

**CITY OF FULLERTON
PROFESSIONAL SERVICES AGREEMENT
WITH
HAZEN AND SAWYER**

THIS AGREEMENT is made and entered into this 18th day of September, 2018 ("Effective Date"), by and between the CITY OF FULLERTON, a California municipal corporation ("City"), and Hazen and Sawyer, an engineering firm, having a place of business at 7700 Irvine Center Drive, Suite 200, Irvine, CA 92618 ("Consultant").

WITNESSETH:

A. City proposes to utilize the services of Consultant as an independent contractor to provide engineering services for the Construction of Well 7A, Abandonment of Well 7, and Pipeline Assessment, as more fully described herein.

B. Consultant represents that it has that degree of specialized expertise contemplated within California Government Code section 37103, and holds all necessary licenses to practice and perform the services herein contemplated.

C. City and Consultant desire to contract for the specific services described herein, and desire to set forth their rights, duties and liabilities in connection with the services to be performed.

D. No official or employee of City has a financial interest, within the provisions of Sections 1090-1092 of the California Government Code, in the subject matter of this Agreement.

NOW, THEREFORE, for and in consideration of the mutual covenants and conditions contained herein, the parties hereby agree as follows:

1.0. SERVICES PROVIDED BY CONSULTANT

1.1. Scope of Services. Consultant shall provide the professional services described in the City's Request for Proposals ("RFP"), attached hereto as Exhibit "A," and Consultant's Response to City's RFP ("Consultant's Proposal"), attached hereto as Exhibit "B," both incorporated herein by this reference.

1.2. Professional Practices. All professional services to be provided by Consultant pursuant to this Agreement shall be provided by personnel experienced in their respective fields and in a manner consistent with the standards of care, diligence and skill ordinarily exercised by professional consultants in similar fields and circumstances in accordance with sound professional practices. Consultant also warrants that it is familiar with all laws that may affect its performance of this Agreement and shall advise City of any changes in any laws that may affect Consultant's performance of this Agreement.

1.3. Performance to Satisfaction of City. Consultant agrees to perform all the work to the reasonable satisfaction of the City, in accordance with the applicable professional standard of care and City specifications and within the hereinafter specified. Evaluations of the work will be done by the City Manager or his designee. If the quality of work is not satisfactory, City in its discretion has the right to:

- (a) Meet with Consultant to review the quality of the work and resolve the matters of concern;
- (b) Require Consultant to repeat the work at no additional fee until it is satisfactory; and/or
- (c) Terminate the Agreement as hereinafter set forth.

1.4. Warranty. Consultant warrants that it shall perform the services required by this Agreement in compliance with all applicable and non conflicting Federal and California employment laws, including, but not limited to, those laws related to minimum hours and wages; occupational health and safety; fair employment and employment practices; workers' compensation insurance and safety in employment; and all other Federal, State and local laws and ordinances applicable to the services required under this Agreement. Consultant shall indemnify and hold harmless City from and against all claims, demands, payments, suits, actions, proceedings, and judgments of every nature and description including attorneys' fees and costs, presented, brought, or recovered against City for, or on account of any liability under any of the above-mentioned laws, which may be incurred by reason of Consultant's performance under this Agreement.

1.5. Non-discrimination. In performing this Agreement, Consultant shall not engage in, nor permit its agents to engage in, discrimination in employment of persons because of their race, religion, color, national origin, ancestry, age, physical handicap, medical condition, marital status, sexual gender or sexual orientation, except as permitted pursuant to Section 12940 of the Government Code.

1.6. Non-Exclusive Agreement. Consultant acknowledges that City may enter into agreements with other consultants for services similar to the services that are subject to this Agreement or may have its own employees perform services similar to those services contemplated by this Agreement.

1.7. Delegation and Assignment. This is a personal service contract, and the duties set forth herein shall not be delegated or assigned to any person or entity without the prior written consent of City. Consultant may engage a subcontractor(s) as permitted by law and may employ other personnel to perform services contemplated by this Agreement at Consultant's sole cost and expense.

1.8. Confidentiality. Employees of Consultant in the course of their duties may have access to financial, accounting, statistical, and personnel data of private individuals and employees of City. Consultant covenants that all data, documents, discussion, or other information developed or received by Consultant or provided for performance of this Agreement are deemed confidential and shall not be disclosed by Consultant without written authorization by City. City shall grant such authorization if disclosure is required by law. All City data shall be returned to City upon the termination of this Agreement. Consultant's covenant under this Section shall survive the termination of this Agreement.

2.0. COMPENSATION AND BILLING

2.1. Compensation. Consultant shall be paid in accordance with the fee schedule set forth in Exhibit B. Consultant's total compensation shall not exceed Two hundred and twenty-

four thousand and fifteen Dollars (\$ 224,015.00).

2.2. Additional Services. Consultant shall not receive compensation for any services provided outside the scope of services specified in the Consultant's Proposal unless the City or the Project Manager for this Project, prior to Consultant performing the additional services, approves such additional services in writing. It is specifically understood that oral requests and/or approvals of such additional services or additional compensation shall be barred and are unenforceable.

2.3. Method of Billing. Consultant may submit invoices to the City for approval on a progress basis, but no more often than two times a month. Said invoice shall be based on the total of all Consultant's services which have been completed to City's sole satisfaction. City shall pay Consultant's invoice within thirty (30) days from the date City receives said invoice. Each invoice shall describe in detail, the services performed, the date of performance, and the associated time for completion. Any additional services approved and performed pursuant to this Agreement shall be designated as "Additional Services" and shall identify the number of the authorized change order, where applicable, on all invoices.

2.4. Records and Audits. Records of Consultant's services relating to this Agreement shall be maintained in accordance with generally recognized accounting principles and shall be made available to City or its Project Manager for inspection and/or audit at mutually convenient times from the Effective Date of this Agreement until three (3) years after the termination date.

3.0. TIME OF PERFORMANCE

3.1. Commencement and Completion of Work. The professional services to be performed pursuant to this Agreement shall commence within five (5) days from the Effective Date of this Agreement. The professional services to be performed pursuant to this Agreement shall be completed in accordance with Exhibit A. Failure to commence work in a timely manner and/or diligently pursue work to completion may be grounds for termination of this Agreement.

3.2. Excusable Delays. Neither party shall be responsible for delays or lack of performance resulting from acts beyond the reasonable control of the party or parties. Such acts shall include, but not be limited to, acts of God, fire, strikes, material shortages, compliance with laws or regulations, riots, acts of war, or any other conditions beyond the reasonable control of a party.

4.0. TERM AND TERMINATION

4.1. Term. This Agreement shall commence on the Effective Date and continue for a period of 18 months unless terminated as provided herein.

4.2. Notice of Termination. The City reserves and has the right and privilege of canceling, suspending or abandoning the execution of all or any part of the work contemplated by this Agreement, with or without cause, at any time, by providing written notice to Consultant. The termination of this Agreement shall be deemed effective upon receipt of the notice of termination. In the event of such termination, Consultant shall immediately stop rendering services under this Agreement unless directed otherwise by the City.

4.3. Compensation. In the event of termination, City shall pay Consultant for reasonable costs incurred and professional services satisfactorily performed up to and including

the date of City's written notice of termination. Compensation for work in progress shall be prorated based on the percentage of work completed as of the effective date of termination in accordance with the fees set forth herein. In ascertaining the professional services actually rendered hereunder up to the effective date of termination of this Agreement, consideration shall be given to both completed work and work in progress, to complete and incomplete drawings, and to other documents pertaining to the services contemplated herein whether delivered to the City or in the possession of the Consultant.

4.4. Documents. In the event of termination of this Agreement, all documents prepared by Consultant in its performance of this Agreement including, but not limited to, finished or unfinished design, development and construction documents, data studies, drawings, maps and reports, shall be delivered to the City within ten (10) days of delivery of termination notice to Consultant, at no cost to City. Any use of uncompleted documents without specific written authorization from Consultant shall be at City's sole risk and without liability or legal expense to Consultant.

5.0. INSURANCE

5.1. Insurance Required. Consultant shall procure and maintain throughout the duration of this Agreement, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by Consultant, its agents, representatives, employees, and/or subcontractors. Consultant shall provide current evidence of the required insurance in a form acceptable to City and shall provide replacement evidence for any required insurance which expires prior to the completion, expiration or termination of this Agreement. Nothing in this section shall be construed as limiting in any way, the Indemnification and Hold Harmless clause contained in this Agreement or the extent to which Consultant may be held responsible for payments of damages to persons or property.

5.2. Minimum Scope and Limits of Insurance.

A. Commercial General Liability Insurance. Consultant shall maintain commercial general liability insurance coverage in a form at least as broad as ISO Form #CG 0001 ED. 11/88, with a limit of not less than \$1,000,000 each occurrence. If such insurance contains a general aggregate limit, it shall apply separately to the Agreement or shall be twice the required occurrence limit.

B. Business Automobile Liability Insurance. Consultant shall maintain business automobile liability insurance coverage in a form at least as broad as ISO Form # CA 0001 T ED. 6/92, with a limit of not less than \$1,000,000 each accident. Such insurance shall include coverage for owned, hired and non-owned automobiles.

C. Workers' Compensation and Employers' Liability Insurance. Consultant shall maintain workers' compensation insurance as required by the State of California (Labor Code section 1860) and employers' liability insurance with limits of not less than \$1,000,000 each accident.

D. Professional Liability Insurance. Consultant shall maintain professional liability insurance appropriate to Consultant's profession with a limit of not less than \$2,000,000. Architects' and engineers' coverage shall be endorsed to include contractual liability. If the policy is written as a "claims made" policy, the retro date of the policy shall be prior to the start

of the contract work. Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of the contract work.

If the Consultant maintains broader coverage and/or higher limits than the minimums shown above, the City requires and shall be entitled to the broader coverage and/or higher limits maintained by the Consultant. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the City.

5.3. Deductibles and Self-Insured Retentions. Any deductible or self-insured retention must be declared to and approved by the City.

5.4. Other Insurance Provisions. The required insurance policies shall contain or be endorsed to contain the following provisions:

A. Commercial General Liability, Business Automobile Liability: City, its elected or appointed officials, officers, employees, and volunteers are to be covered as additional insureds with respect to liability arising out of work or operations performed by or on behalf of Consultant, including materials, parts or equipment furnished in connection with such work or operations; or with respect to liability arising out of automobiles owned, leased, hired or borrowed by or on behalf of Consultant. Such coverage as an additional insured shall not be limited to the period of time during which the Consultant is conducting ongoing operations for City but rather, shall continue after the completion of such operations. The coverage shall contain no special limitations on the scope of its protection afforded to City, its officers, employees, and volunteers.

B. Commercial General Liability, Business Automobile Liability: This insurance shall be primary insurance at least as broad as ISO CG 20 01 04 13 as respects City, its officers, employees, and volunteers and shall apply separately to each insured against whom a suit is brought or a claim is made. Any insurance or self-insurance maintained by City, its officers, employees, and volunteers shall be excess of this insurance and shall not contribute with it.

C. Workers' Compensation and Employers' Liability Insurance: Insurer shall waive their right of subrogation against City, its officers, employees, and volunteers for work done on behalf of City.

D. All Coverages: Each insurance policy required by this clause shall be endorsed to state that coverage shall not be canceled, except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to City.

5.5 Acceptability of Insurers. All required insurance shall be placed with insurers acceptable to City with current BEST'S ratings of no less than A, Class VII. Workers' compensation insurance may be placed with the California State Compensation Insurance Fund. All insurers shall be licensed by or hold admitted status in the State of California. At the sole discretion of City, insurance provided by non-admitted or surplus carriers with a minimum BEST'S rating of no less than A, Class X may be accepted if Consultant evidences the requisite need to the sole satisfaction of City.

5.6 Verification of Coverage. Consultant shall furnish City with certificates of insurance which bear original signatures of authorized agents and which reflect insurers names and addresses, policy numbers, coverage, limits, deductibles and self-insured retentions. Such

certificates shall be attached to this Agreement and made a part hereof. All certificates and endorsements must be received and approved by City before work commences. City reserves the right to require at any time complete, certified copies of any or all required insurance policies and endorsements.

6.0. GENERAL PROVISIONS

6.1. Entire Agreement. This Agreement constitutes the entire agreement between the parties with respect to any matter referenced herein and supersedes any and all other prior writings and oral negotiations. This Agreement may be modified only in writing, and signed by the parties in interest at the time of such modification. The terms of this Agreement shall prevail over any inconsistent provision in any other contract document appurtenant hereto, including exhibits to this Agreement.

6.2. Representatives. The City Manager or his designee shall be the representative of City for purposes of this Agreement and may issue all consents, approvals, directives and agreements on behalf of the City, called for by this Agreement, except as otherwise expressly provided in this Agreement.

Consultant shall designate a representative for purposes of this Agreement who shall be authorized to issue all consents, approvals, directives and agreements on behalf of Consultant called for by this Agreement, except as otherwise expressly provided in this Agreement.

6.3. Project Managers. City shall designate a Project Manager to work directly with Consultant in the performance of this Agreement.

Consultant shall designate a Project Manager who shall represent it and be its agent in all consultations with City during the term of this Agreement. Consultant or its Project Manager shall attend and assist in all coordination meetings called by City.

6.4. Notices. Any notices, documents, correspondence or other communications concerning this Agreement or the work hereunder may be provided by personal delivery, facsimile or mail and shall be addressed as set forth below. Such communication shall be deemed served or delivered: a) at the time of delivery if such communication is sent by personal delivery; b) at the time of transmission if such communication is sent by facsimile; and c) 48 hours after deposit in the U.S. Mail as reflected by the official U.S. postmark if such communication is sent through regular United States mail.

IF TO CONSULTANT:

Hazen and Sawyer
7700 Irvine Center Drive, Suite 200
Irvine, CA 92618
Attn: Cindy Miller, Principal in Charge

IF TO CITY:

City of Fullerton
303 West Commonwealth Avenue
Fullerton, CA 92832
Donald K. Hoppe, Director of Public Works

6.5. Attorneys' Fees. In the event that litigation is brought by any party in connection with this Agreement, the prevailing party shall be entitled to recover from the opposing party all costs and expenses, including reasonable attorneys' fees, incurred by the prevailing party in the exercise of any of its rights or remedies hereunder or the enforcement of any of the terms,

conditions, or provisions hereof.

6.6. Governing Law. This Agreement shall be governed by and construed under the laws of the State of California without giving effect to that body of laws pertaining to conflict of laws. In the event of any legal action to enforce or interpret this Agreement, the parties hereto agree that the sole and exclusive venue shall be a court of competent jurisdiction located in Orange County, California.

6.7. Assignment. Consultant shall not voluntarily or by operation of law assign, transfer, sublet or encumber all or any part of Consultant's interest in this Agreement without City's prior written consent. Any attempted assignment, transfer, subletting or encumbrance shall be void and shall constitute a breach of this Agreement and cause for termination of this Agreement. Regardless of City's consent, no subletting or assignment shall release Consultant of Consultant's obligation to perform all other obligations to be performed by Consultant hereunder for the term of this Agreement.

6.8. Indemnification and Hold Harmless. To the fullest extent of the law, and consistent with Civil Code section 2782.8, Consultant agrees to defend, indemnify, hold free and harmless the City, its elected and appointed officials, officers, agents and employees, at Consultant's sole expense, from and against any and all claims, demands, actions, suits or other legal proceedings brought against City, its elected and appointed officials, officers, agents, and employees arising out of, pertaining to, or relating to the negligence, recklessness, or willful misconduct of the Consultant, its employees, and/or authorized subcontractors, in performing design professional services pursuant to this Agreement. The defense obligation provided for hereunder shall apply without any advance showing of negligence, recklessness or willful misconduct of the Consultant, its employees, and/or authorized subcontractors, but shall be required whenever any claim, action, complaint, or suit asserts as its basis the negligence, recklessness, or willful misconduct of Consultant, its employees, and/or authorized subcontractors, and/or whenever any claim, action, complaint or suit asserts liability against the City, its elected and appointed officials, officers, agents, and employees based upon such negligence, recklessness, or willful misconduct, whether or not the Consultant, its employees, and/or authorized subcontractors are specifically named or otherwise asserted to be liable. Notwithstanding the foregoing, the Consultant shall not be liable for the defense or indemnification of the City for claims, actions, complaints or suits arising out of the sole or active negligence or willful misconduct of the City. This provision shall supersede and replace all other indemnity provisions contained either in the City's specifications or Consultant's Proposal, which shall be of no force and effect.

6.9. Independent Contractor. Consultant is and shall be acting at all times as an independent contractor and not as an employee of City. Consultant shall have no power to incur any debt, obligation, or liability on behalf of City or otherwise act on behalf of City as an agent. Neither City nor any of its agents shall have control over the conduct of Consultant or any of Consultant's employees, except as set forth in this Agreement. Consultant shall not, at any time, or in any manner, represent that it or any of its or employees are in any manner agents or employees of City. Consultant shall secure, at its sole expense, and be responsible for any and all payment of Income Tax, Social Security, State Disability Insurance Compensation, Unemployment Compensation, and other payroll deductions for Consultant and its officers, agents, and employees, and all business licenses, if any are required, in connection with the services to be performed hereunder. Consultant shall indemnify and hold City harmless from any and all taxes, assessments, penalties, and interest asserted against City by reason of the independent contractor relationship created by this Agreement. Consultant further agrees to

indemnify and hold City harmless from any failure of Consultant to comply with the applicable worker's compensation laws. City shall have the right to offset against the amount of any fees due to Consultant under this Agreement any amount due to City from Consultant as a result of Consultant's failure to promptly pay to City any reimbursement or indemnification arising under this paragraph.

6.10. PERS Eligibility Indemnification. In the event that Consultant or any employee, agent, or subcontractor of Consultant providing services under this Agreement claims or is determined by a court of competent jurisdiction or the California Public Employees Retirement System (PERS) to be eligible for enrollment in PERS as an employee of the City, Consultant shall indemnify, defend, and hold harmless City for the payment of any employee and/or employer contributions for PERS benefits on behalf of Consultant or its employees, agents, or subcontractors, as well as for the payment of any penalties and interest on such contributions, which would otherwise be the responsibility of City.

Notwithstanding any other agency, state or federal policy, rule, regulation, law or ordinance to the contrary, Consultant and any of its employees, agents, and subcontractors providing service under this Agreement shall not qualify for or become entitled to, and hereby agree to waive any claims to, any compensation, benefit, or any incident of employment by City, including but not limited to eligibility to enroll in PERS as an employee of City and entitlement to any contribution to be paid by City for employer contribution and/or employee contributions for PERS benefits.

6.11. Cooperation. In the event any claim or action is brought against City relating to Consultant's performance or services rendered under this Agreement, Consultant shall render any reasonable assistance and cooperation which City might require.

6.12. Ownership of Documents. All findings, reports, CAD drawings, documents, information and data, including, but not limited to, computer tapes or discs, files and tapes furnished or prepared by Consultant or any of its subcontractors in the course of performance of this Agreement, shall be and remain the sole property of City. Consultant agrees that any such documents or information shall not be made available to any individual or organization without the prior consent of City. Any use of such documents for other projects not contemplated by this Agreement, and any use of incomplete documents, shall be at the sole risk of City and without liability or legal exposure to Consultant. City shall indemnify and hold harmless Consultant from all claims, damages, losses, and expenses, including attorneys' fees, arising out of or resulting from City's use of such documents for other projects not contemplated by this Agreement or use of incomplete documents furnished by Consultant. Consultant shall deliver to City any findings, reports, documents, information, data, in any form, including but not limited to, computer tapes, discs, files audio tapes or any other Project related items as requested by City or its authorized representative, at no additional cost to the City.

6.13. Public Records Act Disclosure. Consultant has been advised and is aware that this Agreement and all reports, documents, information and data, including, but not limited to, computer tapes, discs or files furnished or prepared by Consultant, or any of its subcontractors, pursuant to this Agreement and provided to City may be subject to public disclosure as required by the California Public Records Act (California Government Code Section 6250 *et seq.*). Exceptions to public disclosure may be those documents or information that qualify as trade secrets, as that term is defined in the California Government Code Section 6254.7, and of which Consultant informs City of such trade secret. The City will endeavor to maintain as confidential all information obtained by it that is designated as a trade secret. The City shall not, in any way,

be liable or responsible for the disclosure of any trade secret including, without limitation, those records so marked if disclosure is deemed to be required by law or by order of the Court.

6.14. Conflict of Interest. Consultant and its officers, employees, associates and subconsultants, if any, will comply with all conflict of interest statutes of the State of California applicable to Consultant's services under this agreement, including, but not limited to, the Political Reform Act (Government Code Sections 81000, *et seq.*) and Government Code Section 1090. During the term of this Agreement, Consultant and its officers, employees, associates and subconsultants shall not, without the prior written approval of the City Representative, perform work for another person or entity for whom Consultant is not currently performing work that would require Consultant or one of its officers, employees, associates or subconsultants to abstain from a decision under this Agreement pursuant to a conflict of interest statute.

6.15. Responsibility for Errors. Consultant shall be responsible for its work under this Agreement. Consultant, when requested, shall furnish clarification and/or explanation as may be required by the City's representative, regarding any services rendered under this Agreement at no additional cost to City. In the event that an error or omission attributable to Consultant occurs, then Consultant shall, at no cost to City, provide all necessary design drawings, estimates and other Consultant professional services necessary to rectify and correct the matter to the sole satisfaction of City and to participate in any meeting required with regard to the correction.

6.16. Prohibited Employment. Consultant will not employ any regular employee of City while this Agreement is in effect.

6.17. Order of Precedence. In the event of an inconsistency in this Agreement and any of the attached Exhibits, the terms set forth in this Agreement shall prevail. If, and to the extent this Agreement incorporates by reference any provision of any document, such provision shall be deemed a part of this Agreement. Nevertheless, if there is any conflict among the terms and conditions of this Agreement and those of any such provision or provisions so incorporated by reference, this Agreement shall govern over the document referenced.

6.18. Costs. Each party shall bear its own costs and fees incurred in the preparation and negotiation of this Agreement and in the performance of its obligations hereunder except as expressly provided herein.

6.19. No Third Party Beneficiary Rights. This Agreement is entered into for the sole benefit of City and Consultant and no other parties are intended to be direct or incidental beneficiaries of this Agreement and no third party shall have any right in, under or to this Agreement.

6.20. Headings. Paragraphs and subparagraph headings contained in this Agreement are included solely for convenience and are not intended to modify, explain or to be a full or accurate description of the content thereof and shall not in any way affect the meaning or interpretation of this Agreement.

6.21. Construction. The parties have participated jointly in the negotiation and drafting of this Agreement. In the event an ambiguity or question of intent or interpretation arises with respect to this Agreement, this Agreement shall be construed as if drafted jointly by the parties and in accordance with its fair meaning. There shall be no presumption or burden of proof

favoring or disfavoring any party by virtue of the authorship of any of the provisions of this Agreement.

6.22. Amendments. Only a writing executed by the parties hereto or their respective successors and assigns may amend this Agreement.

6.23. Waiver. The delay or failure of either party at any time to require performance or compliance by the other of any of its obligations or agreements shall in no way be deemed a waiver of those rights to require such performance or compliance. No waiver of any provision of this Agreement shall be effective unless in writing and signed by a duly authorized representative of the party against whom enforcement of a waiver is sought. The waiver of any right or remedy in respect to any occurrence or event shall not be deemed a waiver of any right or remedy in respect to any other occurrence or event, nor shall any waiver constitute a continuing waiver.

6.24. Severability. If any provision of this Agreement is determined by a court of competent jurisdiction to be unenforceable in any circumstance, such determination shall not affect the validity or enforceability of the remaining terms and provisions hereof or of the offending provision in any other circumstance. Notwithstanding the foregoing, if the value of this Agreement, based upon the substantial benefit of the bargain for any party, is materially impaired, which determination made by the presiding court or arbitrator of competent jurisdiction shall be binding, then both parties agree to substitute such provision(s) through good faith negotiations.

6.25. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original. All counterparts shall be construed together and shall constitute one agreement.

6.26. Corporate Authority. The persons executing this Agreement on behalf of the parties hereto warrant that they are duly authorized to execute this Agreement on behalf of said parties and that by doing so the parties hereto are formally bound to the provisions of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by and through their respective authorized officers, as of the date first above written.

CITY OF FULLERTON

Donald K. Hoppe
Director of Public Works

Date: _____

CONSULTANT

Signature

Date: _____

Name and Title

Social Security or Taxpayer ID Number

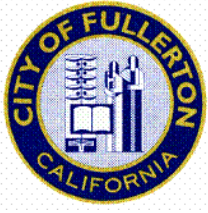
APPROVED AS TO FORM:

Richard D. Jones, City Attorney

EXHIBIT A

REQUEST FOR PROPOSALS

Attachment A - Request for Proposal



CITY OF FULLERTON

Public Works Department – Engineering Division

July 5, 2018

Tori Yokoyama
Hazen and Sawyer
7700 Irvine Center Drive, Suite 200
Irvine, CA, 92618

RE: Request for Proposal
Engineering/Hydrogeological Services for the Construction of Well 7A, Abandonment of Well 7, and Pipeline Assessment

Dear Tori Yokoyama:

The City of Fullerton ("City") is requesting a proposal for professional hydrogeological and engineering services for the construction of Well 7A and abandonment of existing Well 7 at the City's Main Plant. The Main Plant is located at 627 West La Palma Avenue, Anaheim, CA 92801. The City is also seeking pipeline assessment services for one of the pipelines leaving Main Plant.

BACKGROUND

The Main Plant consists of five active water wells (Well 3A, Well 4, Well 5, Well 6, and Well 8) and one inactive water well, Well 7. Wells 3A, 4, 5, 6, 7 and 8 were constructed in 1995, 1927, 1959, 1959, and 1974, respectively. While active Wells 4 through 8 range in production from around 1,000 gpm to 1,600 gallons per minute (gpm), Well 3A has produced approximately 2,200 gpm over a two year period (CY 2016-2017). All active wells in the Main Plant extract water from a groundwater basin managed by the Orange County Water District (OCWD). Active wells 4 through 8 are relatively shallow with perforation depths ranging from 300 to 410 bgs while Well 3A has perforations from 580 to 1,280 bgs. While active Wells 4 through 8 always discharge into a common forebay for disinfection, Well 3A has its own chlorine station and discharges directly into the existing distribution main (see Attachment A). Well 3A still maintains a connection to the forebay for chlorine station maintenance events.

Well 7 has not been consistently online since April 2014 due to poor water quality and production. From May 2013 to April 2014, Well 7 was only pumping water at a flow rate of around 400 gpm even though it was originally designed to pump out 1,500 gpm. Water quality samples were collected from this well until January 2015 during which tetrachloroethylene (PCE) levels reached as high as 3.6 µg/L—more than half of the state and federal maximum contaminant level (MCL) of 5 µg/L for PCE. Due to poor production and water quality concerns, Well 7 should be abandoned per state and local regulations at the time of drilling for the new well.

Aside from abandoning Well 7, the City seeks to construct a new well, 7A. Well 7A should also be located at the City's Main Plant and be designed and constructed to produce the highest quality of potable water possible in accordance with all federal, state, and local regulations.

THE EDUCATION COMMUNITY

303 West Commonwealth Avenue, Fullerton, California 92832-1775
(714) 738-6845 • Fax (714) 738-3115 • Website: www.ci.fullerton.ca.us

The new well may be approximately 1,300 to 1,400 feet deep and shall be equipped with a new vertical turbine pump that produces 2,500 to 4,500 gpm without impacting the production of the other active wells at this site. Well 7A shall be designed in an open air facility enclosed with fencing and a gate system, similar to existing Well 3A.

To assist the City in abandoning Well 7 and in the locating, drilling, equipping, and construction of Well 7A and related facilities, the City requires the services of a Consultant. The Consultant shall provide the following professional services:

- Hydrogeological
- Civil
- Structural
- Mechanical
- Electrical
- Instrumentation and controls (I&C)
- Environmental
- Any other engineering services required to complete all work necessary for a successful operation of a potable water well.

The City is also seeking professional civil engineering pipeline assessment services for the replacement or rehabilitation of a portion of the existing water main transmission (see highlighted portion on Attachment B). Constructed in 1959, 700 feet of 18-inch diameter and 100 feet of 16-inch steel pipelines have experienced six water main breaks in the last decade. There have not been any main breaks on the approximately 1,950-ft long, 16-inch diameter cast iron pipeline but its installation may have originated from the 1910's. The 24-inch diameter SCCP pipeline exiting west from Main Plant shall be included in the hydraulic analysis but not in the pipeline assessment. The discharge pressure through these distribution pipelines had historically been 120 psi. However, the City operates only at 88 psi now due to age and high pressure concerns.

The new well shall be drilled, constructed, tested, and equipped in compliance with the following standards and industry guidelines:

- Department of Water Resources (DWR) Bulletin Nos. 74-81 and 74-90;
- American Water Works Association (AWWA) A100-15, E103-15, C654-13, and any other applicable standards;
- California Well Standards (Well Standards);
- California Waterworks Standards, Title 22, CCR, Div 4, Chapter 16 (CAWS);
- Standard Specifications for Public Works Construction (Green Book);
- American Society of Mechanical Engineers (ASME) Standards; and
- National Electric Code (NEC)

Important Note

Any interested Consultant is required to participate in a pre-proposal field visit for the project. The field visit will be only accessible by escort by City Staff. If the proposed date/time is not convenient, the Consultant can request a separate date/time.

Proposed field visit information is as follows:

Location: 627 W. La Palma Ave, Anaheim, CA 92801
Date: Wednesday, July 18th, 2018
Time: 10:00 AM

SCOPE OF WORK

The scope of work for this project shall be conducted in three phases:

- I) Professional Hydrogeological services for drilling a new well and abandoning an existing well.
- II) Professional Engineering services for assessing potential production of the new well and hydraulic assessment of the distribution pipelines from Main Plant.
- III) Professional Engineering services for equipping a new well and pipeline distribution design (if applicable).

All phases will require management and administration services.

Project Management and Administrative Services

1. Task 1 – Project management

The Consultant shall promote efficient communication between Consultant, City of Fullerton, and others as required. For all meetings, Consultant shall prepare agendas and meeting minutes. The minutes shall be sent to the City within five (5) working days after each meeting. The Project Manager shall be accompanied by the appropriate engineering staff or subconsultant representatives necessary to conduct the meetings.

As part of progress payment requests, Consultant shall provide documentation of achieved progress.

a. Kick-off Meeting

The Consultant shall meet with City staff to review the scope and approach of the project, identify team members' involvement, and identify project constraints and anticipated long lead items. The Consultant shall submit a list of existing documentation requests prior to the kick-off meeting. At the meeting, the Consultant shall submit an initial schedule with critical milestones.

b. Coordination meetings

The Consultant shall coordinate monthly progress conference calls to review project progress, issues to be resolved, early study results, etc. The Consultant shall prepare any figures or other documents that may aid in discussions.

c. Agency coordination and Permitting

Consultant shall coordinate with the OCWD and the City of Anaheim as needed for all required documents, notifications, and permits. In addition, the Consultant shall be responsible for coordinating with the City of Anaheim Public Utilities Electric Services Division for all power requirements for Well 7A and the designer of the City's instrumentation and controls (I&C) system, Control Automation Design (CAD), to integrate the new well with the City's existing SCADA system.

Consultant shall identify and prepare a list of all permits and clearances necessary for carrying out drilling, equipping, constructing, discharging, operating, abandoning, and pipe rehabilitation (if applicable) activities. The list shall also include the party responsible for obtaining each permit and be included in the preliminary design report (Task 3) and preliminary design memorandum (Task 7). The anticipated timelines for obtaining the permits shall be included in the overall project schedule.

The City will issue payments separately for all fees required by the agencies. At a minimum, the Consultant shall prepare documentation for the following agencies:

i. Division of Drinking Water (DDW)

The City will be the primary contact for DDW. The City will prepare the application for an amended domestic water supply permit and will submit Title 22 water quality data. Consultant shall prepare other requirements included in Attachment C of this RFP.

ii. National Pollution Discharge Elimination System (NPDES)

Prepare documents required for the City to obtain a De Minimis permit, Order No. R8-2015-0004, NPDES No. CAG998001 (refer to Attachment D). City will review and submit Consultant prepared documents.

iii. City of Anaheim

The Consultant shall coordinate with the Environmental Services Division and submit the well permit application and verification document signed by a state certified hydrogeologist that the new well will not negatively impact an existing well. During drilling and abandoning activities, Consultant shall coordinate with City of Anaheim inspector(s). For pipeline assessment activities, Consultant shall coordinate with the City of Anaheim Public Works department as necessary.

iv. CEQA

For CEQA, the City plans to file a notice of exemption for this project.

Deliverables

- DDW requirements
- NPDES documentation
- City of Anaheim documentation

2. Task 2 – Research and Field Reconnaissance

a. Existing documentation review

Perform the accumulation and review of existing plans and other available data. The City will provide copies of available applicable plans and a base map file of Main Plant as well as production data and water quality test results from the other wells at Main Plant. The Consultant shall collect and review all available groundwater data, current operations, existing utilities, logs, surrounding potential contaminating activities, and any geotechnical reports available in the region, including information from OCWD and other local agencies.

b. Field Reconnaissance

Consultant shall conduct site visits and document all observed existing conditions.

PHASE I: WELL DRILLING AND ABANDONMENT

Consultant is encouraged to identify any additional work that is not specified in this Phase I Scope of Work that will be necessary or beneficial to complete the Project as defined herein.

3. Task 3 – Well Drilling Preliminary Design Report

The Consultant shall prepare a preliminary design report (PDR) that is based on the data collected and reviewed. The PDR shall document relevant findings and provide the recommended well location in collaboration with City staff.

It is acknowledged that some design parameters cannot be determined until actual well and pump tests are performed.

- a. At a minimum, the PDR shall include the following:
 - Hydrogeological impact
 - Expected water quality properties and pumping capacity
 - Well 7A preliminary design and site plan
 - List of technical specifications; drawings; permits
 - Estimated construction costs
 - Projected schedule
- b. Submit three hard copies of the PDR and an electronic copy for City review.
- c. The Consultant will meet with City staff to review and amend the PDR as needed.
- d. Finalize the PDR based on discussions and comments from Item 3c above and submit three hard copies and an electronic copy of the final PDR.

Deliverables

- Draft PDR (pdf; three hard copies)
 - Final stamped and signed PDR (pdf; three hard copies)
4. Task 4 – Well Drilling and Abandonment PS&E and Bid Assistance

Consultant shall not substantially advance into design until the PDR has been accepted by the City.

City will provide the Invitation to Bid, Supplemental Information to Bidders, Sample Agreement and Bonds, and Bid Proposal forms. City will also provide the General Provisions for modifications by the Consultant if necessary. The Consultant shall prepare the Special Provisions, copies of permits, construction plans, final engineer's construction cost estimate, and any other required documents so that the City may bid, award, and complete the Well 7A drilling phase and well destruction of Well 7.

- a. Well Drilling and Abandonment PS&E

For drilling, constructing, developing, and testing Well 7A and abandoning Well 7, Consultant shall prepare 60%, 90%, 100%, and final plans, specifications, and cost estimates using City's standard format. Each deliverable will be followed by a review-comment-meeting. The meeting and hard copy deliverables for 100% are optional, however. Equipping the well will be done at a future time (see Task 7). The abandonment of Well 7 shall, at a minimum, be per City of Anaheim standards. Consultant shall be responsible for any surveying required to complete the well drilling design.

Well drilling plans, specifications, and other documents shall include all requirements necessary for drilling, constructing, developing, and testing Well 7A and abandoning Well 7 per standards. At a minimum, the deliverables shall include:

- Updated project schedule
- List of permits to be acquired by the Contractor
- Well 7A drilling construction plan(s) and specifications
- Well 7 abandoning plan(s) and specifications
- Final engineer's construction cost estimates
- Bid schedule

b. Bid Assistance

- Assist City staff as required in the bid process including answering bidder's questions and assisting in addendums. Assume ten (10) questions and two (2) addendums; however, if the number is less, not all hours shall be billed to the City.
- Attend pre-bid meeting and record minutes of the meeting.
- Evaluate bids received and recommend award of bid for well drilling and well abandonment.

Deliverables

- 60%, and 90% plans (pdf; three 11"x17" hard copies)
- 60% and 90% specifications and cost estimates (pdf; three 8½"x11" hard copies)
- 100% plans, specifications, and cost estimates (pdf; hard copies optional)
- Signed and stamped final plans (pdf; three 24"x36" hard copies; CAD)
- Signed and stamped final specifications (pdf; three 8½"x11" hard copies; MS Word)
- Final cost estimates (pdf; three 8½"x11" hard copies; MS Excel)
- Bid schedule
- Project schedule
- Bid assistance documents, if needed

5. Task 5 – Well Drilling and Abandonment Construction Services

City will solicit public bids for the selection of the drilling Contractor to perform the requested work under contract with the City. Consultant shall provide a licensed hydrogeologist to serve as project manager for drilling services. Provide consulting hydrogeologist or geologist and, as necessary, resident engineer to observe Contractor's construction progress, ensure quality assurance, and provide assistance in achieving conformance with plans and specifications.

The following include, but are not limited to, tasks that the Consultant will be expected to perform prior and during well construction activities.

- a. Attend pre-construction meeting.
- b. Provide daily coordination with City and Contractor; resolve public complaints; and document field activities. Maintain and submit daily construction progress reports and photos.
- c. Review all Contractor submittals. Assume one initial review and a maximum of two follow-up reviews for each submittal.
- d. Respond to all Contractor RFIs and requests for clarifications (assume 10).
- e. Review, recommend, and prepare change order(s) as needed.
- f. Review all Contractor invoices prior to being submitted to City for payment
- g. Well 7 abandonment field inspection and activities

Consultant shall provide part-time inspection, hydrogeological analysis, and recommendations that include the following, but not limited to, tasks:

- Periodically visit site to observe Contractor's progress and document work.
- Witness videologging.
- Inspect removal, excavating, casing destruction, filling, and sealing operations.

- Prepare a well closure report summarizing all findings, analyses, and recommendations. Include logs, drawings, graphs, test results, etc.
- h. Well 7A drilling field inspection and activities
Provide full-time on-site oversight of drilling, construction, development, and testing operations except the reaming of the pilot hole and mechanical well development which shall occur on a part-time basis. Assume three zone isolation tests will be performed.
Perform field activities including, but not limited to, the following: retrieve soil samples; conduct all testing and analysis required for final design; and monitor and document discharges to the pump-to-waste basin for NPDES compliance.
- i. Provide final design document of well depth, casing, screen and perforations, filter pack, and annular seals signed and stamped by hydrogeologist
- j. Provide “as-built” documents and revisions to record drawings/specification signed and stamped by hydrogeologist
- k. Prepare letter with recommendations of type, capacity, and bowl depth setting of final pumping equipment. Interpret well development results and recommend long-term sustainable well production rate with predicted static water levels (high and low), specific capacity, and predicted long-term decline in specific capacity.
- l. Prepare draft and final well construction report documenting all findings, analyses, recommendations, and test results for City review. Additionally, include all field notes; logs; reviewed submittal packages; responses to Contractor RFIs and contract clarifications; sketches; and drawings. Submit all construction phase photographs and final well video log on DVD discs. The draft can be submitted in electronic form. The final report shall be submitted as an electronic copy and three hard copies, all of which are to be signed by a California certified hydrogeologist.
- m. Prepare and inspect completion of punch list items

Deliverables

- Well closure report (pdf; three hard copies)
- Stamped and signed final well design document (pdf; three hard copies)
- Pump design recommendations letter (pdf; three hard copies)
- Stamped and signed as-built drawings (pdf; one full-size print; CAD)
- Draft well construction report (pdf)
- Stamped and signed final well construction report (pdf; three hard copies; DVDs)

PHASE II: WELL EQUIPPING AND DISTRIBUTION PIPELINE ASSESSMENT

Consultant shall not substantially advance into Phase II until the well drilling activities have been completed to the satisfaction of the City or by written authorization from the City. Consultant is encouraged to identify any additional work that is not specified in this Phase II Scope of Work that will be necessary or beneficial to complete the Project as defined herein.

6. Task 6 – Distribution Pipeline Assessment

Consultant shall assess the condition of the distribution pipeline leaving Main Plant onto Harbor Blvd. Any investigations requiring the shutdown of the main must conform to the City of Fullerton Water Utility Specifications Section 5-08.03 and the requirements by the City of Anaheim. The City's Water Division will assist as necessary for the shutdown for investigative purposes:

https://www.cityoffullerton.com/gov/departments/public_works/engineering/general_engineering/standard_drawings/water.asp

Based upon findings, Consultant shall determine whether the pipeline requires replacement, spot repair, or any rehabilitation at all. Consultant shall perform tests as needed to determine the integrity and remaining service life of the pipeline lengths.

Consultant shall coordinate with the City of Anaheim and Caltrans as needed to complete pipeline assessment.

Consultant shall be responsible for any geotechnical investigations, potholing, and site surveying as needed.

7. Task 7 – Well Equipping and Pipeline Assessment Preliminary Design Memorandum

The Consultant shall prepare a preliminary design memorandum (PDM) that is based on the data collected and reviewed. Consultant shall arrange to meet with City's O&M staff to receive input regarding system insights, preferred manufacturers, and desired operating characteristics.

a. At a minimum, the PDM shall include the following:

- List of technical specifications; drawings; permits
- Updated Well 7A preliminary design and site plan
- Hydraulic calculations including impact to overall water distribution system. Evaluate need for variable frequency drive (VFD).
- System integration with Main Plant operations
- Estimated construction costs
- Projected schedule
- Existing pipeline condition assessment
- If necessary, recommended method for pipeline rehabilitation and/or pipeline expansion. No repairs, spot repairs, and complete pipeline replacement are all options that should be analyzed. Provide estimated construction costs and service life for each method considered.

b. Submit three hard copies of the PDM and an electronic copy for City review.

c. The Consultant will meet with City staff to review and amend the PDM as needed.

d. Finalize the PDM based on discussions and comments from Item 7c above and submit three hard copies and an electronic copy of the final PDM.

Deliverables

- Draft PDM (pdf; three hard copies)
- Final stamped and signed PDM (pdf; three hard copies)

PHASE III: WELL EQUIPPING AND DISTRIBUTION PIPELINE DESIGN

*Note: Award for professional services for Phase III is based upon successful completion of Phase II.

Consultant shall not substantially advance into 60% design phase until the PDM has been accepted by the City.

8. Task 8 – Well Equipping and Distribution Pipeline PS&E

City will provide the Invitation to Bid, Supplemental Information to Bidders, Sample Agreement and Bonds, and Bid Proposal forms. City will also provide the General

Provisions for modifications by the Consultant if necessary. The Consultant shall prepare the Special Provisions, copies of permits, construction plans, final engineer's construction cost estimate, and any other required documents so that the City may bid, award, and complete the Well 7A equipping phase.

a. Well Equipping PS&E

For equipping, constructing, and testing Well 7A, Consultant shall prepare 60%, 90%, 100%, and final plans, specifications, and cost estimates using City's standard format. Each deliverable will be followed by a review-comment-meeting. Plans and specifications should consider all items required for maintaining and operating the pumping of water from Well 7A into the City's existing water main and forebay while meeting all water quality standards. Consultant shall be responsible for any additional surveying required.

Consultant shall prepare the bid schedule, preliminary short circuit calculations, wiring diagram, structural and electrical load calculations (if appropriate), and cost estimates using City's standard format.

Consultant shall be responsible for any geotechnical investigations and potholing required to complete the design.

Consultant shall coordinate with Anaheim's Public Utilities Electric Services Division to obtain all requirements for adding electrical capacity.

Consultant shall be responsible for designing all hardware, developing requirements for integration, and coordinating with the City and City's SCADA consultant, CAD, to integrate proposed facilities into the existing SCADA system. Consultant shall develop functional control logic descriptions and define input/output (I/O) requirements. The CAD representatives will integrate the new equipment with the existing SCADA system.

b. Distribution Pipeline PS&E

If pipeline rehabilitation or replacement is the selected approach, Consultant shall prepare 60%, 90%, 100%, and final plans, specifications, and cost estimates using City's standard format. The 60% and 90% will be followed by a review-comment-meeting while the 100% meeting is optional. Plans and specifications should consider all items required to rehabilitate the water main.

Consultant shall be responsible for topographic survey. Survey shall include right-of-way, centerline, lot lines, curb and gutter, cross gutters, surface features, appurtenances, fences, trees, bushes, and all other features required for design of the improvements. Surveyor shall prepare and file pre-construction corner records for street monuments and reestablishment of said monuments post-construction.

Consultant shall be responsible for any geotechnical investigations and potholing.

Consultant shall coordinate with the City of Anaheim Public Works department to obtain all requirements for pipeline rehabilitation.

c. Bid Assistance

- Assist City staff as required in the bid process including answering bidder's questions (assume ten) and assisting in addendums (assume two).
- Attend pre-bid meeting, if any, and record minutes of the meeting.
- Evaluate bids received and recommend award of bid for well equipping.

Deliverables

- Well Equipping
 - 60%, 90%, and 100% plans (pdf; three 11"x17" hard copies)
 - 60%, 90%, and 100% specifications and cost estimates (pdf; three 8½"x11" hard copies)
 - Stamped and signed final plans (pdf; three 24"x36" hard copies; CAD)
 - Stamped and signed specifications (pdf; three 8½"x11" hard copies; MS Word)
 - Final cost estimates (pdf; three 8½"x11" hard copies; MS Excel)
- Distribution Pipeline
 - 60%, 90%, and 100% plans (pdf; three 11"x17" hard copies)
 - 60%, 90%, and 100% specifications and cost estimates (pdf; three 8½"x11" hard copies)
 - Stamped and signed final plans (pdf; three 24"x36" hard copies; CAD)
 - Stamped and signed specifications (pdf; three 8½"x11" hard copies; MS Word)
 - Final cost estimates (pdf; three 8½"x11" hard copies; MS Excel)
- Bid schedule
- Project schedule
- Bid assistance documents, if needed

9. Task 9 – Well Equipping and Pipeline Construction Services

City will solicit public bids for selection of the equipping and pipeline construction Contractor to perform the requested work under contract with the City. Consultant shall provide a licensed engineer to serve as project manager. Provide inspector for well equipping services to ensure quality assurance and assistance in achieving conformance with plans and specifications. Mechanical inspections shall be conducted by a California-registered mechanical or civil engineer and/or ICC Mechanical Inspector M2 or M3. Electrical inspections shall be conducted by a registered electrical engineer, ICC Electrical Inspector E2 or E3, licensed electrician, or certified electrical tester.

City inspector will provide inspection over the pipeline reconstruction.

The following include, but not be limited to, tasks that the Consultant will be expected to perform prior and during well construction.

- a. Attend pre-construction meeting.
- b. Provide daily coordination with City and Contractor; resolve public complaints; and document field activities. Maintain and submit daily construction progress reports and photos.
- c. Review all Contractor submittals. Assume one initial review and a maximum of two follow-up reviews for each submittal. Witness factory testing should not be assumed.
- d. Respond to all Contractor RFIs and requests for clarifications (assume 10).
- e. Review, recommend, and prepare change order(s) as needed.
- f. Review all Contractor invoices prior to being submitted to City for payment

- g. Provide part-time oversight of well equipping construction activities. Monitor and document all discharges to the pump-to-waste basin and storm drains to ensure compliance with NPDES permit.
 - h. Prepare “as-built” drawings from Contractor redline markups.
 - i. Coordinate and assist in verification of intermediate and final operation. Review startup and disinfection plans. Final acceptance shall require all components for the facility to be fully operational and per standards. Consultant shall prepare and submit three (3) copies of the final acceptance test results.
 - j. Prepare an Operation and Maintenance (O&M) manual that includes the following items:
 - General description of the project and how project fits into the overall operation of the water distribution system.
 - Layout plan locating all piping and electrical conduit runs, including wiring diagrams and P&IDs sufficient for troubleshooting.
 - Provide a summary of all initial station instrumentation settings.
 - Include all shop drawings, equipment catalog cuts, and manufacturer manuals.
 - Manufacturers' recommendations concerning equipment maintenance
 - Warranties and guarantees associated with installed equipment.
- Consultant shall submit one electronic draft O&M Manual to City one month prior to the anticipated construction completion date. Consultant shall submit the final O&M Manual to the City before acceptance of the construction contract work.
- k. Prepare and inspect completion of punch list items.
 - l. Facilitate training of City operators

Deliverables

- “As-built” drawings (pdf; one full-size hard copy; CAD)
- Final acceptance test results (pdf; three hard copies)
- Draft O&M Manual (pdf)
- Final O&M Manual (pdf; three 3-ring binder copies)

PROPOSAL

Proposal shall not exceed 30 pages in length (resumes may be included separately in appendix). The proposal should include the following:

- General
 - Cover letter
 - Brief firm profile, including subconsultants.
 - Statement acknowledging the Professional Services Agreement (see Attachment E)
 - Joint venture agreement (if applicable)
- Project Approach
 - Description of services to be provided based on the Consultant's understanding of the project scope. Include anticipated approach, tasks necessary for successful completion, and suggestions or special concerns that the City should be made aware. Work to be done by subconsultant(s) shall be clearly identified.
 - Detailed list specifying what will be included as part of the construction observation services. Include the number of days, hours per day, and percentage of recommended staffing for construction observation services.

- Description of the resources to be utilized and any specific software.
- Relevant Experience
 - Provide a list of similar projects completed or on-going in the last five (5) years and the names, email addresses, and telephone numbers of the clients. Provide descriptions of firm's responsibilities and pertinent experience, including duration of project and cost of services.
- Key Personnel
 - Table with percentage of time each member will contribute to this project.
 - A resume of all project personnel, including subconsultants, describing experience and qualifications. Identify the individual who will be the project manager and have overall responsibility for the project. This individual shall be a certified hydrogeologist or licensed professional engineer. Key personnel assigned to the project shall not be reassigned without the prior written approval from the City.
- Project Schedule
 - A schedule showing the time to complete major items of work.
- Fee Breakdown/Rate Schedule
 - A breakdown of fees by task and subtask for all work described in the project tasks. Include only names of people who will be working on the proposed project and their estimated hours for the individual tasks on the fee schedule.
 - Include current rate schedule.
 - One (1) copy of the not-to-exceed fee proposal shall be submitted concurrently but separately in a sealed envelope, labeled "Engineering/Hydrogeological Services for the Construction of Well 7A, Abandonment of Well 7, and Pipeline Assessment".

Submit four (4) hard copies and one (1) electronic copy of the proposal by **5 p.m., Tuesday, August 7th, 2018**. The response package must be mailed or delivered to the below address prior to the closing date and time for receipt of proposal. Late proposals will not be accepted. All proposals will become the property of the City of Fullerton and will not be subject to return. The proposal must be signed by an official authorized to commit the firm. The proposal shall show the following information on the outside:

1. Address to Tiffany Foo, Associate Water Engineer, City of Fullerton, 303 W. Commonwealth Ave., Fullerton, CA 92832.
2. Respondent's name and address.
3. Project: Engineering/Hydrogeological Services for the Construction of Well 7A, Abandonment of Well 7, and Pipeline Assessment

Any inquiries and questions related to this RFP shall be exclusively communicated by email to TFoo@cityoffullerton.com. No question received after the close of business day on July 31st, 2018 will be answered.

Note - All licensed engineers and hydrogeologists in "responsible charge" working on this City project are required to disclose all disciplinary actions against them. Provide a copy of the actions with submittal of proposal. Please provide a statement if there are no disciplinary actions.

Each proposal prepared in response to this RFP shall be prepared at the sole cost and expense of the firm and with the expressed understanding that no claims against the City for reimbursement will be accepted.

The criteria for evaluating the proposals submitted will include the following items:

- Key personnel qualifications
- Key personnel's experience with related projects

- Project understanding (comprehension of scope of work)
- Quality of proposal
- Fee schedule or cost effectiveness

The City may elect to invite selected firms to interview and answer questions. The interviews would tentatively be scheduled for Monday, August 13th.

This request for proposals does not obligate the City of Fullerton to accept any proposals, negotiate with any firm, award a contract, or proceed with the development of any project proposed in response to this RFP. The awarding of any contract shall be subject to such prior governmental approvals or determinations as may be required or appropriate.

The City reserves the right, at its discretion, to pursue any or all of the following actions related to this RFP: issue addenda; request additional information; negotiate contract on basis of original proposal and/or additional information; permit the correction of errors and waive minor deviations; reject, replace, and approve any and all subconsultants; and issue subsequent requests for proposals, based on refinements of concepts proposed in response to this RFP.

The content of the RFP and successful firm's proposal will become an integral part of the contract, but may be modified by the provisions of the contract. If, in the opinion of the City, the contract for any reason cannot be negotiated, the City may so notify the firm and shall then be free, if it so chooses, to select another firm from the Selection Committee's list ranking the responses submitted.

PROJECT TASKS

Please present your proposal tasks and fees as follows:

Project Management and Administrative Services

- Task 1 – Project Management
- Task 2 – Research and Field Reconnaissance

Phase I: Well Drilling and Abandonment

- Task 3 – Well Drilling Preliminary Design Report
- Task 4 – Well Drilling and Abandonment PS&E and Bid Assistance
- Task 5 – Well Drilling and Abandonment Construction Services

Phase II: Well Equipping and Distribution Pipeline Assessment

- Task 6 – Distribution Pipeline Assessment
- Task 7 – Well Equipping and Pipeline Assessment Preliminary Design Memorandum

*Note: Award for professional services for Phase III is based upon successful completion of Phase I and II. Fees and tasks for Phase III shall be presented after the successful completion of Phase I and II and upon notification from the City.

Phase III: Well Equipping and Distribution Pipeline Design

- Task 8 – Well Equipping and Distribution Pipeline PS&E
- Task 9 – Well Equipping and Pipeline Construction Services

SCHEDULE

The city is anticipating issuing the Notice to Proceed in September 2018.

We look forward to your proposal submitted no later than 5 p.m. on August 7th, 2018. If you have any questions please do not hesitate to contact me.

Sincerely,



Tiffany Foo
Associate Water Engineer
TFoo@cityoffullerton.com
Tel 714.738.6321

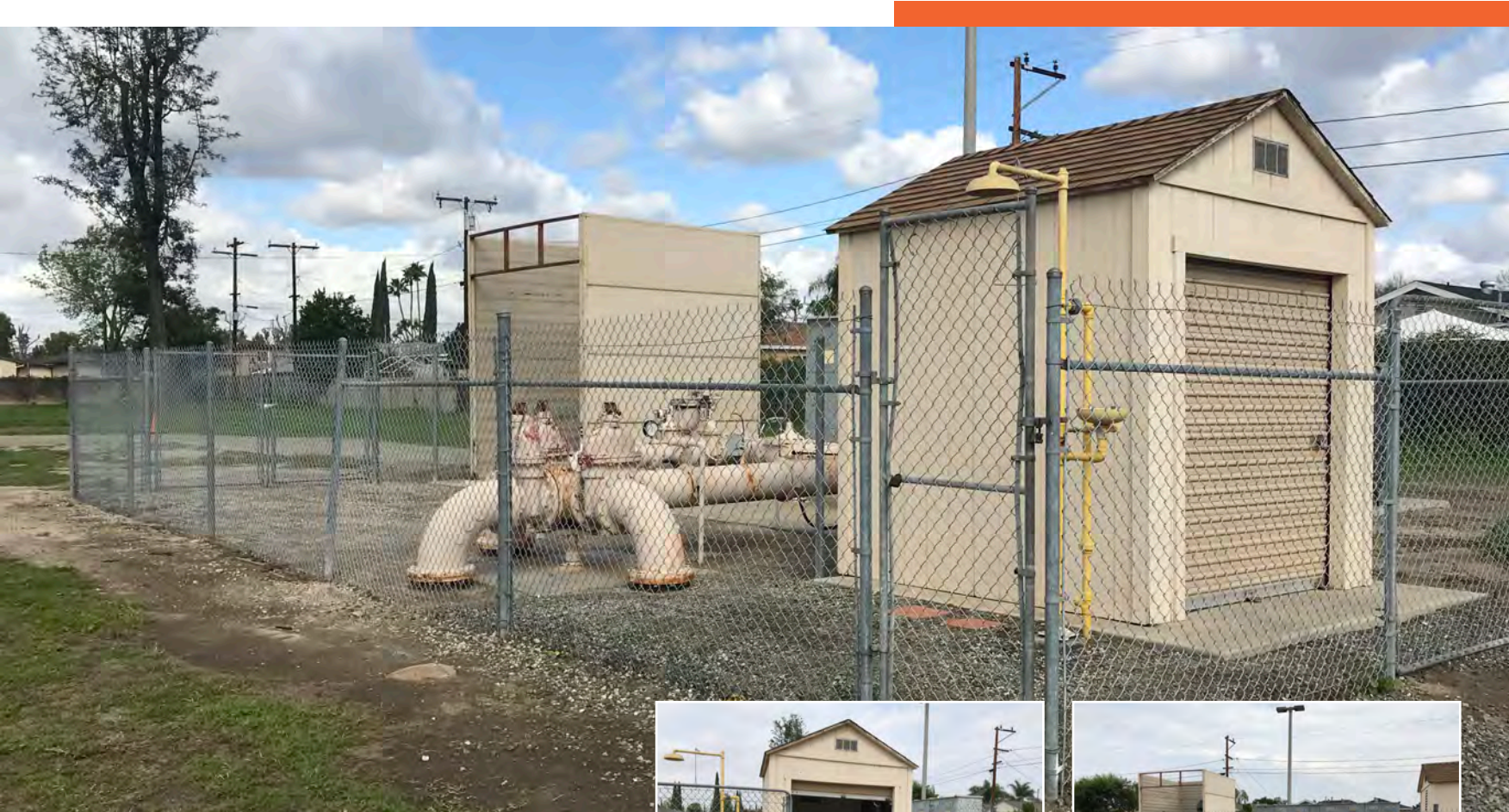
Attachments:

Attachment A – Construction Plans for Main Plant Well No. 3A Wellhead Facilities (W.D. 2175)
Attachment B – Pipeline Assessment
Attachment C – DDW Requirements for New Wells
Attachment D – Order No. R8-2015-0004, NPDES No. CAG998001
Attachment E – City of Fullerton Professional Services Agreement Sample

EXHIBIT B

CONSULTANT'S PROPOSAL

Attachment B - Proposal



Proposal for

Engineering/Hydrogeological Services for the Construction of Well 7A, Abandonment of Well 7, and Pipeline Assessment

August 7, 2018



Hazen and Sawyer
7700 Irvine Center Drive, Suite 200
Irvine, CA 92618 • 949.557.8549

August 7, 2018

Tiffany Foo
Associate Water Engineer
City of Fullerton
303 West Commonwealth Avenue
Fullerton, CA 92832

Re: Request for Proposal, Engineering/Hydrogeological Services for the Construction of Well 7A, Abandonment of Well 7, and Pipeline Assessment

Dear Ms. Foo:

The City of Fullerton is looking to improve operations at its Main Plant, which provides nearly 50 percent of the City's groundwater supply. Production from Main Plant has been limited over recent years due to poor water quality and lack of production from existing Well 7, currently inactive. Additionally, concerns over the condition of a portion of the discharge pipeline, including six main breaks, have forced the City to limit discharge pressures to 88 psi, well below the historical level of 120 psi, limiting operational flexibility. The City has initiated this important project to address these production and operational issues through abandonment of Well 7, construction of new Well 7A, and assessment/design of discharge pipeline rehabilitation and/or replacement. Hazen and Sawyer (Hazen) has assembled a superior team of well design and pipe rehab experts that guarantee the City a highly successful project.

Our team is prepared to address all of the City's concerns and seamlessly deliver this project, offering the following key benefits:

Technical Experts with Regional Experience. The Hazen Team has regional experts that can provide expertise to successfully deliver a new production well for the City. Members of the Hazen Team have worked on numerous well projects in various locations throughout Southern California. Our Project Manager, Steve Conner, has designed over 30 well equipping projects over the past 10 years, providing value to the City in terms of efficient and accurate engineering design. Steve recently completed the Raub 4-R and 5-R Wells for the City of Riverside and is currently working with City of Banning on their newest well. Our hydrogeologist, Tom Harder for Tom Harder Company, has provided technical direction and field oversight for the drilling, design, and construction of more than 100 high capacity municipal water supply wells and recently developed the well evaluation and rehabilitation program for the City's Main Plant Well 5. Additionally, our team members have valuable technical knowledge and experience in pipeline assessment, traditional and innovative rehabilitation methods, and trenchless installation options. Both Steve Conner and Mirko Maher are active members of the North American Society for Trenchless Technology.

Our Local, Cohesive Team. Hazen's local Irvine office, has detailed knowledge of groundwater supply throughout Orange County. Tom Harder's recent experience at the City's Main Plant and the Hazen Team's extensive experience in well design, distribution hydraulic analysis, pipeline assessment and rehabilitation, and system operation will benefit the City.



Expedited, Cost-Efficient Solutions. Your selected consultant must deliver the project to meet the City's schedule and with a cost-efficient fee. The City has a duty to its rate-payers to deliver this project efficiently - both in terms of schedule and cost. We fully acknowledge this and will partner with the City in fulfilling this responsibility.

Hazen acknowledges the City's Professional Services Agreement, and we are looking forward to working as a team with the City. Looking beyond this project, we want to be your "go-to" team for any assistance you need with your production wells and pipelines. We understand how important your production wells are to your system, and we want the successful Well 7A project to be the first step in that process.

Very truly yours,

A handwritten signature in black ink, appearing to read "Cindy", followed by a long, horizontal, wavy line.

Cindy Miller, PE
Vice President and Operations Manager
cmiller@hazenandsawyer.com
(949) 557-8550

Table of Contents

Cover Letter

- 1 Firm Profile**
- 2 Project Approach**
- 3 Relevant Experience**
- 4 Key Personnel**
- 5 Project Schedule**

Appendix

- A Resumes**

Firm Profile



Section No. 1

Firm Profile

Hazen is a nationally-recognized environmental and engineering consulting firm, recognized for finding solutions to our clients' pressing challenges. The City of Fullerton will realize the strength and depth of a national firm, along with the strong local presence and relationships that will guide this project's success.

Since 1951, Hazen has had a singular focus on “**All Things Water**”. By providing excellent engineering to our clients, Hazen has grown to over 1,000 engineering professionals in 51 offices across the United States and around the world. Engineering News Record has listed Hazen as one of the top firms in the nation, focused entirely on the domestic wastewater, storm drainage, recycled water, and potable water market. As a “water-only” firm we bring unique expertise and specialists to each project. One client even suggested that we “do all things water except make it rain!”

In addition to our project experience, Hazen is also a thought-leader in innovative research and evaluation of cutting-edge technology. We are active in Water Environment Research Foundation (WERF), WaterReuse Research Foundation (WRF), and National Water Research Institute. We have presented and published over 285 papers in peer reviewed journals, trade journals and international, national, and regional conferences since 2008.

Not only is Hazen leading the industry in future technology and direction, we are working closely with regulatory agencies during our investigations. The greatest satisfaction in a project is to deliver real, measurable value to our client. We inherently collaborate with operations and maintenance staff from the outset of a design project. We are able to do this because our key team members bring a working background in operations, having worked at wastewater and water agencies. Thus, our attention to the ability of a system to operate efficiently and be low maintenance is, for us, inherent.



According to the **Engineering News-Record (ENR)**, Hazen has consistently ranked as one of the top firms in the nation entirely devoted to water and wastewater.

Hazen and Sawyer's










Areas of Service

- | | |
|-----------------|-----------------------------------|
| Water Resources | Energy Management |
| Drinking Water | Economic & Financial Services |
| Wastewater | Hydraulic Modeling |
| Stormwater | Environmental Planning/Permitting |
| Reuse | PM/CM |
| Conveyance | Sustainability |
| CSO | Asset Management |
| Biosolids | Stream Restoration |
| Pump Stations | Dams & Reservoirs |
| Electrical | Surveying |
| O&M | Utility Management |

Section 2

Project Approach



Section No. 2

Project Approach

The addition of Well 7A and rehabilitation or replacement of the Main Plant discharge pipeline will improve the City's water production, reliability, and operational flexibility. This project will also position the City to manage increasingly complex regulatory requirements and water scarcity.

Project Background

Groundwater is the key component of the City of Fullerton's water supply, providing nearly 75% of the City's supply, with the five active water wells at Main Plant supplying nearly half of that groundwater supply (45%). As the cornerstone of the City's groundwater system, it is critical to ensure that the individual wells at Main Plant are operating cooperatively to maximize aquifer production with minimum interference between wells. The proper abandonment of the inactive Well 7 and construction of new Well 7A at Main Plant will ensure that Main Plant continues to provide needed groundwater supply over the long term.

The primary driver for this project is to supplement existing groundwater production at Main Plant to continue to provide a safe, reliable source of groundwater supply of the highest quality in accordance with all federal, state, and local regulations. Hazen and Sawyer will engage with City staff to outline a comprehensive listing of project goals and objectives, and refer back throughout all phases of the project to ensure that all requirements and City preferences are captured and achieved.

Methodology

Engaging the City in the Design Process

The design process involves two facets. One facet deals with meeting the requirements for proper equipment sizing, safety, operability, and code compliance. In a well design and equipping project, these items include proper sizing and selection of the well casing, pump, and motor; design of discharge and pump-to-waste piping to ensure the pump is operating on its curve within the preferred operating range; and required equipment clearances and adequate accessibility.

We will engage and work side-by-side with the City throughout the duration of this project to ensure all project goals & objectives are achieved.

Project Goals & Objectives

Select well location and layout that considers:

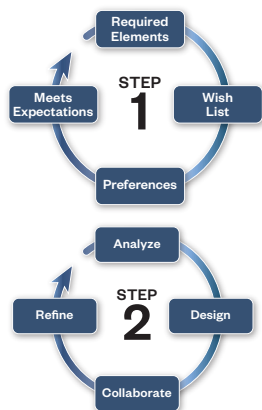
- Minimizing interference with existing well production
- Maximizing water production and quality
- Well construction equipment requirements
- Well maintenance access
- Chemical deliveries
- California Well Standards requirements
- California Fire Code requirements
- CEQA compliance

Design well pump and control system to:

- Protect distribution system from surges during well operations
- Prevent well pump from starting and stopping frequently
- Operate efficiently during low flow, average flow, and peak flow conditions
- Protect shaft bearings above static water level during startup
- Ensure proper chemical dosing and mixing prior to first user
- Be compatible with City's existing SCADA system with ability to integrate with future upgrades

Design well screen and casing to:

- Resist corrosivity of water
- Consider installation and long-term costs savings



The other facet of design is the preferential one. Preferential items could include piping material, pump-to-waste valve type, pump start-up sequence and check valve type, pump lubrication system, isolation valve type, flow meter type and location, and building type.

The first step in our technical approach involves following an iterative process of identifying the required elements for the project, then working with City staff to identify wish list and preference items. We then make sure each of the project components we have identified fully meet the expectations of the City and the requirements of the project. For example, if the City is planning on upgrading their SCADA system in the near future, this can be incorporated into the well control design.

Hydrogeologic Methodology and Well Siting

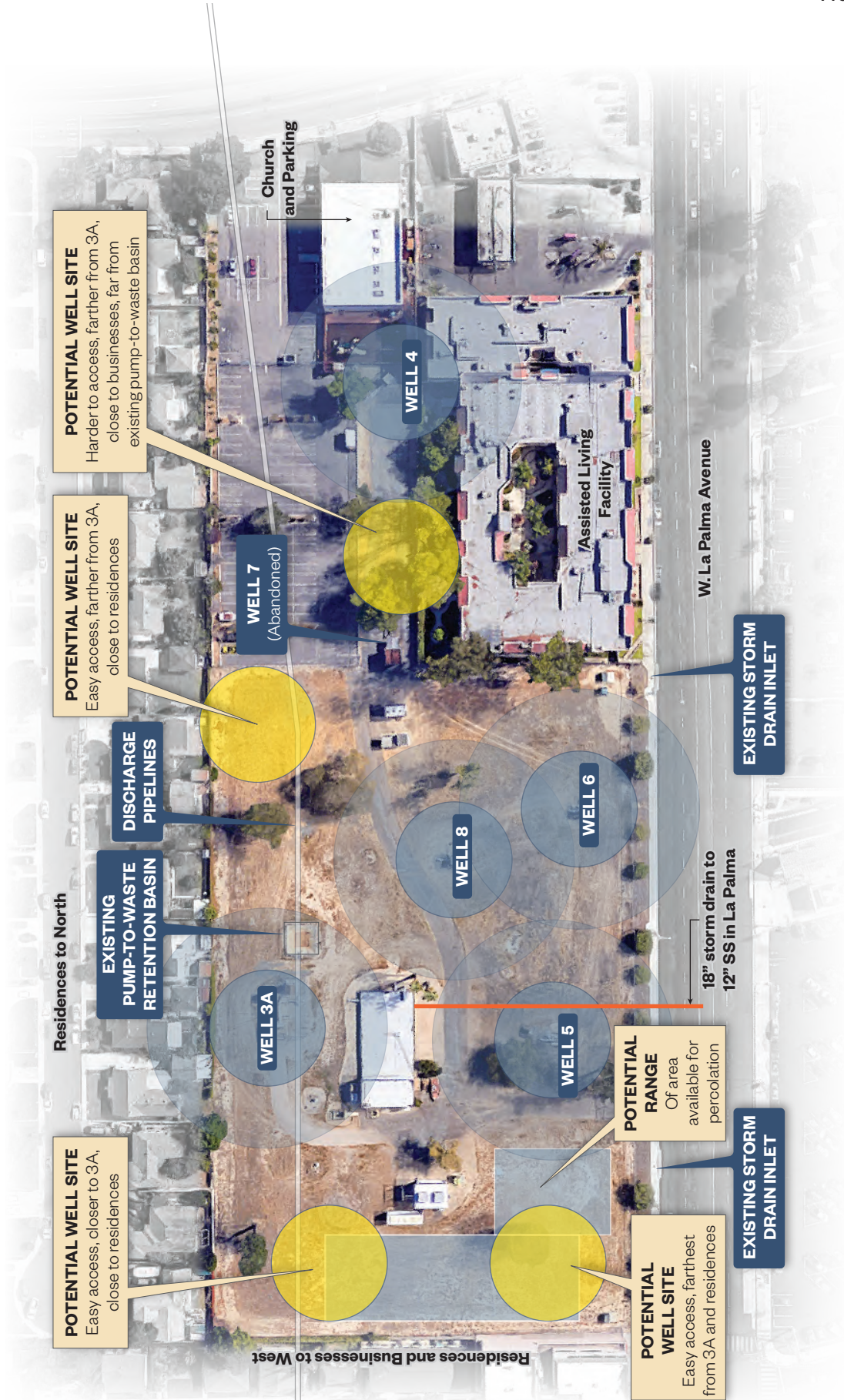
There are several siting and design considerations that must be analyzed for the well site layout and design components such as location, site size and shape, proximity to sensitive receptors, existing utilities, code compliance, and constructability. Some of these considerations are summarized on Exhibit 1 on the following page, along with conceptual well siting alternatives. Our approach to evaluate the optimum well site includes evaluation of the following categories:

- Minimizing interference with zone of influence of other Main Plant wells
- Proximity of existing infrastructure to minimize pipeline
- Access for construction and maintenance equipment
- Avoidance of overhead and underground utilities
- Sound issues for neighboring residences and businesses
- Utilization of the existing pump-to-waste basin

We will prepare a weighted site evaluation analysis as part of the PDR to identify the optimum location for the well site.

Other key well design issues we have identified include:

- **Isolated aquifer zone testing:** During well drilling, we recommend isolated aquifer zone testing to ensure that we can construct the well to avoid the volatile organic compound contamination that has previously been detected in the shallower portions of the aquifer beneath the site.
- **Options for disposal of testing waters:** While the existing pump-to-waste basin may be used in the long term for brief pump-to-waste activities, during initial construction and testing, a significant amount of water to be disposed will be generated. There are two options for disposal:
 - Existing storm drain facilities around the site will be evaluated to determine if they are adequate to handle the significant flows. There are two 10.5"x5"x5" box culverts that pass in front of the site in La Palma Avenue with catch basin inlets adjacent to the site (see Exhibit 1). The discharge pipe diameters from the inlets to the culvert will be verified and analyzed for the ability to convey to test waters. Hazen will work with OC Flood Control District to coordinate the timing of the discharges.



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Exhibit 1

- Another option that will be carefully considered is onsite disposal through percolation. Due to the undeveloped nature of the proposed well site, it may be feasible to discharge water generated during isolated aquifer zone testing and initial well development to the site via spreading and/or sprinkling, allowing it to percolate back into the subsurface. It may also be possible to discharge larger flows generated during final development and aquifer testing, should a bermed percolation pond be constructed (a conceptual location is illustrated on Exhibit 1). The location would be dependent on percolation capacity of the soil, and minimizing interference with the selected well site. The area available may be adequate to contain all or a portion of test waters on site. This could reduce or eliminate the need for expensive temporary conveyance pipelines and simplify compliance with NPDES discharge requirements.

Pipeline Assessment

Also critical to the operation of the Main Plant system are the distribution pipelines leaving the site. Potable water from the wells is conveyed to the distribution system to the west via the 24-inch SCCP pipeline, and to the east via 700-feet of 18-inch diameter and 100-feet of 16-inch diameter steel pipeline followed by 1,950-feet of 16-inch diameter cast iron pipeline. The City is concerned with the long term viability of the pipelines to the east, based upon age and the experience of six water main breaks along the steel portion. This has limited the allowable discharge pressure in the line. The steel and cast iron pipelines to the east will be assessed as part of this project scope.

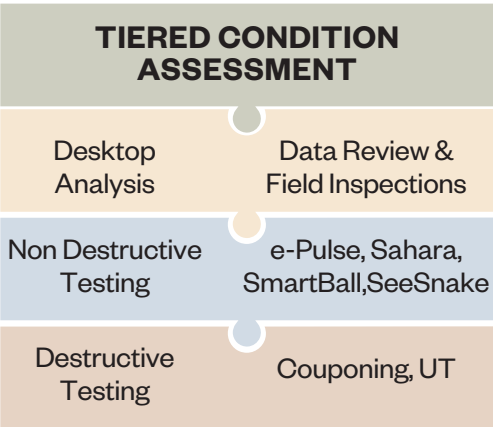
Our nationwide experience in water and wastewater infrastructure management leads to the right condition assessment technology applications and confident solutions

Hazen’s work in infrastructure management includes the execution of a wide range of infrastructure projects, including condition assessment, asset failure modeling, data assessment and integration, and capital prioritization, and includes inspection of water mains of various sizes using multiple technologies. Our proven water main

rehabilitation and renewal planning approach gives our clients a strategy for cost effectively upgrading their distribution system which optimizes operations, identifies water quality issues, and plans for future improvements.

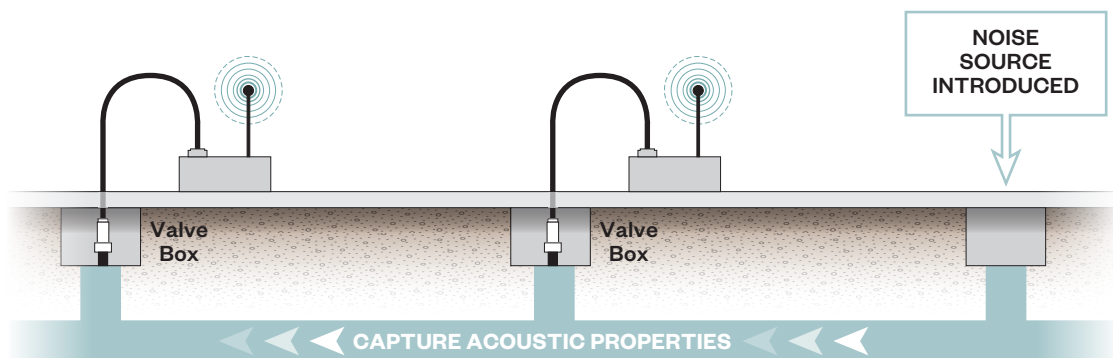
Through a wide range of assessment projects, Hazen has successfully employed a three-tiered condition assessment approach:

1. **Level 1 Condition Assessment** - Desktop analysis, including review of design and operating conditions and deficiencies.
2. **Level 2 Condition Assessment** – Indirect, non-intrusive measurements that can provide additional information on pipe thickness
3. **Level 3 Condition Assessment** – Direct, intrusive measurements that can provide more detailed information but are more costly and difficult to implement than the other levels.



Initial assessment of the pipeline segments identified by the City at Level 1 will include desktop analysis, investigating pipe characteristics such as age, material, profile, working and surge pressures, known coatings or linings, historical operational issues and changes, line breaks, and any information (pictures, measurements, etc) observed during pipe repairs. Also critical to the pipeline evaluation are operational considerations such as ability to operate at the desired pressure range and deliver the capacity required by the City. In our experience, in many cases, a comprehensive review of these data can be sufficient to make decisions regarding rehabilitation or replacement of individual pipe sections. Should additional information be required to make these decisions, the assessment moves to Level 2.

At Level 2, we propose to team with Echologics, to utilize ePulse technology to accurately assess pipeline condition along the length of the segments of concern. As illustrated in the graphic below, ePulse uses acoustic signals and advanced computer algorithms to assign a grade of good, moderate or poor based on the actual condition of the pipe segment, providing actionable data to estimate remaining pipe life or indicate need for pipe replacement. The assessment provides locations of any leaks detected, average minimum remaining structural wall thickness over each test length, and the percentage of wall thickness loss to date and a qualitative description of the likely condition of the piping, so that definitive decisions can be made regarding rehabilitation and replacement. Hazen has worked with Echologics on several condition assessment and leak detection projects; we are currently teamed together on a project assessing pipeline assets throughout California American Water Company's Los Angeles, Ventura, and San Diego service areas. Echologics e-pulse technology is an innovative, non-destructive method to assess pipeline condition with dependable accuracy and minimal operational and no destructive impacts. We have included the optional Level 2 assessment in our scope for completeness, should it be determined, together with the City, that further assessment beyond Level 1 is required.



By implementing a thorough Level 1 Desktop Analysis, supplemented if necessary by a Level 2 assessment utilizing Echologics e-pulse technology, we believe we can avoid potentially costly, disruptive and destructive Level 3 methods, while achieving an accurate assessment of the City's pipeline condition and recommend the appropriate, cost effective rehabilitation/replacement plan for the City.

DDW Coordination

Hazen understand the critical nature of agency coordination and permitting for this project. As stipulated in the scope of work, Hazen will identify, list, and prepare a plan of action at the onset of the project to ensure a successful and seamless permit process that does not impact the overall project schedule. In particular, coordination with the Division of Drinking Water will be key to project success.

The California State Water Resources Control Board's Division of Drinking Water (DDW) requires existing Water Supply Permits to be amended to include new water sources pursuant to the Article 7, Section 116550 of the California Safe Drinking Water Act. To that end, Hazen will provide support to GWP such that the well can be permitted as an approved source. This effort will span the entire duration of the project from initial permitting efforts, to completion of well equipping. Open and early communication with DDW is critical in ensuring that any potential fatal flaws are identified, discussed, and resolved early in the process. This will typically include a site walk with DDW personnel to address any potential problems with the site and/or the proposed location of the well. Prior to this meeting, Hazen will prepare a preliminary plot map (i.e., site map) showing the proposed location of the well in relation to any existing structures, utilities, and improvements. The plot map will show the distance to infrastructure with required setbacks, including sewer and recycled water pipelines, manholes, laterals, petroleum transmission mains, potential sources of groundwater contamination, and flood zone delineations. The map will include 50-, 100-, 150-, and 200-foot radii surrounding the proposed well location as a means of assessing required setbacks.

There are numerous submittals required as part of the Domestic Water Supply Permit amendment effort that will span the entire duration of the project from well drilling through equipping. Anticipated submittals and the entity responsible for each submittal include the following:

- Domestic Water Supply Permit amendment application (Hazen)
- California Environmental Quality Act documents (City)
- Drinking Water Source Assessment and Protection (DWSAP) Program documents (Hazen)
- Well plot map (Hazen)
- Horizontal distances table (Hazen)
- Well Drilling Plans and Technical Specifications (Hazen)
- Well drilling permit (Hazen and Well Drilling Contractor)
- Title 22 groundwater quality (Hazen)
- Aquifer pumping test data (Hazen)
- Well data sheet (Hazen)
- As-built plans (Hazen)
- Well Driller's Report (Hazen and Well Drilling Contractor)
- Chlorination data sheet (Hazen)

Hazen has successfully navigated this process for numerous well projects and this experience will ensure the City a seamless permit process.

Implementation

Project Management and Communication. Hazen utilizes a team approach for project delivery with Steve Conner as the Hazen's Project Manager who will serve as the City's day-to-day point of contact for this project. Steve will also be responsible for overseeing the project delivery and coordination of assigned tasks to the team. Cindy Miller will be our Principal-in-Charge, who is directly responsible to the client for the performance of the office and firm. We maintain close communication with our clients throughout our projects, not only discussing technical issues, but making sure we are on track with deliverables and budget. We use a variety of project management tools to track budgets, schedules, and to ensure effective communication throughout the duration of the project.

Progress Reporting. Proper reporting of progress is essential to maintaining the project schedule and cost as well as early identification of any issues which may lead to scope, cost, or schedule variances. The Project Manager will track the schedule and budget of the work. We utilize several management tools including critical path scheduling, budget projections, and monthly project budget updates, to ensure that high quality deliverables are submitted on time and within budget. For this project, Hazen proposes the following approach to progress reporting:

- **Monthly Progress Reporting** - A monthly Progress Report will be submitted by Hazen. The Progress Report will include information related to work completed that month, work expected for the next month, important upcoming milestones and updates on schedule and budget. The actual percent complete, budget expended and any scope, budget or schedule issues for each task will be included.
- **Monthly Progress Meeting** - Monthly progress conference calls will be attended by the City's Project Manager, Hazen's Project Manager, and key team members as required. The meetings will include discussion of work completed, work planned, and any variances in schedule or cost and potential mitigation efforts.

During the design, Hazen will conduct as-needed meetings with City staff including Engineering and Operations to discuss project progress either in-person or via conference calls utilizing screen sharing software. Meeting minutes will be circulated for concurrence. Hazen also utilizes SharePoint, a web-based application that can integrate with Microsoft Office and can also be used simply for file storage and transfer. It allows for live file editing by multiple parties for more dynamic interaction between the City and Hazen.

Quality Assurance. Hazen adheres to corporate Project Quality Assurance guidelines that outline policies and procedures required for execution of all projects. However, quality doesn't enter our projects simply as a result of any company procedures; it is an attitude within each of our staff about providing the highest quality work to our clients while remaining within our budgetary constraints. To support this commitment, Hazen has developed a Quality Assurance Policy Manual to provide guidance to staff during the execution of projects undertaken by the Firm. The Manual defines our corporate Project Quality Control Program. In accordance with Hazen's QA Policy Manual, QC reviewers should be independent of the design process, so that reviews have a broad perspective. Hazen performs internal QC reviews prior to each submittal to ensure quality deliverables to the City's satisfaction. Hazen also conducts constructability reviews along with safety reviews in accordance with Cal/OSHA standards. Designs will be done in accordance with City of Fullerton Standard Specifications, Standard Specifications for Public Works Construction (Greenbook), and in accordance with local, state, and federal requirements. Built into each budget and schedule is time to complete a quality assurance and quality control review for each project deliverable.

Quality Control Approach



Scope of Work

The scope of work for this project shall be conducted in three phases, as outlined in the RFP. The scope for Phases I and II are included in the proposal, outlined as follows.

Project Management and Administrative Services

Task 1 – Project Management

Hazen will promote efficient communication between Hazen, City of Fullerton, and others as required. For all meetings, Hazen will prepare agendas and meeting minutes. The minutes will be sent to the City within five (5) working days after each meeting. The Project Manager will be accompanied by the appropriate engineering staff or subconsultant representatives necessary to conduct the meetings.

As part of progress payment requests, Hazen will provide documentation of achieved progress.

a. Kick off Meeting

Hazen will meet with City staff to review the scope and approach of the project, identify team members' involvement, and identify project constraints and anticipated long lead items. Hazen will submit a list of existing documentation requests prior to the kick off meeting. At the meeting, Hazen will submit an initial schedule with critical milestones.

b. Coordination Meetings and Reporting

Hazen will coordinate monthly progress conference calls to report on the progress of the project and to discuss any issues that may need to be resolved. The budget for this task includes participation in up to six monthly progress calls and three coordination meetings. Hazen will prepare any figures or other documents that may aid in discussions.

c. Agency Coordination and Permitting

Hazen will coordinate with the OCWD and the City of Anaheim as needed for all required documents, notifications, and permits.

Hazen will identify and prepare a list of all permits and clearances necessary for carrying out drilling, equipping, constructing, discharging, operating, abandoning, and pipe rehabilitation (if applicable) activities. The list will also include the party responsible for obtaining each permit and be included in the preliminary design report (Task 3) and preliminary design memorandum (Task 7). The anticipated timelines for obtaining the permits will be included in the overall project schedule.

The City will issue payments separately for all fees required by the agencies. At a minimum, Hazen will prepare documentation for the following agencies:

i. Division of Drinking Water (DDW)

The City will be the primary contact for DDW. The City will prepare the application for an amended domestic water supply permit and will submit Title 22 water quality data. Hazen will prepare other requirements included in Attachment C of this RFP, including the Drinking Water Source Assessment and Protection report.

ii. National Pollution Discharge Elimination System (NPDES)

Hazen will prepare the necessary documentation to obtain an NPDES permit from the Regional Water Quality Control Board for discharges related to the well drilling and testing. As part of this task Hazen will identify an optimum discharge location and coordinate access to the discharge location.

iii. City of Anaheim

Hazen will coordinate with the Environmental Services Division and submit the well permit application and verification document signed by a state certified hydrogeologist that the new well will not negatively impact an

existing well. During drilling and abandoning activities, Hazen will coordinate with City of Anaheim inspector(s). For pipeline assessment activities, Hazen will coordinate with the City of Anaheim Public Works department as necessary.

iv. **CEQA**

This scope assumes that the City will file a notice of exemption for this project. No time has been budgeted for this task.

v. **OC Flood**

Hazen will coordinate with OC Flood for capacity and timing of discharge for well construction activities, and connection requirement to catch basins.

Deliverables

- List of required permits
- DDW requirements
- NPDES documentation
- City of Anaheim documentation

Task 2 – Research and Field Reconnaissance

a. **Existing documentation review**

Hazen will conduct a desktop review of the existing Well 7 plans and other available data necessary to develop the preliminary design for well destruction and new well construction. Hazen will utilize all available data from the City. In addition to the data and reports from the City, Hazen will obtain and review additional reports and records from local agencies and OCWD, as necessary.

b. **Field Reconnaissance**

Hazen will conduct a site visit to document the existing conditions at the Main Plant site. The investigation will consider site access, location of underground and overhead utilities, potential contaminating sources, construction water resources, discharge water options, and adequate space to drill the new well.

Hazen will prepare and submit a geotechnical investigation including the following tasks:

- **File Review** - Review and summarize available information regarding local conditions for the site surrounding areas including geologic maps and other published reports that may aid in identifying geologic risks. Review published information in the City and our internal files, and available documents at the U.S. Geological Survey and California Geological Survey (CGS) offices/websites regarding local site conditions. Existing geotechnical reports and maps which document geotechnical conditions at the site and its vicinity, and results from previous investigations. Previous laboratory test data will be useful for comparing geotechnical parameters that are generated during our proposed investigation. A careful review and compilation of the existing data and reports will form the basis for our geotechnical/geological understanding of the site, which will be the framework to compile new/additional data at areas with sparse information. With this foundation, it will be possible to focus the available resources for adding new data in the most critical areas.
- **Field Exploration** – Perform geotechnical investigation to characterize the subsurface conditions at the project site. Drill One (1) hollow stem auger boring to a maximum depth of 15 feet below ground surface (bgs) to assess soil conditions and measure the percolation rate near the surface at the selected well location. If refusal is encountered during drilling, the proposed borings will be terminated at shallower depths. Obtain bulk, Standard Penetration Test (SPT) and Modified California soil samples at selected depths (i.e., every 2.5 or 5 feet) from our borings for visual classification and laboratory testing. The boreholes will be backfilled with compacted soil cuttings and surface completion would be performed using cold asphalt patch where asphalt concrete is penetrated. This proposal specifically excludes the assessment of environmental characteris-

tics, particularly those involving hazardous substances at the site. In the event that obviously suspicious subsurface materials are encountered visually or by odor in the geotechnical test boring(s), such boring(s) will be immediately terminated.

- **Laboratory Testing** - We will conduct laboratory testing on the sampled soils to evaluate their engineering properties. This testing may include, but not limited to:
 - Natural Moisture Content & Dry Density of soils (ASTM D2937);
 - Atterberg Limits (ASTM D4318);
 - Grain Size analysis (ASTM D6913);
 - Expansion Index (ASTM D4829);
 - Sand Equivalent (ASTM D2419);
 - Direct Shear (ASTM D3080);
 - R-value (CTM 301); and
 - Corrosion Potential (Caltrans CTM 643, 417, 422).
- **Office Studies** - Review field data and laboratory data and perform engineering analysis for design. Based on the analysis results, prepare a report that includes the results of our investigation and our conclusions and geotechnical recommendations including a site plan, boring logs, laboratory test data, site conditions, geologic conditions, geologic hazards, seismicity, and recommendations for temporary excavations, earthwork, and corrosivity.

Phase I: Well Drilling and Abandonment

Task 3 – Well Drilling Preliminary Design Report

The hydrogeologist will prepare a Preliminary Design Report for Well 7 destruction and Well 7A construction to summarize the data and analysis from Task 2 as well as the basis of the preliminary well design. The PDR will include, but not be limited to, the following:

- A project area map showing the proposed well location with respect to important regional features including existing wells.
- Hydrogeological considerations for drilling and well design (e.g. expected subsurface sediments,

depth to groundwater, aquifer properties, groundwater quality, proximity to surface water sources, and location relative to existing area wells).

- Expected groundwater quality and pumping capacity based in surrounding wells.
- Well research and field reconnaissance results.
- A site plan showing the recommended Well 7A location, overhead electrical lines, sewer lines, nearby manholes, potable water lines, location of nearby storm drains and other site constraints.
- Conceptual well design diagram and description showing the preliminary well depth, casing diameter, casing materials, perforation interval and ancillary piping (i.e. gravel feed tube, sounding tubes, etc.).
- The results of a hydrogeological evaluation of potential pumping interference from operation of the new Well 7A including a map showing potential groundwater level impacts at existing wells within a 1-mile radius.
- Detailed site map for well drilling and construction showing the proposed work area with site ingress/egress, preliminary rig and pipe truck layout, discharge settling tanks, recirculation tanks, discharge piping, proposed discharge location, cuttings disposal, sound walls, and water source.
- Recommended testing and data collection during drilling of the pilot borehole for the well, including downhole geophysical surveys, deviation tests, isolated aquifer zone testing, as applicable.
- A detailed Project schedule from well design through well construction.
- A table of contents for the Technical Specifications including a list of drawings and permits
- Planning-level estimate of construction costs.

In addition to the Well 7A construction preliminary design, the hydrogeologist will include a section in the PDR that addresses the well destruction requirements for the existing Well 7. This section will include a list of required permits as well as a description of the well destruction procedure, as required by the Orange County Health Care Agency and/or the City of Anaheim.

Upon completion, the three hard copies and an electronic copy of the PDR will be submitted in draft form to the City for review and comment. A meeting will be held with the City to discuss the City's comments to the

PDR. Upon addressing comments to the draft PDR, one final stamped and signed PDR will be submitted with three hard copies and one electronic copy to the City.

Deliverables

- Draft PDR (pdf; three hard copies)
- Final stamped and signed PDR (pdf; three hard copies)

Task 4 – Well Drilling and Abandonment PS&E and Bid Assistance

Hazen will not substantially advance into design until the PDR has been accepted by the City.

City will provide the Invitation to Bid, Supplemental Information to Bidders, Sample Agreement and Bonds, and Bid Proposal forms. City will also provide the General Provisions for modifications by Hazen if necessary. Hazen will prepare the Special Provisions, copies of permits, construction plans, final engineer's construction cost estimate, and any other required documents so that the City may bid, award, and complete the Well 7A drilling phase and well destruction of Well 7.

a. Well Drilling and Abandonment PS&E

The hydrogeologist will prepare the detailed Technical Specifications portion of the bid package that describe the processes, tools and procedures for drilling, constructing, developing, and testing of the new Well 7A and destruction of Well 7. The document will be sufficient to enable prospective drilling contractors to provide comparable competitive bids to conduct the work in accordance with the approved design criteria from the PDR. Along with the Technical Specifications, The hydrogeologist will submit a schedule of bid items and a planning-level contractor cost estimate for the work.

The bid package for drilling and well construction, including technical specifications, will be submitted to the City at the 60%, 90%, 100%

completion stages for review and comment in Microsoft Word® format. Upon review and incorporation of the comments, The hydrogeologist will finalize the Technical Specifications and compile all other aspects of the bid package for advertising, including the City's standard bid documents, general provisions, special provisions, and other forms as-needed and provided by the City. It is assumed that the City or others will advertise the bid and distribute the bid package.

b. Bid Assistance

The Hazen Team will provide bid phase services to the City, as needed, during the course of obtaining drilling contractor bids to conduct the work. This work would include:

- Attending the pre-bid meeting with prospective Contractors to view the well site and address questions regarding the Site and Technical Specifications,
- Addressing Contractor questions and preparing bid addenda,
- Reviewing Contractor bid submittals to check for responsiveness and accuracy,
- Evaluating Contractor qualifications, and
- Recommending Bid Award for well drilling and abandonment.

The budget for this task assumes that Hazen will address to up to (10) questions and requests for information (RFIs) and prepare up to two (2) addenda, which will be distributed by the City.

Deliverables

- 60%, and 90% plans (pdf; three 11"x17" hard copies)
- 60% and 90% specifications and cost estimates (pdf; three 8½"x11" hard copies)
- 100% plans, specifications, and cost estimates (pdf; hard copies optional)
- Signed and stamped final plans (pdf; three 24"x36" hard copies; CAD)
- Signed and stamped final specifications (pdf; three 8½"x11" hard copies; MS Word)

- Final cost estimates (pdf; three 8½"x11" hard copies; MS Excel)
- Bid schedule
- Project schedule
- Bid assistance documents, if needed

Task 5 – Well Drilling and Abandonment Construction Services

5a. Pre-construction meeting

The hydrogeologist will participate in the pre-construction meeting with the City and the selected Contractor. The hydrogeologist will prepare the meeting agenda as well as meeting minutes following the meeting.

5b. Daily coordination with the City and Contractor

The hydrogeologist will coordinate all field activity with the City and Contractor, including submittal of daily email progress reports to the City. As needed, The hydrogeologist will provide support to the City to resolve any public complaints (e.g. noise, dust, etc.).

5c. Review of Contractor Submittals

The hydrogeologist will provide one initial review of Contractor submittals and maximum of two follow-up reviews.

5d. Respond to Contractor RFIs

The hydrogeologist will provide support for up to 10 responses to requests for clarifications and RFIs.

5e. Review and Recommend Change Orders

The hydrogeologist will review all Contractor requests for change orders and recommend change orders, as necessary.

5f. Review Contractor Invoices

Review Contractor invoices to verify that the requested payment matches what was recorded by the construction management representative in the field.

After the City selects the drilling contractor, The hydrogeologist will provide on-site observation and oversight

during the abandonment of Well 7 and on-site construction management and data collection during the drilling, construction, development and testing of the new municipal Well 7A. Ben Lewis, California Certified Hydrogeologist, will be the project manager and will oversee all drilling, construction, and abandonment services. The hydrogeologist will have a field staff representative on-site collecting data during all critical activities and we will coordinate with the City to supplement inspection for non-critical site activities.

Subtask 5g: Well 7 Destruction Observation

The hydrogeologist will be on-site to ensure that the Well 7 destruction process is conducted in accordance with the Technical Specifications and Orange County/City of Anaheim requirements. The cost estimate for this task assumes that the destruction process will include bailing, casing perforation, pressure grouting, over-excavation, and cement cap (36 hours).

Subtask 5h: Well 7A Construction, Development and Testing

5.h.1 – Observation during Drilling and Installation of the Conductor Casing

The hydrogeologist will provide full-time on-site observation of the drilling and installation of the conductor casing and sanitary seal for the well. It will be important to verify that the seal is installed to a depth satisfactory to the DDW and City of Anaheim and that the conductor casing and sealing material meet the requirements of the Technical Specifications (12 hours).

5.h.2 – Observation of Pilot Borehole Drilling

The hydrogeologist will provide part-time on-site observation of pilot borehole drilling to log the drill cuttings and identify the depth, thickness and characteristics of aquifers for well screen design. All cuttings will be logged in accordance with the Unified Soil Classification System (USCS). Selected soil samples will be retained for sieve analysis for designing the filter pack. All soil samples will be properly labeled with the client, well number, and each 10-ft depth interval. The budget for this subtask assumes drilling from 50 to 1,400 ft below ground surface at a rate of 10 feet/hour (60 hours).

5.h.3 – Observation during Geophysical Logging

Upon completion of the pilot borehole, The hydrogeologist will provide full-time observation of borehole geophysical logs to provide additional information for well design. It is anticipated that a full suite of geophysical logs will be obtained including resistivity, guard or laterolog, gamma ray, spontaneous potential, and sonic logs. These data will help identify aquifer zone intervals for isolated aquifer zone testing and final well design. The hydrogeologist will also provide observation of a borehole drift (deviation) survey to assess the plumbness of the pilot borehole (8 hours).

5.h.4 – Design and Observation of Isolated Zone Testing

Isolated zones for testing will be selected based on the soil lithologic logs and borehole geophysical logs obtained from the pilot borehole. Recommended zone test intervals for three zones will be submitted to the City for approval via email prior to testing.

The hydrogeologist will provide observation of isolated aquifer zone testing to ensure that each zone is completed to the specified depth, that the seals and filter sand are backfilled properly and to the specified depths, and to monitor groundwater quality during airlifting and pumping. Water levels (both static and pumping) and water quality parameters, including pH, electrical conductivity, sand content, turbidity, specific yield and water temperature, will be monitored by The hydrogeologist staff before and during pumping for each zone. Upon completion of zone testing at each interval, The hydrogeologist will collect groundwater samples for the specified water quality parameters, document and properly store the samples in cooled ice chest containers and deliver them to a laboratory approved by the City for analysis. The cost estimate for this task does not include laboratory analytical costs, which are assumed to be paid directly by the City. Additionally, The hydrogeologist will review and provide an assessment of the aquifer zone testing results (76 hours).

5.h.5 – Observation during Borehole Reaming and Caliper Log

The hydrogeologist will provide part-time onsite observation of borehole reaming in preparation for well construction to ensure that the borehole is straight and plumb and the drilling fluid properties are in accordance with the technical specifications. During reaming, The hydrogeologist will monitor drilling fluid properties and record the amount and type of all drilling fluid additives (i.e., polymers, mud products, etc.). The budget for this subtask assumes drilling from 50 to 1,400 ft at a rate of 10 feet/hour. Well casing and filter pack will be tallied and inspected upon delivery to ensure it meets the requirements of the final design.

A caliper log will be conducted to determine the plumbness of the well. The hydrogeologist will also observe and analyze the caliper log following the borehole ream to assess the final borehole diameter prior to well construction (46 hours).

5.h.6 – Observation during Well Construction

The hydrogeologist will provide full-time onsite observation of the well construction process to ensure that the well is constructed to the depths and screened intervals specified in the final design letter. Casing and screen tallies will be maintained prior to and during well construction. A sample of the delivered filter pack will be tested in-house for grain size distribution analysis to ensure that the delivered filter pack matches the design prior to installation. The hydrogeologist will track filter pack volumes during installation and record the final sounding depth of the top of the filter pack in the annular space of the well borehole. The hydrogeologist will monitor final drilling fluid properties before the drilling fluid circulation is stopped before well construction. Cement grout and other sealing materials will be checked for compliance with the technical specifications. The budget for this task assumes the well will be completed to 1,400 ft bgs.

5.h.7 – Observation during Initial Mechanical Development by Airlift and Swab

The hydrogeologist will provide part-time observation during mechanical well development by airlift and swab to ensure that the entire screened interval is swabbed and the discharge is free and clear of drilling mud and suspended sediment prior to pump development. The budget for this task assumes part-time observation of up to 72 hours of Contractor development time. In the event that it is determined that additional airlift and swab hours are necessary to fully develop the well, The hydrogeologist can provide observation for the additional development on a time-and-materials basis at the unit billing rates provided in Table 1 (48 hours).

5.h.8 – Observation during Pumping Development

The hydrogeologist will provide part-time observation during pumping development to ensure that the discharge is free and clear of suspended sediment and the specific capacity is stable prior to pumping tests. The budget for this task assumes full-time observation of up to 60 hours of Contractor pumping development (64 hours).

5.h.9 – Observation and Data Collection during Step-Drawdown Pumping Test

The hydrogeologist will provide full-time onsite data collection services during both step-drawdown and constant rate pumping tests for Well 7A. The step-drawdown test will be conducted at a minimum of three different pumping rates (i.e. steps), with a total test duration of nine hours. The test will provide information on well efficiency, specific capacity, and optimum discharge rate. The results of the step-drawdown test will be used to determine the discharge rate for the constant rate test (10 hours).

5.h.10 – Observation and Data Collection during 24-hr Constant Rate Pumping Test and Flowmeter (Spinner) Test

The hydrogeologist will provide full-time onsite observation and data collection during one 24-hr constant rate test to monitor groundwater levels and discharge rates to ensure representativeness of results. Monitoring will include up to four hours of post-pumping

groundwater level recovery monitoring. The constant rate test will provide information for the long-term operation of the well including the design discharge rate and pump setting. Upon completion of the constant rate test, The hydrogeologist will collect groundwater samples for Title 22 analysis. The hydrogeologist will coordinate with the Contractor and the City to obtain the proper sample containers and arrange delivery to the site. The hydrogeologist will also deliver water quality samples to a laboratory approved by the City upon collection. The cost estimate for this task assumes that laboratory costs for the analysis will be paid directly by the City.

The budget for this task assumes the flowmeter (spinner) survey will be conducted during the 24-hr constant rate test. Following the completion of the pumping test, The hydrogeologist will prepare a letter report summarizing the pumping test results that will include, but not necessarily limited to, a recommended long-term discharge rate, pump setting, the pump design, and historical high and low static water levels compared to the current static water level (32 hours).

5.i – Design of the Filter Pack and Screen Including Sieve Analysis of Formation Samples

The hydrogeologist will perform a grain size distribution analysis with selected soil samples from the pilot borehole drilling in order to design the filter pack for the well. Selection of the filter pack will determine the slot size for the well screen. It is assumed that sieve analysis will be conducted on up to eight samples. We will also analyze the borehole lithologic logs, geophysical logs, isolated aquifer zone test results, and grain size distribution analyses to determine the final filter pack gradation, screen slot size, and screened intervals for the new well. Upon completion, the recommended well design of the casing, screen, filter pack and annular seal will be submitted to the City via letter report for review and approval. Upon approval, the final recommended well design will be submitted to the drilling contractor for procuring well casing and filter pack.

5.j – Prepare As-Built Construction Drawings

The hydrogeologist will prepare an as-built construction drawing of the completed Well 7A, as constructed.

The drawing will be incorporated into the final well completion report.

5.k – Prepare Pumping Test Summary and Recommended Well Design Letter Report

Upon completion of pumping tests, The hydrogeologist will prepare a pumping test summary report that includes the data collected during the pumping tests, pumping test charts, and recommendations for the design discharge rate and pump setting for the permanent pump.

5.l – Preparation of Well Construction Report

The hydrogeologist will prepare a summary report describing the results of the construction, development and testing of Well 7A. At a minimum, the report will include:

- The background and purpose for the replacement Well 7A,
- Documentation of the drilling and testing methodology,
- Borehole lithologic and geophysical logs,
- Isolated aquifer zone testing results,
- A description of the final well design, including an “as-built” diagram of the well,
- Analysis and results of the mechanical and pumping development,
- Analysis and results of the pumping tests,
- Groundwater quality results,
- Recommendations for optimum discharge rate, pump setting, and pump design, and;
- Summary of all site operations and construction.

It is assumed for cost estimating purposes that one draft version of the well completion summary report (80%) will be submitted to the City in pdf format via email for review and comment. One final version will be submitted after addressing the City’s comments (three hard copies with electronic files in pdf format for the entire report; all data tables, borehole logs, and graphics will be submitted in native digital formats).

5.m– Demobilization and Site Close-out

This task includes on-site observation of the drilling contractor’s demobilization and final clean-up of the site. The hydrogeologist will be onsite to ensure that the well is secured from entry and the Site is returned to a condition satisfactory to the City.

Task 5n – Optional Tasks

Subtask 5.n.1 – Observation of Test Pump Mobilization and Installation in Well 7A

As needed, the hydrogeologist will provide observation services during the mobilization and installation of the test pump to be used for development pumping/surging and pumping tests. Observation during installation will ensure that the specifications of the delivered pump and associated equipment are in accordance with the technical specifications and that the pump is installed to a depth in accordance with the technical specifications and acceptable to the City.

Subtask 5.n.2 – Observation of Alignment Survey, Video Survey and Disinfection

As needed, the hydrogeologist will provide final observation of Well 7A closeout activities that are typically included in our Technical Specifications, including a final well alignment survey, completion video survey, and final disinfection.

Phase II: Well Equipping and Distribution Pipeline Assessment

Hazen will not substantially advance into Phase II until the well drilling activities have been completed to the satisfaction of the City or by written authorization from the City.

Task 6 – Distribution Pipeline Assessment

6.a – Level 1 Distribution Pipeline Assessment

Hazen will perform a Level 1 desktop analysis of the distribution pipeline leaving Main Plant onto Harbor Blvd. A Level 1 desktop analysis includes investigating pipe characteristics such as age, material, profile, working and surge pressures, known coatings or linings,

historical operational issues and changes, line breaks, and any information (pictures, measurements, etc) observed during pipe repairs. Hazen will work with the City to identify operational deficiencies, such as inability to operate at the desired pressure range and deliver the capacity required by the City. Initial recommendations for pipeline replacement and/or rehabilitation will be summarized and presented to the City for review.

Based upon the results of the Level 1 analysis, in conjunction with the City it will be determined if further assessment is desired, at which time a Level 2 field analysis can be initiated utilizing ePulse® technology.

Task 6 – Optional Tasks

6.b – Level 2 Distribution Pipeline Assessment

Hazen will coordinate with the City of Anaheim and Caltrans as needed to complete Level 2 pipeline assessment utilizing ePulse® technology.

This non-destructive technology can identify the condition of both distribution and transmission mains, while simultaneously searching for leaks, without the need for large excavations or service disruptions.

The ePulse® technology uses acoustic signals and advanced computer algorithms to assign a grade of good, moderate or poor based on the actual condition of the pipe segment. Knowing the actual condition of these buried assets will enable the City to optimize its replacement programs.

The field investigation will determine the locations of any leaks identified, average minimum remaining structural wall thickness over each test length, the percentage of wall thickness loss to date, and a qualitative description of the likely condition of the piping.

Hazen will prepare a summary report detailing the findings of the assessment and recommendations for replacement, spot repair, or other rehabilitation measures.

Task 7 – Well Equipping and Pipeline Assessment Preliminary Design Memorandum

Hazen will prepare a preliminary design memorandum (PDM) that is based on the data collected and reviewed. Hazen will arrange to meet with City's O&M staff to receive input regarding system insights, preferred manufacturers, and desired operating characteristics.

The PDM will include the following:

- List of technical specifications; drawings; permits
- Updated Well 7A preliminary design and site plan
- Hydraulic calculations including impact to overall water distribution system. Evaluate need for variable frequency drive (VFD).
- System integration with Main Plant operations
- Estimated construction costs
- Projected schedule
- Existing pipeline condition assessment
- If necessary, recommended method for pipeline rehabilitation and/or pipeline expansion. No repairs, spot repairs, and complete pipeline replacement are all options that will be analyzed. Provide estimated construction costs and service life for each method considered.

7.a – Prepare Preliminary PDM

Three hard copies and an electronic copy of the PDM will be submitted for City review. Hazen will meet and coordinate with City staff during preparation of the PDM.

7.b – Prepare Final PDM

The PDM will be finalized based on discussions and comments from City review of the Draft PDM. Three hard copies and an electronic copy of the final stamped and signed PDM will be submitted to the City.

Section 3

Relevant Experience



Section No. 3

Relevant Experience

The Hazen Team has the experience and expertise to deliver the hydrogeological and engineering services needed for this project.

Hazen offers significant experience in hydrogeological evaluation and groundwater supply development, well design and equipping, and pipeline assessment and design. Key team members have over 50+ production well design experience within the last 10 years, as highlighted in the table below.

Client	Project	Role	Year	Notes
RCWD	Well 309 Building Analysis	Prelim. Study	Current	Well building retrofit evaluation
Modesto	Well 274 Replacement	Design	Current	One (1) well
Kingman, AZ	Well 10 Equipping	Design	Current	One (1) well
Beverly Hills	Maple Yard Wells	Start-up, DDW	Current	Two (2) wells in const
CDA	Phase 3 Expansion	Program Mgmt	Current	Two (2) wells in const
Beverly Hills	La Brea Groundwater Project	Prelim. Design	2017	Three (3) wells
Santa Ana	Well 29 Analysis	Prelim. Study	2017	One (1) well
Coachella Valley	Cr6 Treatment Facilities	Design	2016	Thirty (30) well sites
Bellflower	High Capacity Well	Design	2015	One (1) well
San Bernardino	Raub 4-R and Raub 5-R	Design	2015	Two (2) wells
South Coast	GRF Well #2	Design	2014	One (1) well
Hi-Desert	Well 20w	Design	2014	One (1) well
Mojave Water	R3 Project	Design	2013	Six (6) wells
IRWD	Wells 21 and Wells 22	Design	2012	Two (2) wells
CDA	Phase 1 and Phase 2 Expansion	Design	<2012	Eleven (11) wells
OCWD	Groundwater Storage Program	Design	<2012	Eight (8) wells
MNWD	Well 31	Design	<2012	One (1) Well
Downey	Well 27 and 28	Prelim. Study	<2012	Two (2) wells
Empire Land	Hesparin Well 33	Prelim. Study	<2012	One (1) well
Highland Fairview	Aquabella Wells	Design	<2012	Two (2) wells

In addition, we are partnering with Tom Harder Company, bringing another 100 wells experience to the table for the City, including recent work at the City's Main Plant Well No. 5. The best reasons for selecting our team come from our clients, who are your colleagues. We encourage the City to contact our references to hear about the quality of our work and our services. The following projects and references demonstrate our technical expertise, project management capabilities, and client services on similar projects.

*Bellflower High Capacity Well

City of Bellflower

Bellflower, CA



The Bellflower High Capacity Well project included preparation of a siting study, preliminary design report, final engineering design, and construction management and inspection services for the well drilling and equipping of the City's new high-capacity groundwater well. The well was designed to produce 3,500 gpm. The well is equipped with a 400 HP variable frequency drive-driven vertical turbine well pump enclosed in a building for noise mitigation and well security. The project included design of a sodium hypochlorite disinfection system, backup generator, and HVAC. Noise mitigation was a key issue for this project, with sound dampening design for the building and emergency backup generator. Some Key Features include:

- Developed three (3) alternatives for the improved site
- Final design of 3,500 gpm well
- Construction management, inspection, and start-up assistance

Team

Cindy Miller, *PIC*

Steve Conner, *Proj. Mgr.*

Project Duration

2009-2013

Project Fee

\$550,000

Client Reference

Steve Bucknam

Project Manager

City of Bellflower

(Contract PM)

16600 Civic Center Drive

Bellflower, CA 90706

(949) 363-6461

steve@bucknam.net

Key Features

- Developed three (3) alternatives for the improved site
- Final design of 3,500 gpm well
- Construction management, inspection, and start-up assistance

**This project was performed by key team members while working with another firm.*

Team

Cindy Miller, *PIC*
Steve Conner, *Proj. Mgr.*

Project Duration

2014-2016

Project Fee

\$918,000

Client Reference

Ned Sciortino, VP
Development Hillwood
Investment Properties
1350 South E Street
San Bernardino, CA 92408
(909) 382-21631
Ned.Sciortino@hillwood.com

Key Features

- Preliminary design
- Final design (well equipping, site layout, pipelines)
- Construction management, inspection, and start-up assistance

***Raub 4-R and Raub 5-R Well Replacement Project**

City of Riverside

San Bernardino, CA



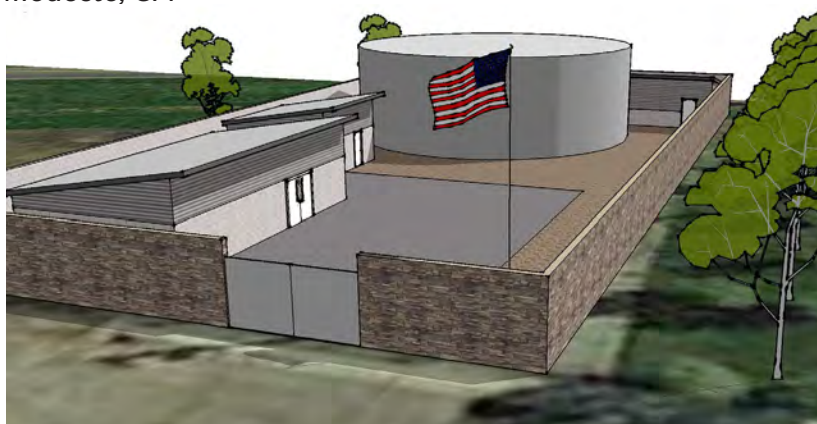
Provided engineering design and construction management services for the Raub 4-R and Raub 5-R Well Replacement Project which involved relocation of two existing production wells to make way for construction of a large warehouse. This time-critical project involved construction of two new wells prior to destruction of the existing wells, all of which occurred under clear and immovable deadlines on the part of the developer. The project included the drilling, equipping, and testing of two ground-water extraction wells (Raub 4-R and Raub 5-R) with disinfection of both wells; installation of discharge and pump-to-waste pipelines for two new wells and existing Raub 7; and installation of a pre-lube system, abandonment of three wells, and demolition of two wells. In addition, electrical improvements, approximately 4,400 linear feet of 12", 20", and 24" DIP pipelines, approximately 1,300 linear feet of 20" CML&CMC bypass line, conduits, and equipment to handle or carry raw water to a nearby treatment facility was also provided. Portable emergency generator receptacles were installed at each well. The project team coordinated with the developer, the City of Riverside, the City's hydrogeologist, and the drilling and equipping contractors to accomplish the project goals and provided technical specifications, bidding support, construction management, design, and inspection services. Both wells were successfully constructed, developed, and tested at production rates of up to 5,500 gpm.

**This project was performed by key team members while working with another firm.*

Well 274 Replacement Project

City of Modesto

Modesto, CA



Well drilling and well equipping design to replace Well 274, originally installed in 1967. The well requires replacement due to excessive sanding, and being pulled water from a shallow aquifer impacted by nitrates at concentrations exceeding the MCL. The project includes site design for a future reverse osmosis treatment system and storage tank.

Team

Kent O'Brien, *Project Manager and Geohydrologist*
Steve Conner, *Well Equipping Lead*
Chris Thunhorst, *Electrical, I&C*

Project Duration

2017-Current

Project Fee

\$300,000

Client Reference

Robert Davalos, PE
Associate Civil Engineer
City of Modesto
1010 10th Street
Modesto, CA 95354
(209) 571-5869
rdavalos@modestogov.com

Key Features

- Well equipping design
- Well site layout design

*La Brea Subarea Groundwater Supply

City of Beverly Hills

Beverly Hills, CA



Developed a comprehensive Preliminary Design Report (PDR) to expand local water supply by developing local groundwater in the La Brea Subarea. The project includes developing approximately 1,700 acre-feet per year (AFY) of new potable water supply from local groundwater in the La Brea Subarea of the Central Groundwater Basin by drilling new wells. As part of the project, the team oversaw construction of a pilot well to verify water quality and production, as well as performed CCTV inspection of an abandoned watermain to assess condition and evaluate alternative rehab methods for use as the proposed well discharge transmission main. The production wells were optimally located to provide the highest sustainable groundwater production, on sites that can be permitted by Division of Drinking Water. Conveyance facilities (20,000+ LF) from the well sites to the City's existing reverse osmosis water treatment plant.

**This project was performed by key team members while working with another firm.*

Team

Cindy Miller, *PIC*
Steve Conner, *Well Equipping Lead*
Tori Yokoyama, *Project Eng.*
Alex Rahimian-Pour, *DDW Coordination*

Project Duration

2016-2017

Project Fee

\$700,000

Client Reference

Vincent Chee
Project Manager
City of Beverly Hills
345 Foothill Road
Beverly Hills, CA 90210
(310) 285-2521
vchee@beverlyhills.org
malloy@irwd.com

Key Features

- Comprehensive preliminary design report
- Provided well equipping and site layout preliminary design for two (2) well sites
- Project completed on schedule and on budget



Leakage Reduction Project for California American Water/California Energy Commission

California American Water

Los Angeles, San Diego, and Ventura, California Service Areas

Hazen is working with CalAm on this \$1.5M project funded by California Energy Commission called “Demonstrating Innovative Leakage Reduction Strategies: Correlating Continuous Acoustic Monitoring, Satellite Imagery and Flow Sensitive Pressure Reducing Valve Systems.” This large scale pipeline assessment project deployed multiple pipeline assessment, leak detection, and leak prevention technologies in California American Water systems in Los Angeles, San Diego, and Ventura. Technologies were deployed over a 12-month duration. Tasks included coordinating field work conducted by vendors and California American operations staff, logging and maintaining field results, developing a graphical user interface to track technologies and leak reporting, working with vendors to improve technologies, and preparing a final report.

Main Plant Well No. 5 Condition Assessment and Rehab

City of Fullerton, CA

Fullerton, CA

The City of Fullerton’s Main Plant Well No. 5 is an aging well constructed in 1959. After detecting bacteria in the discharge from the well, the City retained Thomas Harder & Co. (TH&Co) to investigate the source of the bacteria and develop a program to mitigate it. TH&Co conducted an initial evaluation and condition assessment through a review of well records, water quality data, and downhole video logs. Based on the review, TH&Co developed a well rehabilitation program that included:

- Removal of existing pump
- Complete removal of oil floating on the groundwater in the well
- Brushing of the casing and perforations
- Enhanced chlorine disinfection
- Airlift and swab development

TH&Co provided on-site observation of all well rehabilitation work.

Team

Tori Yokoyama, *Project Manager*

Project Duration

2017-2018

Project Fee

\$1.5M

Client Reference

Ben Stanford, Ph.D.
Senior Director, Water Intelligence
Technology and Innovation
Division
American Water
(office) 856-727-6232
(cell) 646-599-3164
Ben.Stanford@amwater.com

Key Features

- Pipeline assessment
- Leak prevention and rehabilitation methods evaluation



Team

Tom Harder, *Hydrogeologist*

Project Duration

2017

Project Fee

\$23,500

Client Reference

Ms. Tiffany Foo
City of Fullerton
303 W. Commonwealth Ave.
Fullerton, CA 92832
(714) 738-6321
TFoo@cityoffullerton.com

Key Features

The rehabilitation program was successful at mitigating the bacteria in the groundwater from the well. The City is currently re-equipping the well with a new pump.

Team

Tom Harder, *Hydrogeologist*

Project Duration

2010-2018

Project Fee

\$414,000

Client Reference

Mr. John Daverin
Eastern Municipal Water District
2270 Trumble Road
Perris, CA 92572-8300
(951) 928-3777 ext. 4584
daverinj@emwd.org

Key Features

2,000 gallons per minute, respectively. Well 96 was successfully constructed with a design discharge rate of 1,000 gpm. Well 94 was successfully constructed with a design discharge rate of 1,500 gpm. Discharge water from each well was suitable for direct supply to the Reverse Osmosis desalter plant.



Hydrogeological Services for the Drilling and Construction of Four Perris II Desalter Brackish Water Wells

Eastern Municipal Water District, CA

The Eastern Municipal Water District is in the process of increasing its water supplies through the development of groundwater impacted by high salts from historical agricultural activities. TH&Co has played a key role in developing this resource through initial hydrogeological studies of the Perris Basin, well siting analysis, initial test drilling, and assistance with permits from both the California Department of Drinking Water and Regional Water Quality Control Board.

Since 2010, TH&Co has been providing well design and construction management support for the drilling, construction, and equipping of the desalter wells. This work has included:

- Preparation of detailed technical specifications for four high capacity brackish water production wells.
- Site inspection during drilling, geophysical logging, isolated aquifer zone testing, well construction, well development, pumping tests, and project closeout (disinfection, final video and alignment testing) of three of the production wells.
- Development of final well designs for three wells based on analysis of lithologic logs, geophysical logs, sieve analyses, and isolated aquifer zone testing
- Preparation of reports summarizing the work.

Wells 93 and 95 were successfully constructed with design discharge rates of 2,500 and

Section 4

Key Personnel



Section No. 4

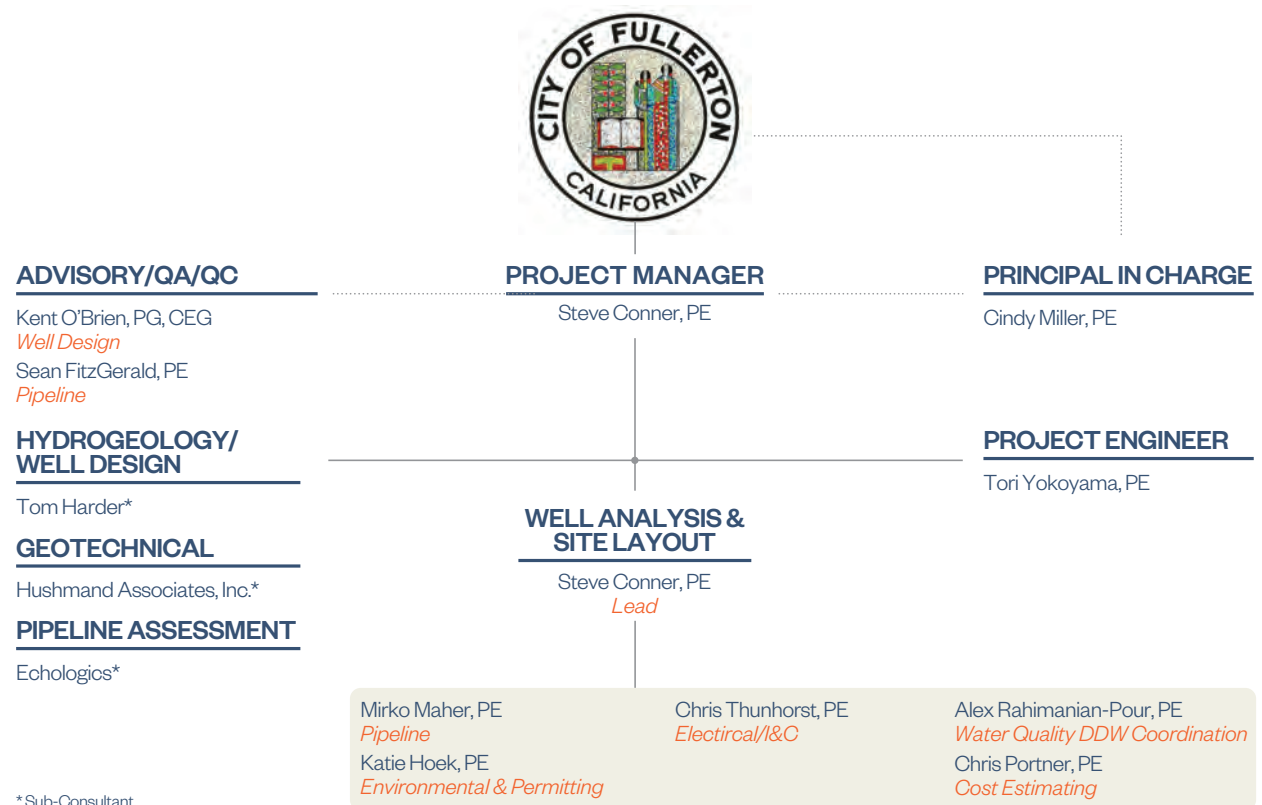
Key Personnel

We have assembled a team of highly qualified professionals with local experience working collaboratively to deliver well design and equipping projects.

Our project team has been assembled based on the project needs and the team members' qualifications.

1. Hazen will partner with Tom Harder, who is integral to the project through his unmatched knowledge of local hydrogeology and the City's groundwater system. Hazen's team has had a strong working relationship with Tom Harder for 20 years.
2. Our proposed team has worked together on numerous local projects, which results in both high quality and cost-effective projects, with a deep understanding of local conditions supplemented by technical expertise and a bench of resources located throughout California.
3. The firm's culture has been to avoid the creation of unnecessary management, administration, and marketing layers, thus minimizing excessive overhead and total costs to the project.

This section outlines the Hazen Team organizational structure, as well as the qualifications and responsibilities of our team's key members. This indicates reporting/accountability relationships and proposed points of contact for interaction with City staff. In addition, we propose to subcontract Echologics for Pipeline Field Assessment and HAI Geotechnical for geotechnical services whom Hazen has worked with on a variety of projects in California.





Steve Conner, PE

Project Manager / Well Analysis & Site Layout

Steve is a professional civil engineer with 22 years of experience in the planning and design of water and wastewater infrastructure including production wells, storage tanks, treatment systems, pipelines, booster stations, lift stations, and sewer facilities. Steve specializes in complex pumping and piping system layout, hydraulic design, groundwater supply and treatment design, and construction phase assistance including start-up and operation of pumping and treatment facilities. Steve coordinates all engineering support disciplines (civil, architectural, structural, process, mechanical, electrical, and I&C) during project design and construction phases.



Cindy Miller, PE

Principal-in-Charge

Cindy has been responsible for delivering some of the largest groundwater supply projects in Southern California over the past two decades. Her experience includes well siting evaluations, well equipping mechanical and civil layouts, hydraulic analysis and pump selection, operational control strategies, wellhead disinfection, and wellhead treatment analysis and design.



Kent O'Brien, PG, CEG

Advisory/QA/QC

Kent has over 26 years of experience specializing in the design and construction groundwater production systems with hands-on experience in field operating procedures and data collection programs required for aquifer testing and water treatment pilot testing. He also has comprehensive knowledge of drilling techniques, well design, well installation, aquifer tests, groundwater monitoring programs, and sampling procedures. Due to the specialized nature of well design, Kent will serve as a quality control reviewer the well design portion of the project.



Sean FitzGerald, PE

Advisory/QA/QC

Sean FitzGerald has 25 years conveyance experience and currently serves as Hazen's Conveyance Practice Leader. He has extensive experience in all stages of sanitary and storm sewer collection and distribution system planning, operation and detailed design. A long-standing member of the Water Environment Federation Collection System Committee, he served as Vice Chair and co-authored two of the leading Manuals of Practice, including FD-6 Exiting Sewer Evaluation and Rehabilitation and FD-17 Prevention and Control of Sewer System Overflows.



Tom Harder, PE

Hydrogeology/Well Design

Tom Harder is a Principal Hydrogeologist with more than 28 years of experience on a wide range of groundwater projects. Tom is supported by a staff of seven geologists and geoscientists based locally in Anaheim, California with extensive experience in well drilling observation, well design and construction oversight/inspection, project management services, groundwater sample collection, groundwater quality analysis, and groundwater modeling.



Tori Yokoyama, PE

Project Engineer

Tori is experienced in project management and design of water and sewer pipelines in City streets. His background includes both the design of new facilities, as well as rehabilitation of aging existing facilities. Tori is a detailed, hands-on engineer that understands how to efficiently move a project forward from start to finish.



Mirko Maher, PE

Pipeline

Mirko is a civil engineer with comprehensive infrastructure experience in planning, design, and construction management of water and wastewater infrastructure, including treatment, conveyance and pipeline facilities. Over the past 18 years Mirko has delivered solutions to municipal clients nationally specializing in infrastructure rehabilitation and new construction. Mirko has a very strong background in pipeline assessment, rehabilitation methods, trenchless technologies, and alternative analysis for pipeline design and construction.



Alex Rahimianian-Pour, PE

Water Quality DDW Coordination

Alex serves as Hazen's Senior Principal Engineer in Irvine, California Office. He has over 22 years of experience in water and wastewater treatment. Alex's project experience has focused on water quality evaluation, water treatment, wastewater treatment, and recycled water treatment planning, design, implementation, and optimization for various municipal and industrial water works.



Katie Hoek, PE

Environmental & Permitting

Katie is committed to shepherding projects through federal, state and local environmental review processes and ensuring all project permits are properly identified, tracked and obtained. She works closely with regulators and approving agencies to facilitate project designs that are responsive to applicable requirements, plans and laws. She is experienced in stakeholder facilitation and works with the design team to address stakeholder concerns and preferences. She has prepared environmental reviews under NEPA and CEQA and regularly works with federal (USACE, USFWS, FEMA) and state agencies. Katie brings a strong background in the preparation of CEQA Plus documents. She was involved in the CVWD Cr6 EIR and CWD Cr6 Mitigated Negative Declaration.



Chris Thunhorst, PE

Electrical/I&C

Chris serves as Hazen's Electrical and Instrumentation Group Leader for the West Region. Chris has over 17 years of experience in electrical engineering for building systems, water and wastewater treatment facilities, and pumping stations associated with water distribution and wastewater collection systems.



Chris Portner, PE

Cost Estimating

Chris is a Civil Engineer with experience in process engineering, wastewater treatment plant design, cost estimating and construction management. He has performed cost estimating from planning level through construction for both water and wastewater projects, including conveyance and treatment facilities. Chris is an AACEi Certified Estimating Professional.



Hushmand Associates, Inc.

Geotechnical

Hushmand Associates, Incorporated (HAI) was founded in 1990 by Dr. Ben Hushmand, P.E., and established as a State of California Corporation on July 8, 1999. HAI is a geotechnical, environmental, earthquake, materials testing and specialty inspection engineering firm with more than 20 years of successful project experience. The company consists of a team of engineers, geologists, laboratory technicians, and specialty technicians with unparalleled capabilities and experience in design and construction in the following areas: public works, transportation, industrial buildings, water resources, infrastructure, utilities, oil refineries, landfills, and commercial/residential developments involving conventional and specialty geotechnical and earthquake engineering.



Echologics

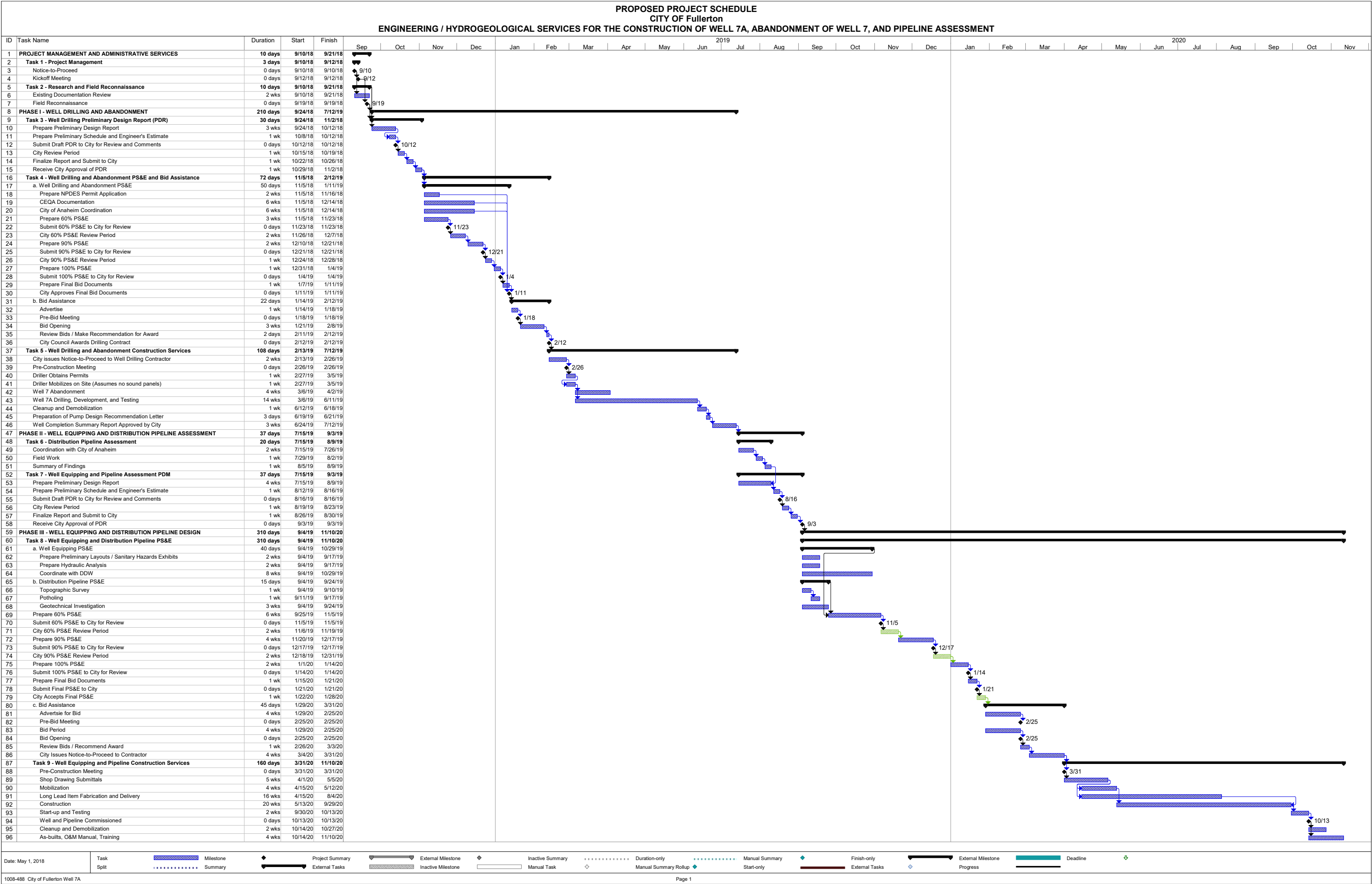
Pipeline Assessment

Founded in 2003 as a result of joint research with the National Research Council of Canada, Echologics pioneered the development of advanced acoustic technologies, products and services that enable non-invasive diagnostics of water utility pipeline infrastructure, including leak detection, pipe condition assessment and water loss management. Echologics has enabled municipalities, water utilities and industrial businesses across North America, Europe, Middle East, Asia and Australia to boost water infrastructure efficiency, reduce costs and prioritize capital spending.

Section 5

Project Schedule





Appendix A

Resumes





Steven Conner, PE

Well Equipping & Site Layout

Mr. Conner is a professional civil engineer with 22 years of experience in the planning and design of water infrastructure including production wells, pipelines, storage tanks, treatment systems, and booster stations.

Education

BS, Civil Engineering/Water Resources, University of California at Irvine

Certification/License

Professional Engineer: CA

Transportation Worker Identification Credential (TWIC), California, 2011

Areas of Expertise

- Well Equipping Design
- Pipeline Design
- Trenchless Pipeline Rehabilitation and Installation
- Planning and design of major water and wastewater facilities
- Pump station design
- In-depth evaluation of system requirements for proposed new facilities as well as for rehabilitation, upgrade, or replacement of existing pump stations

Experience

- 22 years

Professional Activities

American Society of Civil Engineers, Member

Mr. Conner is responsible for project management, design supervision, contract administration, client interaction and development, and personnel management. His expertise includes: complex pumping and piping system layout, hydraulic design, groundwater supply and treatment design, and construction phase assistance including start-up and operation of pumping and treatment facilities. Mr. Conner coordinates all engineering support disciplines (civil, architectural, structural, process, mechanical, electrical, and I&C) during project design and construction phases.

Bellflower High Capacity Well, City of Bellflower, Bellflower, CA

Project Manager. Prepared a preliminary design report and provided final engineering design and construction management and inspection services for the well drilling and equipping of the city's new high-capacity groundwater well. The well is designed to produce 3,500 gallons per minute of high-quality groundwater to replace a large portion of the city's water supplies. Electrical design services included a motor control center, a variable-frequency drive for the well pump, interior and exterior lighting, an automatic transfer switch, and an emergency diesel-fueled generator. Control design included preparation of process and instrumentation diagrams and specification of control components to provide consistency with control components installed in existing city facilities. Provided engineering support during testing and start-up of the well.

Raub 4-R and Raub 5-R Well Replacement Project, Hillwood Properties San Bernardino, CA

Project Manager. Provided engineering design and construction phasing for the Well Replacement Project, which included the drilling, equipping, and testing two ground water extraction wells, Raub 4-R & Raub 5-R, with disinfection of both wells. The project also included installation of discharge and pump-to-waste pipelines for Raub 4-R, Raub 5-R, and existing Raub 7, to carry raw water to a nearby treatment facility and detention pond; approximately 4,400 linear feet of 12-inch, 20-inch, and 24-inch DIP pipelines; approximately 1,300 linear feet of 20-inch CML and CMC bypass line; installation of a gravity pre-lube system; abandonment of three wells; demolition of two wells; electrical improvements; conduits and wiring; and emergency generator connections at each well.

Wells 21 and 22 Wellhead Facilities and Pipelines, Irvine Ranch Water District, Tustin, CA

Task Manager. Task manager responsible for the design of the wellhead facilities and untreated water pipeline. Deliverables included plans, specifications and engineers estimates of probable construction costs for each the wellhead facilities and all pipelines. Well 21 and Well 22, with capacities of 3,300 gpm and 1,600 gpm respectively, are submersible turbine pump / motor assemblies, installed within vaults, and one well is equipped with a bladder-type surge tank. Project included 7,000 ft. of 24-inch steel untreated water pipeline, 13,000 feet of 36-inch steel product water pipeline and 1,700 LF of 10-inch HDPE brine concentrate pipeline. The pipelines required jack-and-bores to cross the OCTA Metrolink train tracks, an Orange County Flood Control District channel, BNSF train tracks, a box culvert, and Peter's Canyon Channel.

Mojave Water Agency Regional Recharge and Recovery (R3) Project, San Bernardino County, CA

Design Manager - Wells, Pump Station, Recharge Facility, Turnout Facilities, Reservoirs, Disinfection System, and pipelines. Mr. Conner provided engineering services to the Mojave Water Agency for the Regional Recharge and Recovery (R3) Project, a high-profile water supply project in San Bernardino County. The project will ultimately recharge up to 40,000 acre-feet per year of State Water Project water into the Upper Mojave River flood plain for later distribution to member agencies. The Phase I project included construction of six wells to extract up to 15,000 acre-ft per year, over 16 miles of 12-inch to 48-inch diameter pipe, a 2.65 MG welded steel reservoir, a flow control and recharge facility with 40,000 gpm capacity and up to 235 psi pressure drop, a pump station sized for 25,000 gpm with pumps installed to provide 15,000 gpm, and four turnout flow control facilities for delivering the water to member agencies.

Installation of Replacement Well to Improve Water Quality Using In-Well Blending for Small Disadvantaged Community, Modesto, CA

Well Equipping Lead. Designing a replacement well for the City of Modesto on behalf of the City of Grayson. The existing Well 274 is one of two wells that are the only source of municipal water for the City of Grayson's approximately one thousand residents. The existing Well 274 is shallow and extracts groundwater from the upper portion of the aquifer system degraded by nitrate at concentrations exceeding the MCL. The intent of this project is to design and install a well with two screen sections to extract and blend contaminated and uncontaminated water to meet MCL requirements. The Project also includes consideration of space and utility upgrades for a future treatment system and / or storage tank. To this end, the concept-level design considers a future Reverse Osmosis (RO) treatment plant or application of emerging technology for the biological treatment of nitrate.

City of Santa Ana Well 29 Improvements Alternatives Analysis, Santa Ana, CA

Project Manager. The City of Santa Ana owns and operates Well 29, located at the southeast corner of Flower Street and First Street, adjacent to City owned tennis courts. Well 29 pumps directly to an existing 8 MG reservoir. The existing well site includes the well head and discharge piping assembly, control equipment, a chlorination system in a building, and an SCE transformer. An alternatives analysis was conducted to recommend upgrades at the site including site improvements, structural, mechanical, and electrical upgrades. Highlights of the study include developing three (3) alternatives for the improved site, providing 3D renderings for each site alternative, and developing a preliminary opinion of probable cost for the design and construction of each alternative discussed. The City is moving forward with implementing the recommended alternative from this analysis.



Sean FitzGerald, PE

Advisory/QA/QC - Pipeline

Education

M.S. Environmental Engineering,
University of Cincinnati

B.S. Civil Engineering, University
of Cincinnati

Certification/License

Professional Engineer

NASSCO PACP Certification

BAM-I Asset Management
Certification

Areas of Expertise

- Asset management
- Water and sewer master planning
- Hydraulic analysis
- Pipe and pump station design
- Sewer assessment and rehabilitation

Professional Activities

Water Environment Federation –
Collection System Committee

OWEA Collection System
Committee

American Water Works
Association

North American Society
for Trenchless Technology

Kentucky - Tennessee Water
Environment Association

Mr. FitzGerald currently serves as Hazen's Conveyance Practice Leader. He has 27 years of extensive conveyance experience in all stages of collection and distribution system planning, operation and detailed design. He has led numerous small and large diameter sewer condition assessment and rehabilitation projects including evaluations for wet weather capacity involving complex geometries and difficult structural conditions.

Sliplining Standard Specification Update, Los Angeles Bureau of Engineering, CA

Technical lead for the update of the City's standard specification for slipline grouting and temporary odor control.

Piscataway Creek Sewer Basin Comprehensive Study, WSSC, Laurel, MD

Provided technical assistance on the comprehensive assessment of the Piscataway drainage basin. The basin includes over 390 miles of sewers ranging from 6 to 120 inches in diameter. Additional project components included flow monitoring, sewer CCTV inspection, manhole inspections, exposed sewer inspections, hydraulic modeling, GIS, and rehabilitation cost estimating. This project was conducted to meet the requirements of the Consent Decree.

Dorchester Brook Sewer Rehabilitation, Boston Water and Sewer Commission, MA

Provided technical assistance and rehabilitation planning for the condition assessment and rehabilitation of a 10' x 12' large diameter brick sewer. The project team conducted a detailed structural analysis to evaluate the key loadings on the existing structure to help determine the risk of failure and to evaluate available alternatives. The evaluation included shotcrete, cured-in-place, and spiral wound lining. The selected option was a new spiral wound lining that would provide complete structural renewal of the sewer based on finite element analysis. The spiral wound process included grouting of the annular space to provide a transfer of loads evenly to the new liner.

Low Level Sewer Rehabilitation Design, Baltimore, MD

Provided overall technical and design assistance for the Low Level Sewer Rehabilitation Design, a tri-venture project to conduct a Sewershed Planning and Evaluation Study of the Low Level Sewershed, which includes approximately 250 miles of sewers ranging in size from 8 to 100 inches in diameter. This project satisfied the City's Consent Decree to eliminate SSOs and CSOs. Project components included various field inspections, GIS and data management, hydraulic modeling, and cost estimating for necessary rehabilitation.

Crestview Pump Station Overflow Elimination Evaluation and Conceptual Design, Sanitation District No. 1 of Northern Kentucky, Fort Wright, KY

Technical lead for the evaluation and development of alternatives to eliminate overflows. The evaluation included a detailed refinement of the Infoworks model and an evaluation of detailed CCTV, smoke testing and dye testing to identify sources of I/I. These efforts included the innovative use of Micrometering to isolate sources of I/I to very small areas to further refine rehabilitation efforts. Key challenges included capacity constraints in the downstream gravity sewer and the ability to remove private sources of I/I. Alternatives included sewer rehabilitation, gravity elimination, equalization storage, pumping improvements, & force main improvements. Presented conceptual design for feasible alternatives.

Sanitary Sewer Rehabilitation Program Support Basic Ordering Agreement, Washington Suburban Sanitary Commission, Laurel, MD

Technical advisor for the investigation, design, bidding, and construction administration services for the rehabilitation of numerous segments of pipes ranging in sizes from 6-inch to 33-inch and rehabilitation of several manholes located in both suburban and heavily urbanized environment. The work performed includes evaluating and coding sewer and manhole's existing conditions per MACP/PACP requirement; the development of contract documents; field visits to assess site conditions; coordinating with sub-consultants on developing permit applications, field visits, cost estimates; developing cost estimates and permit applications; meeting with clients to address comments and finalize the contract document for bid.

Emergency Large Diameter Sewer Assessment and Rehabilitation, Franklin, TN

In response to recent failures of relatively new fiberglass pipe in its collection system, Hazen and Sawyer mobilized quickly with Hydromax USA to assess approximately 22,000 LF of pipe ranging from 24"-54" in diameter and is managing emergency repairs and replacements which include pipe replacement and CIPP lining. Forensic analysis is also being conducted on the failed pipe.

Cambridge Branch Sewer, Massachusetts Water Resource Authority

Technical lead for the detailed condition assessment using CCTV and multi-sensor technology of 17,000 LF of 72"-84" brick sewer in a highly urban area. Project also includes a detailed assessment of rehabilitation options and provided recommendations.

Winthrop Sewer, Massachusetts Water Resource Authority

Technical lead for the detailed condition assessment using CCTV and multi-sensor technology including lidar of 15,000 LF of 108" sewer in a highly urban area with failing shotcrete and epoxy lining. Project also includes a detailed assessment of rehabilitation options and provided recommendations.

Large Diameter Sewer Rehabilitation, City of Indianapolis

Project Manager for the assessment of over 16,000 LF of sewers ranging from 60 to 156 inches and the detailed design of over 12,000 LF of shotcrete, sliplining and cured-in-place rehabilitation. By performing the detailed inspection prior to designing the rehabilitation, the City saved at least \$1 million on rehabilitation by determining that about 4,000 feet of sewer that had been slated for rehabilitation did not require any immediate repair.



Katie Hoek, PE

Environmental & Permitting

Ms. Hoek is experienced in permitting, environmental assessment, and performing water quality studies.

Education

MS, Civil/Environmental Engineering, Stanford University
BS, St. Lawrence University

Certification/License

Professional Engineer

Areas of Expertise

- Permitting
- EIS/EA
- Water Quality Studies/Reports

Professional Activities

NYSAWWA

- Membership Chair

NYWEA

- Watershed Technical Conference Program Committee Member

Technical Publications

"FEMA All-Hazards Mitigation Plan for the Village of Ellenville, NY."

"What You Always Wanted to Know about Chloramine Disinfection: A Survey of 13 Major Water Utilities" AWWA ACE 10: Chicago, 2006 and AWWA Opflow, Volume 36, No. 11, November 2010

Chromium 6 Removal Project, Coachella Valley Water District, Palm Desert, CA

This \$250MM project included a CEQA Plus Environmental Impact Report to address the new treatment systems for the removal of Chromium 6 from the potable water system. Ms. Hoek provided guidance and support to development of the EIR.

Catalum SPDES Permit Modification EIS, Ulster County, NY, NYC

For the Catalum EIS, Ms. Hoek is serving as a technical resource and also as liaison to the ARWG, a task force of state and local governments, NYC-DEP, and stakeholder and citizen groups working to protect and manage the lower Esopus Creek. The Catalum EIS will evaluate potential impacts to the environment from alum addition under an existing SPDES permit at DEP's Kensico Reservoir, and from releases to lower Esopus Creek made by NYCDEP to manage downstream flows and redirect turbid water out of the City's water supply system. On precursor work under another contract, Ms. Hoek served as Project Manager, coordinating a team of resource specialists to analyze potential impacts of the releases and their potential to impact wetlands, hydraulic conditions, stream geomorphology, wildlife, water quality, and fish and benthic communities along a 30-mile reach of Lower Esopus Creek. Ms. Hoek is also ensuring the EIS conforms to state and City Environmental Review requirements.

Aqueduct Connection Environmental Support, NYCDEP, All boroughs, NY

Ms. Hoek is the program and portfolio coordinator for the ACES contract, which provides permitting and environmental support for several design contracts associated with DEP's Water for the Future priority program. Through this role, she serves as the technical liaison between the design and environmental contracts to ensure design assumptions are well established, identified and communicated. She also shepherds SEQRA reviews (EAS and EIS submittals) and permits to keep the distinct source augmentation projects on track, which will allow DEP to remove the Delaware Aqueduct from service for the first time in a century and make critical repairs.

Climate Change and Population Growth Effects on NYC's Sewer and Wastewater Systems, NYCDEP

Ms. Hoek served as a Project Engineer to help identify potential infrastructure risk and adaptation strategies to address population growth, anticipated sea level rise, and climate change. This involved reviewing drawings of existing infrastructure, conducting site visits and compiling documents associated with potentially vulnerable wastewater infrastructure for analysis under a comprehensive risk matrix designed to help prioritize available adaptation alternatives. The adaptation alternatives were then evaluated by cost and feasibility and ultimately applied to the entirety of NYC's wastewater treatment facilities for implementation.

General Engineering Services and Permitting Support, Borough of Ho-Ho-Kus, Ho-Ho-Kus, NJ

Project Engineer, provided permitting support for all water supply projects including installation of new chlorination systems at two wells, and replacement of piping at two wells to ensure adequate chlorine contact time in accordance with USEPA's groundwater rule. She led an evaluation of unaccounted for water in the borough and completed an application to NJDEP to increase the borough's water allocation and return an existing well to service, which was ultimately granted.

Ashokan Dividing Weir Gatehouse Improvements, NYCDEP, Ulster County, NY

DEP owns and operates the Ashokan Dividing Weir Gatehouse, which was constructed 1909-11 and in need of enhancements to maintain operability and better regulate water levels across the dividing wire. As a Principal Scientist, Ms. Hoek evaluated potential environmental impacts of this project, including land use, historic and cultural resources, natural resources, traffic, and hazardous materials. She coordinated DEC and USACOE permitting needs and prepared all permit tracking documents and reports in accordance with DEP Permit Resource Division SOPs on behalf of the design team.

Climate Change and Population Growth Effects on NYC's Sewer and Wastewater Systems, NYCDEP

Ms. Hoek served as a Project Engineer to help identify potential infrastructure risk and adaptation strategies to address population growth, anticipated sea level rise, and climate change. This involved reviewing drawings of existing infrastructure, conducting site visits and compiling documents associated with potentially vulnerable wastewater infrastructure for analysis under a comprehensive risk matrix designed to help prioritize available adaptation alternatives. The adaptation alternatives were then evaluated by cost and feasibility and ultimately applied to the entirety of NYC's wastewater treatment facilities for implementation.

Chloramination Report, NYCDEP, Westchester County, NY

Incorporated data on NYC's drinking water system into a database to be analyzed for a report on the possible benefits, results, and impacts of a switch to chloramines (vs. chlorine) for treating NYC's drinking water supply. Also conducted sampling at Kensico Reservoir to support water quality studies for the project. Subsequently involved in drafting several versions of the investigative report designed to recommend a course of action for NYCDEP to follow regarding Stage 2 D/DBP Compliance. As part of this work, utilized a UMASS-developed linear regression model and a NYC system hydraulic model to predict disinfection by-product concentrations in various locations throughout the City's distribution systems, as well as evaluate how these concentrations change under various disinfection and operation scenarios. (2010)

Catskill/Delaware Water Supplies Chloramination Study, NYCDEP, Westchester County, NY

Analyzed information for and drafted several versions of an investigative report designed to recommend a course of action for NYCDEP to follow regarding Stage 2 D/DBP compliance.



Education

B.S., Civil and Environmental Engineering, University of California Berkeley

Certification/License

Professional Engineer

Areas of Expertise

- Project management
- Detailed pipeline design
- Water/Wastewater pipelines & treatment
- Pump station conveyance facilities
- Preliminary studies, evaluations
- Pipeline design: PVC, steel, HDPE
- Horizontal directional drilling (HDD)
- Jack and bore
- Cured in place pipe design (CIPP)
- Conveyance
- Trenchless pipe design
- Pipe bursting
- Pipe rehabilitation

Professional Activities

AWWA
NASTT
CWEA
ASCE

Mirko Maher, PE

Pipeline

Mr. Maher has a strong technical background for planning, design and construction management specializing in water, recycled water and wastewater pipelines, site improvements for pump stations, reservoirs and wastewater plants, and transmission facilities.

Mirko has managed and developed contract drawings and specifications with the use of BIM software (Civil 3D) for the rehabilitation and new construction of more than 20 miles of large diameter pipelines, sized 36-inch to 10-foot in diameter with flows ranging from 30 to 500 MGD with multiple pump station connections. He is also accomplished with utility coordination and research to determine which agencies and utilities have facilities and/or jurisdiction in project areas. He has a strong background in preliminary study, evaluations and alternative analysis for pipeline design, considering all aspects of work in design and construction of wastewater collection systems to help determine best methods of pipeline rehabilitation.

Newport Force Main Rehabilitation Project No. 5-60, Orange County Sanitation District, Newport Beach, CA

Project Engineer/Task Leader responsible for the preparation and management assistance of project tasks and sub consultants for the planning, analysis, and rehabilitation of the Newport Force Main. Mirko also provided hands-on technical design assistance which included investigations necessary for identifying utilities, feasibilities and alternative analysis. The project includes assessing rehabilitation methods, and design including open cut and trenchless technologies to rehabilitate 28,000 feet of pressurized 30-inch and 36-inch force main. The force main network conveys 30 mgd of raw sewage to the District's Plant 2 for treatment. Rehabilitation of the network will consist of cured-in-place-pipe lining, micro tunnel replacement and open cut methods. Leading collection of information and research needed to support recommendations and future design activities, developing rehabilitation recommendations, alternative analysis, and cost planning. Mirko also provided engineering services and production of construction drawings using Civil 3D in conformance with OCSD standards.

Bay Bridge Pump Station and Force Mains Rehabilitation Study and EIR, Orange County Sanitation District, Newport Beach CA

As Task Leader and Engineer, Mirko was responsible for leading a team to provide preliminary design drawings and an alignment alternative analysis to recommend the rehabilitation of 1,200 feet of existing dual

24-inch force mains and 16.5 MGD sewer pump station. A defensible alternative analysis was completed in a 300-page report to support CEQA and EIR efforts. A recommended project with budgetary planning level costs for the proposed pump station and force mains was also provided. The planned facilities will service 60% of Newport Beach with an estimated CIP costs of approximately 35 million dollars. The rehabilitation alternative analysis study was provided with a solution in mind that reduced the client's risk exposure during and after construction for one of the client's most critical assets, resulting in agency acceptance and permits for rejuvenation. Managed and assisted preparation of EIR covering the selected location of the new pump station and associated force mains.

Reconstruction of the Los Alamitos Pump Station and Retarding Basin, Orange & Los Angeles Counties, CA
Project Engineer provided construction support services and Operations and Maintenance manual for a new storm water pump station. The new pump station features four (4) natural gas engine-driven mixed-flow pumps, each of which produced 90,000 gallons per minute (with 1500 hp engines) and a sump pump system with a capacity of 3,000 gallons per minute, to replace the Los Alamitos facility for Orange County Public Works. Engine related components include a compressed air starting system, primary and secondary jacket water cooling system, natural gas primary fuel system, and propane back up fuel system. Each pump discharges into a new 54" force main that siphons under the Haynes Steam Plant intake open channel, and discharges to the San Gabriel River. The existing force mains were originally RCP. As part of the project, a condition assessment was performed including a CCTV inspection and concrete core samples taken out of the manhole structure. The assessment found that the existing force mains were in sufficient condition for rehabilitation instead of complete replacement. The final design included a structural CIPP liner for each force main.

La Cienega Pipeline Alternatives Analysis and Rehabilitation Study, La Brea Subarea, Beverly Hills, CA
Mirko was part of the team in charge of developing a comprehensive Preliminary Design Report (PDR) to expand local water supply by developing local groundwater in the La Brea Subarea. The project includes approximately 1700 acre-feet per year (AFY) of new potable water supply from local groundwater in the La Brea Subarea of the Central Groundwater Basin by drilling new wells. The production wells were optimally located to provide the highest sustainable groundwater production, on sites that can be permitted by Division of Drinking Water. Conveyance facilities (20,000+ LF) from the well sites to the City's existing reverse osmosis water treatment plant.

Trunk Sewer Replacement Project Peer Review, Santa Rosa, CA

Mirko is assisting with peer review activities associated with a 75% design of 5,000 lineal feet of sewer replacement to mitigate risks, as well as provide value engineering solutions for the City of Santa Rosa Trunk Sewer replacement project. Activities include reviewing geotechnical reports, hydraulic calculations, plan and specification reviews, and provide recommendations to ensure that current design meets industry standards, while reducing risks and provide value/cost savings recommendations for the project.

West Regional Trunk Sewer Rehab-Orange Trunk Sewer, Orange County Sanitation District, CA

Mirko was responsible for leading a team to provide preliminary design drawings, survey, utility research and alignment analysis for the rehabilitation of approximately 14,000 feet of existing 21-inch VCP sewer. As part of the design, Mirko implemented BIM software to limit rework and improve design drawing efficiencies throughout the CAD/Design process. All work provided was in conformance with OCSD standards.



Cindy Miller, PE

Principal in Charge

Ms. Miller has extensive experience in the planning, design and construction of water supply, treatment, storage and conveyance facilities.

Education

BS, Civil Engineering, University of California, Irvine

Certification/License

Professional Engineer

Areas of Expertise

- Well Equipping Planning and Design
- Pipeline Planning and Design
- Project Management
- Program Management
- Project Delivery
- Groundwater Supply
- Pump Station Planning and Design
- Reservoir Storage Planning and Design
- Drinking Water

Professional Activities

AWWA, ASCE, AMTA
CA-NV AWWA,
CA Water Reuse Assoc.

Her assignments have included providing Program Management services for a \$150 million groundwater supply project, which includes pipelines, wells, pump stations, and an advanced treatment system for R.O. concentrate reduction; Project Manager for preliminary and final design of a 28 MGD microfiltration treatment facility, and Project Manager for a 10 MGD R.O./Ion Exchange groundwater treatment plant.

Bellflower High Capacity Well, City of Bellflower, Bellflower, CA

Project Manager. Prepared a preliminary design report and provided final engineering design and construction management and inspection services for the well drilling and equipping of the city's new high-capacity groundwater well. The well is designed to produce 3,500 gallons per minute of high-quality groundwater to replace a large portion of the city's water supplies. Electrical design services included a motor control center, a variable-frequency drive for the well pump, interior and exterior lighting, an automatic transfer switch, and an emergency diesel-fueled generator. Control design included preparation of process and instrumentation diagrams and specification of control components to provide consistency with control components installed in existing city facilities. Provided engineering support during testing and start-up of the well.

Raub 4-R and Raub 5-R Well Replacement Project, Hillwood Properties San Bernardino, CA

Principal-in-Charge. Provided engineering design and construction phasing for the Well Replacement Project, which included the drilling, equipping, and testing two ground water extraction wells, Raub 4-R & Raub 5-R, with disinfection of both wells. The project also included installation of discharge and pump-to-waste pipelines for Raub 4-R, Raub 5-R, and existing Raub 7, to carry raw water to a nearby treatment facility and detention pond; approximately 4,400 linear feet of 12-inch, 20-inch, and 24-inch DIP pipelines; approximately 1,300 linear feet of 20-inch CML and CMC bypass line; installation of a gravity pre-lube system; abandonment of three wells; demolition of two wells; electrical improvements; conduits and wiring; and emergency generator connections at each well.

La Brea Subarea Groundwater Supply Project, City Beverly Hills, Beverly Hills, CA

Principal-in-Charge. Developed a comprehensive Preliminary Design Report (PDR). The City of Beverly Hills (City) is moving forward with a project to expand its local water supply by developing local groundwater in the La Brea Subarea, which is located outside of City limits within the City of Los Angeles. The project includes developing approximately 1700 acre-feet per year (AFY) of new potable water supply from local groundwater in the La Brea Subarea of the Central Groundwater Basin by drilling new wells near Interstate 10 and La Cienega Boulevard, located approximately 1 - 2 miles south of the City's southerly boundary. The production wells were optimally located to provide the highest sustainable groundwater production, on sites that can be purchased and developed in the most efficient manner and permitted by Division of Drinking Water. The project required water treatment that is reliable, efficient, and cost effective, with a priority on ease of operation for City staff. Conveyance facilities (20,000+ LF) from the well sites to the City's existing reverse osmosis water treatment plant that includes a combination of new pipeline and rehabilitation of an existing inactive transmission main. Related tasks included drilling an exploratory test hole on a private property to obtain projected production rates and projected water quality, potholing and CCTV to locate and investigate an inactive 18-inch transmission main to determine if it could be used for the purpose of the project, coordination with Division of Drinking Water, property research, environmental studies on potential well site locations, and evaluation of the optimal treatment alternatives. All aspects of the related tasks and analysis were included in a comprehensive Preliminary Design Report.

Mojave Water Agency Regional Recharge and Recovery (R3) Project, Victor Valley, CA

Responsible as overall Project Manager. Provided engineering services to the Mojave Water Agency for the Regional Recharge and Recovery (R3) Project, a high profile water supply project in San Bernardino County. The project will ultimately recharge up to 40,000 acre-feet per year of State Water Project water into the Upper Mojave River flood plain, and will include the construction of up to 22 extraction recovery wells, three reservoirs, a 25,000 gpm pump station, and a fully integrated conveyance system to deliver water to a variety of retail agencies in the High Desert. The Phase I project included construction of six wells to extract up to 15,000 acre-ft per year, over 16 miles of 12-inch to 48-inch diameter pipe, a 2.65 MG welded steel reservoir, a flow control and recharge facility with 40,000 gpm capacity and up to 235 psi pressure drop, a pump station sized for 25,000 gpm with pumps installed to provide 15,000 gpm, and four turnout flow control facilities for delivering the water to member agencies.

Wells 21 and 22 Wellhead Facilities and Pipelines, Tustin, CA

Project Manager, responsible for the design of the wellhead facilities, untreated water pipeline, brine disposal, and product water pipeline. Responsible for engineering services necessary to support the final design, bidding, and construction of the wellhead facilities, untreated water, product water and brine disposal pipelines. Deliverables included plans, specifications and engineers estimates of probable construction costs for each the wellhead facilities and all pipelines. Well 21 and Well 22, with capacities of 3,300 gpm and 1,600 gpm respectively, are submersible turbine pump / motor assemblies, installed within vaults, and one well is equipped with a bladder-type surge tank. Project included 7,000 ft. of 24-inch steel untreated water pipeline, 13,000 feet of 36-inch steel product water pipeline and 1,700 LF of 10-inch HDPE brine concentrate pipeline. The pipelines required jack-and-bores to cross the OCTA Metrolink train tracks, an Orange County Flood Control District channel, BNSF train tracks, a box culvert, and Peter's Canyon Channel. As Project Manager, responsible for overseeing processing of Orange County Flood Control encroachment and discharge permits, cities of Tustin and Irvine encroachment permits, OCSd class 1 wastewater discharge and trunk sewer connection permits, SCRRA/OCTA Metrolink right of entry/crossing agreements, an OSHA tunneling permit, a Caltrans encroachment permit, and a BNSF - right of entry/crossing agreement.



Kent O'Brien, PG, CEG

Advisory/QA/QC - Well Design

Kent is a Senior Hydrogeologist with over 26 years' professional experience. He specializes in the planning and implementation of strategies to resolve groundwater supply problems.

Education

BS, Geological Science, San Diego State University, San Diego CA

MS, Geology/Hydrogeology, San Diego State University, San Diego, CA

Certification/License

Registered Geologist: CA

Certified Engineering Geologist: CA

8-Hour HAZWOPER Annual Courses

Areas of Expertise

- Groundwater Planning
- Groundwater Treatment
- Well Design and Construction
- Well Rehabilitation
- Groundwater CEQA Analysis
- Water Resource Management
- Litigation Support

Professional Activities

CA-NV AWWA

- Water Well Technology Committee

Groundwater Resource Association (GRA).

He combines hands-on experience in design and construction to cost effectively implement groundwater production systems and evaluate treatment options to improve water quality. He applies his experience with groundwater production and treatment systems in his preparation of geology, hydrogeology and water quality reports developed to support water supply environmental and permitting documents.

He has extensive experience in field operating procedures and data collection programs required for aquifer testing and water treatment pilot testing. He also has comprehensive knowledge of drilling techniques, well design, well installation, aquifer tests, groundwater monitoring programs, and sampling procedures. He has extensive experience in the collection and interpretation of hydrogeological data used for well siting analyses. In order to obtain reasonable permit conditions he works closely with the regulatory agencies at the City / County level in addition to the State agencies including the State Water Resource Control Board Division of Drinking Water (SWRCB-DoDW) and the Regional Water Quality Control Boards (RWQCB).

Installation of Replacement Well to Improve Water Quality Using In-Well Blending for Small Disadvantaged Community, Modesto, CA

Kent is currently designing a replacement well for the City of Modesto on behalf of the City of Grayson. The existing Well 274 is one of two wells that are the only source of municipal water for the City of Grayson's approximately one thousand residents. The existing Well 274 is shallow and extracts groundwater from the upper portion of the aquifer system degraded by nitrate at concentrations exceeding the MCL. The intent of this project is to design and install a well with two screen sections to extract and blend contaminated and uncontaminated water to meet MCL requirements. The Project also includes consideration of space and utility upgrades for a future treatment system and / or storage tank. To this end, the concept-level design considers a future Reverse Osmosis (RO) treatment plant or application of emerging technology for the biological treatment of nitrate.

Design and Permitting of Injection Wells, MCAS, Camp Pendleton, San Diego, CA

Kent has completed the design of 16 injection wells and related groundwater monitoring wells for the injection of 870 acre-ft/year of tertiary treated waste water into the aquifer along the coast north of San Diego, CA. The purpose of the project is to protect the drinking water aquifer from seawater intrusion caused by inland groundwater well pumping and to manage the salt and nutrient loading in the groundwater basin. Mr. O'Brien is also completing the Waste Discharge Requirements technical report and developing a strategy for managing salinity changes in the injection area.

New Well Installation and Rehabilitation of Existing Well, Ukiah, CA

Kent is the Project Manager for fast-track project to install a municipal well in response to drought conditions. The drought has resulted in the severe reduction in surface water supplies and a sharp increase in the use of groundwater. The new well is scheduled to be installed and brought on line within a four month work schedule. In addition, the project requires the simultaneous evaluation of an existing well which has been losing production capacity and has elevated bacteria. Both wells are being designed concurrently and include the installation of a multi-zone monitoring well.

Groundwater Storage and Recovery Project EIR, City and County of San Francisco, CA

Kent's role is developing the hydrogeologic section for the project level CEQA document related to the aquifer storage and recovery (ASR) project proposed by the San Francisco Public Utilities Commission (SFPUC). The SFPUC proposes to provide surface water to Partner Agencies (the cities of San Bruno, Daly City and Cal Water) to be used in lieu of the agencies pumping groundwater during normal and wet rainfall years. The reduction of pumping by Partner Agencies would ultimately increase groundwater storage within the South Westside Groundwater Basin. Stored groundwater would be utilized by pumping 16 new Project wells during periods of insufficient surface water supplies (i.e., dry years). The Draft EIR is currently in circulation.

Power Efficiency Evaluation 19 Municipal Wells, City of Redlands, CA

Kent was the lead Hydrogeologist in City-wide evaluation of operational efficiency. The broad reaching study evaluated the City's operations to identify cost savings. A focus of the study was the power consumption of the water supply system, half of which consists of 16 operating municipal wells with flow rates up to 2,000 gpm. Mr. O'Brien developed a program to use existing data to identify the most cost effective wells to operate and those wells which should be redeveloped or used only for backup.

Well Construction Expert for City of Davis, Davis, CA

Kent provided litigation support as a technical expert in well construction standards and standards of municipal well operation on behalf of the City of Davis. The City of Davis was subject to litigation related the construction and operation of their well field and the spread of contamination from a hazardous waste site. The case was settled out of court in 2014 on terms beneficial to the City of Davis.

Groundwater Supply Evaluation | Marine Corps Base Camp Pendleton, Carlsbad, CA

Kent led an investigation of eight water supply wells which will supply water to a newly designed water treatment plant. The study evaluates the production capacity and sustainable yield of the eight wells. Based on the results of the well investigation and pipeline design, the existing pumps in each well will be replaced with new pumps to more effectively match the water demands of the new pipelines. The project also includes evaluating the water quality with respect to constituents which could interfere with the operation of the proposed membrane filtration plant.



Education

MS, Environmental Engineering,
University of California at Berkeley

BS, Civil and Environmental
Engineering, University of California
at Berkeley

Certification/License

Professional Engineer

Areas of Expertise

- Change Order Preparation and Negotiation
- Construction Management
- Cost Estimating
- Design Services During Construction
- Scheduling
- Wastewater Treatment Plant Design

Christopher Portner, PE, CEP

Cost Estimating

Mr. Portner is a Civil Engineer with experience in process engineering, wastewater treatment plant and pump station design, cost estimating and construction management. He is currently responsible for all of Hazen's Cost Estimating in California and has performed cost estimating from planning level through construction for both water and wastewater projects, including conveyance and treatment facilities. Mr. Portner is a AACEi Certified Estimating Professional.

Owners Agent San Fernando Basin Groundwater Remediation, Los Angeles Department of Water and Power, Los Angeles, CA

Developed cost estimates and potential project schedules to support the owner's agent tasks of Proposition 1 grant funding and NCP RI/FS completion.

Chromium-6 Water Treatment Facilities Project, Coachella Water Authority, CA

Cost Engineer for detailed design for removal of chromium-6 from groundwater drinking wells. Project was bid as a Construction-Manager-at-Risk (CMAR), with the CMAR joining the design process at the 60% stage. Detailed design for this \$200M+ project included a central regeneration facility, remote well treatment sites with both strong base and weak base ion exchange systems and transmission pipelines.

Cr6 Treatment Facilities for Wells 13A, AA and 1E, Indio Water Authority, Indio, CA

Cost Engineer for design of groundwater treatment systems to remove chromium 6 from affected wells. Ion exchange units were used for the treatment system, other work included additional conveyance and the required supporting mechanical, structural, electrical and instrumentation equipment. The project was fast-tracked, requiring the cost estimate to be prepared in parallel with design, requiring close coordination with the Design Team to incorporate and track changes.

Chromium-6 Treatment and Compliance Study and Design, Coachella Water Authority, CA

Cost Engineer for compliance study alternatives and detailed design for removal of chromium-6 from ground-water drinking wells. Potential alternatives analyzed included ion exchange technology including onsite and offsite regeneration of resins. Detailed design for this \$200M+ project included a central regeneration facility, remote well treatment sites with both strong base and weak base ion exchange systems and transmission pipelines.

Hexavalent Chromium Removal Project, California American Water

Cost Engineer for a pilot study to treat groundwater to meet the Chromium (VI) Maximum Contaminant Level. The pilot provides for testing of a Strong-Base Anion Resin system with brine regeneration and onsite brine treatment at various flows.

Reservoirs 1 & 2 Chemical Facilities, Mesa Water District, Costa Mesa, CA

Cost Engineer for design of upgrades at two reservoirs to address nitrification in the distribution system. Scope of work included addition of mixing to the reservoirs and chemical injection and monitoring systems and associated structures and appurtenances.

Replacement Well 274, City of Modesto, CA

Project Engineer for design of the replacement of an existing drinking water well. Project scope included replacement of existing 220gpm well with a new 400gpm well. Also included are new aboveground facilities for disinfection and electrical and control.

Southern Solutions Water Supply Project, Newland Real Estate Group, Goodyear, AZ

Cost Engineer for design of a reverse osmosis treatment system for groundwater supply wells. Scope included pretreatment (chemical and mechanical), reverse osmosis and disinfection.

Domestic Water System Source of Supply/Treatment Study, Coachella Valley Water District, Riverside, CA

Cost Estimator and Scheduler for an alternative analysis portion of a Consent Order Decree project to provide additional levels of treatment to groundwater and surface water. The scope of work included alternative analysis of ground water treatment systems at remote wellhead locations, traditional centralized surface water treatment plants and point-of-use systems.

Phase IIIB Assessment of Ion Exchange and Adsorptive Media for Hexavalent Chromium Removal from Drinking Water, City of Glendale, CA

Cost Engineer for an investigative study to identify potential groundwater treatment systems for chromium removal. The scope of the work included identification and evaluation of a suite of technologies suitable for chromium removal as well as bench scale and pilot testing.

Water System Modifications, Globe, AZ

Cost Engineer for alternative analysis of water system improvements related to addition of booster pump stations in various pressure zones.

High-Quality Industrial Water Supply Feasibility Study, EPCOR Water, Phoenix, AZ

Cost Engineer for a feasibility study to provide advanced treated water for use in cooling towers of an industrial power generation facility. Scope included transmission and treatment of the water with ultrafiltration and reverse osmosis, along with chemical addition.



Alex Rahimian-Pour, PE

Water Quality DDW Coordination

Alex's project experience concentrates on water quality evaluation and potable water treatment including: Groundwater, Surface Water, Brackish and Desalination Treatment Systems Design, Implementation, and Optimization.

Education

B.S., Chemical Engineering,
Technical University of Tehran, IR

M.S., Civil and Environmental
Engineering, University of
Alberta, Edmonton, CA

Certification/License

Professional Engineer

Professional Activities

Member, International
Desalination Institute

Member, American Water Works
Association

Member, American Membrane
Technology Association

Member, Water Environment
Federation

Publications

- Bowdan, J., Rahimian-Pour, A.,
2010. Performance of Various
Halophytes for Concentrate
Volume Reduction. WaterReuse
CA Annual Conference, San
Diego, CA
- Rahimian-Pour A; Wiley J;
Rudinica MP; Miller CL; 2008
Providing a New Water Supply
Solution for Mexican Coastal
Resorts. AMTA Annual
Conference, Naples, FL

Phase 3 Expansion Chino Basin Desalter Authority (CDA) , Chino, CA

Provided engineering services to the Chino Basin Desalter Authority DA for their Phase 3 Expansion Project. Phase 3 Expansion increased production capacity of the CDA's groundwater desalter Facilities to over 35,000 acre-ft per year of potable water capacity. The project included construction of new groundwater wells, pipelines, treatment facility to recover desalter concentrate (i.e. concentrate reduction facility), product water pump station expansion and new product water pump stations.

Reverse Osmosis and Packed Tower Aeration Water Treatment Plant, Pomona, CA

Project engineer for Cal Poly Pomona's new water treatment plant, including planning, preliminary and final design, cost estimating, environmental permitting, and grant application assistance for a new one-million-gallons-per-day (MGD) brackish groundwater reverse osmosis (RO) water treatment plant. The project is located on Perry's Island, a prominent site visible at the main entry to the university campus. The project required review and approval by an architectural review committee for building aesthetic requirements and was designed to conform to LEED® Silver targets. The project included well water quality analysis and design and completion of the initial detailed design drawings for grant application within 15 days using a large project team over a holiday period. This extraordinary effort allowed the owner to secure \$2.47 million in grant funding.

Reservoir 1 and 2 Chemical Facilities Design, Mesa Water District, Costa Mesa, CA

Mr. Rahimian-Pour is Project Engineer for the final design of Reservoir 1 and 2 chemical facilities, including sodium hypochlorite and aqueous ammonia injections and reservoirs mixing systems. The project includes site survey, geotechnical investigation, computational fluid dynamics (CFD) modeling, and engineering services to prepare final design plans, specifications, and cost estimate for the design of sodium hypochlorite

and aqueous ammonia storage and feed systems, and reservoirs mixing systems to improve water quality and minimize the potential for the disinfection by-products formation.

Wells, Water Treatment, and Transmission Main Project, Preliminary Design Report, Beverly Hills, CA

Responsible for providing engineering services for Phase I of this project. Tasks include preparation of a Preliminary Design Report for new high capacity groundwater wells in the La Brea Subarea of the Central Basin; evaluation of water treatment alternatives; evaluation of potential transmission pipeline alignments; identification of required infrastructure, and a recommended CEQA process.

Well No. 27 Iron/Manganese Removal Water Treatment Plant, South Gate, CA

The City of South Gate's Well No. 27 is an existing groundwater supply with a capacity of approximately 1,500 gpm. A recently completed project included the installation of a chemical oxidation and multi-media filtration system comprising Anthracite and Greensand Plus media for the removal of iron and manganese. The oxidation/filtration system has experienced challenges meeting the Regional Water Quality Control Board Division of Drinking Water (DDW) enforceable secondary standards for manganese removal. The project included assisting the City of South Gate in development and implementation of a corrective course of action to achieve the necessary level of iron and manganese removal to meet EPA and DDW water quality standards. Other's tasks included site visit and review of Operations and Maintenance plan in order to prepare a test protocol outlining the specific requirements and sampling necessary to prepare for and conduct testing of the oxidation/filtration system. The protocol included media pre-conditioning requirements and recommendation for regeneration of the Greensand Plus media for effective and consistent manganese removal. In addition, the project included assisting in the initial and final startup of the water treatment plant."

Reverse Osmosis Water Treatment Plant, Pomona, CA

Responsibilities included water resources design support. The project included planning, preliminary and final design, cost estimating, environmental permitting, and grant application assistance for a new one-million-gallons-per-day (MGD) brackish groundwater reverse osmosis (RO) water treatment plant (WTP). The project is located on Perry's Island, a prominent site visible at the main entry to the university campus. The project required review and approval by an architectural review committee for building aesthetic requirements and was designed to conform to LEED® Silver targets. The project included well water quality analysis and design and completion of the initial detailed design drawings for grant application within 15 days using a large project team over a holiday period. This extraordinary effort allowed the owner to secure \$2.47 million in grant funding.

Baker Regional Water Treatment Plant, Lake Forest, CA

Project Engineer for Irvine Ranch Water District's, Baker Regional Water Treatment Plant (BRWTP) Project. For a number of years, water agencies in South Orange County have investigated alternatives for improving both water supply and water system reliability. These agencies determined that a local treatment plant utilizing untreated water from Metropolitan Water District as its source of supply would be the preferred alternative. The project included preliminary and final design services for the BRWTP. The plant is sized for a capacity of 25mgd, and will utilize microfiltration as the primary method of treatment. Additional project components include: raw water pump station, pretreatment, including chlorine dioxide and coagulant, pressurized MF membranes, UV disinfection, chloramination, backwash recovery system, solids handling facilities and product water pump station.



Tori Yokoyama, PE

Project Engineer

Mr. Yokoyama is experienced in project management and design of water and sewer pipelines in City streets. His background includes both the design of new facilities, as well as rehabilitation of aging existing facilities.

Education

BS, Civil Engineering, California State Polytechnic University, San Luis Obispo

Certification/License

Professional Engineer

Areas of Expertise

- Pipelines
- Pump Stations
- Reservoirs
- Master Plans
- Hydraulic Modeling

Professional Activities

CA-NV AWWA
OCWA
ASCE

La Brea Subarea Groundwater Supply Project, City Beverly Hills, Beverly Hills, CA

Project Engineer. Developed a comprehensive Preliminary Design Report (PDR). The City of Beverly Hills (City) is moving forward with a project to expand its local water supply by developing local groundwater in the La Brea Subarea, which is located outside of City limits within the City of Los Angeles. The project includes developing approximately 1700 acre-feet per year (AFY) of new potable water supply from local groundwater in the La Brea Subarea of the Central Groundwater Basin by drilling new wells near Interstate 10 and La Cienega Boulevard, located approximately 1 - 2 miles south of the City's southerly boundary. The production wells were optimally located to provide the highest sustainable groundwater production, on sites that can be purchased and developed in the most efficient manner and permitted by Division of Drinking Water. The project required water treatment that is reliable, efficient, and cost effective, with a priority on ease of operation for City staff. Conveyance facilities (20,000+ LF) from the well sites to the City's existing reverse osmosis water treatment plant that includes a combination of new pipeline and rehabilitation of an existing inactive transmission main. Related tasks included drilling an exploratory test hole on a private property to obtain projected production rates and projected water quality, potholing and CCTV to locate and investigate an inactive 18-inch transmission main to determine if it could be used for the purpose of the project, coordination with Division of Drinking Water, property research, environmental studies on potential well site locations, and evaluation of the optimal treatment alternatives. All aspects of the related tasks and analysis were included in a comprehensive Preliminary Design Report.

Leakage Reduction Project for American Water/California Energy Commission, California American Water, Los Angeles, San Diego, and Ventura, California Service Areas

Mr. Yokoyama is the Project Manager of the \$1.5M project funded by California Energy Commission called “Demonstrating Innovative Leakage Reduction Strategies: Correlating Continuous Acoustic Monitoring, Satellite Imagery and Flow Sensitive Pressure Reducing Valve Systems.” The project deployed multiple leak detection and leak prevention technologies in California American Water systems in Los Angeles, San Diego, and Ventura. Technologies were deployed over a 12-month duration. Tasks included coordinating field work conducted by vendors and California American operations staff, logging and maintaining field results, developing a graphical user interface to track technologies and leak reporting, working with vendors to improve technologies, and preparing a final report.

City of Santa Ana Well 29 Improvements Alternatives Analysis, Santa Ana, CA

Project Engineer. The City of Santa Ana owns and operates Well 29, located at the southeast corner of Flower Street and First Street, adjacent to City owned tennis courts. Well 29 pumps directly to an existing 8 MG reservoir. The existing well site includes the well head and discharge piping assembly, control equipment, a chlorination system in a building, and an SCE transformer. An alternatives analysis was conducted to recommend upgrades at the site including site improvements, structural, mechanical, and electrical upgrades. Highlights of the study include developing three (3) alternatives for the improved site, providing 3D renderings for each site alternative, and developing a preliminary opinion of probable cost for the design and construction of each alternative discussed. The City is moving forward with implementing the recommended alternative from this analysis.

West Grove Valley Pipelines, Riverview Pipelines, Santa Ana, CA

Project Manager. Two projects with the City of Santa Ana included a total of over 17,000 LF of water pipeline design ranging in size from 8-inch to 12-inch diameter. The City is actively replacing aging and undersized water mains throughout their distribution system. The West Grove Valley project include 9,500 LF of pipeline replacement design. The Riverview project included 7,700 LF of pipeline replacement design.

Waterline Replacement Project, Yorba Linda Water District, Yorba Linda, Anaheim, and Placentia, CA

Project Manager. Provided preliminary and final design and construction support services for the replacement of seven pipeline segments, the replacement of one pressure-reducing station, and the installation of one new pressure-reducing station. The pipeline replacements required many connections to existing pipelines, laterals, services, fire hydrants, and other appurtenances.

Atlantic Avenue Cast Iron Main Replacement, Long Beach Water Department, Long Beach, CA

Project Manager. Provided engineering services for approximately 10,000 linear feet of new eight-inch ductile iron pipe to replace the cast iron water main on Atlantic Avenue between the intersections with 405 Freeway/ Spring Street and Pacific Coast Highway. Services included design, permitting, and traffic control.

Western Avenue and Rolling Hills Water Main Replacement / Rehabilitation, City of Torrance, Torrance, CA

Project Engineer. Provided engineering services for the replacement of 4,200 feet of 12-inch water main on Western Avenue between 190th Street and Del Amo Boulevard and 700 feet along Rolling Hills Road, and the replacement of approximately 2,500 square feet of pavement in two locations along Western Avenue due to damage from water main breaks. Services included topographic surveys and traffic control plans in addition to final design.

THOMAS E. HARDER

Hydrogeologist

EDUCATION

B.S., Geology. California State Polytechnic University - Pomona, 1990

M.S., Geology with Honors. Emphasis in Hydrogeology, California State University – Los Angeles, 1995

PROFESSIONAL REGISTRATIONS

California Professional Geologist (No. 6512)

Certified California Hydrogeologist (No. 588)

PROFESSIONAL AFFILIATIONS

National Ground Water Association

Groundwater Resource Association of California

Watereuse Association

During his 28 years of professional experience, Mr. Harder has provided technical direction and management for some of the largest water resource projects in southern California, including the Chino Desalter Well Field Design and Construction, the Kern Water Bank, and the Mojave Water Agency's Regional Recharge and Recovery Project. In addition to his expertise in a wide range of hydrogeological disciplines, Mr. Harder is a recognized expert in water well design and construction management.

PROFESSIONAL EXPERIENCE

2008 to Present: *Principal Hydrogeologist*, Thomas Harder & Co.; Anaheim, California

1998 to 2008: *Senior Geohydrologist*, Geoscience Support Services, Inc.; Claremont, California

1997 to 1998: *Principal Hydrogeologist, Geosciences Department Manager*, Parsons Engineering Science; Pasadena, California

1989 to 1997: *Senior Geologist*, Harding Lawson Associates; Irvine, California

TECHNICAL COMMITTEE PARTICIPATION

2016: Metropolitan Water District of Southern California Regional Recycled Water Advisory Panel

2011 to Present: Kern Fan Monitoring Committee – Groundwater Model Technical Advisory Subcommittee

2010 to Present: Chino Basin Recharge Master Plan Steering Committee

2009 to Present: Chino Basin Watermaster Appropriative Pool and Advisory Committee

2003 to Present: Big Bear Lake Department of Water Groundwater Management Technical Review Team

2002 to Present: Chino Basin Subsidence Technical Committee

PROJECT EXPERIENCE – WELLS AND WELL FIELD DESIGN

Construction and Testing of Municipal Production Wells – Southern California

Client: Multiple Water Districts and Cities. 1998 to Present.

Provided technical direction and field oversight for the drilling, design and construction of more than 100 high capacity municipal water supply wells throughout Southern California. Included development of technical specifications, field inspection of the drilling process including borehole logging, inspection of geophysical logging, aquifer zone testing, well construction, well development, pumping tests, water quality sampling, and flowmeter surveys. Provided technical direction for the design of wells including the evaluation of field borehole logs, cuttings samples, sieve analyses, geophysical logs and zone-specific water quality analyses. Prepared and coordinated the preparation of numerous well completion reports. Wells have included:

- *Baldy Mesa Water District* (1 Production Well - No. 9)
- *Beaumont Cherry Valley Water District* (7 Production Wells - 23, 24, 25, 26, 29, 1A and 2A)
- *Big Bear City Community Services District* (4 Production Wells - 3B, 8, 9 and 10)
- *California Department of Forestry and Fire Protection* (1 Production Well – Owens Valley)
- *California Water Service Company* (1 Production Well - Bakersfield Station 214-01)
- *Chino Basin Desalter Authority* (9 Chino II Desalter Wells - II-1, II-2, II-3, II-4, II-6, II-7, II-8, II-9, II-9a), (3 Chino I Expansion Wells - I-13, I-14, I-15)
- *City of Big Bear Lake Dept. of Water and Power* (9 Production Wells - Canvasback, McAlister, Moonridge, Sheephorn, Magnolia, Sawmill, Seminole, Cherokee, and Arrastre Creek)
- *City of Blythe* (1 Production Well)
- *City of Ontario* (2 Production Wells - 40 and 41)
- *Coachella Valley Water District* (Design Only - 10 Production Wells)
- *Eastern Municipal Water District* (Perris II Desalter Wells 93, 94, 95 and 96; Well 38)
- *Golden State Water Company* (Kiowa Well)
- *High Valleys Water District* (1 Production Well – McMullen Flat)
- *Highland Fairview Development* (2 Production Wells)
- *Irvine Ranch Water District* (SWEX Wells 1, 2, and 3)
- *Jurupa Community Services District* (3 Production Wells - 22, 23, and 25)
- *Lake Arrowhead Community Services District* (2 Production Wells - 6 and 8)
- *M.D.J. Development Company* (1 Production Well - Alta Vista Country Club Well)
- *Metropolitan Water District of Southern California – (Cadiz)* (1 Production Well -PW-1)
- *Rancho Mission Viejo* (1 Production Well – Well 5)
- *Rosedale-Rio Bravo Water Storage District* (8 Drought Relief Project Production Wells – WB-1 through WB-3; SUP-1, SUP-2, SUP-4 through SUP-6); (3 Onyx Ranch Wells)
- *San Diego County Water Authority / City of Oceanside* (3 Production Wells - PW-9, PW-10 and PW-11)
- *Santa Margarita Water District* (2 Production Wells)
- *Three Valleys Municipal Water District* (Grand Ave Well)



PROJECT EXPERIENCE – WELLS AND WELL FIELD DESIGN

Main Plant Well 5 Rehabilitation – Anaheim, CA

Client: City of Fullerton. 2017.

Developed a well evaluation and rehabilitation program for an existing production well located on the City's Main Plant lot in Anaheim, California. The rehabilitation program was initiated to address bacteria in the discharge. The program included brushing, bailing, and chlorination through a dual-swab. The rehabilitation program was successful at remediating the bacteria problem.

Well Destruction, Well 54 – Menifee, CA

Client: Eastern Municipal Water District. 2015.

Developed detailed technical specifications for the destruction of one well. The specifications were developed in accordance with Department of Water Resources and local requirements. Mr. Harder provided technical direction and management for field staff overseeing destruction of the well.

Well Destruction, Well 71 – Menifee, CA

Client: Eastern Municipal Water District. 2015.

Developed detailed technical specifications for the destruction of one well. The specifications were developed in accordance with Department of Water Resources and local requirements. Mr. Harder provided technical direction and management for field staff overseeing destruction of the well.

Well Rehabilitation Program, IRWD Well 110 – Irvine, CA

Client: Irvine Ranch Water District. 2013.

Developed a well rehabilitation program for one Irvine Desalter well. Included development of detailed technical specifications for both chemical and mechanical rehabilitation. The specifications were developed based on review of video logs, CITM and sidewall sampling and analysis. Provided project management and technical direction to field staff for the rehabilitation of the well, which was successful at restoring the specific capacity of the well to original conditions.

Well Destruction, IRWD Well 14 – Tustin, CA

Client: RBF Consulting/Irvine Ranch Water District. 2008.

Developed detailed technical specifications for the destruction of one well. The specifications were developed in accordance with Department of Water Resources and local requirements.

Arlington/Riverside Basin Test Drilling Program – Riverside, CA

Client: Western Municipal Water District. 2017 - 2018.

Designed a test drilling program for the Arlington and Riverside Basin areas of Riverside, California in order to assess potential production potential and water quality for future Arlington Desalter wells. The results of the testing will be used to identify optimum locations for future Arlington Desalter expansion.



BEN HUSHMAND, Ph.D., P.E.
PRESIDENT, PRINCIPAL ENGINEER

PROFESSIONAL EXPERIENCE

Dr. Hushmand has more than 35 years of experience in geotechnical and environmental design, research, testing, and applications, specializing in soil dynamics and analysis and design of soil-structure systems. He has managed and acted as lead engineer in some of the most challenging national and private projects of the last two decades involving seismic hazard evaluations and geotechnical investigations for large public works, including transportation, port and marine, water resources, industrial, and commercial projects; design and seismic evaluation of critical facilities such as schools and hospitals, police stations, 911 centers, and traffic management centers; dynamic load response evaluation of bridges, dams, and underground structures; development of large databases for load carrying capacity of highway bridges and culverts; liquefaction potential evaluations for dams and marine structures; soil-structure interaction problems of foundations and retaining structures; site-specific seismicity evaluations; physical modeling similitude studies of engineering and geologic systems at normal and elevated gravity; and large scale subsurface exploration and geotechnical design of buried structures. Dr. Hushmand has worked on many projects studying the dynamic behavior of shallow foundations, piles, gravity base offshore platforms, dams, bridges, retaining walls, and liquefiable soils. He has specialized expertise related to experimental and computer modeling studies of the dynamic response of ports, bridges, landfills, earth structures and shallow and deep foundations. His broad and extensive background in dynamic testing has been recognized internationally, and he is one of a select cadre of renowned experts in this field.

RELEVANT PROJECT EXPERIENCE

Naples Sewer Improvement Project (SC-0269), Long Beach, CA. HAI conducted a geotechnical investigation to provide recommendations to rehabilitate or replace sanitary sewer pipeline in various locations in Naples Island. Based on a couple of emergency sewer repairs in Naples Islands, a neighborhood of islands located in the southeastern area of the City, that occurred within the year 2014, the Long Beach Department of Water and Power (LBWD) televised all sewer mains within the Naples Island area to confirm sewer main size, material, and its structural and operational condition. The project consists of reviewing approximately 7,850 feet of existing CCTV inspections and making recommendations to rehabilitate or replace sanitary sewer pipeline in various locations in Naples Island. Client: MBI / Long Beach Department of Water and Power (LBWD), 2015.

Bay Bridge Pump Station and Force Mains Rehabilitation Study (SP-178), Newport Beach, CA. MBI is currently performing and Environmental Impact Report (EIR) and an alignment study to replace a portion of the Newport Force Main network constructed underneath Newport Bay Channel. HAI is currently conducting a geological, geotechnical, and seismic Technical Background Report (TBR) to assist MBI in the evaluation of the potential environmental impact of the project and possible mitigation measures as part of the EIR and alignment study. Client: MBI / Orange County Sanitation District (OCSD), 2015.

Registration

- *Civil Engineer, CA No. C44777*
- *40-Hour OSHA Trained, 29 CFR 1910.120 (e)(2)/8 CCR 5192.*
- *Radiation Safety and Use of Nuclear Gauges Certificate*

Education

- *Ph.D. Civil (Geotechnical & Earthquake Engineering, California Institute of Technology (Caltech), 1984*
- *M.S., Civil Engineering, California Institute of Technology, 1978*
- *B.S., Structural Engineering, Sharif Univ. of Technology, Tehran, Iran, 1977*

Professional Organizations & Academic Credentials

- *International Society of Soil Mechanics and Foundation Engineers (ISSMFE)*
- *American Society of Civil Engineers (ASCE)*
- *Earthquake Engineering Research Institute (EERI)*
- *Seismological Society of America (SSA)*
- *Member Technical Review Committee, National Science Foundation (NSF)*
- *Adjunct Faculty, Caltech 1990-2004*
- *Visiting Faculty, USC 1985-1989*
- *Member Soil Dynamics Committee, ASCE 1984-2000*

Year of Experience:

- *Over 35 Years*
- *Over 28 Years with HAI*

New Starlight Reservoirs at Hellman Wilderness Park, Whittier, CA. HAI provided geotechnical engineering services for feasibility study of two alternatives for the proposed water storage improvements for the City of Whittier, as follows: 1) Two smaller tanks with total maximum capacity of 2 MG, or 2) One larger tank with a maximum capacity of 2 MG. Two alternatives were also considered for construction of the tanks: 1) An above grade steel tank, and 2) A partially-buried reinforced concrete tank. Client: RBF/MBI, City of Whittier, 2011-2015.

Disinfection CT Credit Improvements Project at the Earl Schmidt Filtration Plant, Castaic, CA. HAI conducted a geotechnical investigation to provide recommendations to enhance the disinfection system at the facility and improve disinfection CT credit to meet all regulatory requirements for all operational conditions. The project consisted of design and construction of a chlorine contact basin supported on a reinforced concrete mat foundation, two 54-inch diameter steel pipes that connect the chlorine contact basin with the existing piping system, and appurtenant structures. Client: RBF/MBI, Castaic Lake Water Agency (CLWA), 2014.

Citywide Sanitary Sewer Improvement Program/Projects (CSSIPP) Group 6, Crescent Avenue, Loara Street, and North Street, Anaheim, CA. HAI conducted a geotechnical investigation to provide recommendation for implementation of the City of Anaheim's Combined West Anaheim Area Master Plan of Sanitary Sewers, Second Revision dated March 2005 for Model 6 (Model 6 CWAAMPSS) project. The proposed improvements will consist of installation of Vitrified Clay Pipes (VCP) with diameters varying between 10 and 24 inches by conventional open excavation and trenching method. The approximate total length of this project is 4,300 linear feet. Client: RBF/MBI, City of Anaheim, 2014.

Structural, Seismic, and Safety Assessment of 32 Steel Tank Reservoirs, CA. HAI performed a geotechnical investigation for the proposed Structural, Seismic, and Safety Assessment of Steel Tank Reservoirs under the jurisdiction of Moulton Niguel Water District (MNWD). The project included 32 reservoirs at 20 sites, built between 1963 and 2002. The scope of work comprised reviewing available published geotechnical reports, conducting a field investigation, performing laboratory testing, interpreting field and laboratory test data, performing engineering analyses, and preparing a final report presenting our findings, conclusions, and recommendations for seismic retrofit. Client: RBF/MBI, MNWD, 2012.

Rio Vista Water Treatment Plant Tanks Project, Santa Clarita, CA. HAI conducted a geotechnical and seismic engineering investigation to provide recommendations for design and permitting of two alternatives for construction of steel tanks: 1) Two 1.75-MG tanks or 2) A single 3.5-MG tank. Alternative 1 proposes two tanks so that construction could be phased based on recycled water system demands. The proposed 1.75-MG tanks (Alternative 1) will have approximately a 40-foot high shell and will be about 100 feet in diameter. The proposed 3.5-MG tank (Alternative 2) will have approximately a 41-foot high shell and will be about 141 feet in diameter. Client: RBF/MBI, Castaic Lake Water Agency (CLWA), 2011.

Anaheim Sewer Improvement Lines, La Palma Avenue, Romneya Drive and Acacia Street, Anaheim, CA. HAI conducted a geotechnical investigation to provide recommendations to improve the sewer system and install additional sewer lines. Part of this work consists of approximately 10,000 feet of sewer lines. Client: RBF/MBI, City of Anaheim, 2011.

2010 Pipeline Replacement Project, Yorba Linda, Placentia and Anaheim, CA. HAI conducted a geotechnical investigation to provide recommendations to install, repair, or replace approximately 6,740 linear feet water pipelines in the cities of Yorba Linda, Placentia and Anaheim. Client: RBF/MBI, Yorba Linda Water District (YLWD), 2011.

Orangethorpe Transmission Main Project, Anaheim and Placentia, CA. HAI conducted a geotechnical investigation to provide recommendations for design of approximately 6,500 linear feet of 16-inch-diameter pipe along Orangethorpe Avenue between Van Buren Street and Boisseranc Street. Client: RBF/MBI, City of Anaheim, 2009.



NARESH BELLANA, MS, PE SENIOR STAFF ENGINEER

PROFESSIONAL EXPERIENCE

Mr. Bellana has more than 8 years of experience in geotechnical and earthquake engineering. He specializes in analysis and design of excavations including utility trenches, shallow and deep foundation systems, seismic hazard and risk analysis, vibration monitoring and dynamic analysis for sensitive projects, and CQA for installation of driven and drilled piles for bridges. Mr. Bellana has been involved in geotechnical investigations, drilling, soil testing, dynamic soil properties characterization, one-dimensional soil response analyses, and analysis of field and laboratory data to characterize subsurface soil layering and properties for use in engineering analyses to develop geotechnical design parameters for foundation design, pavement design, slope stability evaluations and mitigation.

RELEVANT PROJECT EXPERIENCE

Windy Ridge Reservoir and Access Road, Anaheim, CA

Senior Staff Engineer for the design and construction of a 1.6-million gallon capacity above-ground steel tank and an access road about 1 mile long in Santa Ana Mountains. The site will require an excavation of approximately 100 feet in highly fractured bedrock. Slope stability analysis was performed for both static and pseudo-static loading conditions considering the reduction in shear strength values due to fractured and discontinuous joint pattern using the Hoek-Brown model. Recommendations were also developed for mitigation of rock fall hazards. Developed the plans and performance specifications for installation of a series of multi-tiered MSE walls up to 45 feet in height along a one mile access road connecting the site and the public street and designed the MSE wall based on AASHTO LRFD design methodology. *Client: MWH/City of Anaheim*

East Garden Grove-Wintersburg Channel Levee Soil Mix Project, Groundwater Impact Evaluation from Station 37+00 to 102+00, Huntington Beach, County of Orange, CA

Senior Staff Engineer for geotechnical investigation and groundwater monitoring to develop a baseline database for shallow perched groundwater level below residential areas along the channel south of Warner Avenue. Developed empirical models of the shallow groundwater movement using the monitoring data since 2009 and evaluated the potential effect of the proposed levee improvements. Thirty three (33) groundwater monitoring wells and 3 digital piezometers were installed and data is continuously collected. Compiled the data and performed analyses of field and laboratory data to provide a baseline report for the shallow groundwater table level and its flow direction prior to installation of the proposed sheet pile-soil mix hybrid system. Potential mitigation options and their possible effects on groundwater were also reviewed. Currently, HAI is analyzing the groundwater monitoring data collected by County of Orange from January 2011 till date. *Client: County of Orange*

Saugus Aquifer Treatment Plant at Former Whittaker-Bermite Facility, Santa Clarita, CA

The project consisted of geotechnical investigation, laboratory testing, engineering analyses, observation and testing during construction for a proposed Groundwater Treatment System and an associated transfer tank to be located at the former Whittaker-Bermite facility. HAI also performed geotechnical observation and testing activities during construction of the Treatment Plant. The activities consisted of observation and testing of overexcavation, and placement of backfill soils and geogrid soil reinforcements as recommended in the geotechnical report. *Client: AECOM*

Loma Terrace Sewer System Relocation Project, Laguna Beach Water District, Orange County, CA

The project consisted of consolidating numerous sewer lines and manholes while replacing deteriorated pipes and eliminating an inverted siphon in one of the lines. The project segment has approximately 1,700 feet of 18-inch diameter sewer line and was proposed to be constructed along 3rd Street between Park Avenue and the parking lot north of the City Hall in the City of Laguna Beach, CA. The proposed VCP sewer line is expected to be installed by conventional open excavation and trenching method. The invert depth of the proposed sewer line varies between 5

Registration

- Civil Engineer, CA No. C80747
- 40-Hour OSHA Trained, 29 CFR 1910.120 (e)(2)/8 CCR 5192.
- Radiation Safety and Use of Nuclear Gages.

Education

- M.S., Civil Engineering, University of California Los Angeles, 2009
- B. Tech., Civil Engineering, Indian Institute of Technology, Guwahati, India, 2006

Year of Experience

- 8+ Years
- 7+ Years with HAI

and 15 feet below ground surface (bgs). HAI performed geotechnical investigation to provide geotechnical engineering data and design parameters for the proposed sewer line. *Client: City of Laguna Beach/Psomas*

Owens Lake Piezometer Installation and Hydraulic Testing, Lone Pine, Inyo County, CA

Senior Staff Engineer responsible for piezometer well installation and testing around perimeter of Owens Lake in Owens Valley on the eastern side of Sierra Nevada Mountains. *Client: LADWP*

Geotechnical Engineering Investigation for Structural, Seismic and Safety Assessment of Steel Tank Reservoirs, Laguna Niguel, CA

HAI performed a geotechnical investigation for the proposed Structural, Seismic and Safety Assessment of Steel Tank Reservoirs under the jurisdiction of Moulton Niguel Water District (MNWD). The project includes 32 reservoirs at 20 sites, built between 1963 and 2002. The scope of work comprised reviewing available published geotechnical reports, conducting a field investigation, performing laboratory testing, interpreting field and laboratory test data, performing engineering analyses, and preparing a final report presenting our findings, conclusions, and recommendations for seismic retrofit. *Client: RBF / MNWD*

Inland Empire Utilities Agency (IEUA) Wineville Extension Recycled Water Pipeline, Fontana, CA

Senior Staff Engineer responsible for geotechnical investigation for the design of proposed pipeline for the Fontana segment (approximately 15,100 linear feet) and the Day Creek segment (approximately 5,400 linear feet) which include jack and bore locations. Seismic design parameters based on California Building Code (CBC) 2010 were provided for the design considerations. Recommendations were also provided for site preparation & grading; lateral earth pressures; pavement design; foundation design; pipe jacking; site drainage and construction activities. *Client: IEUA/GHD*

Yorba Linda Water District (YLWD) 2010 Pipeline Replacement project, Yorba Linda, Placentia and Anaheim, CA

HAI conducted a preliminary geotechnical investigation for the installation, repair, or replacement of water pipelines. Part of this work consists of: 1) 3,000 linear feet of new 12-inch diameter pipeline on Plumosa Drive, from Lemon Drive to Bastanchury Road in Yorba Linda; 2) 1,280 linear feet of new 8-inch diameter pipeline on Tamarisk Drive, Fircrest Drive & Pebble Beach Lane in Yorba Linda; 3) 400 linear feet of new 8-inch diameter pipeline on Sunwood/Peppertree Lane in Anaheim; 4) Approximately 140 linear feet of new 16-inch diameter pipeline on Hidden Hills BPS Discharge Line in Yorba Linda; 5) 220 linear feet of new 12-inch diameter pipeline on Catalina Court, South of Joel Brattain Drive in Yorba Linda; 6) 300 linear feet of new 8-inch diameter pipeline on Easement South of Gordon Lane & East of Ohio Street in Yorba Linda; 7) Slip lining 1,200 linear feet of existing 26-inch diameter pipeline with 12-inch diameter High Density Polyethylene (HDPE) including connections to services, Fire Hydrant and all appurtenances on Richfield Road, from YLWD Well 5 to Nancita Street in Placentia; and 8) 200 linear feet of new 8-inch diameter pipeline on Richfield Road, Nancita Street to approximately 100 feet north of the Orange County Flood Control District channel in Placentia. *Client: RBF/MBI, YLWD*

Towers for a Wireless Network, Orange County, CA

HAI conducted a geotechnical investigation to provide recommendations for the towers for a wireless network project, under the jurisdiction of MNWD. The scope of work comprised reviewing available published geotechnical reports, conducting a field investigation, performing laboratory testing, interpreting field and laboratory test data, performing engineering analyses, and preparing a final report presenting our findings, conclusions, and recommendations for design and construction of deep foundations for towers (monopoles) for a wireless network for the MNWD. The towers will be constructed at sixteen (16) different locations in the cities of Laguna Niguel, Laguna Hills, Aliso Viejo, and Mission Viejo, CA. *Client: RBF Consulting/MNWD*

Sewer Improvement Lines- La Palma Ave, Romneya Dr. and Acacia St., Anaheim, CA

Senior Staff Engineer responsible for field investigation and laboratory testing; corrosion analysis; seismicity analyses; and provided temporary excavation support recommendations, pavement design parameters and construction recommendations. *Client: RBF Consulting*

PROFESSIONAL EXPERIENCE

Mr. Nitha received his MS degree in Geotechnical and Civil Engineering from University of Nevada, Reno (UNR) and his BS degree in Civil Engineering from University of Peradeniya, Sri Lanka. He has more than 10 years of experience in geotechnical engineering for water resources, transportation, landfills, and mine reclamation projects.

He has been involved in field investigation, slope stability analysis, liquefaction analysis, site response analysis and analysis of field and laboratory data to characterize subsurface soil layering and properties for use in engineering analyses to develop geotechnical design parameters for reservoir and pipeline alignment design, pavement, and slope stability analysis and design.

Registration

- Civil Engineer, CA No. C82422
- 40-Hour OSHA Trained, 29 CFR 1910.120 (e)(2)/8 CCR 5192
- Radiation Safety and Use of Nuclear Gages.

Education

- M.S., Civil Engineering, University of Nevada, Reno, 2011
- B.S. Civil Engineering, University of Peradeniya, Sri Lanka, 2004

Year of Experience:

- 10 Years
- 7 Years with HAI

RELEVANT PROJECT EXPERIENCE

Yorba Linda Water District On-Call Services, CA

Providing YLWD with geotechnical observations, testing, and material inspection services during construction. Scope of work includes: 1) Data and site condition review and preconstruction meeting attendance, 2) Geotechnical observations, sampling and testing, 3) Pavement placement observation and testing, 4) Material inspection and laboratory testing, 5) Geotechnical laboratory testing, and 6) Project management and certification reports. The projects include the following: Yorba Linda Boulevard Pipeline Project (J-2008-17); Yorba Linda Boulevard Pump Station Project (J2008-17B); 2012 Waterline Replacement Project Phase II (J2011-20); 2015 Water Pipeline Replacement Project (J2014-12); Well No. 21 Wellhead Equipping Project; Richfield Road Water Main (J2014-23); Fairmont Booster Pump Station Upgrade Project (J2010-11B); La Palma Bike Trail Emergency Repair Project; Box Canyon PRS and Ohio St. Waterline Project (J2014-11); Well 22 Equipping Project (J2009-22#22); and Additional Geotechnical Services for Emergency and Non-Emergency Projects. *Client: YLWD, 2012 - Present.*

Windy Ridge Reservoir and Access Road, Anaheim, CA

Senior Staff Engineer for the design and construction of a 1.6-million gallon capacity above-ground steel tank and an access road about 1 mile long in Santa Ana Mountains. The site will require an excavation of approximately 100 feet in highly fractured bedrock. Slope stability analysis was performed for both static and pseudo-static loading conditions considering the reduction in shear strength values due to fractured and discontinuous joint pattern using the Hoek-Brown model. Recommendations were also developed for mitigation of rock fall hazards. Developed the plans and performance specifications for installation of a series of multi-tiered MSE walls up to 45 feet in height along a one mile access road connecting the site and the public street and designed the MSE wall based on AASHTO LRFD design methodology. *Client: MWH/City of Anaheim, 2011-2017.*

Long Beach Water Department– South Long Beach Sewer Improvements, City of Laguna Beach, CA

Performed a geotechnical investigation to evaluate subsurface soil conditions and to provide foundation and grading recommendations for design and construction of the proposed South Long Beach Sewer Improvement Project for the Long Beach Water Department (LBWD). The purpose of the project was to assess sewer pipelines in the project area and identify those that require rehabilitation/replacement. The project consists of reviewing approximately 23,900 linear feet of existing closed circuit television (CCTV) inspections for structural deficiencies, and making recommendations to rehabilitate, replace, or take no action on the sanitary sewer pipeline. The project identified 76 sewer segments located in various streets requiring improvements with 8-inch and 10-inch diameter segments. Pipe materials include vitrified clay pipe (VCP) and concrete pipe (CP). Thirteen sewer segments required open trench rehabilitation methods and three locations were identified that required geotechnical investigation and recommendations by LBWD. The final report addressed site, subsurface, and ground water conditions, laboratory testing, excavation stability and shoring requirements, earthwork and compaction criteria, potential seismic hazards,

site seismic response coefficients and design criteria, lateral earth pressures, suitable foundation system and design parameters, and pipe bedding and shading and trench zone requirements. *Client: Psomas, 2016.*

Naples Sewer Improvement Project (SC-0269), Long Beach, CA

HAI conducted a geotechnical investigation to provide recommendations to rehabilitate or replace sanitary sewer pipeline in various locations in Naples Island. Based on a couple of emergency sewer repairs in Naples Islands, a neighborhood of islands located in the southeastern area of the City, that occurred within the year 2014, the Long Beach Department of Water and Power (LBWD) televised all sewer mains within the Naples Island area to confirm sewer main size, material, and its structural and operational condition. Based on a review of over 300 closed circuit television (CCTV) surveys of approximately 43,000 linear feet of sewer pipeline, LBWD has identified approximately 7,850 feet of pipe requiring replacement or rehabilitation. The project consists of reviewing approximately 7,850 feet of existing CCTV inspections and making recommendations to rehabilitate or replace sanitary sewer pipeline in various locations in Naples Island. *Client: RBF/LBWD, 2015.*

Bay Bridge Pump Station and Force Mains Rehabilitation Study (SP-178), Newport Beach, CA

RBF performed an Environmental Impact Report (EIR) and an alignment study to replace a portion of the Newport Force Main network constructed underneath Newport Bay Channel. As part of this project, HAI conducted a geological, geotechnical, and seismic Technical Background Report (TBR) to assist RBF in the evaluation of the potential environmental impact of the project and possible mitigation measures as part of the EIR and alignment study. *Client: RBF/OCSD, 2015.*

Wineville Extension Recycled Water Pipeline – Phase I and II, Ontario and Fontana, CA

Senior Staff Engineer to perform field exploration program for preparing a Geotechnical Baseline Report (GBR) for the 7-mile underground pipeline. The information obtained will be included as part of the request for bid package to be provided to the Contractor. The pipeline is located along public streets in residential and industrial areas with busy traffic and congested underground utilities. Effective coordination for traffic control, acquiring encroachment permits, and utilities clearance were essential to implement the exploration program. *Client: IEUA/ GHD, 2014.*

Loma Terrace Sewer System Relocation Project, Laguna Beach Water District, Orange County, CA

The project consisted of consolidating numerous sewer lines and manholes while replacing deteriorated pipes and eliminating an inverted siphon in one of the lines. The project segment has approximately 1,700 feet of 18-inch diameter sewer line and was proposed to be constructed along 3rd Street between Park Avenue and the parking lot north of the City Hall in the City of Laguna Beach, California. The proposed VCP sewer line is expected to be installed by conventional open excavation and trenching method. The invert depth of the proposed sewer line varies between 5 and 15 feet below ground surface (bgs). HAI performed geotechnical investigation to provide geotechnical engineering data and design parameters for the proposed sewer line. *Client: City of Laguna Beach/ PSOMAS, 2012.*

Corona Del Mar Water Transmission Main, Newport Beach, CA

Senior Staff Engineer for a geotechnical investigation to evaluate subsurface soil conditions and to provide recommendations for design and construction of the proposed Corona Del Mar Water Transmission Main for the City of Newport Beach. The overall length of the project was approximately 8,175 linear feet. *Client: City of Newport Beach/ PSOMAS, 2012*

Starlight Reservoir at Hellman Wilderness Park, Whittier, CA

Staff Engineer responsible for perming engineering analysis and preparing the report for feasibility study of two alternatives for the proposed water storage improvements for the City of Whittier, as follows: 1) Two smaller tanks with total maximum capacity of 2 MG, or 2) One larger tank with a maximum capacity of 2 MG. Two alternatives were also considered for construction of the tanks: 1) An above grade steel tank, and 2) A partially-buried reinforced concrete tank. Performed a field investigation to explore subsurface conditions by drilling four 2.5-foot-diameter bucket-auger borings (50 to 72 feet bgs) and downhole logging by geologist. Report included site subsurface condition, site-specific probabilistic seismic hazard analysis for acceleration response spectra for both Design Basis and Maximum Considered Earthquakes, site-response coefficient and seismic design criteria per CBC 2010; potential seismic hazards, suitable foundation system, potential settlements, seismic and static lateral load resistance of foundation systems, slab-on-grade design, stability analysis of slopes, retaining walls design parameters, earthwork and compaction criteria, and evaluation of corrosion and chemical attack potential of soils. *Client: RBF Consulting/Michael Baker Intern, 2011-2015.*



ANDREW GIBBS, B.A. S., EIT

Project Field Specialist
Echologics, a Mueller Technologies Company

Andrew graduated from Queens University, in Kingston, Ontario, Canada, with a bachelors in Mechanical Engineering. He is a registered Engineer in Training (EIT) with Professional Engineers of Ontario (PEO).

Andrew has worked with Echologics on semi-permanent basis since May 2015 and in a permanent basis starting in May 2018. Working on various projects, he conducted acoustic leak detection surveying on various pipe sizes, materials and ages with accuracy and attention to detail. He performed condition assessment data collection and analysis using correlators and assisted in implementing a new proprietary technology on a project located in a large Canadian city. During his employment, Mr. Gibbs worked closely with clients to create customized reports tailored to their needs and he also supervised sub-contractors in the field and through contract negotiation. At Echologics, Andrew had the opportunity to work in the United States and throughout Canada gaining a broad range of project experience.

QUALIFICATIONS

- Queens University Kingston, ON
Bachelor of Applied Science,
Mechanical Engineering (2017)

SKILLS

- Expertise in pipeline condition assessment & non-destructive testing.
- Experience managing projects of a variety of size and scope.
- Strong understanding of engineering theory and its practice.
- Excellent client management skills.

HALLMARK PROJECTS

- Washington Suburban Sanitary Commission:
Multi-year project for leak detection and condition assessment on 65+mi/ year of distribution mains
- New Jersey American Water:
Multiple transmission and distribution main leak detection and condition assessment projects in NJ, USA
- Middlesex Water Company:
Multiple projects for leak detection and condition assessment on distribution and transmission mains within NJ, USA
- District of Muskoka:
Project Manager & Field Lead for an ePulse condition assessment program of ductile iron watermain in Ontario, CA
- MEGlobal:
Project Manager & Field Lead for an ePulse condition assessment program of a large chemical processing facility for their cast iron fire suppression distribution system in Alberta, CA
- Newfoundland & Labrador Hydro:
Project Manager & Field Lead for an ePulse condition assessment program of hydroelectric facility for their cast iron distribution system in Newfoundland, CA

SNAPSHOT OF PROFESSIONAL EXPERIENCE

- 2015 – Current.....Echologics
- Sept 2014- Nov 2015Queen's University Science Formal
- Sept 2014 - Apr 2015..... Queen's Fuel Cell Team
- May 2012 – Aug 2014.....Gib-San Pool & Landscape Creations



GREG ROBBINS, PE, PMP

Project Engineer- Echologics, LLC

Greg Robbins has field experience with LeakFinderST leak correlation and ePulse® acoustic pipe condition assessment, as well as water pipe remaining service life calculations with the Echologics organization. Greg serves as the lead engineer and regional operations manager for pipeline projects in the southern United States as well as technical advisor for U.S. sales staff.

SKILLS

- Acoustic Leak Detection and Condition Assessment Specialist
- Report Writing
- Project Management

QUALIFICATIONS

- Bachelor of Science, Civil Engineering, Oklahoma State University, 2007

PROFESSIONAL LICENSES AND REGISTRATIONS

- Professional Engineer
 - Texas Board of Professional Engineers (113241)
 - Arizona Board of Technical Registration (60474)
 - Maryland Board of Professional Engineers (44624)
 - Louisiana Professional Engineering & Land Survey Board (41455)
- Project Management Professional (1964530)
- Associate Water Asset Manager

REFEREE

John Bull, PE Eastman
Chemical 903 237 5409

HALLMARK PROJECTS

- New Orleans, LA - Large Diameter Leak Detection
- Denver, CO – Small Diameter Condition Assessment
- Dallas, TX– Small/Large Diameter Condition Assessment
- San Diego, CA - Small Diameter Condition Assessment

SNAPSHOT OF PROFESSIONAL EXPERIENCE

2011 - Current Echologics, LLC
2007 - 2011 Lockwood, Andrews and Newnam, Inc.



MICHAEL ARCHIE

Sr. Field Specialist - Echologics, LLC

Mr. Archie has over 6 years of experience in leak detection and condition assessment, specifically with LeakFinder. As a Sr. Field Specialist, Michael provides project planning, contractor supervision, on-site data acquisition, data analysis, site inspections and final reporting for leak detection and condition assessment projects on small and large diameter water mains.

SKILLS

- Leakage control surveys and detection
- Logistics, field work/data collection & analysis
- Flow and pressure data logging

HALLMARK PROJECTS

QUALIFICATIONS

- Submarine Training Facility, Norfolk, VA

- **Condition Assessment Program, Raw Water Feed – Louisville Water Utility, KY, USA (2018)** - Scanning of 11 evacuation sites of Cast Iron pipe sections, ranging from 38 to 48 inches were performed using Broadband Electromagnetic (BEM) approach. This is one of the largest BEM projects for Echologics. Michael was responsible for delivering current leakage status, average minimum remaining pipe wall thickness and providing fitness for services & remaining services list estimate for the client.
- **Condition Assessment of critical force main with catastrophic failure history (North Miami Beach, FL) (2017)** - A section of 20-inch ductile iron pipe was inspected using Broadband Electromagnetic (BEM) technology. The testing consisted of full circumferential scanning on one site of the pipe. BEM testing indicated an average wall thickness of 0.34 inches.
- **Leak Detection & Condition Assessment using BEM – Jacksonville, FL, USA 2016** - Leak detection and condition assessment services were performed on Cast Iron water main owned by Jacksonville Electric Authority using Broadband Electromagnetic (BEM) approach. Five sections were scanned to predict average minimum thickness and useful remaining life of the pipe segments. It was concluded that 47% of the total pipe surveyed was in poor condition with more than 30% wall thickness loss from nominal. No leaks were located during the course of the survey. Michael managed this project from initial site inspection to delivery of the final report to the client
- **New Orleans Leak Detection and Condition Assessment Services Program** (over \$250,000 USD)
- **Water Distribution System Leak Detection Survey Puerto Rico National Guard Project** (\$ over 150,000USD)

SNAPSHOT OF PROFESSIONAL EXPERIENCE

2013 - Current Echologics LLC
2003-2013 US Navy, various locations



Hazen

Hazen and Sawyer
7700 Irvine Center Drive • Suite 200 • Irvine, CA, 92618



Fee Proposal
City of Fullerton
Engineering/Hydrogeological Services for Construction of Well 7A,
Abandonment of Well 7, and Pipeline Assessment
September 4, 2018

Task / Description		Hazen and Sawyer										Subconsultants			Total Fee
		Principal in Charge QA/QC	Project Manager	Project Engineer	Senior Electrical	Structural	CADD	Admin	Total Hours	Labor	Direct Costs	Geohydrologist	Surge Modeling	Blacoh	
Task 1 Project Management															
1.a	Kickoff Meeting	2	3	3	-	-	-	-	8	\$2,015	\$50	\$ 2,700		-	\$4,765
1.b	Coordination Meetings	-	24	16	-	-	-	2	42	\$9,940	\$200	\$ 2,100		-	\$12,240
1.c	Agency Coordination and Permitting	2	2	16	-	-	-	-	20	\$4,820	\$50	-		-	\$4,870
1.c.i	Division of Drinking Water	-	2	8	-	-	8	-	18	\$3,380		\$ 6,350		-	\$9,730
1.c.ii	NPDES Permit	-	-	-	-	-	-	-	0	\$0		\$ 7,600		-	\$7,600
1.c.iii	City of Anaheim	-	-	8	8	-	-	-	16	\$3,880		\$ 2,200		-	\$6,080
1.c.iv	CEQA Support	-	-	-	-	-	-	-	0	\$0		-		-	\$0
1.c.v	OC Flood	-	-	16	-	-	-	-	16	\$3,760		-		-	\$3,760
TASK 1 TOTAL		4	31	67	8	0	8	2	120	\$27,795	\$300	\$20,950	\$0	\$0	\$49,045
Task 2 - Research and Field Reconnaissance															
2.a	Existing Document Review	-	2	8	-	-	-	-	10	\$2,380		\$ 2,360		-	\$4,740
2.b	Field Reconnaissance	-	4	8	-	-	-	-	12	\$2,880	\$50	\$ 2,025		-	\$4,955
TASK 2 TOTAL		0	6	16	0	0	0	0	22	\$5,260	\$50	\$4,385	\$0	\$0	\$9,695
Task 3 - Well Drilling Preliminary Design Report															
3.a	Prepare Well Drilling Preliminary Design Report	-	4	4	-	-	-	-	8	\$1,940		\$ 11,700		-	\$13,640
TASK 3 TOTAL		0	4	4	0	0	0	0	8	\$1,940	\$0	\$11,700	\$0	\$0	\$13,640
Task 4 - Well Drilling and Abandonment PS&E and Bid Assistance															
4.a	Well Drilling and Abandonment PS&E	-	2	4	-	-	-	-	6	\$1,440		\$ 14,720		-	\$16,160
4.b	Bid Assistance	-	4	10	-	-	-	-	14	\$3,350		\$ 2,610		-	\$5,960
TASK 4 TOTAL		0	6	14	0	0	0	0	20	\$4,790	\$0	\$17,330	\$0	\$0	\$22,120
Task 5 - Well Drilling and Abandonment Construction Services															
5.a-f	Construction Management	-	8	-	-	-	-	-	8	\$2,000		\$ 11,790		-	\$13,790
5.g	Well 7 Destruction Observation	-	-	-	-	-	-	-	0	\$0		\$ 3,600		-	\$3,600
5.h	Well 7A Construction, Development and Testing	-	-	-	-	-	-	-	0	\$0	\$0	\$ 44,165		-	\$44,165
	1. Observation during Drilling and Conductor Casing (Full-time)	-	-	-	-	-	-	-	0	\$0		\$ 1,210		-	\$1,210
	2. Observation during Pilot Borehole Drilling (Part-time)	-	-	-	-	-	-	-	0	\$0		\$ 6,100		-	\$6,100
	3. Observation during Geophysical Logging (Full-time)	-	-	-	-	-	-	-	0	\$0		\$ 800		-	\$800
	4. Design and Observation of Aquifer Zone Testing (3 Zones)	-	-	-	-	-	-	-	0	\$0		\$ 8,010		-	\$8,010
	5. Observation od Borehole Reaming (Part-time)	-	-	-	-	-	-	-	0	\$0		\$ 4,660		-	\$4,660
	6. Observation During Well Construction (Full-time)	-	-	-	-	-	-	-	0	\$0		\$ 7,710		-	\$7,710
	7. Observation during Initial Development Airlift and Swab (Part-time)	-	-	-	-	-	-	-	0	\$0		\$ 4,860		-	\$4,860
	8. Observation during Development by Pumping (Full-time)	-	-	-	-	-	-	-	0	\$0		\$ 6,500		-	\$6,500
	9. Observation during Step-drawdown Pumping Test (Full-time)	-	-	-	-	-	-	-	0	\$0		\$ 1,085		-	\$1,085
	10. Observation during 24-hour Constant Rate Pumping Test (Part-time)	-	-	-	-	-	-	-	0	\$0		\$ 3,230		-	\$3,230
5.i	Design of Filter Pack and Screen, Prepare Well Design Letter	-	4	2	-	-	-	-	6	\$1,470		\$ 5,010		-	\$6,480
5.j	Provide As-Built Construction Drawings	-	-	-	-	-	-	-	0	\$0		\$ 1,420		-	\$1,420
5.k	Analyze Pumping Test Results and Prepare Pump Design Letter	-	4	2	-	-	-	-	6	\$1,470		\$ 2,950		-	\$4,420
5.l	Prepare Well Completion Report for Well 7A	-	-	-	-	-	-	-	0	\$0		\$ 8,720		-	\$8,720
5.m	Demobilization and Site Close-out	-	-	-	-	-	-	-	0	\$0		\$ 810		-	\$810
5.n.1	Observation of Test Pump Mobilization and Installation in the Well	-	-	-	-	-	-	-	0	\$0		\$ 1,600		-	\$1,600
5.n.2	Observation of Final Well Alignment, Video Log, and Disinfection	-	-	-	-	-	-	-	0	\$0		\$ 2,520		-	\$2,520
TASK 5 TOTAL		0	16	4	0	0	0	0	20	\$4,940	\$0	\$82,585	\$0	\$0	\$87,525
Task 6 - Distribution Pipeline Assessment															
6.a	Level 1 Distribution Pipeline Assessment	-	8	24	-	-	-	-	32	\$7,640		-		-	\$7,640
6.b	Surge Analysis, Recommendations, and Monitoring	-	4	6	-	-	-	-	10	\$2,410		-	\$ 3,500	\$ 2,500	\$8,410
TASK 6 TOTAL		0	12	30	0	0	0	0	42	\$10,050	\$0	\$0	\$3,500	\$2,500	\$16,050
Task 7 - Well Equipping and Pipeline Assessment Preliminary Design Memorandum															
7.a	Prepare Preliminary PDM	2	20	48	8	6	16	2	102	\$22,070	\$200	-		-	\$22,270
7.b	Prepare Final PDM	2	4	8	-	-	-	2	16	\$3,620	\$50	-		-	\$3,670
TASK 7 TOTAL		4	24	56	8	6	16	4	118	\$25,690	\$250	\$0	\$0	\$0	\$25,940
TASKS 1-7 GRAND TOTAL		8	99	191	16	6	24	6	350	\$80,465	\$600	\$136,950	\$3,500	\$2,500	\$224,015