMI for Treatment System Modifications.

i. After giving notice to and receiving approval from the SFA, OCWD and/or IRWD may temporarily shut down the OCWD/IRWD Assets of the CCMI for a period not to exceed 18 months ("**Shutdown Period**") to modify the OCWD/IRWD Assets to optimize treatment of volatile organic compounds.

ii. If OCWD and IRWD believe that the Shutdown Period must be extended due to circumstances beyond the control of OCWD and IRWD (including but not limited to an epidemic, riot, insurrection, war, or act of God), then OCWD and IRWD will provide written notice to the SFA explaining the need to extend the Shutdown Period.

iii. Any extension of the Shutdown Period must be approved in writing by the SFA.

iv. Modification must be done in accordance with any regulatory approvals required by the USEPA and CALEPA.

2. This Fifth Amendment does not alter or modify any other provision of the Agreement, including Paragraph IV or change any other contractual obligations as may exist between the Parties to this Agreement, except as expressly stated herein.

FOR THE UNITED STATES

Date: _____

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Email: leslie.hill@usdoj.gov

FOR THE ORANGE COUNTY WATER DISTRICT

Date: _____

Michael R. Markus, P.E.
General Manager

Stephen R. Sheldon
President, Board of Directors

Approved as to Form:

By: _____
Jeremy N. Jungreis,
General Counsel

FOR THE IRVINE RANCH WATER DISTRICT

Date: _____

_____

Paul A. Cook
General Manager

Approved as to Form:

By: _____

Claire Hervey Collins,
General Counsel