CITY OF SANTA FE

Date: October 24, 2024

To: Governing Body, Finance Committee, and Public Works & Utilities Committee

From: P. Fred Heerbrandt, P.E., Engineer Supervisor FH

Via: John Dupuis, Public Utilities Department Director JD

Subject: Hazen and Sawyer Operational Support Contract Amendment #1

Vendor Name: Hazen and Sawyer

Munis Vendor Number: 7789

ITEM AND ISSUE:

Public Utilities Department/Wastewater respectfully requests your review and approval of an Amendment #1 to contract #3204638 with Hazen and Sawyer for an Emergency Service. Amendment #1 increases the amount of compensation by $2,666,930.00 that will expand existing tasks within the original scope of work. The total compensation will not exceed $5,384,930.00 including gross receipt tax for a term of 3 years.

CONTRACT NUMBER:

The FY24 Munis contract number is 3204638

BACKGROUND AND SUMMARY:

The Wastewater Management (WWM) Division is requesting approval of Amendment #1 to expand three existing tasks withing the existing contract scope of work, which includes compiling and Asset Inventory and Condition Assessment, Production of a Digital Twin Process Model, and additional On-site Operational Support. The original contract was executed to respond to an Administrative Order issued by US EPA and NMED, due to the discharge of inadequately treated wastewater. The original contract was approved on April 4, 2024 as and Emergency, Item #24-0299.

Prior Approvals and Supporting Information:

PROCUREMENT METHOD:

The procurement method used was NMSA 1978, Section 13-1-127, Emergency

Chief Procurement Officer (CPO) / Designee: Alan Webber **Date:** Dec 15, 2024
CPO Comment/Exceptions: 24-0710

FUNDING SOURCE:

Fund Name/Number: WWM Enterprise Fund/Fund 500

Munis Org Name/Number: CIP//5000375

Munis Object Name/Number: WIP Construction/572970

Budget Officer / Designee: Andrea Salazar **Date:** Nov 20, 2024
Budget Officer Comment/Exceptions: _____

ASSOCIATED APPROVALS:

Does this purchase require any of the following associated approvals: ☐ Yes | ☐ No
(ITT, Vehicles/Fleet, Facilities, Asset, Grant Review)

IT Components included? ☐ Yes | ☒ No
Approval: _____ **Title:** _____ **Date:** _____
Comment/Exceptions: _____

Vehicles included? ☐ Yes | ☒ No
Approval: _____ **Title:** _____ **Date:** _____
Comment/Exceptions: _____

Construction, Facilities, Furniture, Fixtures, Equipment included? ◉ Yes | ○ No
Approval: _____ **Title:** _____ **Date:** _____
Comment/Exceptions: _____

Capital Asset* or Project ☒ Yes | ☐ No**
Project Ledger #:WWM245002
(*will this procurement result in a tangible item that costs more than $5,000?
(**Capital Projects are new and improvement projects that are going to cost $10,000 or more
Approval: Lisa Storey **Title:** Accounting Manager **Date:** Nov 20, 2024
Comment/Exceptions: _____

Is this a Grant Funded Purchase? ☐ Yes | ◉ No
Approval: _____ **Title:** _____ **Date:** _____
Comment/Exceptions: _____

ATTACHMENTS:

Procurement Document: Emergency Determination

Vendor's Quote

Professional Services Contract

Emergency Determination (original)
CPO Service Determination Email
Professional Service Contract amendment 1
quote
Certificate of Liability Insurance
Original contract packet with previous contract amendments
BAR

Log # *{Finance use only}*:	
Journal # *{Finance use only}*:	

City of Santa Fe, New Mexico
BUDGET AMENDMENT RESOLUTION (BAR)

DEPARTMENT / DIVISION NAME	DATE
Public Utilities Department / Wastewater Management Division	9/9/2024

ITEM DESCRIPTION	ORG	OBJECT	PROJECT	INCREASE	DECREASE
EXPENDITURES				*{enter as positive #}*	*{enter as negative #}*
Hazen and Sawyer Operational Support Contract	5000375	572970		$2,666,930.	
REVENUES				*{enter as negative #}*	*{enter as positive #}*
				$ 2,666,930	$ -

JUSTIFICATION: *(use additional page if needed)*
--Attach supporting documentation/memo

To increase contract #3204638 HAZEN for amendment 1 CIP see memo for more detail

{Complete section below if BAR results in a net change to ANY Fund}	
Fund(s) Affected	Fund Balance Increase/(Decrease)
WWM Enterprise Fund 500	(2,666,930)
TOTAL:	(2,666,930)

P. Fred Heerbrandt, P.E. — 9/9/2024
Prepared By *{print name}* — Date

Division Director Signature *{optional}* — Date

John Dupuis (Oct 25, 2024 14:15 MDT) — Oct 25, 2024
Department Director Signature — Date

{Use this form for Finance Committee/ City Council agenda items ONLY}

CITY COUNCIL APPROVAL

City Council Approval Date:

Agenda Item #:

Andy Hopkins — ahopkins@santafenm.gov — Nov 20, 2024
Budget Officer — Date

EMILY OSTER — Nov 22, 2024
Finance Director *{≤ $5,000}* — Date

City Manager *{≤ $60,000}* — Date

HAZE&SA-01 KGODWIN

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 4/19/2024

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Ames & Gough 8300 Greensboro Drive Suite 980 McLean, VA 22102	PHONE (A/C, No, Ext): (703) 827-2277	FAX (A/C, No): (703) 827-2279
	E-MAIL ADDRESS: admin@amesgough.com	

INSURED	INSURER(S) AFFORDING COVERAGE	NAIC #
Hazen and Sawyer 498 Seventh Avenue New York, NY 10018	INSURER A : American Casualty Co of Reading, PA A(XV)	20427
	INSURER B : National Fire Insurance Company of Hartford A(XV)	20478
	INSURER C : Continental Insurance Company A(XV)	35289
	INSURER D : Continental Casualty Company (CNA) A, XV	20443
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			7036845683	3/29/2024	3/29/2025	EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 1,000,000
	X Contractual Liab.						MED EXP (Any one person)	$ 15,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PERSONAL & ADV INJURY	$ 1,000,000
	POLICY X PRO-JECT LOC						GENERAL AGGREGATE	$ 2,000,000
	OTHER:						PRODUCTS - COMP/OP AGG	$ 2,000,000
								$
B	AUTOMOBILE LIABILITY			7036845635	3/29/2024	3/29/2025	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
							Comp./Coll. Ded	$ 1,000
C	X UMBRELLA LIAB X OCCUR			7036845649	3/29/2024	3/29/2025	EACH OCCURRENCE	$ 1,000,000
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$ 1,000,000
	DED X RETENTION $ 10,000							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N	N / A		7036845652	3/29/2024	3/29/2025	X PER STATUTE OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) N						E.L. EACH ACCIDENT	$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
D	Professional Liab.			AEH008231489	3/29/2024	3/29/2025	Per Claim/Aggregate	1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: CONTRACT #19-0235, ON-CALL ENGINEERING SERVICES FOR THE CITY

The City of Santa Fe, NM is included as additional insured with respect to General Liability, Automobile Liability and Umbrella Liability when required by written contract. General Liability, Automobile Liability and Umbrella Liability are primary and non-contributory over any existing insurance and limited to liability arising out of the operations of the named insured and when required by written contract. General Liability, Automobile Liability, Umbrella Liability and Workers Compensation policies include a waiver of subrogation in favor of the additional insureds where permissible by state law and when required by written contract. Umbrella Liability coverage sits excess over General Liability, Automobile Liability and Employers Liability coverage. 30-day Notice of
SEE ATTACHED ACORD 101

CERTIFICATE HOLDER

City of Santa Fe, NM
Water Division Director
801 W. San Mateo
Santa Fe, NM 87505

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

AGENCY CUSTOMER ID: HAZE&SA-01 KGODWIN

LOC #: 0

ADDITIONAL REMARKS SCHEDULE

AGENCY		NAMED INSURED
Ames & Gough		Hazen and Sawyer 498 Seventh Avenue New York, NY 10018
POLICY NUMBER		
SEE PAGE 1		
CARRIER	NAIC CODE	EFFECTIVE DATE: SEE PAGE 1
SEE PAGE 1	SEE P 1	

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: ACORD 25 FORM TITLE: Certificate of Liability Insurance

Description of Operations/Locations/Vehicles:
Cancellation will be issued for the General Liability, Automobile Liability, Umbrella Liability, Workers Compensation and Professional Liability policies in accordance with policy terms and conditions.
Pollution Liability coverage is provided and included within the Professional Liability policy noted above. It shares the limits of the Professional Liability policy.

Signature: P. Fred Heerbrandt, P.E.
P. Fred Heerbrandt, P.E. (Oct 25, 2024 06:55 MDT)

Email: pfheerbrandt@santafenm.gov

City of Santa Fe
Emergency Determination Form

The emergency procurement method may only be used as described in NMSA 1978, Section 13-1-127 and in the City's Procurement Manual XII.

NOTE:

Notify all signatories as soon as you are made aware of the emergency. Give them a brief synopsis of the emergency, answer their questions, and let them know this document and all supporting documents will be sent to them for signatures. They should know about the request prior to obtaining signatures.

The Department that makes an emergency procurement to plan or prepare for the response to a serious threat to public health, welfare, safety or property caused by a flood, fire, epidemic, riot, act of terrorism, equipment failure or similar event shall account for the money spent in making the procurement and report on that accounting to the City's Finance Department Director within ninety days after the end of the contract or fiscal year in which the procurement was made, whichever comes first.

I.

Department:	Public Utilities, Wastewater Division, City of Santa Fe
Department Director:	John Dupuis
Department Contact:	Michael Dozier
Department Telephone Number:	(505) 955-4642
City of SF Chief Procurement Officer:	Travis Dutton-Leyda
Telephone Number:	(505) 629-8351

II.

Name of Contractor:	Hazen and Sawyer
Address of Contractor:	100 Sun Ave. NE, Suite 206, Albuquerque, NM 87109
Amount of prospective contract:	$5,384,930.00
Term of prospective contract:	3 years
Location of Services:	Paseo Real Wastewater Reclamation Facility

III. **Please thoroughly list the services (scope of work), construction or items of tangible personal property of the contract:**

The scope of work to be delivered by Hazen and Sawyer (Hazen) includes:

- Asset Inventory and Condition Assessment – Hazen will inventory all PRWRF assets, develop attribute data, field verify the condition of assets, develop risk-based scoring criteria, identify level of service goals, perform asset cost analysis, and develop a 10-year capital improvement plan for the PRWRF.
- Digital Twin – Hazen will provide technical services to advance the City's data visualization and process optimization initiatives. The digital twin task is broken into six subtasks:

development and tag addition, data exploration and cleaning, development of a data visualization tool, real-time process optimization, development of a mechanistic process digital twin, and addition of data-driven optimization features into the process twin (i.e., development of a hybrid model that includes mechanistic as well as data-driven components).

- Onsite Operational Support – Hazen will provide onsite support from July 24, 2024 through October 25, 2024 followed by part-time support for the remaining duration of Hazen's contract scheduled to end on September 30, 2026. Hazen staff will serve as an extension of the City's staff to support the operation and maintenance of the PRWRF.

IV. **Provide an explanation for the justification of the procurement including a description of the emergency condition(s) requiring use of emergency procurement and the practicable competition utilized in compliance with NMSA 1978, Section 13-1-127.**

The United States Environmental Protection Agency (EPA) issued Administrative Order (AO) CWA-06-2024-1765 to the City on July 10, 2024. The AO states that the City's Paseo Real Water Reclamation Facility (PRWRF) has repeatedly failed to meet effluent limits specified in the National Pollutant Discharge Elimination System (NPDES) Permit No. NM00222292. The City issued a response to the EPA's AO on April 4, 2024. The City's response provided an initial plan for immediate actions (30 days), near-term actions (6 months), and long-term actions (18 months) intended to address the permit violations as quickly as possible and implement measures to prevent similar exceedances from reoccurring.

Similarly, the New Mexico Environment Department (NMED) has determined that the City of Santa Fe Paseo Real Wastewater Treatment Plant (WWTP) has been operating in noncompliance with the New Mexico Water Quality Act (WQA) and Water Quality Control Commission's (WQCC) regulations (20.6.2 and 20.6.4 New Mexico Administrative Code) adopted pursuant to the WQA.

To facilitate the most efficient response to these regulators, the City requires emergency procurement to develop a plan and to implement that plan to bring the Paseo Real WWTP into compliance as soon as is feasible to do so.

Hazen has continuously supported the City's efforts to bring PRWRF back into permit compliance. Over the course of that effort, the City identified additional areas where Hazen's services will support the City's overall goals. The justification for each task included in this amendment follows:

- Asset Inventory and Condition Assessment – The City does not have a complete inventory of PRWRF assets and their condition. An asset inventory including condition is the foundation of an Asset Management Plan (AMP). An AMP is needed to proactively plan and execute repair/replacement of PRWRF assets to reduce the probability of asset failure(s) resulting in future permit violations.
- Digital Twin – The City does not have a system for processing and visualizing plant operational data or a system for simulating how operational changes may impact process performance. Data visualization dashboards will allow PRWRF staff to view operational data in real-time and make data-driven decisions. A digital twin will allow PRWRF staff to simulate the impacts of potential operational changes to verify that proposed changes will be beneficial rather than detrimental to operational goals and permit compliance.
- Onsite Operational Support – The PRWRF is currently understaffed, which has made it challenging for the City to perform operation and maintenance (O&M) activities and implement changes to improve plant performance. The City asked Hazen to station licensed Wastewater Treatment Operators onsite to improve plant O&M and implement the changes necessary to improve plant performance.

V. **Please describe what measures are being taken to minimize the duration and effect of this emergency procurement (for example: is the emergency only in place until a competitive process can be completed, etc.).**

By retaining Hazen to perform the requested scope of work, we can bring and continue maintain the facility in compliance with the acts and regulations listed above, thereby eliminating or minimizing the associated risks to public health and safety associated with noncompliant discharge.

VI. **Describe what measures the Department will take in the future to prevent/mitigate use of emergency procurement under similar circumstances.**

It is our goal and desire to prevent the conditions that precipitated the need for this emergency procurement by implementing immediate, near-term and long-term actions that will bring the WWTP back into compliance and maintain that compliance for the remainder of the plant's service life.

Certified by:

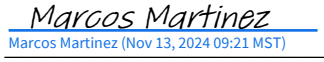
Nov 14, 2024

City Chief Procurement Officer, Travis Dutton-Leyda **Date**

City Approval by:

Nov 14, 2024

Department Director, John Dupuis **Date**

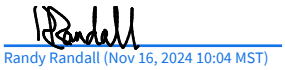


Nov 13, 2024

Senior Assistant City Attorney, Marcos Martinez **Date**

Nov 15, 2024

Finance Director, Emily Oster **Date**



Nov 16, 2024

Interim City Manager, Randy Randall **Date**

Note: All emergencies must be posted to the SPD website:
https://www.generalservices.state.nm.us/statepurchasing/submit-emergency.aspx
and the City of Santa Fe's website:
https://santafenm.gov/finance-2/purchasing-1/solicitations

Attachments:

Vendor's Quote – Matches the total requested for this emergency.

Reference: 40-M0087-24-EM027

Hazen

Hazen and Sawyer
100 Sun Ave, NE, Suite 206
Albuquerque, NM 87109

March 18, 2024

John Dupuis
Public Utilities Director
City of Santa Fe Public Utilities Department
801 W. San Mateo Rd
Santa Fe, NM 87505

Re: Paseo Real Water Reclamation Facility (PRWRF)
Engineering, Operational Support, and Related Services in
Response to EPA Administrative Order CWA-06-2024-1745

Dear Mr. Dupuis:

We appreciated the opportunity to meet with the City of Santa Fe (City) on Wednesday, March 13, 2024 to discuss the referenced Administrative Order (AO) the City received from the U.S. Environmental Protection Agency (EPA) Region 6. As we discussed, the City would like to implement an overall plan that 1) responds to and resolves the AO, and 2) prepares the City for long-term, future success in operating and managing the Paseo Real Water Reclamation Facility (PRWRF) and similarly at a future facility being considered and visioned by the City as an eventual replacement for the PRWRF. The City's plan focuses on improving current data collection, regulatory compliance, operational, knowledge management / transfer, and management practices at the PRWRF, combined with selective capital improvements to existing PRWRF facilities. This comprehensive plan can be broken down into the following nine (9) steps:

1. Provide sampling and regulatory support to ensure compliance with existing permits.

2. Support the City's external communications with the New Mexico Environment Department (NMED).

3. Build a comprehensive base of knowledge management tools / decision trees to guide PRWRF staff in day-to-day operations and management of the facility.

4. Improve PRWRF laboratory practices, data management, workflows, and communications for all testing performed to ensure regulatory compliance and/or support treatment operations.

5. Provide an inventory of all PRWRF instrumentation, calibration practices, data flows, and uses of information currently collected and rectify gaps to improve process monitoring and control.

6. Develop a model for treatment operations using open-source software that integrates information available from lab test results and real-time supervisory control and data acquisition (SCADA) data.

7. Develop a "digital twin" model of PRWRF to simulate and help optimize treatment plant operations.

8. Develop tools for remote simulation and testing of proposed changes to plant operations.

9. Provide engineering support for short-term treatment plant improvement projects.

The following narrative further defines the specific activities and services Hazen and Sawyer ("Hazen") proposes to provide. This work will be performed under a new engineering services agreement between the City and Hazen to be issued in response to EPA Administrative Order CWA-06-2024-1745.

Scope of Work

1. Sampling and Regulatory Support

Hazen will coordinate one soil sampling event and four quarterly groundwater sampling events at the PRWRF, with the samples being analyzed for poly- and perfluoroalkyl substances (PFAS). Both the soil and groundwater samples will be analyzed using EPA Method 1633. The sampling and reporting will be conducted by a third party in the place of City staff, with minor support from City staff. We have assumed that a total of 10 soil samples will be collected during one soil sampling event (including duplicate samples), and that each sample will be collected from a depth of 2 to 3 feet below ground surface using a hand auger. Ten groundwater samples will be analyzed during each groundwater sampling event (7 PRWRF monitor wells and 3 quality assurance samples). The groundwater sampling for PFAS will begin before Hazen begins supporting the groundwater sampling that is required by the facility's discharge permits (discussed below).

Hazen will coordinate the quarterly groundwater sampling and analysis that is required under discharge permits DP-289 (Wastewater Reclamation Facility) and DP-135 (Sludge Disposal Facility) issued by the NMED Ground Water Quality Bureau (GWQB) for six (6) quarters, starting with the second quarter sampling event in 2024. Hazen will also coordinate the required reporting under these permits. The sampling and reporting will be conducted by a third party in the place of City staff, with minor support from City staff (e.g., for purge water disposal). The City will provide additional information (e.g., monthly totalized average daily and peak daily influent volumes, monthly volumes discharged to each reclaimed domestic wastewater recipient, discharge monitoring reports) for inclusion in the quarterly discharge permit reports prepared for NMED. This task will support the City in achieving compliance with the requirements of these permits.

2. Communications Support

Along with City leadership and staff, Hazen staff (Amy Ewing) will participate in weekly phone calls that will be scheduled with NMED to discuss the current and planned activities and progress made in support of responding to and resolving the AO.

3. **Build a comprehensive base of knowledge management tools / decision trees for PRWRF operations**

Daily activities by PRWRF operations, maintenance, and management staff will support routine and consistent compliance with permit limits established by the City's National Pollutant Discharge Elimination System (NPDES) Permit NM 0022292 once staff have a clear understanding of:

- The purpose of each unit process
- Key Performance Indicators (KPIs) for measuring its performance
- Its relationship to upstream and downstream unit processes
- Information needed to monitor the process, and
- Expectations for each level of staff on how to achieve performance goals set for the process

Hazen proposes to develop these understandings by developing a series of documents called Area Procedures and Expectations (APEs) for each of the seven (7) liquid stream unit processes and four (4) solids handling processes at PRWRF. Each APE, developed as a PowerPoint presentation, will provide a clear guide for each level of operations, maintenance, and management staff, and will provide specific guidance for how and when to adjust the process, by how much, and by whom. Hazen's production of APEs will leverage existing Operation and Maintenance (O&M) Manual and Standard Operating Procedure (SOP) documentation the City may already have in place for PRWRF.

APE production will also document gaps between available information routinely collected (e.g., lab tests and SCADA data) versus what is needed to achieve reliable performance, how such information is distributed, and what improvements to information management are needed so that key items are communicated to staff who need it the most and at a frequency that supports their needs. APE production will also identify information and records currently being collected that do not serve the purpose of optimizing a treatment process. Lastly, APEs will capture information provided during the development of Items 4 and 5 described below.

Once the APEs have been prepared, Hazen will provide on-site staff training for each. This will include administering knowledge assessment quizzes to confirm staff are absorbing the critical information needed to successfully operate and maintain each unit process.

The collection of APEs will form the foundation for PRWRF knowledge management / transfer to which existing staff can refer as they work to optimize facility operations and to train future staff. As "living documents", APEs can be periodically updated by the City to reflect new facilities and capital improvements implemented at PRWRF.

The next element of this PRWRF knowledge management program summarizes the information contained in the 11 APEs (7 for liquid processes / 4 for solids handling) and provides an overview for how each process is supposed to work. This document called **Unit Process Operating Strategies** provides a useful reference to all levels of PRWRF staff and will serve as a tool for newcomers so they can quickly become familiar with "the right way" to operate plant facilities.

The final element of the knowledge management program currently envisioned will be preparation of a PRWRF **Operational Plan**. This document will provide information on the staff hierarchy, command and

communications structure, state and federal regulatory permits, plant safety programs, interrelationships with other City work groups (e.g., purchasing and materials management), and key summaries about PRWRF unit processes extracted from the **Unit Process Operating Strategies** document. Whereas the latter focuses on the information needed to optimize plant treatment operations, the **Operational Plan** focuses on the PRWRF enterprise as a whole and the communications within each internal and external City work group needed to achieve the best performance possible from PRWRF.

4. **Improve PRWRF laboratory practices, data management, workflows, and communications**

Hazen will provide the City with external sampling and reporting support for samples that are collected by PRWRF staff and analyzed by the in-house laboratory to demonstrate compliance with applicable state and federal discharge permits and to support operational control of PRWRF unit processes. We will work with City staff to ensure that all lab process documentation is current and complete and will assist in clearly defining appropriate workflows for PRWRF staff involved in sample collection, testing, and reporting of results. This task will include performing a review of lab operations, external collection and testing of laboratory samples for a period of up to 4 weeks, and assistance with the transition back to in-house sampling and analysis after PRWRF staff roles and responsibilities have been clearly defined for future lab activity. Item 4 includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

5. **Provide an inventory of all PRWRF instrumentation**

Hazen will develop an updated inventory of all instrumentation installed at PRWRF including calibration procedures and how this information is managed, stored, accessed, and communicated (e.g., paper logbooks, SCADA, Operator10™ software, or an alternate operational data storage platform/historian). This inventory will identify existing instruments that do not perform their intended function and/or could be re-deployed to provide the information needed by Operations staff. This inventory will also note opportunities to add instruments that will support real-time monitoring of treatment processes, as needed to accomplish Items 6 through 8 below. If practical, Hazen will use the City's current asset database format and structure to prepare this inventory of PRWRF instrumentation, which might then be used as an input to the City's asset management program.

6. **Develop a model for treatment operations**

Hazen will use the available information from lab data and SCADA data including any improvements to these sources realized through the outcomes of the work on Items 3 through 5 above, and will develop an operational model for PRWRF performance. This model will be developed using open-source software (e.g., SUMO™, BioWIN™, or similar product) and calibrated using the available data set. This model will be tested using the updated procedures for controlling and adjusting plant operations developed under our work for Item 3. This item includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

7. **Develop a "digital twin" model of plant operations to simulate and help optimize treatment plant operations**

The modeling work for Item 6 will next be used to develop a more advanced model that will serve as a "digital twin" the City can use for a variety of purposes including:

- A testbed for proposed changes to existing modes of operation for a particular treatment process
- Observing responses to upset / unexpected conditions for influent wastewater
- Assessing the impact that mechanical breakdown of treatment plant equipment may have on plant performance

As described, the "digital twin" should allow the City to evaluate the plant's response to a suite of unexpected stressors and determine what facility improvements or changes to normal operating procedures will foster a more resilient operation. Item 7 includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

8. **Develop tools for remote simulation and testing of proposed changes to plant**

The City has expressed interest in having Hazen partner with a nationally recognized firm to perform remote modeling, testing, and optimization of PRWRF operations, such as are provided by the company AM-Team or a similar entity. This item will build upon the work completed by Hazen for Items 3 through 7. The specific scope for Item 8 will be further refined once the outcomes for Items 3 through 7 have been established.

9. **Provide engineering support for short-term plant improvement projects at PRWRF**

The City has engaged the services of AAC Construction to perform select construction projects at PRWRF that are characterized as limited scope, remove-and-replace in-kind for specific treatment plant equipment / systems that are out of service or are no longer working. Examples of these limited scope projects include restoring two (2) former traveling bridge filter systems to working condition and installing a new mechanical bar screen the City previously procured. Hazen will provide the engineering support the Contractor may need to properly install and commission these equipment systems so that they perform as intended. There may be other projects of this type that the City decides to undertake, in addition to these two projects, for which Hazen can provide the engineering support the Contractor may need. We have included an allowance of $400,000 to cover the effort we anticipate may be needed for engineering support for short-term plant improvement projects.

Project Management

Hazen will perform ongoing project management activities including cost control and monitoring, invoicing, and general coordination with the City's project manager and staff for each of the 9 items of support described under **Scope** that the City authorizes. Each month, we will provide an overall progress report and invoice for authorized tasks similar to the reporting and invoicing process we currently employ for Engineering On-call Contract #23-0516.

Schedule

The work elements described under Scope are expected to be completed over the next 30 months, as needed and as directed by City staff. We are prepared to begin our work for the City immediately upon receipt of its written authorization to proceed.

Compensation

We are requesting an initial authorization of $2,718,000 including NMGRT to provide the services that are described under the Scope. Attachment 1 provides a budget breakdown for Items 1 through 7 and 9. As requested by the City, we have deferred estimating the effort for Item 8, pending completion of Items 1 through 7. All work will be performed on a time and materials basis using the labor rates attached to this letter. Please note these labor rates are the same rates used by Hazen for its work under Engineering On-Call Contract #23-0516 with the City of Santa Fe, and which get adjusted annually at the beginning of the City's fiscal year. Expenses may include reimbursable mileage, printing, mailing, supplies, and other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

Please call me at (505) 259-1679 or Charlie Leder at (505) 236-3889 if you have any questions or would like to discuss further Hazen's plan for providing services to help the City respond to EPA Administrative Order CWA-06-2024-1745.

Sincerely,

Greg Gates, PE
Vice President

Charles S. Leder, PE
Senior Associate

Accepted by City of Santa Fe Public Utilities Department

By: _____ Date: _____

Name: John Dupuis

Title: City of Santa Fe Public Utilities Director

Attachment 1

Proposed budgets for Engineering, Operational Support, and Related Services in Response to EPA Administrative Order CWA-06-2024-1745

Service Item	Proposed time and materials budget
1. Regulatory support	$ 250,000
2. Communications support	$ 25,000
3. Build a comprehensive base of knowledge management tools / roadmaps for PRWRF operations	$ 750,000
4. Improve PRWRF laboratory practices, data management, workflows, and communications	$ 350,000
5. Provide an inventory of all PRWRF instrumentation	$ 250,000
6. Develop a model for treatment operations	$ 300,000
7. Develop a "digital twin" model of plant operations to simulate and help optimize treatment plant operations	$ 200,000
8. Develop tools for remote simulation and testing of proposed changes to plant	TBD
9. Provide engineering support for short-term plant improvement projects at PRWRF	$ 400,000
Total estimated budget for all Items	$ 2,525,000
NMGRT Allowance[1]	$ 193,000
Total budget including applicable NMGRT	$ 2,718,000

1. Estimate calculated using the Albuquerque FY 2024 NMGRT rate of 7.625%. NMGRT will be assessed on labor and subconsultant work performed in New Mexico.

LABOR RATES FOR HAZEN AND SAWYER STAFF

	Rates over next 4 years			
	2023-2024	2024-2025	2025-2026	2026-2027
Vice President / Project Director	$348.91	$359.38	$370.16	$381.26
Senior Associate	$281.39	$289.83	$298.52	$307.48
Associate	$225.11	$231.86	$238.82	$245.98
Senior Principal Engineer	$191.33	$197.07	$202.98	$209.07
Principal Engineer	$168.83	$173.89	$179.11	$184.48
Engineer	$157.58	$162.31	$167.18	$172.20
Assistant Engineer	$135.06	$139.11	$143.28	$147.58
Technician	$112.55	$115.93	$119.41	$122.99
Effective date for rates	7/1/2023	7/1/2024	7/1/2025	7/1/2026

1. Work performed by subconsultants will be billed at cost plus a 10% mark-up

Hazen

City of Santa Fe, NM
Paseo Real WRF Asset Inventory and Condition Assessment
Scope of Work

1. Project Understanding

The Paseo Real Water Reclamation Facility (PRWRF) is owned and operated by the City of Santa Fe, New Mexico (CITY). The PRWRF has a permitted capacity of 13 million gallons per day (mgd), average day maximum month flow. PRWRF effluent is discharged into the lower Santa Fe River and can also be conveyed to non-potable reuse customers.

The CITY has requested a scope from Hazen and Sawyer (Hazen) for the development of an Asset Management Plan (AMP) for the PRWRF Facility. In parallel, Hazen has been supporting the City in the selection and procurement of a Computerized Maintenance Management System (CMMS) software product. The City has negotiated a contract with OpenGov to purchase and implement OpenGov's Asset Management environment for the following asset groups:

- Water Distribution
- Water Treatment
- Wastewater Treatment
- Wastewater Collection / Sanitary Sewer
- Transportation
- Parks and Recreation
- Stormwater

This scope of work will include asset inventory and attribute data development, field verification of the inventory along with physical condition assessment, development of risk scoring criteria, identifying level of service goals, asset cost analysis, and development of a 10-year capital improvement plan for the PRWRF Facility (wastewater treatment group). This task will lay the foundation for future asset management endeavors by establishing the following:

- Defining an "asset"
- Defining and assigning asset attributes
- Defining asset hierarchy
- Developing an asset inventory
- Performing a physical condition assessment
- Developing the risk scoring criteria (for likelihood of and consequence of failure scores)
- Developing the levels of service (LOS) that will help drive a prioritization of risk-based CIP projects and are focused on helping the CITY meet its LOS
- Creating a prioritized list of CIP projects based upon defensible risk scores and LOS

The database developed during this task (outside of CIP development), will be used to populate the CMMS system. Hazen acknowledges that both efforts are simultaneously occurring and will work to ensure that development and incorporation of data into the CMMS system is as seamless as possible.

The major elements of this task order are summarized below:

- Review of existing data and records
- Data validation and acceptance – establishing the limits and hierarchy of what to include in asset inventory, establishing asset definitions and attribute information
- Asset inventory and condition assessment field work – creating data collection forms and performing onsite inventory and condition assessment
- Establishment of an Asset Register
- Evaluation of expected useful / remaining life of assets and replacement cost data for assets
- Development of level of service goals and key performance indicators
- Development of a maintenance planning strategy
- Establishing an asset risk framework and risk scoring criteria for assets
- Development of an asset insights dashboard

The scope of work is detailed in the following section.

2. Scope of Services

The Scope of Services for this task order includes the following tasks:

Task 1 – Project Management

Hazen will perform the following project management activities associated with this effort:

1. Project Management – Task consists of ensuring performance of the work follows the agreed upon scope, budget, and schedule (estimated 12 months).
2. Submit monthly invoices and associated progress reports
3. Project Kickoff Meeting – The purpose of the meeting will be to:
    - Identify the key project personnel and contact information.
    - Review the project scope of services and project schedule
    - Review and discuss coordination with the CITY staff, treatment plant operations staff, and other supporting key staff.
    - Discuss the requested existing data, information, and materials CITY will provide
4. Conduct regular progress meetings with CITY project manager
5. QA/QC – Hazen will incorporate a robust QA/QC procedure of all data collected, placed in the asset register, and all deliverables provided to CITY.

All data developed for the CITY as part of this project, including mapping, asset attributes, inventories, CIP plans and anything else generated by the project, is the property of the CITY and will be available to the CITY in electronic format. Hazen will keep the CITY informed of the project progress and will notify the CITY of issues that arise which could potentially affect the schedule, scope, or budget. Any work outside this scope of work will only be performed following written approval by the CITY.

Task 1 Deliverables

- Monthly Invoices with Project Status Reports
- Kickoff Meeting Draft Agenda and Meeting Minutes
- Progress meetings minutes

- Any data generated during the project (draft (at the request of the CITY) or final (all final data to be given to the CITY)).

Task 2 – Data Review, Validation, and Acceptance

Prior to beginning this task, Hazen will submit a request for information (RFI) that includes existing asset information from the current CMMS system, process and instrumentation-related information from SCADA, and record drawings. These details are anticipated to be submitted in digital format for ease of analysis and inclusion in the condition assessment form. This task shall consist of the following services:

1. Hazen will evaluate the information provided by the CITY in response to the RFI
2. Hazen will use industry standards and confer with the CITY during a workshop to establish definition of an "asset" to be included in the inventory phase of the project.
3. Hazen will establish asset types and subtypes to develop a final nomenclature to move forward for the asset inventory phase of the project.
4. Hazen will propose to the CITY a standard asset hierarchy and classifications for various asset types, including name and numbering methods, based on industry standards. The CITY will be given an opportunity to comment on the hierarchies and suggest changes to it during a workshop.
5. Hazen will host a workshop with the CITY to gain input from the CITY and to use that to determine what attribute information will be collected on each class and subclass of assets. At a minimum, each asset must have an asset ID, name, location, condition, useful life remaining, type, material, size, and replacement cost. Additional attributes could include: manufacturer, serial number, capacity, flow rate, dimensions, installation date, operating status, as well as many others. Following the meeting Hazen will provide the CITY with a list of attribute information for the CITY's review. The CITY will approve the list before data collection occurs.

Task 2 Deliverables

1. Asset Inventory Draft Determination
    - Definition of an "asset" for each class and subclass of assets
    - Asset hierarchy in a flow diagram
    - List of asset types and subtypes in a spreadsheet

Task 3 – Asset Hierarchy and Asset Register Development

This task focuses on developing a comprehensive asset hierarchy and asset register for the PRWRF.

1. Designate Qualifying Assets – Hazen will conduct a workshop with CITY stakeholders to finalize the list of qualifying assets based on the preliminary list developed in Task 2.
2. Define Asset Hierarchy – Following the designation of qualifying assets, the workshop will continue to establish an appropriate asset hierarchy, ensuring all assets within the PRWRF are included. The asset hierarchy and the asset register will include the following components:
    - Asset Definition: Compile asset definitions using existing PRWRF asset lists and assets identified in Task 2.

- Asset Class: Group assets by type, functions, useful life, and pricing attributes (e.g. size, material, power).
- Data Standards: Establish data attributes required to support asset management needs.

3. Asset Register Development – Hazen will create the asset register using a hierarchical structure with "parent-child" relationships, allowing the CITY to navigate the database easily and extract information at various levels.

Task 3 Deliverables

- Asset Hierarchy
- Preliminary Asset Register with all identified assets, all available asset attribute information, photos of all visible assets, unique asset ID numbers, asset names that are known by staff (Microsoft Excel). This information will be provided to OpenGov as soon as available for use in initiation and validation phases.

Task 4 – Asset Inventory and Condition Assessment

This task includes the desktop and field work required for the asset inventory and condition assessment. Following completion of Task 2, Hazen will create an asset inventory in digital format that includes all asset types and subtypes with relevant attributes, as well as a condition assessment form. This task shall consist of the following services:

1. Hazen will develop a digital survey and condition assessment form to collect and assess asset data in the field.
    - Hazen will develop a physical condition framework for each asset type by discipline (civil/structural, HVAC, mechanical, and electrical/I&C) using the International Infrastructure Management Manual (IIMM) as a guideline to be used to assess condition during field verification. Hazen will share the draft condition assessment process with the CITY and the CITY will have a chance to comment and input on the process. Field personnel familiar with the assets will be invited to the meeting and their input will be considered in this process.
    - Hazen will include all asset attributes in forms that should be collected for each asset type Such as Collector 123, Fulcrum, or a similar platform which the City can utilize in the future independently.
    - Hazen will include the asset type, subtype, and hierarchy as fields to be populated in the digital form.
2. Hazen will create an asset register template that includes all asset types and subtypes with defined attributes. The asset register will also contain physical condition-related attributes.
3. Hazen will pre-populate available information from the obtained data. The information will be verified and updated during the field inspection, along with a physical condition score.
4. Hazen's field team will comprise specialists in civil/structural, HVAC, mechanical, and electrical/I&C.
5. Hazen will perform a visual condition assessment of each asset. The goal of the condition assessment is to identify the current state of assets with a condition score allowing estimation of the assets' remaining useful lives.

6. Hazen will design the Santa Fe WRF Asset Insight Dashboard user interface along with a data model and share with the CITY project manager before proceeding. Upon user interface approval, Hazen will develop the following four visual reports:

    - Home – Page navigation and a visual overview of the WRF assets.
    - Summary – Overview of asset count, condition, location, risk, useful life, and renewal needs.
    - Asset Details – Detailed view of asset attributes, inspection photos, and deterioration curve.
    - Asset Condition – View asset condition statistics by condition score and installation decade.

    All Dashboard pages will provide the user with the ability to filter visuals by process area, equipment type, discipline, condition score, and risk matrix bin.

    The Asset Insight Dashboard will be designed so that it may link with other facilities that are part of the CITY's operations.

Task 4 Deliverables

- Draft register for review by the CITY. Comments should be addressed by Hazen (it is understood that if a comment is not possible to address (i.e., can't make the change) Hazen will provide an explanation of why not.
- Final Asset Register with Attributes and Condition Assessments as specified in the list of attributes and containing any required changes based on the review of the draft – Spreadsheet. This information will be provided to OpenGov as soon as available for use in the configuration phase.
- PRWRF Asset Insight Digital Dashboard Pictures of each asset that is visible. The asset pictures will have the entire asset in the first picture with all subsequent pictures showing close ups of particular issues or concerns (e.g., the name plate, cracks, missing bolts, rust or other corrosion.) In any case with a visible name plate a picture of the name plate will be taken. The photos will be attached to the asset in the spreadsheet with the full asset photo as the first picture in the set of photos.

Task 5 – Expected/Remaining Useful Life Determination

This task aims to determine the expected useful life (EUL) and remaining useful life (RUL) of asset classes.

1. Expected Useful Life (EUL) – Using manufacturer design life, industry publications such as Engineering News Record (ENR), and data from similar Hazen projects, Hazen will establish a baseline EUL for each asset class.

2. Remaining Useful Life (RUL) – Based on collected attribute data, CITY maintenance records, and condition assessment scores, Hazen will estimate the RUL for each asset by adjusting up or down from the general attribute life. For example, if a pipe is to last 100 years but it is known to have multiple breaks and has shown signs of deterioration, the pipe's life should be shortened. If a pipe is known to be in good shape, exhibited no issues, etc., its life will be extended. For assets lacking visual condition assessments and any other information on

maintenance, repairs, or operator knowledge, the RUL will be calculated by dividing expected design life by asset age with straight line deterioration.

Task 5 Deliverables

- Estimated EUL for each asset class
- Estimated RUL for each asset
- Updated asset register with EUL and RUL for each asset

Task 6 – Replacement Valuation

This task involves estimating the current replacement cost for each asset.

1. Cost Data Collection and Review – Consolidate and review historical replacement cost data, local knowledge, RS Means databases, and costs from similar Hazen projects. Hazen will estimate current replacement costs in 2024 dollars using unit cost methods.
2. Workshop – Hazen will conduct a 3-hour Asset Valuation Review and Lifecycle Costing Workshop with CITY to review and validate replacement costs, develop cost factors for full implementation estimates, and determine maintenance strategies for run-to-fail assets and those with rehabilitation plans.

Task 6 Deliverables

- Updated asset register with bare and full cost estimates
- Total estimated valuation of the entire facility
- Workshop agenda, minutes, and presentation materials

Task 7 – Validate Levels of Service (LOS) and Develop Key Performance Indicators (KPIs)

This task will define and validate the Levels of Service (LOS) and Key Performance Indicators (KPIs).

1. Preliminary LOS and KPI Development – Hazen will seek input from CITY regarding potential LOS goals and KPIs prior to the workshop.

2. Using the list of potential LOS goals and other available information on LOS more generally, Hazen will develop a preliminary list of LOS and KPIs for CITY to review before a workshop.

3. Hazen will conduct a 3-hour workshop with key stakeholders to identify and validate LOS and KPIs for the facility. The discussion must include the following: what information would be required to measure the goals and determine whether KPIs are met, how difficult it would be to get this information (including whether this data currently exists), where the data would be held, how the KPIs would be calculated and stored, and who would have access to the data. Additionally, discussions of which goals/KPIs should be more publicly shared should be held.

Task 7 Deliverables

- LOS and KPI Summary Table
- Data required to meet the goals summary and where data is stored

Task 8 – Maintenance Planning

This task develops a maintenance planning strategy. Hazen will utilize a proven approach for utilizing asset criticality to determine the type of maintenance activities to be performed for the top ten qualifying asset classes. The level of effort required for maintenance activities will support estimated FTE staffing requirements.

1. Maintenance Approach Development – Utilize manufacturer-specific O&M manuals and industry-leading practices for failure monitoring and mitigation. Techniques include Failure Mode and Effects Analysis (FMEA), Preventive Maintenance Optimization (PMO), and Reliability Centered Maintenance (RCM).
2. Categorization of Maintenance Activities
    - Low Criticality: Operations Only or Run-To-Failure (RTF) Strategy—basic visual inspections or repair/replacement upon failure.
    - Medium Criticality: Operations + Condition/Performance—includes some condition/performance activities based on physical characteristics and financial feasibility.
    - High Criticality: Operations + Condition + Performance—comprehensive maintenance activities based on typical failure modes, from basic inspections to advanced predictive maintenance.

Task 8 Deliverables

- Maintenance strategy documentation for each asset class

Task 9 – Additional Services

The following tasks may be authorized by the CITY to develop a full Asset Management Program (AMP). The additional services described below provide high-level goals for each task as more information becomes available. At that time, the task item and deliverable will further be further delineated and detailed and authorized fee negotiated:

1. Gap Analysis – Prior to the development of the AMP, Hazen will provide a gap analysis at the facility to verify changes (asset removal or addition during the Emergency AO Projects) and update the data inventory. This scope item assumes up to 200 assets to be input into the data inventory.

2. Risk Framework Development - Define a performance condition assessment and consequence of failure assessment framework. This will include defining criteria, scoring definitions and scales, weighting, and scoring methodology specific to CITY'S PRWRF assets. Hazen will coordinate and solicit feedback from the Southwest Environmental Finance Center on project details.

3. Asset Risk Assessment (LoF and CoF) - implementation of a comprehensive asset risk assessment approach, including:
    a) Performance Condition Assessment
    b) Consequence of Failure Assessment
    c) Risk Scoring

4. Renewal and Replacement CIP Forecasting – Based on replacement valuations determined in task Hazen will provide a specific set of recommendations for the PRWRF that focus on:
    a. Known upcoming / in-process projects
    b. Program recommendations
    c. CIP project recommendations

    The CIP Projects will be identified by a priority based upon BRE and typically divided into high (1-2 years), medium (3-5 years) and low (6-10 years) priority. Hazen will delineate between rehabilitation and replacement projects and costs and provide costing for each recommendation by year. In addition, Hazen will utilize the information to develop asset inspection and maintenance scheduling guidelines for qualifying assets.

5. Staff Training – Hazen will develop and facilitate staff training of the AMP to support ownership and longevity of the program. Staff training is assumed to be conducted over a one-day period.

6. Unidentified Additional Services - In the development of this scope, Hazen and the CITY acknowledge there are uncertainties and unidentified tasks associated with the development of a full AMP. This task provides resources required to address these unidentified items. A budget allowance of $100,000 is included in this scope and budget for unidentified additional services.

3. Assumptions

Certain assumptions have been made in preparing the Scope of Services. To the extent possible, these assumptions are stated herein and are reflected in the estimated fee for services. If the requirements of the Project are different from the assumptions presented herein, or if the CITY desires additional services, the resultant scope changes will serve as the basis for amending this Contract or initiating the development of a new Contract as mutually agreed by CITY and Hazen. Project assumptions include:

- Based on similar projects, Hazen expects the asset count to be less than 1,500 assets inventoried. This scope of work assumes that the asset inventory will not exceed 1,500 assets. An inventory in excess of 1,500 assets will be considered additional work. The Hazen will keep the CITY informed of the progress of the inventory and if projected inventory exceeds the assumed quantity of assets.
- Kickoff meeting will be held virtually on MS Teams.
- No confined space entry is included during the asset inventory or condition assessment.
- There will be approximately 1-2 weeks of onsite asset inventory field work (estimated at 3-4 days per week)
- The CITY will open any electrical cabinets, operate equipment or valves, turn on/off equipment, etc., as needed to capture asset information.
- Operators will be available for the duration of Hazen's fieldwork and Hazen will seek to involve the Operators in the process of obtaining information to support knowledge transfer. Operators who are knowledgeable about the assets will be available to Hazen staff during field work.
- The efforts described herein would support and be compatible with a future ISO14001 certification.

4. Schedule

The proposed schedule for completing Tasks 1 through 8 is 12 months following notice to proceed. We are prepared to begin our work for the City immediately upon receipt of its written authorization to proceed. The schedule for additional services outlined in Task 9 would be determined when the scope of additional services requested by the CITY is negotiated.

5. Compensation

We are requesting an initial authorization of $623,038 to provide the services that are described under the Scope. Attachment 1 provides a budget breakdown for Tasks 1 – 9. All work will be performed on a time and materials basis. Expenses may include reimbursable mileage, airfare, lodging, printing, mailing, supplies, and other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

Hazen

Attachment 1

Proposed budgets for Asset Inventory and Condition Assessment Services

		Total	Fee		
Task	Description	Hours	Labor	Expense	Total
1	Project Management	174	$48,901	$500	$49,401
2	Data Review, Validation, and Acceptance	128	$41,391	$4,200	$45,591
3	Asset Inventory and Asset Register Development	132	$28,785	$3,700	$32,485
4	Asset Inventory and Condition Assessment	740	$142,026	$18,500	$160,526
5	Expected / Remaining Useful Life Determination	70	$13,864	$0	$13,864
6	Replacement Valuation	86	$17,931	$3,700	$21,631
7	Validate LOS and Develop KPIs	76	$15,262	$0	$15,262
8	Maintenance Planning	136	$26,981	$0	$26,981
9	Additional Services	494	$207,333	$5,550	$212,883
	NMGRT (8.1875% of Labor)			$44,415	$44,415
	TOTAL	**2,100**	**$542,473**	**$55,565**	**$623,038**

Hazen

The city of Santa Fe (the City) seeks to develop data visualization and process optimization tools that provide end-users with access to a common authoritative source for critical plant operations and performance data. This suite of tools is expected to provide plant process and operations staff with the ability to visualize plant performance data in near-real-time (NRT) and gain actionable insights to improve or optimize process performance. The suite will consist of a plantwide data visualization tool as well as a holistic process optimization web application that utilizes both mechanistic as well as data-driven modules to provide maximum value. Hazen will execute the project by developing core data system building blocks and visualization tools that enhance situational awareness and provide near-term functional value, while in parallel developing advanced process insight tools that leverage this data foundation.

The City has expressed a desire to develop a tool (or tools) that allows process engineers and plant operators at the Paseo Real Water Reclamation Facility (PRWRF) to visualize process data, assess plant performance as well as gain usable and actionable process optimization insights in close to real-time. City staff also noted that the ability to assess the impacts of operational changes (i.e., what-if or scenario analyses) on performance and ability to meet compliance requirements would be critical.

Under this Task Order, Hazen will provide technical support services to advance the City's data visualization and process optimization initiatives. This task order is broken into six major tasks: dataflow development and tag addition, data exploration and cleaning, development of a data visualization tool, real-time process optimization, development of a mechanistic process digital twin, and addition of data-driven optimization features into the process twin (i.e., development of a hybrid model that includes mechanistic as well as data-driven components).

Hazen

Contents

Hazen

Task 1. Data Foundation

The primary goal of this task is to ensure that critical analytical and operational data from the PRWRF is securely available in a central SQL data warehouse. Major activities include collaborating with City IT staff to develop secure SCADA and OP10 data export processes, building the data warehouse and necessary data pipelines, identifying and acquiring raw time series data, and creating new calculated time series for process optimization. Work under this task establishes the data foundation and computational environment for subsequent tasks.

Task 1.1: System Connectivity and Data Engineering

The goal of this task is to establish data connectivity, data pipelines, SQL data warehouse, and ancillary data engineering components necessary to provide a foundation for both project analytics and for routine operational use of project-developed tools by the City. While the data warehouse developed under this task will focus on a subset of critical data necessary to optimize plant performance, the overall data framework will be designed for future scalability, such that it may serve as a testbed and starting point for future plant-wide visualization and reporting if desired by the City.

Under this task Hazen will work closely with City IT staff and data stewards to develop secure and repeatable data acquisition processes and to comply with cybersecurity and data governance standards provided by the City upon project initiation. Key activities include:

- Collaborate with plant technical staff to draft a high-level requirements document and proposed data architecture diagram to support discussions with City IT staff. The document will focus on defining core requirements such as user roles and objectives, data sources, data granularity and refresh frequency, data retention and storage, and data accessibility and security.
- Hold up to 5 virtual coordination meetings with City IT staff and data owners.
- Provision a secure workspace within Hazen's Microsoft Azure or Fabric tenant that is dedicated to City of Santa Fe data and applications. This effort will consider opportunities to integrate or leverage existing data handling and reporting processes that are currently operational in Hazen's Azure and Power BI tenants, including a single user endpoint through the Santa Fe BI Application developed by Hazen, automated integration between live and historical data using stored procedures, and one-way data exports to securely obtain data from Santa Fe's operational systems.
- Design and build a semantic model and data warehouse to integrate metadata, raw data, calculated data, and cleaned data. The semantic model will be extensible to integrate model output data and recurring predictive data developed under subsequent tasks. As above, this effort will maximize opportunities to integrate or reuse existing model structures, with the overall goal of delivering a high-performing and low maintenance system.
- Develop a scalable process for managing time series metadata from multiple data sources (with a focus on SCADA and OP10). This includes specifying location and parameter attributes, friendly names, higher-level location and parameter categories, and reference values (e.g. regulatory limits,

operational targets, thresholds). This process will be based on an Excel file, a Microsoft List, or similar compatible technology.

- Support City staff in the development of recurring automated processes for securely exporting data and metadata from the SCADA Historian and the OP10 database to the data warehouse.
- Support City staff in the creation of gateways if needed.
- Ensure compliance with cybersecurity, data governance, and application development standards provided by the City.

Task 1.2: Acquire Raw Time Series Data

The goal of this task is to identify and acquire raw time series data from lab analyses and plant instrumentation that is most valuable for optimizing plant performance. This task involves reviewing metadata from OP10 and SCADA systems, identifying tags, developing queries, configuring data pipelines for recurring data movement, and conducting a one-time export of historical data. The data products created in this task form the data foundation of subsequent modeling and analytical activities.

- Review OP10 and SCADA historian metadata for the purpose of identifying tags or parameters that are most valuable for optimizing plant performance. Metadata shall be provided by the City, or alternately the City shall provide credentials sufficient to access metadata tables.
- Based on metadata review, collaborate with plant technical staff to select up to 20 critical influent and effluent concentrations and secondary process operational data from the OP10 system.
- Based on metadata review, collaborate with plant technical staff to select up to 200 tags critical for process assessment and control from the SCADA historian.
- Populate consistent metadata attributes for the selected raw time series data, including location and parameter attributes, user friendly names, reference values, and other attributes that may be useful in the display layer.
- Develop and deploy a system for managing and storing metadata attributes using Excel, Microsoft List, or similar no-code/low-code technology compatible with the data warehousing environment.
- Develop a script to query the OP10 database and return the desired parameters.
- Develop a script to query the SCADA historian and return the desired tags, aggregated to an hourly timestep. Temporal aggregation method will be tailored to the specific tag (e.g., for some tags an hourly average may be appropriate, while for others an hourly maximum may be appropriate).
- Conduct a one-time manual export of up to 5 years of historical data from SCADA Historian and OP10 database and load the data into the data warehouse. This work is limited to extraction of data from database or historian tables and does not include extraction of data from files.
- Configure, test, and deploy data pipelines and scheduling/orchestration features to establish recurring acquisition of data exported from SCADA and OP10 systems.

Task 1.3: Calculate New Time Series Data

The goal of this task is to develop new calculated time series that are critical for process control, compliance, and optimization. These will include loading rates to processes such as the primary and secondary clarifiers, and secondary process key performance indicators (KPIs) such as total and aerobic solids retention times (SRT and aSRT), RAS rates, WAS rates, chemical usage normalized to forward flow, chemical usage per unit mass of nutrient removal achieved, air usage per unit of BOD/nutrient removal, and energy use per unit flow treated. These calculated time series will be developed for both historical data and for new incoming data as part of the operational system. Key activities include:

- Collaborate with plant technical staff to identify and define up to 50 new calculated time series.
- Develop equations and write scripts to generate new time series data. Scripts will be generated in SQL, Python, or other language consistent with the data warehousing environment.
- Validate script output by comparing summary statistics to expected upper and lower bounds for each parameter.
- Execute the scripts for historical data and store the data in the data warehouse.
- Configure, test, and deploy the scripts to automatically calculate and store new time series data on a recurring basis.
- Populate metadata for new calculated time series, including location and parameter attributes, user friendly names, and reference values.

Task 1 Deliverables:

- Scripts for querying City SCADA Historian and OP10 database
- Cloud-based SQL data warehouse containing up to 5 years of selected historical SCADA and OP10 data
- Scripts and/or data system configurations for recurring acquisition of data exported from SCADA and OP10 systems.
- Scripts for recurring calculation of new calculated time series.
- Metadata table for raw and calculated time series

Task 2. Data Exploration and Cleaning

The goal of this task is to develop data cleaning protocols to ensure that subsequent analytical, modeling, and visualization tools are driven by clean, quality-assured data. The focus will be on a subset of time series critical to model accuracy and performance, including influent flows and concentrations, airflows, sensor data (DO, ammonia), effluent quality, and solids production (primary and WAS sludge per unit flow treated). Data cleaning will be performed for up to 100 time series critical to performance of the models developed under Tasks 5 and 6.

Task 2.1. Initial Data Quality Review

Hazen will review available historical data from the data warehouse (e.g., up to 5 years of hourly data) with the goal of identifying data quality issues. This will involve creating a time series plot in Python for each of the 100 variables of interest. A process engineer (subject matter expert) will review each plot and identify obvious outliers, (e.g., an influent orthophosphate measurement of 100 mg/L when all the other values are below 10 mg/L). Those outliers will be manually removed from the dataset that will later be used for model development. Then, a data scientist will replot the cleaned data. Up to two additional iterations will be performed.

Following the first round of review by the subject matter expert, a more in-depth look at data quality issues will begin. For example, data stagnation may be seen in some measurements like sensors if a basin is taken offline. A measurement that appears to stagnate will be compared to other measurements to verify if this is the product of a basin being offline (e.g., DO readings are zero and airflow stagnates in the same basin, and flow through the other oxidation ditch doubles). This process of data review will identify the issues most frequently encountered in the dataset, including missing data, data out of range, stagnant data, or abrupt changes in the data. The issues identified and catalogued will inform the data cleanup methods employed in Task 2.2.

Task 2.2. Implement Data Cleaning Protocols

Based on the most frequently issues identified in the dataset, Hazen will develop data cleaning protocols for up to 100 time series. Cleaning protocols will be implemented using the Python Pecos algorithm, which identifies a normal range of operating values for each parameter and hence detects outliers; stagnation, missing data, and abrupt changes in values. For the 100 variables in data cleaning, up to a total of 200 custom rules may be implemented for targeted data cleaning. For instance, a stagnant airflow reading would trigger a check to see if the concerned oxidation ditch is out of service so that the airflow for that basin (or zone) can be recorded as zero. Missing hourly data will be replaced with the average value for the week for that same time of day and/or the same instrument reading in a parallel location.

Data cleaning will be executed using Python or similar scripts within the dedicated cloud workspace, and cleaned data will be integrated into the data warehouse. The raw and cleaned data will be maintained as distinct datasets to allow the analyst to visualize and compare raw and cleaned time series in the Power BI dashboard (Task 3).

The cleaned data will be displayed in Power BI and a numerical value assigned to each daily/hourly datapoint of the 100 time series selected. The coded values shall be as follows:

- 0 = good data, no issues found
- 1 = abrupt change
- 3 = data outside of high/low boundary
- 4 = abrupt change + data outside of high/low boundary

- 5 = stagnation
- 7 = missing data
- 8 = stagnation + data outside of high/low boundary

There will be three pages in Power BI dedicated to data cleaning visualization. The first page will display daily data and its coded value for each time series. The second page will do the same for hourly time series. The third page will plot each time series and its low and high boundaries. The duration of the timescale can be varied to have as much or little granularity as desired.

The data cleaning process will be established for near real-time cleaning through Power BI and Python scripting. The data cleaning scripts will be employed for three months on a trial basis. During this time, staff should review the results and provide comments at the conclusion of the trial. At the end of the trial period, the scripts will be finalized. It is anticipated that up to 20 rule modifications will be implemented based on feedback from City staff.

Task 2 Deliverables:

- Cleaned historical data for up to 100 time series, stored in the data warehouse as distinct time series and available for visualization in the Power BI dashboard.
- Data cleaning and filling scripts that will be implemented in near-real time on a daily/hourly basis, as specified for each of the 100 time series.

Task 3. Data Visualization Tool

The goal of this task is to develop a comprehensive visualization and reporting tool for near real-time assessment of PRWRF performance and process health. The tool will allow City staff to visualize observed data (Tasks 1 and 2), and mechanistic model-predicted data from Task 5 when used with Process Advisor results (Task 6). The overall objective is to enhance situational awareness and integrate data-driven process analytics with operator experience. Note that the Task 5 deliverable is a stand-alone web application that represents the physical layout of the PRWRF, which is separate from the Power BI tool discussed to this point.

The tool will be deployed in Hazen's tenant within Microsoft's Power BI web service and updated at an approximately hourly cadence. The refresh schedule may be further fine-tuned to optimize delivery and usage within the constraints of the Power BI web service. City team members will access the tool via desktop, tablet, or mobile devices.

Task 3.1. Develop Power BI Architecture

The goal of this task is to design, build, and deploy the core Power BI architecture necessary to deliver interactive Power BI dashboards to the end user. A robust backend and semantic model are essential for functionality and scalability as data and components are added to the system. Key activities include:

- Configure a Power BI semantic model and dataflows to integrate data and metadata from the data warehouse. Design shall consider import, direct query, composite, or other options as appropriate based on data volumes and analytical needs.
- Enrich core data and metadata tables with a master calendar table plus ancillary helper tables as needed.
- Set up a Power BI workspace for access by City and Hazen team members, and publish the Power BI report to the workspace
- Establish data refresh schedules to update dashboards with SCADA and OP10 data and calculated time series data regularly. Coordinate with end users to determine an appropriate refresh interval.

Task 3.2. Develop Observed Data Pages

The goal of this task is to create interactive dashboard pages that allow modelers, process engineers, and operations staff to easily review and analyze PRWRF operations and process performance data. The pages will be designed to meet multiple different end-user needs, including data inventory, data quality review, near-real-time process status, historical trending, and detailed process performance comparing against targets and historical benchmarks.

Observed data pages developed under this task will include at a minimum:

- Data Inventory: View all tags in the dataset and summary statistics for each tag (e.g., number of data points, min, max, avg, date range)
- Data Gaps: Highlight missing data. Note extended missing data periods will not be filled in using the Pecos algorithm described earlier. That is for short-duration events spanning a few hours or 1 - 2 days depending on the granularity of the data received.
- Single-Tag Data Navigator: Visualize time series data for any single tag. Assess daily, weekly, monthly, yearly, and seasonal trends, view percentile plots, compare year-on-year and month-on-month averages. Compare historical and current values against targets, benchmarks, limits, or other reference values.
- Single-Tag Data QC: Visualize raw versus cleaned time series data for any single tag.
- Multi-Tag Data Navigator: Plot and visualize multiple tags together, with percentile distributions and tabulated summaries of averages, minimums, maximums, and key percentiles. Plotting pages will leverage the capabilities of native Power BI visualizations; custom-coded visualizations are not included in this task.
- Correlation Analysis: Perform simple correlation analysis on selected tags, displaying results as a heatmap or scatter plot.

In addition, up to 5 custom pages will be developed to serve specific purposes and highlight selected metrics of interest to plant process and operational staff. These pages will be tailored to display plant-wide or process-specific metrics that are frequently reviewed or required by operations staff to make

decisions. The custom pages will provide a clear and concise overview of specific processes or topic areas, making it easier for staff to monitor and analyze important key aspects of their operation. As an example, custom pages might include:

- Interactive process flow diagram (PFD): An interactive PFD can be developed which displays the latest values of critical metrics adjacent to the relevant unit process or process areas. Additionally, tooltips can be provided, which allow users to hover over displayed metrics to get additional statistics for that tag.
- Nutrient Removal Performance: Dedicated pages for the removal efficiency of specific nutrients or species, including metrics like effluent concentrations, nutrient removal per pound of chemical used, and efficiency of bio-P or denitrification.
- Secondary Process Configuration: Highlights the set-up of the secondary process and the resultant effluent quality, displaying metrics like current MLSS, wasting rates, number of oxidation ditches in service, SRT, DO concentrations and oxidation ditch or secondary effluent ammonia.
- Energy Consumption: Focuses on energy use in the treatment process comparing the latest overall energy use to historical consumption. Metrics like energy use normalized to forward flow or blower energy use per pound of oxygen required are highlighted.
- Historical data sorter: Allows sorting of operational data by influent load, flow, and temperature, enabling staff to identify operationally similar days and conduct data-driven what-if analyses. This page can be updated to include the scoring algorithm (Task 6) to help operations staff identify high-performing decisions.

These pages will be developed through an interactive process that includes:

- Needs Assessment: Hazen meets with City staff to identify overall concepts, key questions, and specific requirements. This involves a 2-hour virtual workshop and up to 10 hours of individual interviews.
- Draft Development: Based on City feedback Hazen will develop up to 5 custom pages plus associated metrics.
- User Testing: Deploy draft pages for 1-2 weeks, allowing City staff to use and provide feedback.
- Feedback Collection: City staff provide prioritized feedback in a 1-hour comments virtual meeting or a document synthesizing feedback from multiple users.
- Revisions: Hazen addresses feasible comments within identified task budget limits and tracks remaining items.
- Final Deployment: Hazen deploys the final versions of the custom pages after City staff verify that comments were satisfactorily addressed.

Task 3.3. Develop Model Input/Output Pages

The goal of this task is to develop interactive dashboard pages for reviewing input and output data for the various models that comprise the overall Process Advisor Tool, including the Influent Model, the Process Model, the Setpoint Model, and the Optimization Tool. These pages will be geared for use by system

administrators, modelers, and analysts, and are focused on model data QC, model verification, model performance evaluation, and ad hoc plotting/tabulation.

The measures and semantic model updates developed under this task will establish the foundation for additional dashboard pages in Task 3.4, which will be geared for use by plant engineers and staff focusing on process performance and operator guidance.

Key activities include:

- Configure the Power BI semantic model and dataflows to integrate input and output data from the Influent Model, the Process Model, the Setpoint Model, and the Optimization Tool.
- Configure the semantic model to store and handle multiple different model realizations, such that users can examine model predictions over time (e.g., visualize output from today's model simulations as well as those executed last month).
- Configure the semantic model and associated metadata tables to allow easy comparison between observed and model-predicted values (e.g. compare observed vs predicted influent TN load, or observed vs predicted values).
- Create measures and dashboard pages for interactively displaying model inputs and outputs. These pages will be geared toward model data QC, model verification, model performance examination, and ad hoc plotting/tabulation.

Task 3.4. Develop Operational Guidance Pages

The goal of this task is to develop interactive dashboard pages for reviewing operational guidance provided by the various models that comprise the overall Process Advisor Tool, including the Influent Model, the Process Model, the Setpoint Model, and the Optimization Tool. These pages will be geared for use by plant operations staff and will feature integration of observations, predictions, and recommendations.

Up to 3 custom Operational Guidance Pages will be developed under this task. As an example, custom pages might include:

- Influent Load Predictions: Visualize predicted influent flow and load parameters for the next 24 hours. This page will help operators anticipate and prepare for varying influent conditions, incorporating model predictions and historical trends.
- Process Performance Indicators: Display key performance indicators (KPIs) such as SRT, MLSS, DO concentrations, and effluent quality metrics. This page will integrate model predictions and real-time data to provide a comprehensive overview of process performance.
- Optimization Recommendations: Present recommended operational setpoints for parameters like airflow, DO/aeration setpoints, wasting rates, and internal recycle rates. This page will integrate outputs from the Optimization Tool to guide operators in achieving optimal process performance.

Development of the pages will be similar to the custom page development process described above.

Task 3 Deliverables:

- A Power BI application containing one or more reports with multiple pages for interactive visualization of observed and model-predicted operational and process control data.
- Documentation, comprising a high-level PowerPoint presentation summarizing Power BI dataflows; an Excel-based data dictionary; and explanatory technical notes embedded within the Power BI application as comments, tooltips or metadata.
- Up to 8 hours of in-person and/or virtual training in usage of the Power BI tool.
- 40 hours of post-acceptance follow-on support for up to one year beyond delivery of the tools.

Task 4. Evaluate Real-Time Process Control Strategies

The ability to incorporate existing and/or new online analyzers into control strategies will be evaluated since this can provide immediate operational benefit. Up to three control strategies will be evaluated including but not limited to:

- Ammonia-based aeration control to optimize nitrification and denitrification simultaneously
- Automated aerobic SRT control to maintain nitrification as a load and temperature changes
- Nitrate-paced internal recycle to optimize energy and denitrification capacity
- Orthophosphate-paced metal salt addition to optimize cost, energy, and nutrient removal
- Live state point analysis tool to assess secondary clarifier capacity

In addition, the value of primary effluent COD and ammonia measurements will be evaluated as optional input to the holistic optimization modules described later.

The result of this task will be a presentation and a ten-page memorandum outlining the operational control strategy, capital cost estimates associated with implementation (equipment purchase, installation, and integration services), and a qualitative description of the programming logic. Examples of these programs used successfully at other WRFs will be presented as well. The memorandum is not a functional control description suitable for programming by an integrator, nor does it include any process modeling required for site-specific automated aerobic SRT control. That level of detail could be provided in future contracts.

Since no prior design work has been implemented at the PRWRF by Hazen, cost estimates will be order of magnitude and assume that power sources and wire and conduit pathways are available at the desired locations. This task does not include a detailed electrical evaluation.

Task 4 Deliverables:

- Virtual presentation and a ten-page memorandum outlining the operational control strategy, capital cost estimates associated with implementation (equipment purchase, installation, and integration services), and a qualitative description of the programming logic.

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Task 5. Develop Mechanistic Process Digital Twin (Process Model)

Mechanistic wastewater process models developed using commercial simulators (such as BioWin, GPS-X, or SUMO) are often employed for wastewater treatment facility design or process optimization planning. These models are complex and require detailed user training, limiting the number of staff who can run or modify simulations. Process advisory digital twins help overcome this operational barrier by expanding the number of staff who can leverage the model. The goal of this task is to create a mechanistic process digital twin to enhance the operational capabilities and process understanding of PRWRF staff.

The process digital twin and optimization toolkit (including the data-driven additions from Task 6) will be hosted by Hazen as a web application. The City will be responsible for hosting fees required to ensure full-time availability of the tool for City staff. Hazen will provide an estimate of these routine pass-through cloud service hosting fees to ensure transparency and accurate budgeting for the City.

Task 5.1. Develop Mechanistic Process Model

The mechanistic process model for the facility will be initially developed in BioWin under and existing scope task. Process model development will be based on historical operational data plus plantwide process sampling data collected from June 18 – 26, 2024.

The process model will be calibrated using a selection of plant data (to be determined by subject matter experts based on observed plant operational metrics and mass balances over different time periods) and validated against data from a different time period. Further context on process model development can be found in the scope outlining PRWRF Engineering, Operational Support, and Related Services in Response to EPA Administrative Order CWA-06-2024-1745, provided by Hazen to the City on March 18, 2024.

Under this scope, an uncalibrated SUMO model of the PRWRF will be developed. SUMO is proposed to leverage their advanced and well-documented digital twin API packages for live data integration and equipment control. An uncalibrated SUMO model will be deployed initially and later replaced with a calibrated model when the calibrated BioWin model is complete. A comparison of the BioWin calibrated model and SUMO calibrated model results will be developed to verify the models are equivalent.

Task 5.2. Build Web Interface for Mechanistic Process Twin

A web application wrapping the SUMO mechanistic process model will be developed and deployed for PRWRF staff. Users will be able to change influent characteristics and operational parameters (e.g., basins or units in service, DO concentrations, RAS and WAS rates) to visualize process impacts. This version of the process model will not have any connection with the live data and is intended as a training tool to facilitate PRWRF staff understanding of treatment concepts, and view the impacts of operating the process in different ways on performance and effluent quality.

In addition to specifying influent characteristics and operational parameters, users will select the number of primary and secondary clarifiers in service and specify SVI. Historical primary clarifier performance

(percent TSS removal as a function of units in service and hydraulic loading rate) will be analyzed to develop a linear relationship between either units in service, and/or hydraulic loading rate and percent TSS removal. This relationship will then be hard coded into the web application. Secondary clarifier performance will be coded using known relationships between SVI, which the user will specify, and Vo and K, the downward settling velocity and compaction coefficient, respectively, commonly used to model sludge settling mechanistically.

As a web-based application, the mechanistic process digital twin will be able to be accessed by up to three staff via a web browser (e.g. Microsoft Edge) from desktop computers running Windows 10 or later. Facility operators will be able to utilize the tool to develop and test their ideas for optimization and/or learn from mistakes with no effect on actual plant operations.

Building the web application involves creating an interactive homepage, that is an aerial image of the plant, with a customized set of key inputs and outputs, such as process MLSS, wasting rates and effluent nutrient concentration levels, which will help the user visualize the facility's performance, relative to the permit limits. There will also be a second screen to focus on the secondary process configuration, so users can better evaluate the treatment process to ensure regulatory compliance. The second screen includes a graph that shows DO, ammonia, nitrate, nitrite, and orthophosphate concentrations along the length of the oxidation ditches.

The web application will be introduced to PRWRF staff through a 2-hour virtual training meeting, which will be recorded for future use. Introductory training materials will be presented in PowerPoint, and then the web application will be demonstrated.

Task 5.3. Add Gamified User Interface for Operator Training

Hazen will add "gamified" features to the web application that will allow operators to create their own profile and avatar, and keep track of their high score simulation. Up to ten unique profiles will be supported. As operators interact with the tool from Task 5.2, they will be able to change treatment process variables and see the impact on process settings (such as the impacts of changing MLSS and wasting rates on the SRT), process performance (such as effluent quality and nutrient profiles), process efficiency (such as chemical use and energy use per unit flow treated) and solids generation (i.e., primary solids and WAS generated per unit flow treated). The game score will be determined by the scoring algorithm developed in Task 6.

The gamified user interface is expected to increase operator engagement with the process model and allow them to easily interact and extract valuable insights from mechanistic process models, which are typically not intuitive or user-friendly and have a steep learning curve. There will be some limitations to this as SVI is specified by the modeler and not predicted based on mechanistic equations in SUMO. Therefore, that portion of the score would have to be determined by the user-entered value.

Task 5.4 Replace Uncalibrated Model With Calibrated Model

When the BioWin model has been calibrated, the SUMO model will also be adjusted to match the performance of the BioWin model. The results of this conversion and verification will be presented to

City staff in a virtual meeting. Then, the uncalibrated SUMO model in the mechanistic digital twin will be replaced by the calibrated version, resulting in more accurate and representative predictions.

Task 5.5 Review Process Model

Approximately two months after deployment of the calibrated model, a virtual meeting with key stakeholders will be held to obtain operator feedback. Approximately 40 hours of additional development time will be included for operational enhancements to make the tool more useful.

Task 5 Deliverables:

- Uncalibrated SUMO model.
- Mechanistic process digital twin tool hosted by Hazen as a web-application. The web app will be geared for what-if process simulation and operator training with gamified features to promote engagement.
- Calibrated SUMO model.
- A presentation of the SUMO model calibration compared to the BioWin calibration.
- A two-hour recorded training course on using the process model.
- A follow-up virtual meeting 2 months after delivery to discuss user engagement and opportunities for improvement. 40 development hours are included in this scope.

Task 6. Process Advisor Tool

The goal of this task will be to build a Process Advisor Tool. The Process Advisor Tool includes an Influent Flow and Load Prediction Model, the mechanistic Process Model from Task 5, an equipment Setpoint Model, developed in this task, and development of an optimization algorithm and Optimization Tool to balance competing objectives in secondary treatment. This tool will take the mechanistic model from an offline training tool to a near real-time process advisory tool to guide operation of the secondary treatment system. The output of the tool will be hourly recommendations for airflow, DO/aeration setpoints, wasting rates, internal recycle rates and return activated sludge flow rates, and predicted energy and chemical consumption, SVI, and effluent quality. The following tasks are envisioned to develop the Process Advisor that leverages both mechanistic and data-driven components.

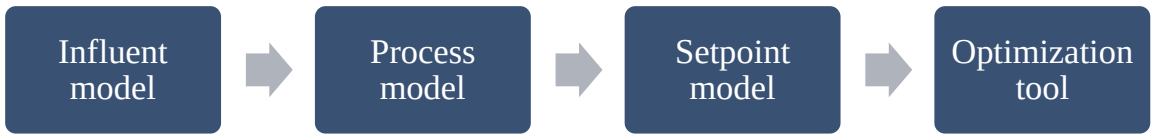
The first step in real-time system optimization is knowing what flow and loads are entering the PRWRF. While the process model in Task 5 is invaluable as a training tool, it is not linked to live data and does not know the influent conditions entering the PRWRF. Those conditions will be predicted using a data-driven model.

A data-driven Operational Setpoint Model is recommended to address three issues that mechanistic models alone cannot solve. First, mechanistic models don’t always represent real-world conditions accurately. They are simplifications of a more complex environmental system. Second, mechanistic

models often cannot directly incorporate live sensor data, which is also one of the most valuable indicators of real-world conditions. For example, the PRWRF has ammonia sensors near the end of the aerobic zone in the oxidation ditches. However, neither SUMO nor BioWin allows the user to specify the ammonia concentration at a given location in the process, this can only be specified on the influent. Therefore, it is not possible to use the sensor data in the process model directly. Third, mechanistic models to predict sludge settling properties from easily and routinely measured wastewater variables do not exist. Given that SVI is critically linked to secondary treatment capacity, some site-specific understanding of factors contributing to good/poor settling should be incorporated into operational decision making and optimization.

To address these limitations and gaps, a more robust representation of the system using a hybrid model that incorporates the mechanistic (SUMO) model and data-driven models of unknowns is recommended. Here, unknowns are things we would like to be able to predict like effluent ammonia, nitrate, orthophosphate, chemical feed quantities, energy use, SVI, and suggested internal flow rates like WAS, RAS, and nitrified recycle.

Before describing the tasks involved in this hybrid model development (Process Advisor Tool), it is important to understand the overall workflow and how the Process Model from Task 5 fits in. A flow diagram of the various components of the Process Advisor is shown in the figure below.



1. Influent Model (Task 6.1)

    a. Data-driven models will predict influent flow and load for the following day. This operation will run once a day around 10 pm.

    b. That average daily value for each parameter (flow, BOD concentration, etc.) will be converted to an hourly flow/concentration value using known diurnal flow and loading curves for PRWRF starting with midnight the following day, and running 12 am to 11 pm.

2. Process Model (Task 5)

    a. A dynamic 24-hour simulation using the Process Model will then ensue. The Process Model will emulate the operational control strategies used at the PRWRF. For example, if air is added to maintain a specific DO setpoint, that same approach will be modeled in SUMO.

b. Outputs such as energy and chemicals used and effluent characteristics from the Process Model will then become inputs to a data-driven model (the Setpoint Model).

c. This dynamic model will run from approximately 10:30 pm to 11:30 pm the night before the day it predicts values for.

3. Setpoint Model (Task 6.2). This data-driven model will run once an hour starting at midnight. Additional inputs to the data-driven model will include live sensor data.

    a. The Setpoint Model will recommend equipment setpoints for internal plant flows, DO, and airflow.

    b. The Setpoint Model will also predict effluent quality, energy and chemical use along with SVI.

    c. Optimization Tool (Task 6.3)

        i. A scoring algorithm that assigns targets, weights, and penalties to key variables will be developed. It is envisioned that this algorithm will include up to 8 variables: effluent ammonia, nitrate, total nitrogen, total phosphorus, and organic nitrogen; SVI, energy use for secondary treatment, and alum use.

        ii. An optimization algorithm will be applied to the scoring algorithm to maximize a daily score.

        iii. Each hour, a Python script will trigger the optimization algorithm to run the Setpoint Model iteratively to find an optimal operating strategy for the existing conditions.

        iv. The resulting variable values from the highest scoring algorithm will be returned hourly and displayed as a recommendation in the Power BI visualization tool (Task 3).

Task 6.1. Develop Influent Flow and Load Prediction Model

Hazen will perform exploratory data analysis to determine the most relevant variables for predicting influent flow and loading (COD, BOD, ISS, TKN, ammonia, TP). This step includes adding variables to the dataset to account for time lags in the system. Additional variables will be added and/or created as needed to predict hourly flows for the next 24-hours such as forecasted rainfall and streamflow. These influent flow and load predictions will be used as inputs to the mechanistic model. The mechanistic model will also receive information originating in SCADA (via a secure route established in Tasks 1-3) to specify the number of primary and secondary clarifiers in service, and the SVI from real data.

Up to eight algorithms will be developed to predict the following:

1. Average daily COD and BOD concentration today as a function of past values taking into account expected delays in laboratory data. If BOD is more accurate, COD (needed for the mechanistic model) will be estimated using the predicted BOD value and a fixed COD:BOD ratio. COD and BOD will be modeled as two separate variables, since they are expected to be predicted using distinct sets of predictor variables.
2. Average daily TSS concentration today as a function of past values. This will be converted to ISS (needed for the mechanistic model) using a fixed VSS:TSS influent ratio.
3. Average daily TKN and ammonia concentration today as a function of past values taking into account expected delays in laboratory data. If ammonia is more accurate, TKN (needed for the mechanistic model) will be estimated using the predicted ammonia value and a fixed ammonia:TKN ratio. Ammonia and TKN are being counted as two separate variables, since there may be differences in the approaches utilized to predict each of them.
4. Average daily TP concentration today as a function of past values.
5. Average daily Alkalinity concentration today as a function of past values.
6. Average daily influent flow.

The accuracy of these models and prediction approach will be considered to determine which models and approaches are best suited for deployment. For example, if the accuracy of the TKN model is poor but BOD is high, then TKN could be estimated from the BOD estimate and an average BOD:TKN ratio from historical data. It is assumed that a normalized diurnal flow and loading curve will be used to convert the daily average values to hourly values. For wet weather flow predictions, a more sophisticated predictive model could be developed under another scope. For this exercise, a simplification will be made to identify above average daily influent flow predictions as “wet weather,” and replace the normalized diurnal flow pattern with one wet weather hydrograph of the City’s choosing.

Task 6.2. Develop Operational Setpoint Model

Hazen will perform exploratory data analysis to determine the most relevant variables for predicting 16 operational setpoints and/or effluent parameters one hour in the future including but not limited to effluent ammonia, nitrate, organic nitrogen, and TP; and SVI, alum use, energy use for secondary aeration, RAS flow, internal recycle flow, DO setpoints, and airflow setpoints. This step includes adding variables to the dataset to account for time lags in the system. Outputs from the mechanistic model will also serve as inputs to this model. One Python model with up to sixteen outputs will be developed.

The accuracy of the Setpoint Model at predicting each output value will be presented and assessed. If a desired target is not accurately predicted, additional variables will be added and attempts will be made to optimize the accuracy of the model. A reasonable degree of accuracy is an R^2 value of approximately 0.7, but this may be adjusted depending on the mean absolute error relative to the average value of each parameter. Up to three iterations of model refinement to improve accuracy will be attempted. Variables with poor predictive accuracy will not be deployed in the final model.

It is anticipated that the XGBoost model will be utilized for this project. For simplification, each model will have the same independent variables weighted differently.

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Model quality and accuracy will also be evaluated using subject matter expertise, feature importance tables, and SHAP plots, which seek to explain the most important variables in each model and their directionality on the predicted variable. This is to verify that the logic in the model is appropriate.

Task 6.3. Create Scoring Algorithm and Optimization Tool

Scoring Algorithm. A scoring algorithm will be developed and deployed for assessing current performance (as part of Task 3) and identifying potential optimization solutions to provide actionable insights to plant operations staff (as part of Task 6). This algorithm will incorporate competing goals and appropriately weigh the outcomes. Hazen will solicit feedback from the City of Santa Fe to assign weights to different process goals, such as effluent ammonia, effluent phosphorus, chemical use, energy use, etc.

An example scoring algorithm for another facility is shown below.

Parameter	Average	Target	Weight
Effluent Ammonia (mg/L)	0.08	0.1	5
Effluent Nitrate (mg/L)	0.9	1.0	0.8
Effluent TP (mg/L)	1.3	1.4	1.2
Effluent Organic Nitrogen	0.9	0.9	0.5
SVI (mL/g)	83	90	0.004
Blower Energy (kW)	1508	1300	0.000003
Alum (gpd)	765	700	0.00001
Methanol (gpd)	842	485	0.00005

Three example values and point scores are shown below. In Example 3, the nitrification points are assigned as follows: (target – value)^2 x weight = (0.1-0.08)^2*5 = 0.002. This approach, developed with a holistic approach to treatment, allows the value of various treatment components like nitrification, denitrification, phosphorus removal, and settling properties to be compared with a single score.

Example	Ammonia	Nitrate	TP	SVI	Blower Energy	Alum	Methanol	Organic N
1	0.4	1.5	1.6	110	2000	1000	1200	1.1
2	0.2	1.1	1.5	100	1500	850	720	1
3	0.08	0.8	0.6	80	1000	400	400	0.8

Example	Nitrification Points	Nitrate Points	TP Points	SVI points	Energy Points	Alum Score	Methanol Score	Organic N Score	Total Score
1	-0.4500	-0.4000	-0.2400	-1.6000	-1.4700	-0.0030	-0.0036	-0.1000	-4.3
2	-0.0500	-0.0800	-0.1200	-0.4000	-0.1200	-0.0015	-0.0012	-0.0500	-0.8
3	0.0020	0.1600	0.9600	0.0400	0.0009	0.0030	0.0004	0.0500	1.2

The weights assigned to the competing goals will be tailored specifically to the PRWRF. The algorithm will assign points (or rewards) or penalties based on whether the process meets the treatment goals and the degree to which those goals are being met, exceeded, or unmet. Up to two versions of the weights can be programmed, for examples if there is a seasonal component to account for differences in seasonal permit limits or fundamental seasonal changes in operational paradigms, or to represent two operational philosophies—one that weighs regulatory compliance without regard for cost, and a second that incorporates energy and cost savings.

This scoring algorithm will be used to assess the current performance of the process alongside the visualization tool in Task 3. It can also be applied to past data where all required information is available. This historical data can be searched and filtered to identify days similar to the present to see how past performance was scored, giving the operator access to the operational setpoints that led to the best and worst outcomes in the past to aid in decision-making. Ultimately, it will be integrated with the completed hybrid (mechanistic + data-driven) tool developed in Task 6, which will automate the process. However, it will be available to operators sooner in a manual, data-driven historical data search format under Task 3.

Optimization Tool. The Optimization Tool involves writing a Python script that will trigger the optimization algorithm to run the Setpoint Model iteratively to find an optimal operating strategy for the existing conditions. This will happen each hour. The optimization algorithm will allow effluent variables to vary within an acceptable range (e.g., ammonia between 0.05 mg/L and 0.3 mg/) while predicting the behavior of the other variables in the optimization algorithm until a maximum score is achieved. The resulting variable values from the highest scoring algorithm will be returned hourly to the display layer in the Power BI visualization in Task 3 as a recommendation.

A Python script will also record the same values of those operational variables alongside the recommendation, so that after six months the recommendations can be compared with actions. The goal is to see how much the two programs are alike and different, and to build trust in this control strategy. Those two variables can be visualized side-by-side in the Power BI visual provided as Part of Task 3. The point is to build a database of advisory guidance to compare to actual control strategies. In this scope, the recommendations will never advance beyond an advisory tool, but if PRWRF staff like the results and trust the results, these recommendations could be integrated into a control strategy at an additional cost.

Task 6.4. Deploy Process Advisor Tool

Both the mechanistic and data-driven models need to be deployed in a digital cloud environment as a workflow. This includes the Influent Model, the Process Model, and the Operational Setpoint Model. As stated earlier, the Influent Model will run once a day at a fixed time, while the other two will run hourly in a sequence. This workflow also involves obtaining other necessary information from SCADA for the Process and Operational Setpoint Models such as the number of primary and secondary clarifiers in service, instrumentation data, the number of basins in service, etc.

The SQL data foundation (Task 1) will be leveraged to securely prepare the required inputs and store the outputs from each model in the sequence. SQL, Python, PowerQuery and/or other scripts will be used to move this information through the workflow. The following views in SQL are expected:

- Prepared data for influent models (8 views updated daily)
- Hourly diurnal flow and load curves for COD/BOD, TKN, TP, TSS, flow, and alkalinity (6 views that do not need to be updated)
- Output from mechanistic model (1 view updated daily)
- Prepared data input for Setpoint Model (1 view updated hourly)
- Output from Setpoint Model (1 view updated hourly)

This will be a Hazen-hosted Azure environment that will display the recommended operating points to the City via the Power BI dashboard (Task 3). This workflow is expected to take up to two hours to complete daily. Hosting fees will be estimated during the course of the project and communicated to the City. While there are no markups, the fees will be an ongoing expense for the City. Success of this step is predicated upon being able to obtain the proper data connectivity linkages described earlier in the scope.

Task 6.5. Documentation and Training

Hazen will develop a 20-page memorandum documenting the model development and deployment process. An appendix will contain a figure showing the accuracy of each data-driven model on a scatter plot of predicted versus observed values, a feature importance plot, and a SHapley Additive exPlanations (SHAP) plot. This single page document of each model will visually convey its accuracy and the importance and directionality of the independent variables.

Each step of the workflow (Influent Model, automated running of the Process Model, and the Setpoint Model) will be tested and the results shared with the City. Each step will be operated in a test mode and monitored for 30 days by Hazen staff, which will review the results on a weekly basis. During this time period, City staff will also have access to the visualization of results. Following the 30-day test, a virtual meeting will be held to discuss any feedback. Approximately 40 hours of additional development work are allocated for any modifications, and upon completion, the model will be considered complete.

A two-hour virtual training presentation will be held and recorded for PRWRF staff. This presentation will review the content of the technical memorandum and walk users through how to view the results of the models in the Power BI platform. An additional 40 hours of maintenance work to be allocated over the following 6 months are also included. Any additional effort beyond that will require a new scope and fee.

Task 6 Deliverables:

- Three additional Power BI pages displaying the recommendations from Process Advisor Tool.
- Azure workflow to sequentially run models and store model outputs.
- Scoring algorithm to enable assessment of current process performance and operate the Optimization Tool.

- 20-page technical memorandum.

Task 7**.** Data-Driven E. coli Model

PRWRF staff may wish to explore additional data-driven modeling outside of secondary treatment and the Process Advisor workflow. This scope item is included to account for one additional data-driven model, which can be developed and deployed as part of Task 3 (alongside the Task 6 deployment of the Process Advisor tool). It is anticipated that the City would like to develop a model to predict E.coli values one day in advance.

The technical approach will be similar to the influent concentration and load model development in Task 6.1. However, it is included separately from Task 6 because the outputs of the models developed under Task 6 could potentially be used as input variables for this model, and it is also anticipated that this model will utilize different independent variables from the models in Task 6, necessitating additional effort. The model in this task is anticipated to include other variables such as secondary effluent characteristics, which would not be appropriate to include in the influent model prediction and a downstream measurement cannot predict an upstream value.

The accuracy of this model will be evaluated using the same approaches described in Task 6. If acceptable accuracy is achieved, this model will be deployed alongside the Process Advisor Tool in Task 6.

A 10-page technical memorandum summarizing the development of this model will be provided. A two-hour virtual training session with City staff will be included and recorded to summarize the model development and document the functionality of the tool and its intended use.

Task 7 Deliverables:

- One additional Power BI page displaying the E. Coli predicted value for the following day.
- Azure workflow to sequentially run models and store model outputs.
- A 10-page technical memorandum summarizing the development of this model.
- 2-hour virtual training workshop.

Meetings

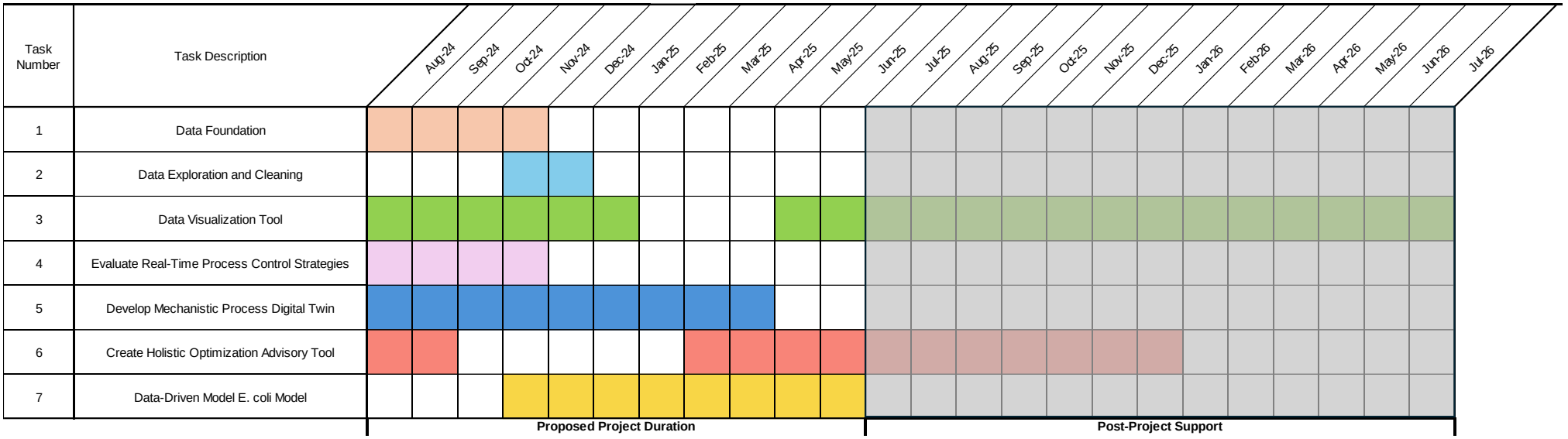
As described above, Hazen will host six (6) virtual progress meetings and three (3) virtual workshops during the course of this task order. The progress meetings will be aimed at providing progress updates to the City as well as soliciting necessary feedback from the City on forthcoming deliverables. The workshops will focus on process staff and operator training in using the mechanistic process digital twin initially, and the Process Advisor Tool ultimately. While the exact agenda for the meetings may be modified in accordance with tool status or priorities for discussion or feedback, the meetings and workshops are broadly expected to cover the following:

Virtual Meeting / Workshop Number	Associated Tasks	Broad Meeting / Workshop Topic
Meeting 1 (May be up to 5 meetings 1.1, 1.2, 1.3, 1.4, 1.5)	1	Meeting with IT or Other City Staff as Needed for Data Sharing, Access and Continuous Updates
Meeting 2	2	Meeting to Review Data Flow and Data Cleaning Efforts
Workshop 1	3	Review General Data Visualization Tool (Power BI) and Gain Feedback for Finalization of Custom Pages
Meeting 3	3	Meeting to Solicit City Inputs on Operational Guidance Pages
Meeting 4	4	Meeting to Review Control Strategies
Meeting 5	5	Meeting to Train PRWRF Staff on Process Twin Web Application
Meeting 6	5	Meeting to Obtain Operator Feedback on Calibrated Twin
Workshop 2	6	Workshop to Review Final Tools (Power BI and Web-App) with City
Workshop 3	7	Progress Workshop for Data-Driven E.coli Modeling and Integration into Tools

Schedule

The figure on the following page provides a summary of the timeline for the proposed tasks. The timeline provided here assumes the completion of Task 1.1 as Time “Zero”, i.e., the timeline of months provided in the figure below is contingent upon the completion of the data warehouse set-up

Hazen


Task Number
Task Description
Aug-24
Sep-24
Oct-24
Nov-24
Dec-24
Jan-25
Feb-25
Mar-25
Apr-25
May-25
Jun-25
Jul-25
Aug-25
Sep-25
Oct-25
Nov-25
Dec-25
Jan-26
Feb-26
Mar-26
Apr-26
May-26
Jun-26
Jul-26
1
Data Foundation
2
Data Exploration and Cleaning
3
Data Visualization Tool
4
Evaluate Real-Time Process Control Strategies
5
Develop Mechanistic Process Digital Twin
6
Create Holistic Optimization Advisory Tool
7
Data-Driven Model E. coli Model
Proposed Project Duration
Post-Project Support

Hazen

Assumptions

1. For the data-driven modeling portion, at least 3 years of historical daily influent and effluent flow and concentration data for predicted parameters is available for analysis. Daily E. coli measurements and secondary effluent quality data are required for Task 7.

2. For the data-driven modeling portion, at least 6 months and preferably longer of historical hourly operational and flow data for predicted parameters is available for analysis. This includes but is not limited to DO analyzer readings, airflow measurements, blower/aerator energy use, SVI (daily is okay), nutrient analyzer readings, RAS flow, influent flow, WAS flow, and internal recycle flow. This time period must overlap with the above.

3. Microsoft Azure shall be the Cloud-based environment for digital tool deployments.

4. Santa Fe will access all deployments through HazenCloud, which is a Hazen-hosted Azure space. Hazen issues credentials to individual users and organizations.

5. Data acquisitions and connections can be made within two months (Task 1.1). If this timeline is not possible, the rest of the schedule will need to be adjusted accordingly.

Budget

The proposed not-to-exceed budget to provide the services described herein is $1,120,550. However, the $144,852 remaining in the budget for Task 700 – Digital Twin has been applied as a credit to result in a budget authorization request of $993,892.

Attachment 1 provides a budget breakdown for Task 1 – 7. All work will be performed on a time and materials basis. Labor will be billed using categorical rates. Expenses may include reimbursable mileage, airfare, lodging, printing, mailing, supplies, and other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

Hazen

Attachment 1: Proposed Budget

		Total	Fee		
Task	Description	Hours	Labor	Expense	Total
1	Data Foundation	716	$143,187		$143,187
2	Data Exploration and Cleaning	324	$73,591		$73,591
3	Data Visualization Tool	673	$124,844	$1,000	$125,844
4	Evaluate Real-Time Process Control Strategies	232	$54,450		$54,450
5	Develop Mechanistic Process Digital Twin	992	$263,499	$2,000	$265,499
6	Create Holistic Optimization Advisory Tool	1700	$389,567	$2,400	$391,967
7	Data Driven E. coli Model	275	$66,011		$66,011
	Credit for Budget Remaining in Task 700		($144,852)		($144,852)
	Subtotal Including Credit				$975,698
	NMGRT (8.1875% of Labor)			$18,193	$18,193
	TOTAL	4,912	$970,298	$23,593	$993,892

Hazen

City of Santa Fe, NM
Paseo Real WRF Onsite Operational Support
Scope of Work

1. Project Understanding

The City of Santa Fe (the City) has requested a scope from Hazen and Sawyer (Hazen) to provide onsite operational support at the Paseo Real Water Reclamation Facility (PRWRF). The City has requested full-time support for two months followed by part-time support for the remaining duration of Hazen's contract scheduled to end on September 30, 2026.

2. Personnel

Hazen and Sawyer proposes the following staff for this assignment:

- Tom Pfiester – Grade A Wastewater Treatment Operator licensed in Texas and Florida with 21 years of wastewater treatment operational experience. Prior to joining Hazen, Mr. Pfiester most recently served as Assistant Director of Wastewater Operations for Miami-Dade County.

- TJ Lynch – Grade IV Wastewater Treatment Operator licensed in North Carolina and Virginia with 31 years of wastewater treatment operational experience. Prior to joining Hazen, Mr. Lynch most recently served as Assistant Director of Raleigh Water.

- Charlie Leder – Level 4 Wastewater Treatment Operator licensed in New Mexico with 47 years of wastewater treatment operational experience. Prior to joining Hazen, Mr. Leder most recently served as Manager of Plant Operations for the Albuquerque Bernalillo County Water Utility Authority.

3. Scope of Services

Hazen staff will serve as an extension of the City's staff to support the operation of PRWRF. Hazen staff will provide the following services while stationed at the PRWRF:

- Regularly meet with City staff to assess operational challenges and goals.
- Review and reinforce PRWRF operational and regulatory requirements with City staff.
- Provide suggestions to improve plant operations and treatment efficacy.
- Provide hands-on troubleshooting support.
- Help develop Standard Operating Procedures (SOPs) and other operational guidelines.
- Coordinate with other Hazen staff to keep them apprised of onsite activities and new developments.

4. Schedule

The budget is based on the following schedule assumptions.

- Mr. Pfiester will be stationed at PRWRF full-time July 24, 2024 through September 27, 2024. He will then be stationed at PRWRF part-time (25%) October 1, 2024 to September 30, 2026. During the part-time phase, he will make one 1-week trip to PRWRF per month. The budget includes an additional three weeks of onsite support so Mr. Pfiester can spend four consecutive weeks onsite during the period spanning October 1, 2024 to September 30, 2026. The timing of the 4-week trip will be coordinated by the City and Hazen.

- Mr. Leder will be stationed at PRWRF part-time (50%) during September 2024. He will then be stationed at PRWRF part-time (25%) October 1, 2024 to September 30, 2026.

- Mr. Lynch will periodically visit PRWRF up to four (4) times between September 1, 2024 and September 30, 2026 to provide additional onsite support.

5. Assumptions

The following assumptions have been made in preparing the Scope of Work.

- Hazen staff will not function as the PRWRF Operator-in-Charge. Hazen's role is limited to operations support by providing assistance and suggestions as defined above. Neither Hazen nor individual Hazen staff assume liability for regulatory compliance.
- Monthly Operating Reports (MORs) will be reviewed, signed, and submitted by City staff. Hazen staff will not sign MORs or other regulatory documents.

6. Budget

The proposed not-to-exceed budget to provide the services described herein is $1,050,000. Attachment 1 provides a budget breakdown. All work will be performed on a time and materials basis. Labor will be billed using categorical rates. Expenses may include reimbursable mileage, airfare, lodging, car rentals, other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

Hazen

Attachment 1: Proposed Budget

		Total	Fee		
Task	**Description**	**Hours**	**Labor**	**Expense**	**Total**
1	Full-Time Support	396	$108,196		$108,196
2	Part-Time Support	2,643	$749,478		$749,478
3	Project Management	50	$15,541		$15,541
4	Expenses Allowance			$105,291	$105,291
	Subtotal		$873,215	$105,291	$978,506
	NMGRT (8.1875% of Labor)			$71,494	
	TOTAL	**3,089**	**$873,215**	**$176,785**	**$1,050,000**

Hazen and Sawyer - Emergency Determination

Final Audit Report 2024-11-16

Created:	2024-11-13
By:	Kristy Miera (kamiera@santafenm.gov)
Status:	Signed
Transaction ID:	CBJCHBCAABAA2hi0Pis0UBxON4Xg5s3lhXjePcNEBt09

"Hazen and Sawyer - Emergency Determination" History

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Document e-signed by Randy Randall (rrandall@santafenm.gov)

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Agreement completed.

2024-11-16 - 5:04:27 PM GMT

Item# 24-0710
Munis Contract# 3204638
Original Contract Item# 24-0299
SWPA/GSA/Coop/RFP/ITB #: Emergency

CITY OF SANTA FE
AMENDMENT NO. 1 TO
PROFESSIONAL SERVICES CONTRACT
ITEM# 24-0299

This AMENDMENT No. 1 (the "Amendment") amends the CITY OF SANTA FE Professional Services Contract, dated April 11, 2024 (the "Contract"), between the City of Santa Fe (the "City") and Hazen & Sawyer (the "Contractor"). The date of this Amendment shall be the date when it is executed by the City and the Contractor whichever occurs last.

RECITALS:

A. Under the terms of the Contract, Contractor has agreed to provide Engineering Support Services to assist in bringing the Paseo Real Wastewater Reclamation Facility back into compliance with its NPDES permit.

B. Pursuant to Article 14 of the Contract, and for good and valuable consideration, the receipt and sufficiency of which are acknowledged by the parties, the City and the Contractor agree as follows:

1. SCOPE OF SERVICES

Article 1 of the Contract is amended to add the following additional tasks to the existing Scope of Work:

Additionally, the Contractor shall provide the following Services:

Task 1 – Paseo Real WRF Asset Inventory and Condition Assessment

A summary of the major elements of this task order is listed below:

- Review of existing data and records
- Data validation and acceptance – establishing the limits and hierarchy of what to include in asset inventory,

establishing asset definitions and attribute information

- Asset inventory and condition assessment field work – creating data collection forms and performing onsite inventory and condition assessment
- Establishment of an Asset Register
- Evaluation of expected useful / remaining life of assets and replacement cost data for assets
- Development of level of service goals and key performance indicators
- Development of a maintenance planning strategy
- Establishing an asset risk framework and risk scoring criteria for assets
- Development of an asset insights dashboard

A detailed Scope of Work for this Task 1 is listed in Exhibit B.

Task 2 – Production of a Digital Twin Process Model

The City desires to develop a tool (or tools) that allows process engineers and plant operators at the Paseo Real Water Reclamation Facility (PRWRF) to visualize process data, assess plant performance as well as gain usable and actionable process optimization insights in close to real-time. City staff also noted that the ability to assess the impacts of operational changes (i.e., what-if or scenario analyses) on performance and ability to meet compliance requirements would be critical. Under this Task, Hazen will provide technical support services to advance the City's data visualization and process optimization initiatives. This task is broken into six major tasks: dataflow development and tag addition, data exploration and cleaning, development of a data visualization tool, real-time process optimization, development of a mechanistic process digital twin, and addition of data-driven optimization features into the process twin (i.e., development of a hybrid model that includes mechanistic as well as data-driven components).

A detailed Scope of Work for this Task 2 is listed in Attachment C.

Task 3 – Paseo Real WRF Onsite Operational Support

The City of Santa Fe (the City) has requested a scope from Hazen and Sawyer (Hazen) to provide onsite operational support at the Paseo Real Water Reclamation Facility (PRWRF). The City has requested full-time

support for two months followed by part-time support for the remaining duration of Hazen's contract scheduled to end on September 30, 2026.

Hazen staff will serve as an extension of the City's staff to support the operation of PRWRF. Hazen staff will provide the following services while stationed at the PRWRF:

- Regularly meet with City staff to assess operational challenges and goals.
- Review and reinforce PRWRF operational and regulatory requirements with City staff.
- Provide suggestions to improve plant operations and treatment efficacy.
- Provide hands-on troubleshooting support.
- Help develop Standard Operating Procedures (SOPs) and other operational guidelines.
- Coordinate with other Hazen staff to keep them apprised of onsite activities and new developments

A detailed Scope of Work for this Task 3 is listed in Attachment D.

2. COMPENSATION.

Article 3, paragraph A of the Contract is amended to increase the amount of compensation by a total of $2,666,930.00 so that Article 3, paragraph A reads in its entirety as follows:

A. The City shall pay to the Contractor in full payment for services satisfactorily performed such compensation not to exceed five million three hundred eighty four thousand nine hundred and thirty dollars ($5,384,930.00), including gross receipts tax. The total amount payable to the Contractor under this Contract including gross receipts tax and expenses, shall not exceed $5,384,930.00 (five million three hundred eighty four thousand nine hundred and thirty dollars). This amount is a maximum and not a guarantee that the work assigned to be performed by Contractor under this Contract shall equal the amount stated herein. The parties do not intend for the Contractor to continue to provide services without compensation when the total compensation amount is reached. Contractor is responsible for notifying the City when the services provided under this Contract reach the total compensation amount. In no event will the Contractor be paid for services provided in excess of the total compensation amount without this Contract being amended in writing prior to those services in excess of the total compensation amount being provided.

C. CONTRACT IN FULL FORCE.

Except as specifically provided in this Amendment, the Contract remains and shall remain in full force and effect, in accordance with its terms.

IN WITNESS WHEREOF, the parties have executed this Amendment No. 1 to the Contract as of the dates set forth below.

CITY OF SANTA FE:

Alan Webber
Alan Webber (Dec 15, 2024 14:10 MST)
Alan Webber, CITY MAYOR

DATE: Dec 15, 2024

CONTRACTOR:

Greg Gates (Oct 30, 2024 11:52 MDT)
Greg Gates, Vice President

DATE: Oct 30, 2024

CRS# 03-405247-00-0

ATTEST:

Andrea Salazar
Andrea Salazar (Dec 16, 2024 08:32 MST)
~~GERALYN CARDENAS, INTERIM~~ CITY CLERK
GB MTG 12/11/2024

CITY ATTORNEY'S OFFICE:

Marcos Martinez
Marcos Martinez (Oct 30, 2024 13:12 MDT)
SENIOR ASSISTANT CITY ATTORNEY

APPROVED FOR FINANCES:

EMILY OSTER
FINANCE DIRECTOR

Hazen

City of Santa Fe, NM
Paseo Real WRF Asset Inventory and Condition Assessment
Scope of Work

1. Project Understanding

The Paseo Real Water Reclamation Facility (PRWRF) is owned and operated by the City of Santa Fe, New Mexico (CITY). The PRWRF has a permitted capacity of 13 million gallons per day (mgd), average day maximum month flow. PRWRF effluent is discharged into the lower Santa Fe River and can also be conveyed to non-potable reuse customers.

The CITY has requested a scope from Hazen and Sawyer (Hazen) for the development of an Asset Management Plan (AMP) for the PRWRF Facility. In parallel, Hazen has been supporting the City in the selection and procurement of a Computerized Maintenance Management System (CMMS) software product. The City has negotiated a contract with OpenGov to purchase and implement OpenGov's Asset Management environment for the following asset groups:

- Water Distribution
- Water Treatment
- Wastewater Treatment
- Wastewater Collection / Sanitary Sewer
- Transportation
- Parks and Recreation
- Stormwater

This scope of work will include asset inventory and attribute data development, field verification of the inventory along with physical condition assessment, development of risk scoring criteria, identifying level of service goals, asset cost analysis, and development of a 10-year capital improvement plan for the PRWRF Facility (wastewater treatment group). This task will lay the foundation for future asset management endeavors by establishing the following:

- Defining an "asset"
- Defining and assigning asset attributes
- Defining asset hierarchy
- Developing an asset inventory
- Performing a physical condition assessment
- Developing the risk scoring criteria (for likelihood of and consequence of failure scores)
- Developing the levels of service (LOS) that will help drive a prioritization of risk-based CIP projects and are focused on helping the CITY meet its LOS
- Creating a prioritized list of CIP projects based upon defensible risk scores and LOS

The database developed during this task (outside of CIP development), will be used to populate the CMMS system. Hazen acknowledges that both efforts are simultaneously occurring and will work to ensure that development and incorporation of data into the CMMS system is as seamless as possible.

The major elements of this task order are summarized below:

- Review of existing data and records
- Data validation and acceptance – establishing the limits and hierarchy of what to include in asset inventory, establishing asset definitions and attribute information
- Asset inventory and condition assessment field work – creating data collection forms and performing onsite inventory and condition assessment
- Establishment of an Asset Register
- Evaluation of expected useful / remaining life of assets and replacement cost data for assets
- Development of level of service goals and key performance indicators
- Development of a maintenance planning strategy
- Establishing an asset risk framework and risk scoring criteria for assets
- Development of an asset insights dashboard

The scope of work is detailed in the following section.

2. Scope of Services

The Scope of Services for this task order includes the following tasks:

Task 1 – Project Management

Hazen will perform the following project management activities associated with this effort:

1. Project Management – Task consists of ensuring performance of the work follows the agreed upon scope, budget, and schedule (estimated 12 months).
2. Submit monthly invoices and associated progress reports
3. Project Kickoff Meeting – The purpose of the meeting will be to:
    - Identify the key project personnel and contact information.
    - Review the project scope of services and project schedule
    - Review and discuss coordination with the CITY staff, treatment plant operations staff, and other supporting key staff.
    - Discuss the requested existing data, information, and materials CITY will provide
4. Conduct regular progress meetings with CITY project manager
5. QA/QC – Hazen will incorporate a robust QA/QC procedure of all data collected, placed in the asset register, and all deliverables provided to CITY.

All data developed for the CITY as part of this project, including mapping, asset attributes, inventories, CIP plans and anything else generated by the project, is the property of the CITY and will be available to the CITY in electronic format. Hazen will keep the CITY informed of the project progress and will notify the CITY of issues that arise which could potentially affect the schedule, scope, or budget. Any work outside this scope of work will only be performed following written approval by the CITY.

Task 1 Deliverables

- Monthly Invoices with Project Status Reports
- Kickoff Meeting Draft Agenda and Meeting Minutes
- Progress meetings minutes

- Any data generated during the project (draft (at the request of the CITY) or final (all final data to be given to the CITY)).

Task 2 – Data Review, Validation, and Acceptance

Prior to beginning this task, Hazen will submit a request for information (RFI) that includes existing asset information from the current CMMS system, process and instrumentation-related information from SCADA, and record drawings. These details are anticipated to be submitted in digital format for ease of analysis and inclusion in the condition assessment form. This task shall consist of the following services:

1. Hazen will evaluate the information provided by the CITY in response to the RFI
2. Hazen will use industry standards and confer with the CITY during a workshop to establish definition of an "asset" to be included in the inventory phase of the project.
3. Hazen will establish asset types and subtypes to develop a final nomenclature to move forward for the asset inventory phase of the project.
4. Hazen will propose to the CITY a standard asset hierarchy and classifications for various asset types, including name and numbering methods, based on industry standards. The CITY will be given an opportunity to comment on the hierarchies and suggest changes to it during a workshop.
5. Hazen will host a workshop with the CITY to gain input from the CITY and to use that to determine what attribute information will be collected on each class and subclass of assets. At a minimum, each asset must have an asset ID, name, location, condition, useful life remaining, type, material, size, and replacement cost. Additional attributes could include: manufacturer, serial number, capacity, flow rate, dimensions, installation date, operating status, as well as many others. Following the meeting Hazen will provide the CITY with a list of attribute information for the CITY's review. The CITY will approve the list before data collection occurs.

Task 2 Deliverables

1. Asset Inventory Draft Determination
    - Definition of an "asset" for each class and subclass of assets
    - Asset hierarchy in a flow diagram
    - List of asset types and subtypes in a spreadsheet

Task 3 – Asset Hierarchy and Asset Register Development

This task focuses on developing a comprehensive asset hierarchy and asset register for the PRWRF.

1. Designate Qualifying Assets – Hazen will conduct a workshop with CITY stakeholders to finalize the list of qualifying assets based on the preliminary list developed in Task 2.
2. Define Asset Hierarchy – Following the designation of qualifying assets, the workshop will continue to establish an appropriate asset hierarchy, ensuring all assets within the PRWRF are included. The asset hierarchy and the asset register will include the following components:
    - Asset Definition: Compile asset definitions using existing PRWRF asset lists and assets identified in Task 2.

- Asset Class: Group assets by type, functions, useful life, and pricing attributes (e.g. size, material, power).
- Data Standards: Establish data attributes required to support asset management needs.

3. Asset Register Development – Hazen will create the asset register using a hierarchical structure with "parent-child" relationships, allowing the CITY to navigate the database easily and extract information at various levels.

Task 3 Deliverables

- Asset Hierarchy
- Preliminary Asset Register with all identified assets, all available asset attribute information, photos of all visible assets, unique asset ID numbers, asset names that are known by staff (Microsoft Excel). This information will be provided to OpenGov as soon as available for use in initiation and validation phases.

Task 4 – Asset Inventory and Condition Assessment

This task includes the desktop and field work required for the asset inventory and condition assessment. Following completion of Task 2, Hazen will create an asset inventory in digital format that includes all asset types and subtypes with relevant attributes, as well as a condition assessment form. This task shall consist of the following services:

1. Hazen will develop a digital survey and condition assessment form to collect and assess asset data in the field.
    - Hazen will develop a physical condition framework for each asset type by discipline (civil/structural, HVAC, mechanical, and electrical/I&C) using the International Infrastructure Management Manual (IIMM) as a guideline to be used to assess condition during field verification. Hazen will share the draft condition assessment process with the CITY and the CITY will have a chance to comment and input on the process. Field personnel familiar with the assets will be invited to the meeting and their input will be considered in this process.
    - Hazen will include all asset attributes in forms that should be collected for each asset type Such as Collector 123, Fulcrum, or a similar platform which the City can utilize in the future independently.
    - Hazen will include the asset type, subtype, and hierarchy as fields to be populated in the digital form.
2. Hazen will create an asset register template that includes all asset types and subtypes with defined attributes. The asset register will also contain physical condition-related attributes.
3. Hazen will pre-populate available information from the obtained data. The information will be verified and updated during the field inspection, along with a physical condition score.
4. Hazen's field team will comprise specialists in civil/structural, HVAC, mechanical, and electrical/I&C.
5. Hazen will perform a visual condition assessment of each asset. The goal of the condition assessment is to identify the current state of assets with a condition score allowing estimation of the assets' remaining useful lives.

6. Hazen will design the Santa Fe WRF Asset Insight Dashboard user interface along with a data model and share with the CITY project manager before proceeding. Upon user interface approval, Hazen will develop the following four visual reports:

    - Home – Page navigation and a visual overview of the WRF assets.
    - Summary – Overview of asset count, condition, location, risk, useful life, and renewal needs.
    - Asset Details – Detailed view of asset attributes, inspection photos, and deterioration curve.
    - Asset Condition – View asset condition statistics by condition score and installation decade.

    All Dashboard pages will provide the user with the ability to filter visuals by process area, equipment type, discipline, condition score, and risk matrix bin.

    The Asset Insight Dashboard will be designed so that it may link with other facilities that are part of the CITY's operations.

Task 4 Deliverables

- Draft register for review by the CITY. Comments should be addressed by Hazen (it is understood that if a comment is not possible to address (i.e., can't make the change) Hazen will provide an explanation of why not.
- Final Asset Register with Attributes and Condition Assessments as specified in the list of attributes and containing any required changes based on the review of the draft – Spreadsheet. This information will be provided to OpenGov as soon as available for use in the configuration phase.
- PRWRF Asset Insight Digital Dashboard Pictures of each asset that is visible. The asset pictures will have the entire asset in the first picture with all subsequent pictures showing close ups of particular issues or concerns (e.g., the name plate, cracks, missing bolts, rust or other corrosion.) In any case with a visible name plate a picture of the name plate will be taken. The photos will be attached to the asset in the spreadsheet with the full asset photo as the first picture in the set of photos.

Task 5 – Expected/Remaining Useful Life Determination

This task aims to determine the expected useful life (EUL) and remaining useful life (RUL) of asset classes.

1. Expected Useful Life (EUL) – Using manufacturer design life, industry publications such as Engineering News Record (ENR), and data from similar Hazen projects, Hazen will establish a baseline EUL for each asset class.

2. Remaining Useful Life (RUL) – Based on collected attribute data, CITY maintenance records, and condition assessment scores, Hazen will estimate the RUL for each asset by adjusting up or down from the general attribute life. For example, if a pipe is to last 100 years but it is known to have multiple breaks and has shown signs of deterioration, the pipe's life should be shortened. If a pipe is known to be in good shape, exhibited no issues, etc., its life will be extended. For assets lacking visual condition assessments and any other information on

maintenance, repairs, or operator knowledge, the RUL will be calculated by dividing expected design life by asset age with straight line deterioration.

Task 5 Deliverables

- Estimated EUL for each asset class
- Estimated RUL for each asset
- Updated asset register with EUL and RUL for each asset

Task 6 – Replacement Valuation

This task involves estimating the current replacement cost for each asset.

1. Cost Data Collection and Review – Consolidate and review historical replacement cost data, local knowledge, RS Means databases, and costs from similar Hazen projects. Hazen will estimate current replacement costs in 2024 dollars using unit cost methods.
2. Workshop – Hazen will conduct a 3-hour Asset Valuation Review and Lifecycle Costing Workshop with CITY to review and validate replacement costs, develop cost factors for full implementation estimates, and determine maintenance strategies for run-to-fail assets and those with rehabilitation plans.

Task 6 Deliverables

- Updated asset register with bare and full cost estimates
- Total estimated valuation of the entire facility
- Workshop agenda, minutes, and presentation materials

Task 7 – Validate Levels of Service (LOS) and Develop Key Performance Indicators (KPIs)

This task will define and validate the Levels of Service (LOS) and Key Performance Indicators (KPIs).

1. Preliminary LOS and KPI Development – Hazen will seek input from CITY regarding potential LOS goals and KPIs prior to the workshop.

2. Using the list of potential LOS goals and other available information on LOS more generally, Hazen will develop a preliminary list of LOS and KPIs for CITY to review before a workshop.

3. Hazen will conduct a 3-hour workshop with key stakeholders to identify and validate LOS and KPIs for the facility. The discussion must include the following: what information would be required to measure the goals and determine whether KPIs are met, how difficult it would be to get this information (including whether this data currently exists), where the data would be held, how the KPIs would be calculated and stored, and who would have access to the data. Additionally, discussions of which goals/KPIs should be more publicly shared should be held.

Task 7 Deliverables

- LOS and KPI Summary Table
- Data required to meet the goals summary and where data is stored

Task 8 – Maintenance Planning

This task develops a maintenance planning strategy. Hazen will utilize a proven approach for utilizing asset criticality to determine the type of maintenance activities to be performed for the top ten qualifying asset classes. The level of effort required for maintenance activities will support estimated FTE staffing requirements.

1. Maintenance Approach Development – Utilize manufacturer-specific O&M manuals and industry-leading practices for failure monitoring and mitigation. Techniques include Failure Mode and Effects Analysis (FMEA), Preventive Maintenance Optimization (PMO), and Reliability Centered Maintenance (RCM).
2. Categorization of Maintenance Activities
    - Low Criticality: Operations Only or Run-To-Failure (RTF) Strategy—basic visual inspections or repair/replacement upon failure.
    - Medium Criticality: Operations + Condition/Performance—includes some condition/performance activities based on physical characteristics and financial feasibility.
    - High Criticality: Operations + Condition + Performance—comprehensive maintenance activities based on typical failure modes, from basic inspections to advanced predictive maintenance.

Task 8 Deliverables

- Maintenance strategy documentation for each asset class

Task 9 – Additional Services

The following tasks may be authorized by the CITY to develop a full Asset Management Program (AMP). The additional services described below provide high-level goals for each task as more information becomes available. At that time, the task item and deliverable will further be further delineated and detailed and authorized fee negotiated:

1. Gap Analysis – Prior to the development of the AMP, Hazen will provide a gap analysis at the facility to verify changes (asset removal or addition during the Emergency AO Projects) and update the data inventory. This scope item assumes up to 200 assets to be input into the data inventory.

2. Risk Framework Development - Define a performance condition assessment and consequence of failure assessment framework. This will include defining criteria, scoring definitions and scales, weighting, and scoring methodology specific to CITY'S PRWRF assets. Hazen will coordinate and solicit feedback from the Southwest Environmental Finance Center on project details.

3. Asset Risk Assessment (LoF and CoF) - implementation of a comprehensive asset risk assessment approach, including:
    a) Performance Condition Assessment
    b) Consequence of Failure Assessment
    c) Risk Scoring

4. Renewal and Replacement CIP Forecasting – Based on replacement valuations determined in task Hazen will provide a specific set of recommendations for the PRWRF that focus on:
    a. Known upcoming / in-process projects
    b. Program recommendations
    c. CIP project recommendations

    The CIP Projects will be identified by a priority based upon BRE and typically divided into high (1-2 years), medium (3-5 years) and low (6-10 years) priority. Hazen will delineate between rehabilitation and replacement projects and costs and provide costing for each recommendation by year. In addition, Hazen will utilize the information to develop asset inspection and maintenance scheduling guidelines for qualifying assets.

5. Staff Training – Hazen will develop and facilitate staff training of the AMP to support ownership and longevity of the program. Staff training is assumed to be conducted over a one-day period.

6. Unidentified Additional Services - In the development of this scope, Hazen and the CITY acknowledge there are uncertainties and unidentified tasks associated with the development of a full AMP. This task provides resources required to address these unidentified items. A budget allowance of $100,000 is included in this scope and budget for unidentified additional services.

3. Assumptions

Certain assumptions have been made in preparing the Scope of Services. To the extent possible, these assumptions are stated herein and are reflected in the estimated fee for services. If the requirements of the Project are different from the assumptions presented herein, or if the CITY desires additional services, the resultant scope changes will serve as the basis for amending this Contract or initiating the development of a new Contract as mutually agreed by CITY and Hazen. Project assumptions include:

- Based on similar projects, Hazen expects the asset count to be less than 1,500 assets inventoried. This scope of work assumes that the asset inventory will not exceed 1,500 assets. An inventory in excess of 1,500 assets will be considered additional work. The Hazen will keep the CITY informed of the progress of the inventory and if projected inventory exceeds the assumed quantity of assets.
- Kickoff meeting will be held virtually on MS Teams.
- No confined space entry is included during the asset inventory or condition assessment.
- There will be approximately 1-2 weeks of onsite asset inventory field work (estimated at 3-4 days per week)
- The CITY will open any electrical cabinets, operate equipment or valves, turn on/off equipment, etc., as needed to capture asset information.
- Operators will be available for the duration of Hazen's fieldwork and Hazen will seek to involve the Operators in the process of obtaining information to support knowledge transfer. Operators who are knowledgeable about the assets will be available to Hazen staff during field work.
- The efforts described herein would support and be compatible with a future ISO14001 certification.

4. Schedule

The proposed schedule for completing Tasks 1 through 8 is 12 months following notice to proceed. We are prepared to begin our work for the City immediately upon receipt of its written authorization to proceed. The schedule for additional services outlined in Task 9 would be determined when the scope of additional services requested by the CITY is negotiated.

5. Compensation

We are requesting an initial authorization of $623,038 to provide the services that are described under the Scope. Attachment 1 provides a budget breakdown for Tasks 1 – 9. All work will be performed on a time and materials basis. Expenses may include reimbursable mileage, airfare, lodging, printing, mailing, supplies, and other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

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Attachment 1

Proposed budgets for Asset Inventory and Condition Assessment Services

		Total	Fee		
Task	Description	Hours	Labor	Expense	Total
1	Project Management	174	$48,901	$500	$49,401
2	Data Review, Validation, and Acceptance	128	$41,391	$4,200	$45,591
3	Asset Inventory and Asset Register Development	132	$28,785	$3,700	$32,485
4	Asset Inventory and Condition Assessment	740	$142,026	$18,500	$160,526
5	Expected / Remaining Useful Life Determination	70	$13,864	$0	$13,864
6	Replacement Valuation	86	$17,931	$3,700	$21,631
7	Validate LOS and Develop KPIs	76	$15,262	$0	$15,262
8	Maintenance Planning	136	$26,981	$0	$26,981
9	Additional Services	494	$207,333	$5,550	$212,883
	NMGRT (8.1875% of Labor)			$44,415	$44,415
	TOTAL	**2,100**	**$542,473**	**$55,565**	**$623,038**

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The city of Santa Fe (the City) seeks to develop data visualization and process optimization tools that provide end-users with access to a common authoritative source for critical plant operations and performance data. This suite of tools is expected to provide plant process and operations staff with the ability to visualize plant performance data in near-real-time (NRT) and gain actionable insights to improve or optimize process performance. The suite will consist of a plantwide data visualization tool as well as a holistic process optimization web application that utilizes both mechanistic as well as data-driven modules to provide maximum value. Hazen will execute the project by developing core data system building blocks and visualization tools that enhance situational awareness and provide near-term functional value, while in parallel developing advanced process insight tools that leverage this data foundation.

The City has expressed a desire to develop a tool (or tools) that allows process engineers and plant operators at the Paseo Real Water Reclamation Facility (PRWRF) to visualize process data, assess plant performance as well as gain usable and actionable process optimization insights in close to real-time. City staff also noted that the ability to assess the impacts of operational changes (i.e., what-if or scenario analyses) on performance and ability to meet compliance requirements would be critical.

Under this Task Order, Hazen will provide technical support services to advance the City's data visualization and process optimization initiatives. This task order is broken into six major tasks: dataflow development and tag addition, data exploration and cleaning, development of a data visualization tool, real-time process optimization, development of a mechanistic process digital twin, and addition of data-driven optimization features into the process twin (i.e., development of a hybrid model that includes mechanistic as well as data-driven components).

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Task 1. Data Foundation

The primary goal of this task is to ensure that critical analytical and operational data from the PRWRF is securely available in a central SQL data warehouse. Major activities include collaborating with City IT staff to develop secure SCADA and OP10 data export processes, building the data warehouse and necessary data pipelines, identifying and acquiring raw time series data, and creating new calculated time series for process optimization. Work under this task establishes the data foundation and computational environment for subsequent tasks.

Task 1.1: System Connectivity and Data Engineering

The goal of this task is to establish data connectivity, data pipelines, SQL data warehouse, and ancillary data engineering components necessary to provide a foundation for both project analytics and for routine operational use of project-developed tools by the City. While the data warehouse developed under this task will focus on a subset of critical data necessary to optimize plant performance, the overall data framework will be designed for future scalability, such that it may serve as a testbed and starting point for future plant-wide visualization and reporting if desired by the City.

Under this task Hazen will work closely with City IT staff and data stewards to develop secure and repeatable data acquisition processes and to comply with cybersecurity and data governance standards provided by the City upon project initiation. Key activities include:

- Collaborate with plant technical staff to draft a high-level requirements document and proposed data architecture diagram to support discussions with City IT staff. The document will focus on defining core requirements such as user roles and objectives, data sources, data granularity and refresh frequency, data retention and storage, and data accessibility and security.
- Hold up to 5 virtual coordination meetings with City IT staff and data owners.
- Provision a secure workspace within Hazen's Microsoft Azure or Fabric tenant that is dedicated to City of Santa Fe data and applications. This effort will consider opportunities to integrate or leverage existing data handling and reporting processes that are currently operational in Hazen's Azure and Power BI tenants, including a single user endpoint through the Santa Fe BI Application developed by Hazen, automated integration between live and historical data using stored procedures, and one-way data exports to securely obtain data from Santa Fe's operational systems.
- Design and build a semantic model and data warehouse to integrate metadata, raw data, calculated data, and cleaned data. The semantic model will be extensible to integrate model output data and recurring predictive data developed under subsequent tasks. As above, this effort will maximize opportunities to integrate or reuse existing model structures, with the overall goal of delivering a high-performing and low maintenance system.
- Develop a scalable process for managing time series metadata from multiple data sources (with a focus on SCADA and OP10). This includes specifying location and parameter attributes, friendly names, higher-level location and parameter categories, and reference values (e.g. regulatory limits,

operational targets, thresholds). This process will be based on an Excel file, a Microsoft List, or similar compatible technology.

- Support City staff in the development of recurring automated processes for securely exporting data and metadata from the SCADA Historian and the OP10 database to the data warehouse.
- Support City staff in the creation of gateways if needed.
- Ensure compliance with cybersecurity, data governance, and application development standards provided by the City.

Task 1.2: Acquire Raw Time Series Data

The goal of this task is to identify and acquire raw time series data from lab analyses and plant instrumentation that is most valuable for optimizing plant performance. This task involves reviewing metadata from OP10 and SCADA systems, identifying tags, developing queries, configuring data pipelines for recurring data movement, and conducting a one-time export of historical data. The data products created in this task form the data foundation of subsequent modeling and analytical activities.

- Review OP10 and SCADA historian metadata for the purpose of identifying tags or parameters that are most valuable for optimizing plant performance. Metadata shall be provided by the City, or alternately the City shall provide credentials sufficient to access metadata tables.
- Based on metadata review, collaborate with plant technical staff to select up to 20 critical influent and effluent concentrations and secondary process operational data from the OP10 system.
- Based on metadata review, collaborate with plant technical staff to select up to 200 tags critical for process assessment and control from the SCADA historian.
- Populate consistent metadata attributes for the selected raw time series data, including location and parameter attributes, user friendly names, reference values, and other attributes that may be useful in the display layer.
- Develop and deploy a system for managing and storing metadata attributes using Excel, Microsoft List, or similar no-code/low-code technology compatible with the data warehousing environment.
- Develop a script to query the OP10 database and return the desired parameters.
- Develop a script to query the SCADA historian and return the desired tags, aggregated to an hourly timestep. Temporal aggregation method will be tailored to the specific tag (e.g., for some tags an hourly average may be appropriate, while for others an hourly maximum may be appropriate).
- Conduct a one-time manual export of up to 5 years of historical data from SCADA Historian and OP10 database and load the data into the data warehouse. This work is limited to extraction of data from database or historian tables and does not include extraction of data from files.
- Configure, test, and deploy data pipelines and scheduling/orchestration features to establish recurring acquisition of data exported from SCADA and OP10 systems.

Task 1.3: Calculate New Time Series Data

The goal of this task is to develop new calculated time series that are critical for process control, compliance, and optimization. These will include loading rates to processes such as the primary and secondary clarifiers, and secondary process key performance indicators (KPIs) such as total and aerobic solids retention times (SRT and aSRT), RAS rates, WAS rates, chemical usage normalized to forward flow, chemical usage per unit mass of nutrient removal achieved, air usage per unit of BOD/nutrient removal, and energy use per unit flow treated. These calculated time series will be developed for both historical data and for new incoming data as part of the operational system. Key activities include:

- Collaborate with plant technical staff to identify and define up to 50 new calculated time series.
- Develop equations and write scripts to generate new time series data. Scripts will be generated in SQL, Python, or other language consistent with the data warehousing environment.
- Validate script output by comparing summary statistics to expected upper and lower bounds for each parameter.
- Execute the scripts for historical data and store the data in the data warehouse.
- Configure, test, and deploy the scripts to automatically calculate and store new time series data on a recurring basis.
- Populate metadata for new calculated time series, including location and parameter attributes, user friendly names, and reference values.

Task 1 Deliverables:

- Scripts for querying City SCADA Historian and OP10 database
- Cloud-based SQL data warehouse containing up to 5 years of selected historical SCADA and OP10 data
- Scripts and/or data system configurations for recurring acquisition of data exported from SCADA and OP10 systems.
- Scripts for recurring calculation of new calculated time series.
- Metadata table for raw and calculated time series

Task 2. Data Exploration and Cleaning

The goal of this task is to develop data cleaning protocols to ensure that subsequent analytical, modeling, and visualization tools are driven by clean, quality-assured data. The focus will be on a subset of time series critical to model accuracy and performance, including influent flows and concentrations, airflows, sensor data (DO, ammonia), effluent quality, and solids production (primary and WAS sludge per unit flow treated). Data cleaning will be performed for up to 100 time series critical to performance of the models developed under Tasks 5 and 6.

Task 2.1. Initial Data Quality Review

Hazen will review available historical data from the data warehouse (e.g., up to 5 years of hourly data) with the goal of identifying data quality issues. This will involve creating a time series plot in Python for each of the 100 variables of interest. A process engineer (subject matter expert) will review each plot and identify obvious outliers, (e.g., an influent orthophosphate measurement of 100 mg/L when all the other values are below 10 mg/L). Those outliers will be manually removed from the dataset that will later be used for model development. Then, a data scientist will replot the cleaned data. Up to two additional iterations will be performed.

Following the first round of review by the subject matter expert, a more in-depth look at data quality issues will begin. For example, data stagnation may be seen in some measurements like sensors if a basin is taken offline. A measurement that appears to stagnate will be compared to other measurements to verify if this is the product of a basin being offline (e.g., DO readings are zero and airflow stagnates in the same basin, and flow through the other oxidation ditch doubles). This process of data review will identify the issues most frequently encountered in the dataset, including missing data, data out of range, stagnant data, or abrupt changes in the data. The issues identified and catalogued will inform the data cleanup methods employed in Task 2.2.

Task 2.2. Implement Data Cleaning Protocols

Based on the most frequently issues identified in the dataset, Hazen will develop data cleaning protocols for up to 100 time series. Cleaning protocols will be implemented using the Python Pecos algorithm, which identifies a normal range of operating values for each parameter and hence detects outliers; stagnation, missing data, and abrupt changes in values. For the 100 variables in data cleaning, up to a total of 200 custom rules may be implemented for targeted data cleaning. For instance, a stagnant airflow reading would trigger a check to see if the concerned oxidation ditch is out of service so that the airflow for that basin (or zone) can be recorded as zero. Missing hourly data will be replaced with the average value for the week for that same time of day and/or the same instrument reading in a parallel location.

Data cleaning will be executed using Python or similar scripts within the dedicated cloud workspace, and cleaned data will be integrated into the data warehouse. The raw and cleaned data will be maintained as distinct datasets to allow the analyst to visualize and compare raw and cleaned time series in the Power BI dashboard (Task 3).

The cleaned data will be displayed in Power BI and a numerical value assigned to each daily/hourly datapoint of the 100 time series selected. The coded values shall be as follows:

- 0 = good data, no issues found
- 1 = abrupt change
- 3 = data outside of high/low boundary
- 4 = abrupt change + data outside of high/low boundary

- 5 = stagnation
- 7 = missing data
- 8 = stagnation + data outside of high/low boundary

There will be three pages in Power BI dedicated to data cleaning visualization. The first page will display daily data and its coded value for each time series. The second page will do the same for hourly time series. The third page will plot each time series and its low and high boundaries. The duration of the timescale can be varied to have as much or little granularity as desired.

The data cleaning process will be established for near real-time cleaning through Power BI and Python scripting. The data cleaning scripts will be employed for three months on a trial basis. During this time, staff should review the results and provide comments at the conclusion of the trial. At the end of the trial period, the scripts will be finalized. It is anticipated that up to 20 rule modifications will be implemented based on feedback from City staff.

Task 2 Deliverables:

- Cleaned historical data for up to 100 time series, stored in the data warehouse as distinct time series and available for visualization in the Power BI dashboard.
- Data cleaning and filling scripts that will be implemented in near-real time on a daily/hourly basis, as specified for each of the 100 time series.

Task 3. Data Visualization Tool

The goal of this task is to develop a comprehensive visualization and reporting tool for near real-time assessment of PRWRF performance and process health. The tool will allow City staff to visualize observed data (Tasks 1 and 2), and mechanistic model-predicted data from Task 5 when used with Process Advisor results (Task 6). The overall objective is to enhance situational awareness and integrate data-driven process analytics with operator experience. Note that the Task 5 deliverable is a stand-alone web application that represents the physical layout of the PRWRF, which is separate from the Power BI tool discussed to this point.

The tool will be deployed in Hazen's tenant within Microsoft's Power BI web service and updated at an approximately hourly cadence. The refresh schedule may be further fine-tuned to optimize delivery and usage within the constraints of the Power BI web service. City team members will access the tool via desktop, tablet, or mobile devices.

Task 3.1. Develop Power BI Architecture

The goal of this task is to design, build, and deploy the core Power BI architecture necessary to deliver interactive Power BI dashboards to the end user. A robust backend and semantic model are essential for functionality and scalability as data and components are added to the system. Key activities include:

- Configure a Power BI semantic model and dataflows to integrate data and metadata from the data warehouse. Design shall consider import, direct query, composite, or other options as appropriate based on data volumes and analytical needs.
- Enrich core data and metadata tables with a master calendar table plus ancillary helper tables as needed.
- Set up a Power BI workspace for access by City and Hazen team members, and publish the Power BI report to the workspace
- Establish data refresh schedules to update dashboards with SCADA and OP10 data and calculated time series data regularly. Coordinate with end users to determine an appropriate refresh interval.

Task 3.2. Develop Observed Data Pages

The goal of this task is to create interactive dashboard pages that allow modelers, process engineers, and operations staff to easily review and analyze PRWRF operations and process performance data. The pages will be designed to meet multiple different end-user needs, including data inventory, data quality review, near-real-time process status, historical trending, and detailed process performance comparing against targets and historical benchmarks.

Observed data pages developed under this task will include at a minimum:

- Data Inventory: View all tags in the dataset and summary statistics for each tag (e.g., number of data points, min, max, avg, date range)
- Data Gaps: Highlight missing data. Note extended missing data periods will not be filled in using the Pecos algorithm described earlier. That is for short-duration events spanning a few hours or 1 - 2 days depending on the granularity of the data received.
- Single-Tag Data Navigator: Visualize time series data for any single tag. Assess daily, weekly, monthly, yearly, and seasonal trends, view percentile plots, compare year-on-year and month-on-month averages. Compare historical and current values against targets, benchmarks, limits, or other reference values.
- Single-Tag Data QC: Visualize raw versus cleaned time series data for any single tag.
- Multi-Tag Data Navigator: Plot and visualize multiple tags together, with percentile distributions and tabulated summaries of averages, minimums, maximums, and key percentiles. Plotting pages will leverage the capabilities of native Power BI visualizations; custom-coded visualizations are not included in this task.
- Correlation Analysis: Perform simple correlation analysis on selected tags, displaying results as a heatmap or scatter plot.

In addition, up to 5 custom pages will be developed to serve specific purposes and highlight selected metrics of interest to plant process and operational staff. These pages will be tailored to display plant-wide or process-specific metrics that are frequently reviewed or required by operations staff to make

decisions. The custom pages will provide a clear and concise overview of specific processes or topic areas, making it easier for staff to monitor and analyze important key aspects of their operation. As an example, custom pages might include:

- Interactive process flow diagram (PFD): An interactive PFD can be developed which displays the latest values of critical metrics adjacent to the relevant unit process or process areas. Additionally, tooltips can be provided, which allow users to hover over displayed metrics to get additional statistics for that tag.
- Nutrient Removal Performance: Dedicated pages for the removal efficiency of specific nutrients or species, including metrics like effluent concentrations, nutrient removal per pound of chemical used, and efficiency of bio-P or denitrification.
- Secondary Process Configuration: Highlights the set-up of the secondary process and the resultant effluent quality, displaying metrics like current MLSS, wasting rates, number of oxidation ditches in service, SRT, DO concentrations and oxidation ditch or secondary effluent ammonia.
- Energy Consumption: Focuses on energy use in the treatment process comparing the latest overall energy use to historical consumption. Metrics like energy use normalized to forward flow or blower energy use per pound of oxygen required are highlighted.
- Historical data sorter: Allows sorting of operational data by influent load, flow, and temperature, enabling staff to identify operationally similar days and conduct data-driven what-if analyses. This page can be updated to include the scoring algorithm (Task 6) to help operations staff identify high-performing decisions.

These pages will be developed through an interactive process that includes:

- Needs Assessment: Hazen meets with City staff to identify overall concepts, key questions, and specific requirements. This involves a 2-hour virtual workshop and up to 10 hours of individual interviews.
- Draft Development: Based on City feedback Hazen will develop up to 5 custom pages plus associated metrics.
- User Testing: Deploy draft pages for 1-2 weeks, allowing City staff to use and provide feedback.
- Feedback Collection: City staff provide prioritized feedback in a 1-hour comments virtual meeting or a document synthesizing feedback from multiple users.
- Revisions: Hazen addresses feasible comments within identified task budget limits and tracks remaining items.
- Final Deployment: Hazen deploys the final versions of the custom pages after City staff verify that comments were satisfactorily addressed.

Task 3.3. Develop Model Input/Output Pages

The goal of this task is to develop interactive dashboard pages for reviewing input and output data for the various models that comprise the overall Process Advisor Tool, including the Influent Model, the Process Model, the Setpoint Model, and the Optimization Tool. These pages will be geared for use by system

administrators, modelers, and analysts, and are focused on model data QC, model verification, model performance evaluation, and ad hoc plotting/tabulation.

The measures and semantic model updates developed under this task will establish the foundation for additional dashboard pages in Task 3.4, which will be geared for use by plant engineers and staff focusing on process performance and operator guidance.

Key activities include:

- Configure the Power BI semantic model and dataflows to integrate input and output data from the Influent Model, the Process Model, the Setpoint Model, and the Optimization Tool.
- Configure the semantic model to store and handle multiple different model realizations, such that users can examine model predictions over time (e.g., visualize output from today's model simulations as well as those executed last month).
- Configure the semantic model and associated metadata tables to allow easy comparison between observed and model-predicted values (e.g. compare observed vs predicted influent TN load, or observed vs predicted values).
- Create measures and dashboard pages for interactively displaying model inputs and outputs. These pages will be geared toward model data QC, model verification, model performance examination, and ad hoc plotting/tabulation.

Task 3.4. Develop Operational Guidance Pages

The goal of this task is to develop interactive dashboard pages for reviewing operational guidance provided by the various models that comprise the overall Process Advisor Tool, including the Influent Model, the Process Model, the Setpoint Model, and the Optimization Tool. These pages will be geared for use by plant operations staff and will feature integration of observations, predictions, and recommendations.

Up to 3 custom Operational Guidance Pages will be developed under this task. As an example, custom pages might include:

- Influent Load Predictions: Visualize predicted influent flow and load parameters for the next 24 hours. This page will help operators anticipate and prepare for varying influent conditions, incorporating model predictions and historical trends.
- Process Performance Indicators: Display key performance indicators (KPIs) such as SRT, MLSS, DO concentrations, and effluent quality metrics. This page will integrate model predictions and real-time data to provide a comprehensive overview of process performance.
- Optimization Recommendations: Present recommended operational setpoints for parameters like airflow, DO/aeration setpoints, wasting rates, and internal recycle rates. This page will integrate outputs from the Optimization Tool to guide operators in achieving optimal process performance.

Development of the pages will be similar to the custom page development process described above.

Task 3 Deliverables:

- A Power BI application containing one or more reports with multiple pages for interactive visualization of observed and model-predicted operational and process control data.
- Documentation, comprising a high-level PowerPoint presentation summarizing Power BI dataflows; an Excel-based data dictionary; and explanatory technical notes embedded within the Power BI application as comments, tooltips or metadata.
- Up to 8 hours of in-person and/or virtual training in usage of the Power BI tool.
- 40 hours of post-acceptance follow-on support for up to one year beyond delivery of the tools.

Task 4. Evaluate Real-Time Process Control Strategies

The ability to incorporate existing and/or new online analyzers into control strategies will be evaluated since this can provide immediate operational benefit. Up to three control strategies will be evaluated including but not limited to:

- Ammonia-based aeration control to optimize nitrification and denitrification simultaneously
- Automated aerobic SRT control to maintain nitrification as a load and temperature changes
- Nitrate-paced internal recycle to optimize energy and denitrification capacity
- Orthophosphate-paced metal salt addition to optimize cost, energy, and nutrient removal
- Live state point analysis tool to assess secondary clarifier capacity

In addition, the value of primary effluent COD and ammonia measurements will be evaluated as optional input to the holistic optimization modules described later.

The result of this task will be a presentation and a ten-page memorandum outlining the operational control strategy, capital cost estimates associated with implementation (equipment purchase, installation, and integration services), and a qualitative description of the programming logic. Examples of these programs used successfully at other WRFs will be presented as well. The memorandum is not a functional control description suitable for programming by an integrator, nor does it include any process modeling required for site-specific automated aerobic SRT control. That level of detail could be provided in future contracts.

Since no prior design work has been implemented at the PRWRF by Hazen, cost estimates will be order of magnitude and assume that power sources and wire and conduit pathways are available at the desired locations. This task does not include a detailed electrical evaluation.

Task 4 Deliverables:

- Virtual presentation and a ten-page memorandum outlining the operational control strategy, capital cost estimates associated with implementation (equipment purchase, installation, and integration services), and a qualitative description of the programming logic.

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Task 5. Develop Mechanistic Process Digital Twin (Process Model)

Mechanistic wastewater process models developed using commercial simulators (such as BioWin, GPS-X, or SUMO) are often employed for wastewater treatment facility design or process optimization planning. These models are complex and require detailed user training, limiting the number of staff who can run or modify simulations. Process advisory digital twins help overcome this operational barrier by expanding the number of staff who can leverage the model. The goal of this task is to create a mechanistic process digital twin to enhance the operational capabilities and process understanding of PRWRF staff.

The process digital twin and optimization toolkit (including the data-driven additions from Task 6) will be hosted by Hazen as a web application. The City will be responsible for hosting fees required to ensure full-time availability of the tool for City staff. Hazen will provide an estimate of these routine pass-through cloud service hosting fees to ensure transparency and accurate budgeting for the City.

Task 5.1. Develop Mechanistic Process Model

The mechanistic process model for the facility will be initially developed in BioWin under and existing scope task. Process model development will be based on historical operational data plus plantwide process sampling data collected from June 18 – 26, 2024.

The process model will be calibrated using a selection of plant data (to be determined by subject matter experts based on observed plant operational metrics and mass balances over different time periods) and validated against data from a different time period. Further context on process model development can be found in the scope outlining PRWRF Engineering, Operational Support, and Related Services in Response to EPA Administrative Order CWA-06-2024-1745, provided by Hazen to the City on March 18, 2024.

Under this scope, an uncalibrated SUMO model of the PRWRF will be developed. SUMO is proposed to leverage their advanced and well-documented digital twin API packages for live data integration and equipment control. An uncalibrated SUMO model will be deployed initially and later replaced with a calibrated model when the calibrated BioWin model is complete. A comparison of the BioWin calibrated model and SUMO calibrated model results will be developed to verify the models are equivalent.

Task 5.2. Build Web Interface for Mechanistic Process Twin

A web application wrapping the SUMO mechanistic process model will be developed and deployed for PRWRF staff. Users will be able to change influent characteristics and operational parameters (e.g., basins or units in service, DO concentrations, RAS and WAS rates) to visualize process impacts. This version of the process model will not have any connection with the live data and is intended as a training tool to facilitate PRWRF staff understanding of treatment concepts, and view the impacts of operating the process in different ways on performance and effluent quality.

In addition to specifying influent characteristics and operational parameters, users will select the number of primary and secondary clarifiers in service and specify SVI. Historical primary clarifier performance

(percent TSS removal as a function of units in service and hydraulic loading rate) will be analyzed to develop a linear relationship between either units in service, and/or hydraulic loading rate and percent TSS removal. This relationship will then be hard coded into the web application. Secondary clarifier performance will be coded using known relationships between SVI, which the user will specify, and Vo and K, the downward settling velocity and compaction coefficient, respectively, commonly used to model sludge settling mechanistically.

As a web-based application, the mechanistic process digital twin will be able to be accessed by up to three staff via a web browser (e.g. Microsoft Edge) from desktop computers running Windows 10 or later. Facility operators will be able to utilize the tool to develop and test their ideas for optimization and/or learn from mistakes with no effect on actual plant operations.

Building the web application involves creating an interactive homepage, that is an aerial image of the plant, with a customized set of key inputs and outputs, such as process MLSS, wasting rates and effluent nutrient concentration levels, which will help the user visualize the facility's performance, relative to the permit limits. There will also be a second screen to focus on the secondary process configuration, so users can better evaluate the treatment process to ensure regulatory compliance. The second screen includes a graph that shows DO, ammonia, nitrate, nitrite, and orthophosphate concentrations along the length of the oxidation ditches.

The web application will be introduced to PRWRF staff through a 2-hour virtual training meeting, which will be recorded for future use. Introductory training materials will be presented in PowerPoint, and then the web application will be demonstrated.

Task 5.3. Add Gamified User Interface for Operator Training

Hazen will add "gamified" features to the web application that will allow operators to create their own profile and avatar, and keep track of their high score simulation. Up to ten unique profiles will be supported. As operators interact with the tool from Task 5.2, they will be able to change treatment process variables and see the impact on process settings (such as the impacts of changing MLSS and wasting rates on the SRT), process performance (such as effluent quality and nutrient profiles), process efficiency (such as chemical use and energy use per unit flow treated) and solids generation (i.e., primary solids and WAS generated per unit flow treated). The game score will be determined by the scoring algorithm developed in Task 6.

The gamified user interface is expected to increase operator engagement with the process model and allow them to easily interact and extract valuable insights from mechanistic process models, which are typically not intuitive or user-friendly and have a steep learning curve. There will be some limitations to this as SVI is specified by the modeler and not predicted based on mechanistic equations in SUMO. Therefore, that portion of the score would have to be determined by the user-entered value.

Task 5.4 Replace Uncalibrated Model With Calibrated Model

When the BioWin model has been calibrated, the SUMO model will also be adjusted to match the performance of the BioWin model. The results of this conversion and verification will be presented to

City staff in a virtual meeting. Then, the uncalibrated SUMO model in the mechanistic digital twin will be replaced by the calibrated version, resulting in more accurate and representative predictions.

Task 5.5 Review Process Model

Approximately two months after deployment of the calibrated model, a virtual meeting with key stakeholders will be held to obtain operator feedback. Approximately 40 hours of additional development time will be included for operational enhancements to make the tool more useful.

Task 5 Deliverables:

- Uncalibrated SUMO model.
- Mechanistic process digital twin tool hosted by Hazen as a web-application. The web app will be geared for what-if process simulation and operator training with gamified features to promote engagement.
- Calibrated SUMO model.
- A presentation of the SUMO model calibration compared to the BioWin calibration.
- A two-hour recorded training course on using the process model.
- A follow-up virtual meeting 2 months after delivery to discuss user engagement and opportunities for improvement. 40 development hours are included in this scope.

Task 6. Process Advisor Tool

The goal of this task will be to build a Process Advisor Tool. The Process Advisor Tool includes an Influent Flow and Load Prediction Model, the mechanistic Process Model from Task 5, an equipment Setpoint Model, developed in this task, and development of an optimization algorithm and Optimization Tool to balance competing objectives in secondary treatment. This tool will take the mechanistic model from an offline training tool to a near real-time process advisory tool to guide operation of the secondary treatment system. The output of the tool will be hourly recommendations for airflow, DO/aeration setpoints, wasting rates, internal recycle rates and return activated sludge flow rates, and predicted energy and chemical consumption, SVI, and effluent quality. The following tasks are envisioned to develop the Process Advisor that leverages both mechanistic and data-driven components.

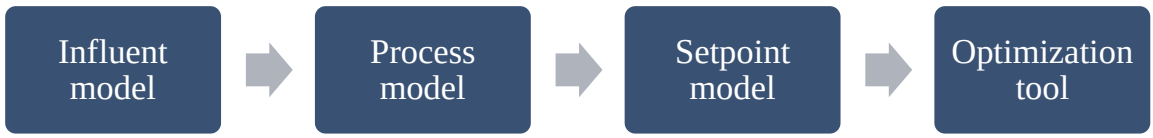
The first step in real-time system optimization is knowing what flow and loads are entering the PRWRF. While the process model in Task 5 is invaluable as a training tool, it is not linked to live data and does not know the influent conditions entering the PRWRF. Those conditions will be predicted using a data-driven model.

A data-driven Operational Setpoint Model is recommended to address three issues that mechanistic models alone cannot solve. First, mechanistic models don’t always represent real-world conditions accurately. They are simplifications of a more complex environmental system. Second, mechanistic

models often cannot directly incorporate live sensor data, which is also one of the most valuable indicators of real-world conditions. For example, the PRWRF has ammonia sensors near the end of the aerobic zone in the oxidation ditches. However, neither SUMO nor BioWin allows the user to specify the ammonia concentration at a given location in the process, this can only be specified on the influent. Therefore, it is not possible to use the sensor data in the process model directly. Third, mechanistic models to predict sludge settling properties from easily and routinely measured wastewater variables do not exist. Given that SVI is critically linked to secondary treatment capacity, some site-specific understanding of factors contributing to good/poor settling should be incorporated into operational decision making and optimization.

To address these limitations and gaps, a more robust representation of the system using a hybrid model that incorporates the mechanistic (SUMO) model and data-driven models of unknowns is recommended. Here, unknowns are things we would like to be able to predict like effluent ammonia, nitrate, orthophosphate, chemical feed quantities, energy use, SVI, and suggested internal flow rates like WAS, RAS, and nitrified recycle.

Before describing the tasks involved in this hybrid model development (Process Advisor Tool), it is important to understand the overall workflow and how the Process Model from Task 5 fits in. A flow diagram of the various components of the Process Advisor is shown in the figure below.



1. Influent Model (Task 6.1)

    a. Data-driven models will predict influent flow and load for the following day. This operation will run once a day around 10 pm.

    b. That average daily value for each parameter (flow, BOD concentration, etc.) will be converted to an hourly flow/concentration value using known diurnal flow and loading curves for PRWRF starting with midnight the following day, and running 12 am to 11 pm.

2. Process Model (Task 5)

    a. A dynamic 24-hour simulation using the Process Model will then ensue. The Process Model will emulate the operational control strategies used at the PRWRF. For example, if air is added to maintain a specific DO setpoint, that same approach will be modeled in SUMO.

b. Outputs such as energy and chemicals used and effluent characteristics from the Process Model will then become inputs to a data-driven model (the Setpoint Model).

c. This dynamic model will run from approximately 10:30 pm to 11:30 pm the night before the day it predicts values for.

3. Setpoint Model (Task 6.2). This data-driven model will run once an hour starting at midnight. Additional inputs to the data-driven model will include live sensor data.

    a. The Setpoint Model will recommend equipment setpoints for internal plant flows, DO, and airflow.

    b. The Setpoint Model will also predict effluent quality, energy and chemical use along with SVI.

    c. Optimization Tool (Task 6.3)

        i. A scoring algorithm that assigns targets, weights, and penalties to key variables will be developed. It is envisioned that this algorithm will include up to 8 variables: effluent ammonia, nitrate, total nitrogen, total phosphorus, and organic nitrogen; SVI, energy use for secondary treatment, and alum use.

        ii. An optimization algorithm will be applied to the scoring algorithm to maximize a daily score.

        iii. Each hour, a Python script will trigger the optimization algorithm to run the Setpoint Model iteratively to find an optimal operating strategy for the existing conditions.

        iv. The resulting variable values from the highest scoring algorithm will be returned hourly and displayed as a recommendation in the Power BI visualization tool (Task 3).

Task 6.1. Develop Influent Flow and Load Prediction Model

Hazen will perform exploratory data analysis to determine the most relevant variables for predicting influent flow and loading (COD, BOD, ISS, TKN, ammonia, TP). This step includes adding variables to the dataset to account for time lags in the system. Additional variables will be added and/or created as needed to predict hourly flows for the next 24-hours such as forecasted rainfall and streamflow. These influent flow and load predictions will be used as inputs to the mechanistic model. The mechanistic model will also receive information originating in SCADA (via a secure route established in Tasks 1-3) to specify the number of primary and secondary clarifiers in service, and the SVI from real data.

Up to eight algorithms will be developed to predict the following:

1. Average daily COD and BOD concentration today as a function of past values taking into account expected delays in laboratory data. If BOD is more accurate, COD (needed for the mechanistic model) will be estimated using the predicted BOD value and a fixed COD:BOD ratio. COD and BOD will be modeled as two separate variables, since they are expected to be predicted using distinct sets of predictor variables.
2. Average daily TSS concentration today as a function of past values. This will be converted to ISS (needed for the mechanistic model) using a fixed VSS:TSS influent ratio.
3. Average daily TKN and ammonia concentration today as a function of past values taking into account expected delays in laboratory data. If ammonia is more accurate, TKN (needed for the mechanistic model) will be estimated using the predicted ammonia value and a fixed ammonia:TKN ratio. Ammonia and TKN are being counted as two separate variables, since there may be differences in the approaches utilized to predict each of them.
4. Average daily TP concentration today as a function of past values.
5. Average daily Alkalinity concentration today as a function of past values.
6. Average daily influent flow.

The accuracy of these models and prediction approach will be considered to determine which models and approaches are best suited for deployment. For example, if the accuracy of the TKN model is poor but BOD is high, then TKN could be estimated from the BOD estimate and an average BOD:TKN ratio from historical data. It is assumed that a normalized diurnal flow and loading curve will be used to convert the daily average values to hourly values. For wet weather flow predictions, a more sophisticated predictive model could be developed under another scope. For this exercise, a simplification will be made to identify above average daily influent flow predictions as “wet weather,” and replace the normalized diurnal flow pattern with one wet weather hydrograph of the City’s choosing.

Task 6.2. Develop Operational Setpoint Model

Hazen will perform exploratory data analysis to determine the most relevant variables for predicting 16 operational setpoints and/or effluent parameters one hour in the future including but not limited to effluent ammonia, nitrate, organic nitrogen, and TP; and SVI, alum use, energy use for secondary aeration, RAS flow, internal recycle flow, DO setpoints, and airflow setpoints. This step includes adding variables to the dataset to account for time lags in the system. Outputs from the mechanistic model will also serve as inputs to this model. One Python model with up to sixteen outputs will be developed.

The accuracy of the Setpoint Model at predicting each output value will be presented and assessed. If a desired target is not accurately predicted, additional variables will be added and attempts will be made to optimize the accuracy of the model. A reasonable degree of accuracy is an R^2 value of approximately 0.7, but this may be adjusted depending on the mean absolute error relative to the average value of each parameter. Up to three iterations of model refinement to improve accuracy will be attempted. Variables with poor predictive accuracy will not be deployed in the final model.

It is anticipated that the XGBoost model will be utilized for this project. For simplification, each model will have the same independent variables weighted differently.

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Model quality and accuracy will also be evaluated using subject matter expertise, feature importance tables, and SHAP plots, which seek to explain the most important variables in each model and their directionality on the predicted variable. This is to verify that the logic in the model is appropriate.

Task 6.3. Create Scoring Algorithm and Optimization Tool

Scoring Algorithm. A scoring algorithm will be developed and deployed for assessing current performance (as part of Task 3) and identifying potential optimization solutions to provide actionable insights to plant operations staff (as part of Task 6). This algorithm will incorporate competing goals and appropriately weigh the outcomes. Hazen will solicit feedback from the City of Santa Fe to assign weights to different process goals, such as effluent ammonia, effluent phosphorus, chemical use, energy use, etc.

An example scoring algorithm for another facility is shown below.

Parameter	Average	Target	Weight
Effluent Ammonia (mg/L)	0.08	0.1	5
Effluent Nitrate (mg/L)	0.9	1.0	0.8
Effluent TP (mg/L)	1.3	1.4	1.2
Effluent Organic Nitrogen	0.9	0.9	0.5
SVI (mL/g)	83	90	0.004
Blower Energy (kW)	1508	1300	0.000003
Alum (gpd)	765	700	0.00001
Methanol (gpd)	842	485	0.00005

Three example values and point scores are shown below. In Example 3, the nitrification points are assigned as follows: (target – value)^2 x weight = (0.1-0.08)^2*5 = 0.002. This approach, developed with a holistic approach to treatment, allows the value of various treatment components like nitrification, denitrification, phosphorus removal, and settling properties to be compared with a single score.

Example	Ammonia	Nitrate	TP	SVI	Blower Energy	Alum	Methanol	Organic N
1	0.4	1.5	1.6	110	2000	1000	1200	1.1
2	0.2	1.1	1.5	100	1500	850	720	1
3	0.08	0.8	0.6	80	1000	400	400	0.8

Example	Nitrification Points	Nitrate Points	TP Points	SVI points	Energy Points	Alum Score	Methanol Score	Organic N Score	Total Score
1	-0.4500	-0.4000	-0.2400	-1.6000	-1.4700	-0.0030	-0.0036	-0.1000	-4.3
2	-0.0500	-0.0800	-0.1200	-0.4000	-0.1200	-0.0015	-0.0012	-0.0500	-0.8
3	0.0020	0.1600	0.9600	0.0400	0.0009	0.0030	0.0004	0.0500	1.2

The weights assigned to the competing goals will be tailored specifically to the PRWRF. The algorithm will assign points (or rewards) or penalties based on whether the process meets the treatment goals and the degree to which those goals are being met, exceeded, or unmet. Up to two versions of the weights can be programmed, for examples if there is a seasonal component to account for differences in seasonal permit limits or fundamental seasonal changes in operational paradigms, or to represent two operational philosophies—one that weighs regulatory compliance without regard for cost, and a second that incorporates energy and cost savings.

This scoring algorithm will be used to assess the current performance of the process alongside the visualization tool in Task 3. It can also be applied to past data where all required information is available. This historical data can be searched and filtered to identify days similar to the present to see how past performance was scored, giving the operator access to the operational setpoints that led to the best and worst outcomes in the past to aid in decision-making. Ultimately, it will be integrated with the completed hybrid (mechanistic + data-driven) tool developed in Task 6, which will automate the process. However, it will be available to operators sooner in a manual, data-driven historical data search format under Task 3.

Optimization Tool. The Optimization Tool involves writing a Python script that will trigger the optimization algorithm to run the Setpoint Model iteratively to find an optimal operating strategy for the existing conditions. This will happen each hour. The optimization algorithm will allow effluent variables to vary within an acceptable range (e.g., ammonia between 0.05 mg/L and 0.3 mg/) while predicting the behavior of the other variables in the optimization algorithm until a maximum score is achieved. The resulting variable values from the highest scoring algorithm will be returned hourly to the display layer in the Power BI visualization in Task 3 as a recommendation.

A Python script will also record the same values of those operational variables alongside the recommendation, so that after six months the recommendations can be compared with actions. The goal is to see how much the two programs are alike and different, and to build trust in this control strategy. Those two variables can be visualized side-by-side in the Power BI visual provided as Part of Task 3. The point is to build a database of advisory guidance to compare to actual control strategies. In this scope, the recommendations will never advance beyond an advisory tool, but if PRWRF staff like the results and trust the results, these recommendations could be integrated into a control strategy at an additional cost.

Task 6.4. Deploy Process Advisor Tool

Both the mechanistic and data-driven models need to be deployed in a digital cloud environment as a workflow. This includes the Influent Model, the Process Model, and the Operational Setpoint Model. As stated earlier, the Influent Model will run once a day at a fixed time, while the other two will run hourly in a sequence. This workflow also involves obtaining other necessary information from SCADA for the Process and Operational Setpoint Models such as the number of primary and secondary clarifiers in service, instrumentation data, the number of basins in service, etc.

The SQL data foundation (Task 1) will be leveraged to securely prepare the required inputs and store the outputs from each model in the sequence. SQL, Python, PowerQuery and/or other scripts will be used to move this information through the workflow. The following views in SQL are expected:

- Prepared data for influent models (8 views updated daily)
- Hourly diurnal flow and load curves for COD/BOD, TKN, TP, TSS, flow, and alkalinity (6 views that do not need to be updated)
- Output from mechanistic model (1 view updated daily)
- Prepared data input for Setpoint Model (1 view updated hourly)
- Output from Setpoint Model (1 view updated hourly)

This will be a Hazen-hosted Azure environment that will display the recommended operating points to the City via the Power BI dashboard (Task 3). This workflow is expected to take up to two hours to complete daily. Hosting fees will be estimated during the course of the project and communicated to the City. While there are no markups, the fees will be an ongoing expense for the City. Success of this step is predicated upon being able to obtain the proper data connectivity linkages described earlier in the scope.

Task 6.5. Documentation and Training

Hazen will develop a 20-page memorandum documenting the model development and deployment process. An appendix will contain a figure showing the accuracy of each data-driven model on a scatter plot of predicted versus observed values, a feature importance plot, and a SHapley Additive exPlanations (SHAP) plot. This single page document of each model will visually convey its accuracy and the importance and directionality of the independent variables.

Each step of the workflow (Influent Model, automated running of the Process Model, and the Setpoint Model) will be tested and the results shared with the City. Each step will be operated in a test mode and monitored for 30 days by Hazen staff, which will review the results on a weekly basis. During this time period, City staff will also have access to the visualization of results. Following the 30-day test, a virtual meeting will be held to discuss any feedback. Approximately 40 hours of additional development work are allocated for any modifications, and upon completion, the model will be considered complete.

A two-hour virtual training presentation will be held and recorded for PRWRF staff. This presentation will review the content of the technical memorandum and walk users through how to view the results of the models in the Power BI platform. An additional 40 hours of maintenance work to be allocated over the following 6 months are also included. Any additional effort beyond that will require a new scope and fee.

Task 6 Deliverables:

- Three additional Power BI pages displaying the recommendations from Process Advisor Tool.
- Azure workflow to sequentially run models and store model outputs.
- Scoring algorithm to enable assessment of current process performance and operate the Optimization Tool.

- 20-page technical memorandum.

Task 7**.** Data-Driven E. coli Model

PRWRF staff may wish to explore additional data-driven modeling outside of secondary treatment and the Process Advisor workflow. This scope item is included to account for one additional data-driven model, which can be developed and deployed as part of Task 3 (alongside the Task 6 deployment of the Process Advisor tool). It is anticipated that the City would like to develop a model to predict E.coli values one day in advance.

The technical approach will be similar to the influent concentration and load model development in Task 6.1. However, it is included separately from Task 6 because the outputs of the models developed under Task 6 could potentially be used as input variables for this model, and it is also anticipated that this model will utilize different independent variables from the models in Task 6, necessitating additional effort. The model in this task is anticipated to include other variables such as secondary effluent characteristics, which would not be appropriate to include in the influent model prediction and a downstream measurement cannot predict an upstream value.

The accuracy of this model will be evaluated using the same approaches described in Task 6. If acceptable accuracy is achieved, this model will be deployed alongside the Process Advisor Tool in Task 6.

A 10-page technical memorandum summarizing the development of this model will be provided. A two-hour virtual training session with City staff will be included and recorded to summarize the model development and document the functionality of the tool and its intended use.

Task 7 Deliverables:

- One additional Power BI page displaying the E. Coli predicted value for the following day.
- Azure workflow to sequentially run models and store model outputs.
- A 10-page technical memorandum summarizing the development of this model.
- 2-hour virtual training workshop.

Meetings

As described above, Hazen will host six (6) virtual progress meetings and three (3) virtual workshops during the course of this task order. The progress meetings will be aimed at providing progress updates to the City as well as soliciting necessary feedback from the City on forthcoming deliverables. The workshops will focus on process staff and operator training in using the mechanistic process digital twin initially, and the Process Advisor Tool ultimately. While the exact agenda for the meetings may be modified in accordance with tool status or priorities for discussion or feedback, the meetings and workshops are broadly expected to cover the following:

Virtual Meeting / Workshop Number	Associated Tasks	Broad Meeting / Workshop Topic
Meeting 1 (May be up to 5 meetings 1.1, 1.2, 1.3, 1.4, 1.5)	1	Meeting with IT or Other City Staff as Needed for Data Sharing, Access and Continuous Updates
Meeting 2	2	Meeting to Review Data Flow and Data Cleaning Efforts
Workshop 1	3	Review General Data Visualization Tool (Power BI) and Gain Feedback for Finalization of Custom Pages
Meeting 3	3	Meeting to Solicit City Inputs on Operational Guidance Pages
Meeting 4	4	Meeting to Review Control Strategies
Meeting 5	5	Meeting to Train PRWRF Staff on Process Twin Web Application
Meeting 6	5	Meeting to Obtain Operator Feedback on Calibrated Twin
Workshop 2	6	Workshop to Review Final Tools (Power BI and Web-App) with City
Workshop 3	7	Progress Workshop for Data-Driven E.coli Modeling and Integration into Tools

Schedule

The figure on the following page provides a summary of the timeline for the proposed tasks. The timeline provided here assumes the completion of Task 1.1 as Time “Zero”, i.e., the timeline of months provided in the figure below is contingent upon the completion of the data warehouse set-up

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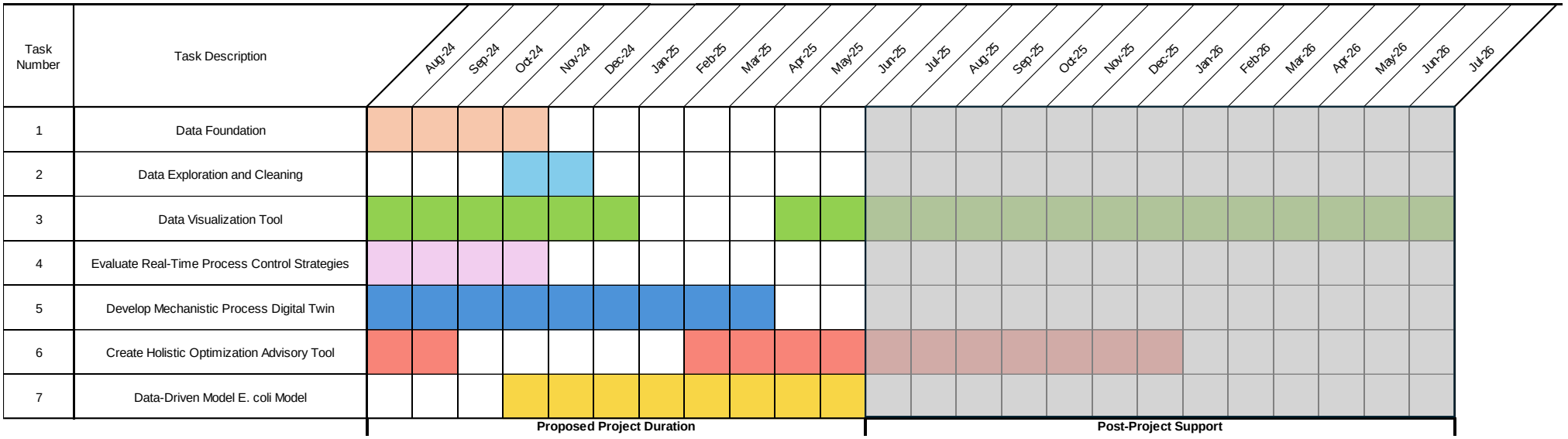
Task Number
Task Description
Aug-24
Sep-24
Oct-24
Nov-24
Dec-24
Jan-25
Feb-25
Mar-25
Apr-25
May-25
Jun-25
Jul-25
Aug-25
Sep-25
Oct-25
Nov-25
Dec-25
Jan-26
Feb-26
Mar-26
Apr-26
May-26
Jun-26
Jul-26
1
Data Foundation
2
Data Exploration and Cleaning
3
Data Visualization Tool
4
Evaluate Real-Time Process Control Strategies
5
Develop Mechanistic Process Digital Twin
6
Create Holistic Optimization Advisory Tool
7
Data-Driven Model E. coli Model
Proposed Project Duration
Post-Project Support

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Assumptions

1. For the data-driven modeling portion, at least 3 years of historical daily influent and effluent flow and concentration data for predicted parameters is available for analysis. Daily E. coli measurements and secondary effluent quality data are required for Task 7.

2. For the data-driven modeling portion, at least 6 months and preferably longer of historical hourly operational and flow data for predicted parameters is available for analysis. This includes but is not limited to DO analyzer readings, airflow measurements, blower/aerator energy use, SVI (daily is okay), nutrient analyzer readings, RAS flow, influent flow, WAS flow, and internal recycle flow. This time period must overlap with the above.

3. Microsoft Azure shall be the Cloud-based environment for digital tool deployments.

4. Santa Fe will access all deployments through HazenCloud, which is a Hazen-hosted Azure space. Hazen issues credentials to individual users and organizations.

5. Data acquisitions and connections can be made within two months (Task 1.1). If this timeline is not possible, the rest of the schedule will need to be adjusted accordingly.

Budget

The proposed not-to-exceed budget to provide the services described herein is $1,120,550. However, the $144,852 remaining in the budget for Task 700 – Digital Twin has been applied as a credit to result in a budget authorization request of $993,892.

Attachment 1 provides a budget breakdown for Task 1 – 7. All work will be performed on a time and materials basis. Labor will be billed using categorical rates. Expenses may include reimbursable mileage, airfare, lodging, printing, mailing, supplies, and other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

Hazen

Attachment 1: Proposed Budget

		Total	Fee		
Task	Description	Hours	Labor	Expense	Total
1	Data Foundation	716	$143,187		$143,187
2	Data Exploration and Cleaning	324	$73,591		$73,591
3	Data Visualization Tool	673	$124,844	$1,000	$125,844
4	Evaluate Real-Time Process Control Strategies	232	$54,450		$54,450
5	Develop Mechanistic Process Digital Twin	992	$263,499	$2,000	$265,499
6	Create Holistic Optimization Advisory Tool	1700	$389,567	$2,400	$391,967
7	Data Driven E. coli Model	275	$66,011		$66,011
	Credit for Budget Remaining in Task 700		($144,852)		($144,852)
	Subtotal Including Credit				$975,698
	NMGRT (8.1875% of Labor)			$18,193	$18,193
	TOTAL	4,912	$970,298	$23,593	$993,892

Hazen

City of Santa Fe, NM
Paseo Real WRF Onsite Operational Support
Scope of Work

1. Project Understanding

The City of Santa Fe (the City) has requested a scope from Hazen and Sawyer (Hazen) to provide onsite operational support at the Paseo Real Water Reclamation Facility (PRWRF). The City has requested full-time support for two months followed by part-time support for the remaining duration of Hazen's contract scheduled to end on September 30, 2026.

2. Personnel

Hazen and Sawyer proposes the following staff for this assignment:

- Tom Pfiester – Grade A Wastewater Treatment Operator licensed in Texas and Florida with 21 years of wastewater treatment operational experience. Prior to joining Hazen, Mr. Pfiester most recently served as Assistant Director of Wastewater Operations for Miami-Dade County.

- TJ Lynch – Grade IV Wastewater Treatment Operator licensed in North Carolina and Virginia with 31 years of wastewater treatment operational experience. Prior to joining Hazen, Mr. Lynch most recently served as Assistant Director of Raleigh Water.

- Charlie Leder – Level 4 Wastewater Treatment Operator licensed in New Mexico with 47 years of wastewater treatment operational experience. Prior to joining Hazen, Mr. Leder most recently served as Manager of Plant Operations for the Albuquerque Bernalillo County Water Utility Authority.

3. Scope of Services

Hazen staff will serve as an extension of the City's staff to support the operation of PRWRF. Hazen staff will provide the following services while stationed at the PRWRF:

- Regularly meet with City staff to assess operational challenges and goals.
- Review and reinforce PRWRF operational and regulatory requirements with City staff.
- Provide suggestions to improve plant operations and treatment efficacy.
- Provide hands-on troubleshooting support.
- Help develop Standard Operating Procedures (SOPs) and other operational guidelines.
- Coordinate with other Hazen staff to keep them apprised of onsite activities and new developments.

4. Schedule

The budget is based on the following schedule assumptions.

- Mr. Pfiester will be stationed at PRWRF full-time July 24, 2024 through September 27, 2024. He will then be stationed at PRWRF part-time (25%) October 1, 2024 to September 30, 2026. During the part-time phase, he will make one 1-week trip to PRWRF per month. The budget includes an additional three weeks of onsite support so Mr. Pfiester can spend four consecutive weeks onsite during the period spanning October 1, 2024 to September 30, 2026. The timing of the 4-week trip will be coordinated by the City and Hazen.

- Mr. Leder will be stationed at PRWRF part-time (50%) during September 2024. He will then be stationed at PRWRF part-time (25%) October 1, 2024 to September 30, 2026.

- Mr. Lynch will periodically visit PRWRF up to four (4) times between September 1, 2024 and September 30, 2026 to provide additional onsite support.

5. Assumptions

The following assumptions have been made in preparing the Scope of Work.

- Hazen staff will not function as the PRWRF Operator-in-Charge. Hazen's role is limited to operations support by providing assistance and suggestions as defined above. Neither Hazen nor individual Hazen staff assume liability for regulatory compliance.
- Monthly Operating Reports (MORs) will be reviewed, signed, and submitted by City staff. Hazen staff will not sign MORs or other regulatory documents.

6. Budget

The proposed not-to-exceed budget to provide the services described herein is $1,050,000. Attachment 1 provides a budget breakdown. All work will be performed on a time and materials basis. Labor will be billed using categorical rates. Expenses may include reimbursable mileage, airfare, lodging, car rentals, other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

Hazen

Attachment 1: Proposed Budget

		Total	Fee		
Task	**Description**	**Hours**	**Labor**	**Expense**	**Total**
1	Full-Time Support	396	$108,196		$108,196
2	Part-Time Support	2,643	$749,478		$749,478
3	Project Management	50	$15,541		$15,541
4	Expenses Allowance			$105,291	$105,291
	Subtotal		$873,215	$105,291	$978,506
	NMGRT (8.1875% of Labor)			$71,494	
	TOTAL	**3,089**	**$873,215**	**$176,785**	**$1,050,000**

Item #:24-0299
Munis Contract #: 3204638
SWPA/GSA/Coop/RFP/ITB#: _____

CITY OF SANTA FE

PROFESSIONAL SERVICES CONTRACT

THIS CONTRACT is made and entered into by and between the City of Santa Fe, New Mexico, hereinafter referred to as the "City," and **Hazen & Sawyer**, hereinafter referred to as the "Contractor," and is effective as of the date set forth below upon which it is executed by the Parties.

RECITALS

WHEREAS, the Chief Procurement Officer of the City has made the determination that this Agreement is in accordance with the provisions of the New Mexico Procurement Code (NMSA 1978, 13-1-28 et seq.) pursuant to NMSA 1978, section 13-1-127; and

WHEREAS, the Contractor is one of such requisite and qualifications and is willing to engage with the City for professional services, in accordance with the terms and conditions hereinafter set out, and the Contractor understanding and consenting to the foregoing is willing to render such professional services as outlined in the Agreement; and

The City and the Contractor hereby agree as follows:

1. Scope of Work

The Contractor shall perform all the work required by this contract and any amendments thereof to build upon the improvements initiated in April 2023. The emergency procurement, this request for authorization, and accompanying Budget Adjustment Request (BAR) respond to the EPA's and NMED's requirement that the City eliminate or mitigate violations identified by the EPA within the shortest possible time. These actions, included as part of the a comprehensive plan, will clearly demonstrate the City's commitment to complete this project within the shortest possible time in the most efficient way possible.

The comprehensive plan focuses on improving current data collection, regulatory compliance, operational knowledge management / transfer, and management practices at the Paseo Real Water Reclamation Facility (PRWRF), combined with selective capital improvements to existing PRWRF facilities. This comprehensive plan can be broken down into the following ten (10) steps:

1. Provide sampling and regulatory support to ensure compliance with existing permits.

2. Support the City's external communications and regularly established weekly updates to improve communication and restore trust with Regulators.

3. Build a comprehensive base of knowledge & management tools / decision trees to guide PRWRF staff in day-to-day operations and management of the facility.

4. Improve PRWRF laboratory practices, data management, workflow, and communications for all testing performed to ensure regulatory compliance and/or support treatment operations.

5. Provide an inventory of all PRWRF instrumentation, calibration practices, data flows, and uses of information currently collected, and rectify gaps to improve process monitoring and control.

6. Develop a model for treatment operations using open-source software that integrates information available from lab test results and real-time supervisory control and data acquisition (SCADA) data.

7. Develop continuous modeling results incorporated into an advanced SCADA interface at the PRWRF to simulate and help optimize treatment plant operations and management.

8. Develop tools for simulation, testing, and operation of proposed changes to plant operations and enable remote operational support for emergency conditions.

9. Short-term treatment plant improvement projects. Examples of these limited scope projects include installing a new mechanical bar screen the already procured by the City, restoring two (2) former traveling bridge filter systems to working condition, or portable container based sand filtration equipment and related pumping capability.

10. Additional support to complete the items above including process engineering alternatives development and review, project management and scheduling support, construction related support and services, training support, and related items or equipment, as described in Contract Documents.

The Contractor shall provide the following services for the City:

See Exhibit A for additional detail for the Scope of Work

2. Standard of Performance; Licenses

A. The Contractor does hereby accept its designation as a professional service, rendering services related to professional services for the City, as set forth in this Agreement. The Contractor represents that Contractor possesses the personnel, experience, and knowledge necessary to perform the services described under this Contract.

B. The Contractor agrees to obtain and maintain throughout the term of this Contract, all applicable professional and business licenses required by law, for itself, its employees, agents, representatives, and subcontractors.

3. Compensation

A. The City shall pay to the Contractor in full payment for services satisfactorily performed such compensation not to exceed two million seven hundred eighteen thousand dollars ($2,718,000.00), excluding gross receipts tax. The New Mexico gross receipts tax levied on the amounts payable under this Contract and shall be paid by the City to the Contractor. **The total amount payable to the Contractor under this Contract excluding gross receipts tax and expenses, shall not exceed $2,718,000.00 (two million, seven hundred eight-teen thousand). This amount is a maximum and not a guarantee that the work assigned to be performed by Contractor under this Contract shall equal the amount stated herein. The parties do not intend for the Contractor to continue to provide services without compensation when the total compensation amount is reached. Contractor is responsible for notifying the City when the services provided under this Contract reach the total compensation amount. In no event will the Contractor be paid for services provided in excess of the total compensation amount without this Contract being amended in writing prior to those services in excess of the total compensation amount being provided.**

B. Payment is subject to availability of funds pursuant to the Appropriations Paragraph set forth below and to any negotiations between the parties from year to year pursuant to Paragraph 1, Scope of Work, and to approval by the City. All invoices MUST BE received by the City no later than thirty 30) days after the termination of the Fiscal Year in which the services were delivered. Invoices received after such date WILL NOT BE PAID.

C. Contractor must submit a detailed statement accounting for all services performed and expenses incurred. If the City finds that the services are not acceptable, within thirty days after the date of receipt of written notice from the Contractor that payment is requested, it shall provide the Contractor a letter of exception explaining the defect or objection to the services, and outlining steps the Contractor may take to provide remedial action. Upon certification by the City that the services have been received and accepted, payment shall be tendered to the Contractor within thirty days after the date of acceptance. If payment is made by mail, the payment shall be deemed tendered on the date it is postmarked.

D. If the City fails to pay the contractor within twenty-one days after receipt of an undisputed request for payment, the City shall pay interest to the contractor beginning on the twenty-second day after payment was due, computed at one and one-half percent of the undisputed amount per month or fraction of a month until the payment is issued. If the City receives an improperly completed invoice, the City shall notify the sender of the invoice within seven days of receipt in what way the invoice is improperly completed, and the owner has no further duty to pay on the improperly completed invoice until it is resubmitted as complete.

F. **Notice of Extended Payment Provision For Grant Funded Contracts**. This contract allows the owner to make payment within 45 days after submission of an undisputed request for payment.

4. Term

THIS CONTRACT SHALL NOT BECOME EFFECTIVE UNTIL APPROVED BY THE CITY. This Contract shall terminate **in three years from date of final signature** unless terminated pursuant to paragraph 5 (Termination), or paragraph 6 (Appropriations). The City reserves the right to renew this contract on an annual basis by mutual agreement not to exceed a total of four (4) years in accordance with NMSA 1978, Sections 13-1-150 through 152.

5. Termination

A. Grounds. The City may terminate this Agreement for convenience or cause. For contracts within their authority, the City Manager or their designee is authorized to provide the notice of termination, otherwise such notice of termination shall be provided by the Mayor or their designee as authorized by the Governing Body. The Contractor may only terminate this Agreement based upon the City's uncured, material breach of this Agreement.

B. Notice; City Opportunity to Cure.

1) The City shall give Contractor written notice of termination at least thirty (30) days prior to the intended date of termination.

2) Contractor shall give City written notice of termination at least thirty (30) days prior to the intended date of termination, which notice shall (i) identify all the City's material breaches of this Agreement upon which the termination is based and (ii) state what the City must do to cure such material breaches. Contractor's notice of termination shall only be effective (i) if the City does not cure all material breaches within the thirty (30) day notice period or (ii) in the case of material breaches that cannot be cured within thirty (30) days, the City does not, within the thirty (30) day notice period, notify the Contractor of its intent to cure and begin with due diligence to cure the material breach.

3) Notwithstanding the foregoing, this Agreement may be terminated immediately upon written notice to the Contractor (i) if the Contractor becomes unable to perform the services contracted for, as determined by the City; (ii) if, during the term of this Agreement, the Contractor is suspended or debarred by the City; or (iii) the Agreement is terminated pursuant to Paragraph 6, "Appropriations", of this Agreement.

C. Liability. Except as otherwise expressly allowed or provided under this Agreement, the City's sole liability upon termination shall be to pay for acceptable work performed prior to the Contractor's receipt or issuance of a notice of termination; provided, however, that a notice of termination shall not nullify or otherwise affect either party's liability for pre-termination defaults under or breaches of this Agreement. The Contractor shall submit an invoice for such work within thirty (30) days of receiving or sending the notice of termination. *THIS PROVISION IS NOT EXCLUSIVE AND DOES NOT WAIVE THE CITY'S OTHER LEGAL RIGHTS AND REMEDIES CAUSED BY THE CONTRACTOR'S DEFAULT/BREACH OF THIS AGREEMENT.*

6. Appropriations

The terms of this Contract are contingent upon sufficient appropriations and authorization being made by the Governing Body for the performance of this Contract. If sufficient appropriations and authorization are not made by the Governing Body, this Contract shall terminate immediately upon written notice being given by the City to the Contractor. The City's decision as to whether sufficient appropriations are available shall be accepted by the Contractor and shall be final. If the City proposes an amendment to the Contract to unilaterally reduce funding, the Contractor shall have the option to terminate the Contract or to agree to the reduced funding, within thirty (30) days of receipt of the proposed amendment.

7. Status of Contractor

The Contractor and its agents and employees are independent contractors performing construction services for the City and are not employees of the City. The Contractor and its agents and employees shall not accrue leave, retirement, insurance, bonding, use of City vehicles, or any other benefits afforded to employees of the City as a result of this Contract. The Contractor acknowledges that all sums received hereunder are reportable by the Contractor for tax purposes, including without limitation, self-employment and business income tax. The Contractor agrees not to purport to bind the City unless the Contractor has express written authority to do so, and then only within the strict limits of that authority.

8. Assignment

The Contractor shall not assign or transfer any interest in this Contract or assign any claims for money due or to become due under this Contract without the prior written approval of the City.

9. Subcontracting

The Contractor shall not subcontract any portion of the services to be performed under this Contract without the prior written approval of the City. No such subcontract shall relieve the primary Contractor from its obligations and liabilities under this Contract, nor shall any subcontract obligate direct payment from the City.

10. Release

Final payment of the amounts due under this Contract shall operate as a release of the City, its officers and employees from all liabilities, claims and obligations whatsoever arising from or under this Contract.

11. Confidentiality

Any confidential information provided to or developed by the Contractor in the performance of this Contract shall be kept confidential and shall not be made available to any individual or organization by the Contractor without the prior written approval of the City.

12. Product of Service – Copyright

All materials developed or acquired by the Contractor under this Contract shall become the property of the City and shall be delivered to the City no later than the termination date of this Contract. Nothing developed or produced, in whole or in part, by the Contractor under this Contract shall be the subject of an application for copyright or other claim of ownership by or on behalf of the Contractor.

13. Conflict of Interest; Governmental Conduct Act

A. The Contractor represents and warrants that it presently has no interest and, during the term of this Contract, shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance or services required under the Contract.

B. The Contractor further represents and warrants that it has complied with, and, during the term of this Contract, will continue to comply with, and that this Contract complies with all applicable provisions of the Governmental Conduct Act, Chapter 10, Article 16 NMSA 1978.

C. Contractor's representations and warranties in Paragraphs A and B of this Article 12 are material representations of fact upon which the City relied when this Contract was entered into by the parties. Contractor shall provide immediate written notice to the City if, at any time during the term of this Contract, Contractor learns that Contractor's representations and warranties in Paragraphs A and B of this Article 12 were erroneous on the effective date of this Contract or have become erroneous by reason of new or changed circumstances. If it is later determined that Contractor's representations and warranties in Paragraphs A and B of this Article 12 were erroneous on the effective date of this Contract or have become erroneous by reason of new or changed circumstances, in addition to other remedies available to the City and notwithstanding anything in the Contract to the contrary, the City may immediately terminate the Contract.

D. All terms defined in the Governmental Conduct Act have the same meaning in this section.

14. Amendment

A. This Agreement shall not be altered, changed, or amended except by instrument in writing executed by the parties hereto and all other required signatories.

B. If the City proposes an amendment to the Contract to unilaterally reduce funding due to budget or other considerations, the Contractor shall, within thirty (30) days of receipt of the proposed Amendment, have the option to terminate the Contract, pursuant to the termination provisions as set forth in Article 4 herein, or to agree to the reduced funding.

15. Entire Agreement.

This Agreement, together with any other documents incorporated herein by reference and all related Exhibits and Schedules constitutes the sole and entire agreement of the Parties with respect to the subject matter of this Agreement, and supersedes all prior and contemporaneous understandings, agreements, representations, and warranties, both written and oral, with respect to the subject matter. In the event of any inconsistency between the statements in the body of this Agreement, and the related Exhibits and Schedules, the statements in the body of this Agreement shall control.

16. Merger

This Contract incorporates all the Agreements, covenants and understandings between the parties hereto concerning the subject matter hereof, and all such covenants, agreements, and understandings have been merged into this written contract.

All terms and conditions of the Emergency Procurement and the Contractor's response to such document(s) are incorporated herein by reference and is included in the order of precedence.

No prior Agreement or understanding, oral or otherwise, of the parties or their agents shall be valid or enforceable unless embodied in this Contract.

17. Penalties for violation of law

NMSA 1978, sections 13-1-28 through 13-1-199, imposes civil and criminal penalties for its violation. In addition, the New Mexico criminal statutes impose felony penalties for illegal bribes, gratuities, and kickbacks.

18. Equal Opportunity Compliance

The Contractor agrees to abide by all federal and state laws and rules and regulations, and Santa Fe City Code, pertaining to equal employment opportunity. In accordance with all such laws of the State of New Mexico, the Contractor assures that no person in the United States shall, on the grounds of race, religion, color, national origin, ancestry, sex, age, physical or mental handicap, or serious medical condition, spousal affiliation, sexual orientation or gender identity, be excluded from employment with or participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity performed under this Contract. If Contractor is found not to be in compliance with these requirements during the life of this Contract, Contractor agrees to take appropriate steps to correct these deficiencies.

19. Applicable Law

The laws of the State of New Mexico shall govern this Contract, without giving effect to its choice of law provisions. Venue shall be proper only in a New Mexico court of competent jurisdiction in accordance with NMSA 1978, section 38-3-2. By execution of this Contract, Contractor acknowledges and agrees to the jurisdiction of the courts of the State of New Mexico over any and all lawsuits arising under or out of any term of this Contract.

20. Workers Compensation

The Contractor agrees to comply with state laws and rules applicable to workers compensation benefits for its employees. If the Contractor fails to comply with the Workers Compensation Act and applicable rules when required to do so, this Contract may be terminated by the City.

21. Professional Liability Insurance

Contractor shall maintain professional liability insurance throughout the term of this Contract providing a minimum coverage in the amount required under the New Mexico Tort Claims Act. The Contractor shall furnish the City with proof of insurance of Contractor's compliance with the provisions of this section as a condition prior to performing services under this Contract.

22. Other Insurance

If the services contemplated under this Contract will be performed on or in City facilities or property, Contractor shall maintain in force during the entire term of this Contract, the following insurance coverage(s), naming the City as additional insured.

A. **Commercial General Liability** insurance shall be written on an occurrence basis and be a broad as ISO Form CG 00 01 with limits not less than $2,000,000 per occurrence and $2,000,000 in the aggregate for claims against bodily injury, personal and advertising injury, and property damage. Said policy shall include broad form Contractual Liability coverage and be endorsed to name the City of Santa Fe their officials, officers, employees, and agents as additional insureds.

B. **Broader Coverage and Limits**. The insurance requirements under this Contract shall be the greater of (1) the minimum coverage and limits specified in this Contract, or (2) the broader coverage and maximum limits of coverage of any insurance policy or proceeds available to the Named Insured. It is agreed that these insurance requirements shall not in any way act to reduce coverage that is broader or that includes higher limits than the minimums required herein. No representation is made that the minimum insurance requirements of this Contract are sufficient to cover the obligations of Contractor hereunder.

C. Contractor shall maintain the above insurance for the term of this Contract and name the City as an additional insured and provide for 30 days cancellation notice on any Certificate of Insurance form furnished by Contractor. Such certificate shall also specifically state the coverage provided under the policy is primary over any other valid and collectible insurance and provide a waiver of subrogation.

23. Records and Financial Audit

The Contractor shall maintain detailed time and expenditure records that indicate the date; time, nature and cost of services rendered during the Contract's term and effect and retain them for a period of three (3) years from the date of final payment under this Contract. The records shall be subject to inspection by the City. The City shall have the right to audit billings both before and after payment. Payment under this Contract shall not foreclose the right of the City to recover excessive or illegal payments.

24. Indemnification

The Contractor shall defend, indemnify and hold harmless the City from all actions, proceeding, claims, demands, costs, damages, attorneys' fees and all other liabilities and expenses of any kind from any source which may arise out of the performance of this Contract, caused by the negligent act or failure to act of the Contractor,

its officers, employees, servants, subcontractors or agents, or if caused by the actions of any client of the Contractor resulting in injury or damage to persons or property during the time when the Contractor or any officer, agent, employee, servant or subcontractor thereof has or is performing services pursuant to this Contract. If any action, suit or proceeding related to the services performed by the Contractor or any officer, agent, employee, servant or subcontractor under this Contract is brought against the Contractor, the Contractor shall, as soon as practicable but no later than two (2) days after it receives notice thereof, notify the legal counsel of the City.

25. New Mexico Tort Claims Act

Any liability incurred by the City of Santa Fe in connection with this Contract is subject to the immunities and limitations of the New Mexico Tort Claims Act, Section 41-4-1, et. seq. NMSA 1978, as amended. The City and its "public employees" as defined in the New Mexico Tort Claims Act, do not waive sovereign immunity, do not waive any defense and do not waive any limitation of liability pursuant to law. No provision in this Contract modifies or waives any provision of the New Mexico Tort Claims Act.

26. Invalid Term or Condition

If any term or condition of this Contract shall be held invalid or unenforceable, the remainder of this Contract shall not be affected and shall be valid and enforceable.

27. Enforcement of Contract

A party's failure to require strict performance of any provision of this Contract shall not waive or diminish that party's right thereafter to demand strict compliance with that or any other provision. No waiver by a party of any of its rights under this Contract shall be effective unless express and in writing, and no effective waiver by a party of any of its rights shall be effective to waive any other rights.

28. Notices

Any notice required to be given to either party by this Contract shall be in writing and shall be delivered in person, by courier service or by U.S. mail, either first class or certified, return receipt requested, postage prepaid, as follows:

To the City:
City of Santa Fe Wastewater Division
Attn: Micheal Dozier, Wastewater Division Director
341 Caja del Rio Road
Santa Fe, NM 87505

To the Contractor:
Hazen & Sawyer
498 Seventh Ave, 11th Floor
New York, NY 10018

29. Authority

If Contractor is other than a natural person, the individual(s) signing this Contract on behalf of Contractor represents and warrants that he or she has the power and authority to bind Contractor, and that no further action, resolution, or approval from Contractor is necessary to enter a binding contract.

30. Non-Collusion

In signing this Agreement, the Contractor certifies the Contractor has not, either directly or indirectly, entered into action in restraint of free competitive bidding in connection with this offer submitted to the City's Chief Procurement Officer.

31. Default/Breach

In case of Default and/or Breach by the Contractor, for any reason whatsoever, the City may procure the goods or services from another source and hold the Contractor responsible for any resulting excess costs and/or damages, including but not limited to, direct damages, indirect damages, consequential damages, special damages, and the City may also seek all other remedies under the terms of this Agreement and under law or equity.

32. Equitable Remedies

The Contractor acknowledges that its failure to comply with any material provision of this Agreement will cause the City irrevocable harm and that a remedy at law for such a failure would be an inadequate remedy for the City, and the Contractor consents to the City 's obtaining from a court of competent jurisdiction, specific performance, or injunction, or any other equitable relief in order to enforce such compliance. The City's rights to obtain equitable relief pursuant to this Agreement shall be in addition to, and not in lieu of, any other remedy that the City may have under applicable law, including, but not limited to, monetary damages.

33. Default and Force Majeure

The City reserves the right to cancel all, or any part of any orders placed under this Agreement without cost to the City, if the Contractor fails to meet the provisions of this Agreement and, except as otherwise provided herein, to hold the Contractor liable for any excess cost occasioned by the City due to the Contractor's default. The Contractor shall not be liable for any excess costs if failure to perform the order arises out of causes beyond the control and without the fault or negligence of the Contractor; such causes include, but are not restricted to, acts of God or the public enemy, acts of the State or Federal Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather and defaults of subcontractors due to any of the above, unless the City shall determine that the supplies or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery scheduled. The rights and remedies of the City provided in this Clause shall not be exclusive and are in addition to any other rights now being provided by law or under this Agreement.

IN WITNESS WHEREOF, the Parties have executed this Contract as of the date of the signature by the required approval authorities below.

CITY OF SANTA FE:

Alan Webber (Apr 11, 2024 16:54 MDT)

ALAN WEBBER, MAYOR

CONTRACTOR:
Hazen Sawyer

Greg Gates (Mar 28, 2024 15:29 MDT)

Greg Gates

DATE: Mar 28, 2024

Vice President
TITLE

CRS#: 03-405247-00-0

Registration #: 19-00155538

ATTEST:

GERALYN CARDENAS (Apr 11, 2024 17:04 MDT)

GERALYN CARDENAS, INTERIM CITY CLERK
GB MTG 04/10/24 XIV

CITY ATTORNEY'S OFFICE:
Marcos Martinez

SENIOR ASSISTANT CITY ATTORNEY

APPROVED FOR FINANCES:

Emily K. Oster

FINANCE DIRECTOR

EXHIBIT A

Hazen
Hazen and Sawyer
100 Sun Ave. NE, Suite 206
Albuquerque, NM 87109

March 18, 2024

John Dupuis
Public Utilities Director
City of Santa Fe Public Utilities Department
801 W. San Mateo Rd
Santa Fe, NM 87505

Re: Paseo Real Water Reclamation Facility (PRWRF)
Engineering, Operational Support, and Related Services in
Response to EPA Administrative Order CWA-06-2024-1745

Dear Mr. Dupuis:

We appreciated the opportunity to meet with the City of Santa Fe (City) on Wednesday, March 13, 2024 to discuss the referenced Administrative Order (AO) the City received from the U.S. Environmental Protection Agency (EPA) Region 6. As we discussed, the City would like to implement an overall plan that 1) responds to and resolves the AO, and 2) prepares the City for long-term, future success in operating and managing the Paseo Real Water Reclamation Facility (PRWRF) and similarly at a future facility being considered and visioned by the City as an eventual replacement for the PRWRF. The City's plan focuses on improving current data collection, regulatory compliance, operational, knowledge management / transfer, and management practices at the PRWRF, combined with selective capital improvements to existing PRWRF facilities. This comprehensive plan can be broken down into the following nine (9) steps:

1. Provide sampling and regulatory support to ensure compliance with existing permits.

2. Support the City's external communications with the New Mexico Environment Department (NMED).

3. Build a comprehensive base of knowledge management tools / decision trees to guide PRWRF staff in day-to-day operations and management of the facility.

4. Improve PRWRF laboratory practices, data management, workflows, and communications for all testing performed to ensure regulatory compliance and/or support treatment operations.

5. Provide an inventory of all PRWRF instrumentation, calibration practices, data flows, and uses of information currently collected and rectify gaps to improve process monitoring and control.

6. Develop a model for treatment operations using open-source software that integrates information

available from lab test results and real-time supervisory control and data acquisition (SCADA) data.

7. Develop a "digital twin" model of PRWRF to simulate and help optimize treatment plant operations.

8. Develop tools for remote simulation and testing of proposed changes to plant operations.

9. Provide engineering support for short-term treatment plant improvement projects.

The following narrative further defines the specific activities and services Hazen and Sawyer ("Hazen") proposes to provide. This work will be performed under a new engineering services agreement between the City and Hazen to be issued in response to EPA Administrative Order CWA-06-2024-1745.

Scope of Work

1. Sampling and Regulatory Support

Hazen will coordinate one soil sampling event and four quarterly groundwater sampling events at the PRWRF, with the samples being analyzed for poly- and perfluoroalkyl substances (PFAS). Both the soil and groundwater samples will be analyzed using EPA Method 1633. The sampling and reporting will be conducted by a third party in the place of City staff, with minor support from City staff. We have assumed that a total of 10 soil samples will be collected during one soil sampling event (including duplicate samples), and that each sample will be collected from a depth of 2 to 3 feet below ground surface using a hand auger. Ten groundwater samples will be analyzed during each groundwater sampling event (7 PRWRF monitor wells and 3 quality assurance samples). The groundwater sampling for PFAS will begin before Hazen begins supporting the groundwater sampling that is required by the facility's discharge permits (discussed below).

Hazen will coordinate the quarterly groundwater sampling and analysis that is required under discharge permits DP-289 (Wastewater Reclamation Facility) and DP-135 (Sludge Disposal Facility) issued by the NMED Ground Water Quality Bureau (GWQB) for six (6) quarters, starting with the second quarter sampling event in 2024. Hazen will also coordinate the required reporting under these permits. The sampling and reporting will be conducted by a third party in the place of City staff, with minor support from City staff (e.g., for purge water disposal). The City will provide additional information (e.g., monthly totalized average daily and peak daily influent volumes, monthly volumes discharged to each reclaimed domestic wastewater recipient, discharge monitoring reports) for inclusion in the quarterly discharge permit reports prepared for NMED. This task will support the City in achieving compliance with the requirements of these permits.

2. Communications Support

Along with City leadership and staff, Hazen staff (Amy Ewing) will participate in weekly phone calls that will be scheduled with NMED to discuss the current and planned activities and progress made in support of responding to and resolving the AO.

3. **Build a comprehensive base of knowledge management tools / decision trees for PRWRF operations**

Daily activities by PRWRF operations, maintenance, and management staff will support routine and consistent compliance with permit limits established by the City's National Pollutant Discharge Elimination System (NPDES) Permit NM 0022292 once staff have a clear understanding of:

- The purpose of each unit process
- Key Performance Indicators (KPIs) for measuring its performance
- Its relationship to upstream and downstream unit processes
- Information needed to monitor the process, and
- Expectations for each level of staff on how to achieve performance goals set for the process

Hazen proposes to develop these understandings by developing a series of documents called Area Procedures and Expectations (APEs) for each of the seven (7) liquid stream unit processes and four (4) solids handling processes at PRWRF. Each APE, developed as a PowerPoint presentation, will provide a clear guide for each level of operations, maintenance, and management staff, and will provide specific guidance for how and when to adjust the process, by how much, and by whom. Hazen's production of APEs will leverage existing Operation and Maintenance (O&M) Manual and Standard Operating Procedure (SOP) documentation the City may already have in place for PRWRF.

APE production will also document gaps between available information routinely collected (e.g., lab tests and SCADA data) versus what is needed to achieve reliable performance, how such information is distributed, and what improvements to information management are needed so that key items are communicated to staff who need it the most and at a frequency that supports their needs. APE production will also identify information and records currently being collected that do not serve the purpose of optimizing a treatment process. Lastly, APEs will capture information provided during the development of Items 4 and 5 described below.

Once the APEs have been prepared, Hazen will provide on-site staff training for each. This will include administering knowledge assessment quizzes to confirm staff are absorbing the critical information needed to successfully operate and maintain each unit process.

The collection of APEs will form the foundation for PRWRF knowledge management / transfer to which existing staff can refer as they work to optimize facility operations and to train future staff. As "living documents", APEs can be periodically updated by the City to reflect new facilities and capital improvements implemented at PRWRF.

The next element of this PRWRF knowledge management program summarizes the information contained in the 11 APEs (7 for liquid processes / 4 for solids handling) and provides an overview for how each process is supposed to work. This document called **Unit Process Operating Strategies** provides a useful reference to all levels of PRWRF staff and will serve as a tool for newcomers so they can quickly become familiar with "the right way" to operate plant facilities.

The final element of the knowledge management program currently envisioned will be preparation of a PRWRF **Operational Plan**. This document will provide information on the staff hierarchy, command and

communications structure, state and federal regulatory permits, plant safety programs, interrelationships with other City work groups (e.g., purchasing and materials management), and key summaries about PRWRF unit processes extracted from the **Unit Process Operating Strategies** document. Whereas the latter focuses on the information needed to optimize plant treatment operations, the **Operational Plan** focuses on the PRWRF enterprise as a whole and the communications within each internal and external City work group needed to achieve the best performance possible from PRWRF.

4. Improve PRWRF laboratory practices, data management, workflows, and communications

Hazen will provide the City with external sampling and reporting support for samples that are collected by PRWRF staff and analyzed by the in-house laboratory to demonstrate compliance with applicable state and federal discharge permits and to support operational control of PRWRF unit processes. We will work with City staff to ensure that all lab process documentation is current and complete and will assist in clearly defining appropriate workflows for PRWRF staff involved in sample collection, testing, and reporting of results. This task will include performing a review of lab operations, external collection and testing of laboratory samples for a period of up to 4 weeks, and assistance with the transition back to in-house sampling and analysis after PRWRF staff roles and responsibilities have been clearly defined for future lab activity. Item 4 includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

5. Provide an inventory of all PRWRF instrumentation

Hazen will develop an updated inventory of all instrumentation installed at PRWRF including calibration procedures and how this information is managed, stored, accessed, and communicated (e.g., paper logbooks, SCADA, Operator10™ software, or an alternate operational data storage platform/historian). This inventory will identify existing instruments that do not perform their intended function and/or could be re-deployed to provide the information needed by Operations staff. This inventory will also note opportunities to add instruments that will support real-time monitoring of treatment processes, as needed to accomplish Items 6 through 8 below. If practical, Hazen will use the City's current asset database format and structure to prepare this inventory of PRWRF instrumentation, which might then be used as an input to the City's asset management program.

6. Develop a model for treatment operations

Hazen will use the available information from lab data and SCADA data including any improvements to these sources realized through the outcomes of the work on Items 3 through 5 above, and will develop an operational model for PRWRF performance. This model will be developed using open-source software (e.g., SUMO™, BioWIN™, or similar product) and calibrated using the available data set. This model will be tested using the updated procedures for controlling and adjusting plant operations developed under our work for Item 3. This item includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

7. **Develop a "digital twin" model of plant operations to simulate and help optimize treatment plant operations**

The modeling work for Item 6 will next be used to develop a more advanced model that will serve as a "digital twin" the City can use for a variety of purposes including:

- A testbed for proposed changes to existing modes of operation for a particular treatment process
- Observing responses to upset / unexpected conditions for influent wastewater
- Assessing the impact that mechanical breakdown of treatment plant equipment may have on plant performance

As described, the "digital twin" should allow the City to evaluate the plant's response to a suite of unexpected stressors and determine what facility improvements or changes to normal operating procedures will foster a more resilient operation. Item 7 includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

8. **Develop tools for remote simulation and testing of proposed changes to plant**

The City has expressed interest in having Hazen partner with a nationally recognized firm to perform remote modeling, testing, and optimization of PRWRF operations, such as are provided by the company AM-Team or a similar entity. This item will build upon the work completed by Hazen for Items 3 through 7. The specific scope for Item 8 will be further refined once the outcomes for Items 3 through 7 have been established.

9. **Provide engineering support for short-term plant improvement projects at PRWRF**

The City has engaged the services of AAC Construction to perform select construction projects at PRWRF that are characterized as limited scope, remove-and-replace in-kind for specific treatment plant equipment / systems that are out of service or are no longer working. Examples of these limited scope projects include restoring two (2) former traveling bridge filter systems to working condition and installing a new mechanical bar screen the City previously procured. Hazen will provide the engineering support the Contractor may need to properly install and commission these equipment systems so that they perform as intended. There may be other projects of this type that the City decides to undertake, in addition to these two projects, for which Hazen can provide the engineering support the Contractor may need. We have included an allowance of $400,000 to cover the effort we anticipate may be needed for engineering support for short-term plant improvement projects.

Project Management

Hazen will perform ongoing project management activities including cost control and monitoring, invoicing, and general coordination with the City's project manager and staff for each of the 9 items of support described under **Scope** that the City authorizes. Each month, we will provide an overall progress report and invoice for authorized tasks similar to the reporting and invoicing process we currently employ for Engineering On-call Contract #23-0516.

Schedule

The work elements described under **Scope** are expected to be completed over the next 30 months, as needed and as directed by City staff. We are prepared to begin our work for the City immediately upon receipt of its written authorization to proceed.

Compensation

We are requesting an initial authorization of $2,718,000 including NMGRT to provide the services that are described under the Scope. Attachment 1 provides a budget breakdown for Items 1 through 7 and 9. As requested by the City, we have deferred estimating the effort for Item 8, pending completion of Items 1 through 7. All work will be performed on a time and materials basis using the labor rates attached to this letter. Please note these labor rates are the same rates used by Hazen for its work under Engineering On-Call Contract #23-0516 with the City of Santa Fe, and which get adjusted annually at the beginning of the City's fiscal year. Expenses may include reimbursable mileage, printing, mailing, supplies, and other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

Please call me at (505) 259-1679 or Charlie Leder at (505) 236-3889 if you have any questions or would like to discuss further Hazen's plan for providing services to help the City respond to EPA Administrative Order CWA-06-2024-1745.

Sincerely,

Greg Gates, PE
Vice President

Charles S. Leder, PE
Senior Associate

Accepted by City of Santa Fe Public Utilities Department

By: _____ Date: _____

Name: John Dupuis

Title: City of Santa Fe Public Utilities Director

Attachment 1

Proposed budgets for Engineering, Operational Support, and Related Services in Response to EPA Administrative Order CWA-06-2024-1745

Service Item	Proposed time and materials budget
1. Regulatory support	$ 250,000
2. Communications support	$ 25,000
3. Build a comprehensive base of knowledge management tools / roadmaps for PRWRF operations	$ 750,000
4. Improve PRWRF laboratory practices, data management, workflows, and communications	$ 350,000
5. Provide an inventory of all PRWRF instrumentation	$ 250,000
6. Develop a model for treatment operations	$ 300,000
7. Develop a "digital twin" model of plant operations to simulate and help optimize treatment plant operations	$ 200,000
8. Develop tools for remote simulation and testing of proposed changes to plant	TBD
9. Provide engineering support for short-term plant improvement projects at PRWRF	$ 400,000
Total estimated budget for all Items	$ 2,525,000
NMGRT Allowance[1]	$ 193,000
Total budget including applicable NMGRT	$ 2,718,000

1. Estimate calculated using the Albuquerque FY 2024 NMGRT rate of 7.625%. NMGRT will be assessed on labor and subconsultant work performed in New Mexico.

LABOR RATES FOR HAZEN AND SAWYER STAFF

	Rates over next 4 years			
	2023-2024	2024-2025	2025-2026	2026-2027
Vice President / Project Director	$348.91	$359.38	$370.16	$381.26
Senior Associate	$281.39	$289.83	$298.52	$307.48
Associate	$225.11	$231.86	$238.82	$245.98
Senior Principal Engineer	$191.33	$197.07	$202.98	$209.07
Principal Engineer	$168.83	$173.89	$179.11	$184.48
Engineer	$157.58	$162.31	$167.18	$172.20
Assistant Engineer	$135.06	$139.11	$143.28	$147.58
Technician	$112.55	$115.93	$119.41	$122.99
Effective date for rates	7/1/2023	7/1/2024	7/1/2025	7/1/2026

1. Work performed by subconsultants will be billed at cost plus a 10% mark-up

City of Santa Fe
Emergency Determination Form

The Department that makes an emergency procurement to plan or prepare for the response to a serious threat to public health, welfare, safety or property caused by a flood, fire, epidemic, riot, act of terrorism, equipment failure or similar event shall account for the money spent in making the procurement and report on that accounting to the City's Finance Department Director within ninety days after the end of the contract or fiscal year in which the procurement was made, whichever comes first.

I. Department: Public Utilities, **City of Santa Fe**

Department Director: John Dupuis

Department Contact: _P. Fred Heerbrandt, P.E.

Department Telephone Number: 505-955-4623

City of SF Chief Procurement Officer: **Travis Dutton-Leyda, CPO**

Telephone Number: **(505) 629-8351**

II. **A. Name of Contractor: AquaSight**

Address of Contractor: 1650 W. Big Beaver Rd., Troy MI 48084

Amount of prospective contract: $350,000.00

Term of prospective contract: Three years

B. Name of Contractor: Great Western Electrical

Address of Contractor: 3310 Girard NE, Albuquerque, nm 87107

Amount of prospective contract: $155,690.08

Term of prospective contract: One year

C. Name of Contractor: Carollo Engineers, Inc.

Address of Contractor: P. O. Box 30835, Salt Lake City, UT 84130-0835

Amount of prospective contract: $80,000.00

Term of prospective contract: One year

D. Name of Contractor: ITSQUEST Staffing

Address of Contractor: 1012 Marquez Pl Ste 301B, Santa Fe, NM 87505

Amount of prospective contract: $264,463.70

Term of prospective contract: One year and two months

E. Name of Contractor: Hazen and Sawyer

Address of Contractor: 100 Sun Ave. NE, Suite 206, Albuquerque, NM 87109

Amount of prospective contract: $2,718,000.00

Term of prospective contract: 2.5 years

F. Name of Contractor: A.A.C. Construction, LLC

Address of Contractor: 18 La Luna Rd, Santa Fe, NM 57507

Amount of prospective contract: $2,465,837.04

Term of prospective contract: Two Years

G. Name of Contractor: Molzen Corbin

Address of Contractor: 2701 Miles Rd. SE, Albuquerque, NM 87106

Amount of prospective contract: $180,000

Term of prospective contract: Two Years

H. Name of Contractor: Rain for Rent (Western Oilfields Supply Co.)

Address of Contractor: 2495 Lakeside Drive, Las Cruces, NM 88007

Amount of prospective contract: $903,214.87

Term of prospective contract: Three Years

GRAND TOTAL: $7,117,250.69

The attached contractors and their associated scopes of work will assist City staff in bringing the wastewater reclamation facility into compliance.

Location of Services: Paseo Real Wastewater Reclamation Facility, 73 Paseo Real, Santa Fe, NM 87507

III. **Please thoroughly list the services (scope of work), construction or items of tangible personal property of the contract:**

1. Emergency funding request to remediate issues currently affecting the WWTF
   a. Contractors: Hazen and Sawyer ($2.7M), AAC construction (est.$2.5M), Carollo ($80k), Aquasight ($350k), ITSQuest (scheduler $264k), Great Western ($156k), Molzen Corbin ($180k), Rain for Rent ($903K)
   b. Improvements Plan
      - Quarterly Reporting disconnect
      - Weekly Meetings with NMED
      - Unit Process Operating Strategy documentation (Carollo/Hazen)
      - Instrumentation Implementation
      - Model Development/SCADA Integration
      - Sample and Reporting External Support
      - Advanced SCADA for Each Process
      - Unit Process Improvements

See attached proposals and scopes of work for details.

IV. **Provide an explanation for the justification of the procurement including a description of the emergency condition(s) requiring use of emergency procurement and the practicable competition utilized in compliance with NMSA 1978, § 13-1-127.**

The United States Environmental Protection Agency (EPA) has issued an Administrative Order (AO) issued to the City of Santa Fe for violations of the Clean Water Act (CWA) (33 U.S.C. §§ 1251-1387). The violations were identified during a review of the permit file and discharge monitoring reports submitted for the Paseo Real Wastewater Reclamation Facility. The violations alleged are for failure to meet permit effluent limitations. This AO does not assess a monetary penalty; however, it does require compliance with applicable federal regulations.

Similarly, the New Mexico Environment Department (NMED) has determined that the City of Santa Fe Paseo Real Wastewater Treatment Plant (WWTP) has been operating in noncompliance with the New Mexico Water Quality Act (WQA) and Water Quality Control Commission (WQCC)' regulations (20.6.2 and 20.6.4 New Mexico Administrative Code) adopted pursuant to the WQA.

To facilitate the most efficient response to these regulators, the City requires emergency procurement to develop a plan and to implement that plan to bring the Paseo Real Wastewater Reclamation Facility into compliance as soon as is feasible to do so.

EPA Region 6 Administrative Order Attached.

III. **Please describe what measures are being taken to minimize the duration and effect of this particular emergency procurement (for example: is the emergency only in place until a competitive process can be completed, etc.).**

By immediately bringing these contractors in to perform their requested scopes of work, we can begin to bring the facility into compliance, thereby eliminating or minimizing the associated risks to public health and safety associated with the non-compliant discharge.

IV. **Describe what measures the Department will take in the future to prevent/mitigate use of emergency procurement under similar circumstances.**

It is our goal and desire to prevent the conditions that precipitated the need for this emergency procurement by implementing the measures afforded by this emergency procurement.

Certified by:

_____ Apr 3, 2024

City Chief Procurement Officer, Travis Dutton-Leyda **Date**

City Approval by:

John Dupuis (Apr 4, 2024 10:44 MDT) Apr 4, 2024

Department Director, John Dupuis **Date**

Marcos Martinez Apr 3, 2024

Marcos Martinez (Apr 3, 2024 17:03 MDT)

City Attorney, Erin McSherry **Date**

John Blair
John Blair (Apr 3, 2024 18:09 MDT)

Apr 3, 2024

City Manager, John Blair **Date**

Emily K. Oster

Apr 4, 2024

Finance Director, Emily Oster **Date**

Note: All emergencies must be posted to the SPD website:
https://www.generalservices.state.nm.us/statepurchasing/submit-emergency.aspx
and the City of Santa Fe's website:
https://santafenm.gov/finance-2/purchasing-1/solicitations

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 6
FINDINGS OF VIOLATION AND COMPLIANCE ORDER
Docket Number: CWA-06-2024-1745; NPDES Permit Number: NM0022292

STATUTORY AUTHORITY

The following findings are made, and Order issued under the authority vested in the Administrator of the United States Environmental Protection Agency (EPA) by Section 309(a) of the Clean Water Act (Act), 33 U.S.C. § 1319(a). The Administrator of EPA delegated the authority to issue this Order to the Regional Administrator of EPA Region 6, who further delegated this authority to the Director of the Enforcement and Compliance Assurance Division.

FINDINGS

1. The City of Santa Fe (Respondent) is a municipality which was incorporated under the laws of the State of New Mexico, and as such, is a "person" as that term is defined at Section 502(5) of the Act, 33 U.S.C. § 1362(5), and 40 C.F.R. § 122.2.

2. At all times relevant to this Order (all relevant times), Respondent owned or operated a municipal wastewater treatment facility located at Airport Road, Santa Fe, Santa Fe County, New Mexico, 87504 (facility), and was, therefore, an "owner or operator" within the meaning of 40 C.F.R. § 122.2.

3. At all times relevant, the facility was a "point source" of a "discharge" of "pollutants" with its municipal wastewater to the receiving waters of Santa Fe River in Segment No. 20.6.4.113 of the Rio Grande Basin which are "waters of the United States" within the meaning of Section 502 of the Act, 33 U.S.C. § 1362, and 40 C.F.R. § 122.2.

4. Because Respondent owned or operated a facility that acted as a point source of discharges of pollutants to waters of the United States, Respondent and the facility were subject to the Act and the National Pollutant Discharge Elimination System (NPDES) program.

5. Under Section 301 of the Act, 33 U.S.C. § 1311, it is unlawful for any person to discharge any pollutant from a point source to waters of the United States, except with the authorization of, and in compliance with, an NPDES permit issued pursuant to Section 402 of the Act, 33 U.S.C. § 1342.

6. Section 402(a) of the Act, 33 U.S.C. § 1342(a), provides that the Administrator of EPA may issue permits under the NPDES program for the discharge of pollutants from point sources to waters of the United States. Any such discharge is subject to the specific terms and conditions prescribed in the applicable permit.

7. Respondent applied for and was issued NPDES Permit No. NM0022292 (herein the permit) under Section 402 of the Act, 33 U.S.C. § 1342, which became effective on September 1, 2021, and expires on August 31, 2026. At all relevant times, Respondent was authorized to discharge pollutants from the facility to waters of the United States only in compliance with the specific terms and conditions of the permit.

8. Part I.A of the permit places certain limitations on the quality and quantity of effluent discharged by Respondent. The relevant discharge limitations are indicated in the attached Table A.

9. Part I.C. of the permit requires the Respondent to sample and test its effluent and monitor its compliance with permit conditions according to specific procedures, in order to determine the facility's compliance or noncompliance with the permit and applicable regulations. It also requires the Respondent to file with EPA certified Discharge Monitoring Reports (DMRs) of the results of monitoring, and Noncompliance Reports when appropriate.

10. Certified DMRs filed by the Respondent with EPA in compliance with the permit show discharges of pollutants from the facility that exceed the permitted effluent limitations established in Part I.A of the permit, as specified in the attached Table B.

11. Each instance in which Respondent discharged pollutants to waters of the United States in amounts exceeding the effluent limitations contained in the permit is a violation of the permit and Section 301 of the Act, 33 U.S.C. § 1311. Each violation of the conditions of the permit or regulations described above is a violation of Section 301 of the Act, 33 U.S.C. § 1311.

12. Administrative Order (AO) Docket Number CWA-06-2019-1773 was issued on March 29, 2019, regarding the facility's NPDES permit excursions. The Respondent submitted a written response to the AO on May 31, 2019.

13. Administrative Order (AO) Docket Number CWA-06-2019-1818 was issued on August 26, 2019, regarding the facility's NPDES permit excursions. The Respondent submitted a written response to the AO on October 23, 2019.

14. Administrative Order (AO) Docket Number CWA-06-2021-1725 was issued on June 1, 2021, regarding the facility's NPDES permit excursions. The Respondent submitted a written response to the AO on June 11, 2021.

SECTION 309 (a)(3) COMPLIANCE ORDER

Based on the foregoing Findings and pursuant to the authority of Section 309 of the Act, EPA hereby orders Respondent to take the following actions:

A. Within thirty (30) days of the effective date of this Order, Respondent shall submit a list of the specific actions taken to correct the reporting and effluent violations cited in this Order.

B. Within thirty (30) days of the effective date of this Order, Respondent shall provide written certification to EPA, Region 6 that the violations cited herein have been corrected and that the facility is in compliance with the requirements of the permit.

C. In the event that Respondent believes complete correction of the violations cited herein is not possible within thirty (30) days of the effective date of this Order, Respondent shall, within thirty (30) days of the effective date of this Order, submit a comprehensive written plan for the elimination of the cited violations within the shortest possible time for EPA review. Such plan shall describe in detail the specific corrective actions to be taken and why such actions are sufficient to correct the violations. The plan may include interim corrective measures to address effluent limit violations as quickly as possible followed by subsequent permanent measures. The plan shall include a detailed schedule for the elimination of the violations within the shortest possible time, as well as measures to prevent these or similar violations from recurring.

D. If Respondent would like to arrange a meeting with EPA to discuss the allegations in this Order, it should contact EPA within forty-five (45) days of the effective date of this Order. The meeting will be held at the Region 6 offices, 1201 Elm Street, Dallas, Texas, and Respondent can provide any information it believes is relevant to this Order. Respondent shall submit to EPA all information or materials it considers relevant to EPA at least ten (10) days prior to the meeting.

E. To arrange a meeting, or to ask questions or comment on this matter, please contact Ms. Mona Tates, of my staff, at (214) 665-7152 or tates.mona@epa.gov.

F. Any information or correspondence submitted by Respondent to EPA under this Order shall be addressed to the following:

Ms. Nancy Williams
williams.nancy@epa.gov

and

Ms. Mona Tates
tates.mona@epa.gov

GENERAL PROVISIONS

Issuance of this Section 309(a)(3) Compliance Order shall not be deemed an election by EPA to forego any administrative, judicial, civil or criminal action to seek penalties, fines, or any other relief appropriate under the Act for the violations cited herein, or other violations that become known to EPA. EPA reserves the right to seek any remedy available under the law that it deems appropriate.

Respondent may seek federal judicial review of the Order pursuant to Chapter 7 of the Administrative Procedure Act, 5 U.S.C. §§ 701-706.

Failure to comply with this Section 309(a)(3) Compliance Order or the Act may result in further administrative action, or a civil judicial action initiated by the United States Department of Justice.

This Order does not constitute a waiver or modification of the terms or conditions of Respondent's NPDES permit, which remains in full force and effect. Compliance with the terms and conditions of this Order does not relieve Respondent of its obligation to comply with any applicable federal, state, or local law or regulation.

The effective date of this Order is the date it is received by the Respondent.

March 4, 2024

Date

Cheryl T. Seager

Digitally signed by Cheryl T. Seager
Date: 2024.03.04 16:05:14 -06'00'

Cheryl T. Seager, Director
Enforcement and
Compliance Assurance Division

This proposal provides an offer to provide staffing services. ITSQuest, Inc. offers a variety of employment and human resource services. A rate quote on additional services will be provided quickly.

Offer to: **John Dupuis**
City of Santa Fe Public Utilities Department
1142 Siler Road
Santa Fe, NM 87507
Phone: 505-955-4209
Email: jedupuis@santafenm.gov"

Position Title	Location	Dates of Service FY2024	Hourly Rate	Weeks	Weekly Units	Unit totals	Rate **	Subtotals	GRT Rate	GRT	Total Budget
Project Manager	SF	4/1/2024 - 6/30/2024	$63.10	13	40	520	$94.02	$48,889.88	8.1875%	$ 4,002.86	$52,892.74

TOTAL PO AMOUNT **$52,892.74**

* Dates are a maximum number of days to be worked. This is not a guarantee of days to be worked.

** To avoid overtime reiumbursements, temporary employees may not work over 40 hours per week.

Price Agreement Number: 40-00000-23-00027

Title: Temporary Administrative and Professional Staffing (GS-02F-006CA)

Term: October 6, 2023 - December 8, 2024

Date: March 19, 2024

Lola Priest

Signature

This offer is open for a period of thirty days. Acceptance by the offeree must be bound by issuing a purchase order.

This proposal provides an offer to provide staffing services. ITSQuest, Inc. offers a variety of employment and human resource services. A rate quote on additional services will be provided quickly.

Offer to:

John Dupuis
City of Santa Fe Public Utilities Department
1142 Siler Road
Santa Fe, NM 87507
Phone: 505-955-4209
Email: jedupuis@santafenm.gov"

Position Title	Location	Dates of Service FY2025	Hourly Rate	Weeks	Weekly Units	Unit totals	Max Bill Rate **	Subtotals	GRT Rate	GRT	Total Budget
Project Manager	SF	7/1/2024 - 6/30/2025	$63.10	52	40	2080	$94.02	$195,559.52	8.1875%	$ 16,011.44	$211,570.96

TOTAL PO AMOUNT $211,570.96

* Dates are a maximum number of days to be worked. This is not a guarantee of days to be worked.

** To avoid overtime reiumbursements, temporary employees may not work over 40 hours per week.

Price Agreement Number: 40-00000-23-00027

Title: Temporary Administrative and Professional Staffing (GS-02F-006CA)

Term: October 6, 2023 - December 8, 2024

Date: March 19, 2024

Lola Priest

Signature

This offer is open for a period of thirty days. Acceptance by the offeree must be bound by issuing a purchase order.

MOLZENCORBIN

March 20, 2024

Mr. Michael Dozier
Wastewater Division Manager
City of Santa Fe
P.O. Box 909
Santa Fe, New Mexico 87504-0909

RE: Emergency Purchase Order to Address EPA Administrative Order CWA-06-2024-1745 Citing Violations at the City of Santa Fe Paseo Real WWTP.

Dear Mr. Dozier:

The City of Santa Fe has requested that Molzen Corbin provide this Proposal for Engineering Services to assist in compliance with Administrative Order CWA-06-2024-1745. The Administrative Order was issued to the City of Santa Fe by the U.S. Environmental Protection Agency (USEPA) on March 4, 2024.

Molzen Corbin is one of the most experienced wastewater engineering firms in New Mexico. We have extensive experience designing, upgrading and retrofitting wastewater treatment facilities for communities throughout New Mexico. Our engineering staff regularly designs process modifications to improve performance at wastewater treatment facilities throughout the state.

We have assisted many communities when they have been issued Administrative Orders by the USEPA. We are experienced at working through the Administrative Order process to help communities comply with both the order and the conditions of their NPDES Permit. We have developed a template for responses to Administrative Orders and can assist them with their response.

Our process engineers work with the community's engineers and operators to evaluate data and assess operating conditions to solve water quality discharge problems. We may recommend changes to operating procedures, upgrades to existing facilities, replacement of aging equipment or installation of new infrastructure to improve effluent quality.

The City has expressed that Molzen Corbin develop a data-driven decision making approach to solving the problems at the Paseo Real Wastewater Treatment Facility. The City would like Molzen Corbin to explore ways that the Facility can be updated and streamlined so processes are equipped with that latest technology that is available.

Molzen Corbin understands that time is critical. The City of Santa Fe must submit a response to USEPA by April 3, 2024 as directed in Compliance Order Section C of the Compliance Order.

WILLINGNESS AND CAPABILITY

Molzen Corbin currently has staff available with the necessary expertise to assist the City of Santa Fe in complying with the Administrative Order. If the City needs services not offered by Molzen Corbin, this proposal includes fee for Additional Services that would allow Molzen Corbin to hire subconsultants. Additional Services may be used to explore multiple approaches to solving problems.

SCOPE OF SERVICES

This project may include but is not limited to the following:

- Research
- Process Engineering
- Design
- Construction Administration
- Telemetry and Controls

COMPENSATION
We propose to perform the Work described above on a Time and Materials basis based on our current Standard Billing Rates enclosed herein.

Basic Services – not to exceed $80,000 would include but not be limited to:

- Research
- Design
- Construction Administration

Additional Services – not to exceed $100,000 would include but not be limited to:

- Process Engineering
- Telemetry and Controls
- Other specialized services to be determined.

If you have any questions or require additional information, please contact Mr. Steve Morrow, P.E. at 505.242.5700.

Sincerely,

MOLZEN CORBIN

Kevin W. Eades, P.E.
Chief Executive Officer

Enclosure

MOLZEN-CORBIN & ASSOCIATES
STANDARD BILLING RATES
AS OF FEBRUARY 1, 2024

DEPARTMENT	BILLING CATEGORIES	2023 RATES
Architectural	Senior Principal Architect	273
	Principal Architect	252
	Senior Architect	210
	Project Architect	168
	Registered Architect	158
	Intern Architect 2	121
	Intern Architect 1	95
	Senior Architectural Designer	142
	Architectural Designer I	137
	Planner	111
	Landscape/Irrigation Designer	111
Civil Engineering	Senior Principal Engineer	273
	Principal Engineer	252
	Senior Engineer	231
	Project Engineer	189
	Professional Engineer	163
	Engineering Intern II	142
	Engineering Intern I	131
	Senior Civil Design Specialist	173
	Engineering Design Specialist	147
	Senior Engineering Design Tech	153
	Engineering Design Tech	116
	Associate Engineering Design Tech	95
Electrical Engineering	Senior Principal Engineer	273
	Principal Engineer	252
	Senior Engineer	210
	Project Engineer	184
	Professional Engineer	163
	Engineering Intern II	142
	Engineering Intern I	126
	Engineering Design Specialist	147
	Engineering Design Tech	116
	Associate Engineering Design Tech	95
Mechanical	Senior Mechanical Engineer	195

MOLZEN-CORBIN & ASSOCIATES
STANDARD BILLING RATES
AS OF FEBRUARY 1, 2024

Water Resource Engineering	Senior Principal Engineer	273
	Principal Engineer	252
	Senior Engineer	231
	Project Engineer	184
	Professional Engineer	163
	Engineering Intern II	142
	Engineering Intern I	131
	Sr. Engineering Design Specialist	168
	Engineering Design Specialist	142
	Engineering Design Tech	116
	O & M Specialist	116
	Associate Engineering Design Tech	95
CADD / Survey	CADD Operator II	84
	CADD Operator I	74
	Survey Technician	111
	Two Person Survey Crew	222
	Two Person GPS Survey Crew	247
	Licensed Surveyor	231
Construction Observation	Senior Observer/Manager	111
	Senior Observer	105
	Observer	100
Administration	Administrative Aide II	79
	Administrative Aide I	58
	Administrative Support	105
	Grants/Technical Administrator	116
	Computer Technician	126
	Senior Technical Writer / Editor	100

Miscellaneous Expenses

Copies	Per Copy	$0.11
Color Copies	Per 8 1/2 x 11 Copy	$1.00
Color Copies	Per 11 x 17 Copy	$2.00
Prints/Plots(24x36)	Per Sheet	$3.00
Mileage	Per Mile (per IRS)	
Sub-Consultants	Cost x 1.1	

Carollo Engineers, Inc.
On Call Engineering Services for
Water and Wastewater Processes and Treatment

SCOPE OF WORK
TASK ORDER 24-WW-01
Establishing Operational Excellence
March 19, 2024

The City of Santa Fe requested assistance to establish knowledge management tools that can be used to document the intent and nuances of each unit process. The resulting documentation can be used for training for new hires and refresher training for existing staff.

An evaluation of current conditions can help define available data, design parameters and current work routines. A gap analysis is typically used to establish the current conditions. From that analysis a more robust approach to formalize a variety of work practices and facility documentation that, if addressed, could provide more consistent facility operation. Consistent facility operation will result in reduced operating costs, less variable facility outputs, and improved O&M awareness.

Initially, three documents are desired. Two are Area Procedures and Expectations (APEs) to capture unit process information: Non-Potable Water Distribution (NPWD) and the Oxidation Ditch Biological Nutrient Removal (BNR) processes. The third is the initial Annual Operations Plan.

This Scope of Services includes working in concert with Hazen and Sawyer and the Wastewater Division Plant Superintendent, with concurrence with the Wastewater Division Director. For success, it is expected that the Plant Superintendent will be heavily involved in the development of the initiatives, with Carollo's and Hazen's Operations Specialists providing guidance and examples to complete and then launch the initiatives developed in this Scope of Services. It is probable that a variety of staff will be engaged, as many of these initiatives involve the existing database, upgraded presentation of concepts and instructions, and computer-based support.

The goal of this Scope of Services is to assist the City of Santa Fe and the Wastewater Division Plant Superintendent in developing means and methods to improve the operation and maintenance of wastewater treatment processes.

The work and resulting deliverables will be split between Carollo Engineers and (under separate authorization) Hazen. Additional authorizations may be required to complete the breadth of the envisioned Establishing Operational Excellence initiatives.

Services will include some or all of the specific tasks listed below, up to the budget upper limit for this Task Order.

PHASE 1 – Site Visit and Gap Analysis

Site Visit

1. This allows Operations Specialist(s) to learn the facility, but more importantly, meet the staff to establish our working relationships.

Conduct a gap analysis to understand the current state of facility operations.

1. The analysis will identify strengths, opportunities and concerns.
2. The results will be documented in a report.

Evaluate current databases for completeness.

1. Compare existing data and presentation to best-industry practices.
2. Includes daily process results, data tracking and trending used for process control and optimization.

Evaluate and upgrade existing unit process performance measurement reports.

1. Refine or establish key performance indicators to match typical industry practices.
2. Refine the presentation of performance data in monthly and annual formats to match KPIs and annual operating plan information.

Standardize unit process Standard Operating Procedures for the NPWD and BNR processes.

1. Evaluate existing SOPs against typical industry practices.
2. Define SOPs that may be missing.
3. Provide template to standardize SOPs based on EPA guidance.
4. Assist staff is the development of pilot SOPs based on the Oxidation Ditch BNR process.

Phase 2 – Develop Pilot APEs

Develop Area Procedures and Expectations (APEs) for the NPWD and BNR processes.

1. APEs will be developed in PowerPoint.
2. The presentation will define the treatment objectives, process control responses, control points, sampling locations, data recording, crucial SOPs, critical preventative maintenance activities, and expected duties and expectations of maintenance and operator personnel working within the process. These serve as a training tool for new employees and refresher information for others.
3. These APEs will be the model for all other identified process areas.

Draft a Facility Operations and Maintenance Plan (Plan).

1. The Plan establishes how O&M staff operate and maintain each unit process at the facility.
2. The Plan describes sampling means and methods used to demonstrate permit compliance.

Draft an Annual Operating Plan (AOP).

1. The AOP identifies factors, such as projected wastewater flows and loads, as well as activities, such as construction or extraordinary maintenance, which will impact plant operations in the coming year.
2. Based on these factors, specific operating strategies are identified for treatment unit processes for the year.

3. The AOP projects upcoming maintenance or construction activities for advanced planning to support budget allocations.
4. The plan identifies facility or capacity deficiencies to help inform capital improvement upgrades.

PRELIMINARY PROJECT APPROACH

The project objectives are provided below.

ID	Description	Work Required
Phase 1		
1.1	Site Visit and Gap Analysis	• Review current conditions • Conduct interview(s) • Confirm findings • Provide findings in a report
1.2	Process data reporting evaluation	• Evaluate existing means and methods • Provide report with suggested improvements
1.4	Data tracking and reporting	• Evaluate existing • Provide report with suggested improvements
1.5	Standard Operating Procedures	• Evaluate existing • Provide template for to standardize current and/or develop future SOPs
Phase 2		
2.1	NPWD Area Procedures and Expectations	• Develop PowerPoint • Provide NPWD staff training
2.2	BNR Area Procedures and Expectations	• Develop PowerPoint • Provide NPWD staff training
2.3	Facility Operations and Maintenance Plan	• Develop initial plan
2.4	Annual Operations Plan	• Develop initial plan

$80,000.00 of the contractual upper limit is allocated to work to be executed under this Task Order, inclusive of labor and expenses, but exclusive of NMGRT. The work will be invoiced on a time and materials basis. Project management time for staffing and budget management and reporting for this task order will be included when work is active on this task order. A progress report will accompany monthly invoices, providing a summary of work conducted under Task Order 24-WW-01 for the subject invoicing period. The invoice will indicate the amount of the $80,000.00 upper limit for this task order that has been incurred versus the amount remaining.

Approved:

Michael Dozier Wastewater Division Manager City of Santa Fe	John Rehring Vice President Carollo Engineers, Inc.
Date	Date
	Becky Luna Senior Vice President Carollo Engineers, Inc.
	Date

REVISED a WORK ORDER PRICING

A.A.C. Construction, LLC

OWNER: CITY OF SANTA FE SEWER DIVISION
Owner's Rep.: Michael Dozier
Project Contact : Michael Dozier, Ph: 505-955-4642

CONTRACTOR: A.A.C. Construction, LLC
PROJECT MANAGER: Andrew Sisneros, (505) 930-0481
Date: 3/19/2024

DESCRIPTION:	**Customer Concern: There is an emergency at the plant and filters have to be maintained and pumps need to be brought into working condition. House keeping of the sludge will be required to be exported from the facility. AAC is being tasked to support the WWTP with the solutions to the problems at hand.**
LOCATION:	**73 Paseo Real, Santa Fe, NM 87507**

	Item Description	Hours	Labor Rate	Total Cost
LABOR:	Coordinator	1200	$85.00	$102,000.00
	Superintendent	960	$65.00	$62,400.00
	Foreman	960	$55.00	$52,800.00
	Heavy Equipment Operator III	960	$50.00	$48,000.00
	Delivery Driver	640	$50.00	$32,000.00
	Truck Driver	640	$50.00	$32,000.00
	Laborer III	960	$45.00	$43,200.00
	Laborer III	960	$45.00	$43,200.00
	Laborer IV	960	$48.00	$46,080.00
	Electrician	640	$275.00	$176,000.00
	Welder	321	$230.00	$73,830.00
	TOTAL LABOR			**$711,510.00**

	Material Description	Material Quote Reference	Total Cost
MATERIAL:	Sand Media	3160cf	$25,000.00
	Anthracite	3160cf	$52,920.00
	Freight for sand		$38,500.00
	Freight for Anthracite		$22,000.00
	Traveling Pads, clean out sludge drying beds 80 each		$24,000.00
	Fittings, Pipes and Parts (Mechanical Supply)	ABQ P & P	$39,450.40
	Misc. Welding Supplies if needed, cat walk,small crane	LA	$25,000.00
	Consumable and misc materials welder		$8,500.00
	Misc Electrical Parts		$18,500.00
	TOTAL MATERIAL		**$253,870.40**

	Equipment Type	Rate Type	Rate	Qnty	Total Cost
EQUIPMENT:	289 Mini Loader		85	640	$54,400.00
	Excavator		160	150	$24,000.00
	Vac Trucks		200000	1	$200,000.00
	Dump Truck 1		155	360	$55,800.00
	Dump Truck 2		155	360	$55,800.00
	1 Ton P.U. With Trailer		30	10	$300.00
	1 Ton Service Truck		15	80	$1,200.00
	1 Ton Pick Up		15	150	$2,250.00
	Small Tools/Pumps, Saws, Hand Tools		25	640	$16,000.00
	Rebuild up to 8 each Flyt pumps		62000	8	$496,000.00
	Freight for Pumps to Abq		1200	40	$48,000.00
	Transport Excavator		1800	2	$3,600.00
	Transport Mini Loader		850	8	$6,800.00
	Telehandler		5000	3	$15,000.00
	TOTAL EQUIPMENT				**$979,150.00**

SUBTOTAL:	$1,944,530.40
Contractor's Fee 16%	$311,124.86
SUBTOTAL:	$2,255,655.26
Tax @ 8.1875%	$184,681.77
Insurance & Bonds	$25,500.00
GRAND TOTAL:	**$2,465,837.04**

Address: A.A.C. Construction, LLC, 18 La Luna Rd, Santa Fe, NM 87507

Authorized Signature

Date

N.M. License # 93237

Great Western Electrical INC.

3310 GIRARD N.E.
ALBUQ., N.M. 87107
(505) 881-6525
Fax (505) 881-6396

March 19, 2024

RE: Electrical Proposal
Santa Fe Waste Water SCATA Fiber Installation
Attention: Andrew Hardinge
Scope:

- Provide 18,000 feet of 1" innerduct.
- Provide 18,000 feet of TLC 24 fiber indoor, outdoor, and plenum rated.
- Provide and install 10 stainless NEMA4 boxes to end fiber runs in each building.
- Provide and install stainless NEMA4 boxes in manholes where fiber and innerduct splice.
- Pull innerduct and fiber per COSF WWTF proposed innerduct conduit system drawing.
- Provide and install a 2" EMT conduit from the SCATA room in the administration building to the underground manhole conduit system.
- Core holes into manholes to extend raceways to Las Campanas golf course pump house, dissolved air flotation control building, the holding tank by the lime bed, the maintenance office, and the primary clarifiers.

Labor	$70,363.35
Material retail	$63,101.26
Material 10% discount	$56,791.14
Equipment	$13,073.50
Permit	$800.00
Sub Total	$141,027.99
NMGRT @ 8.1875%	$11,546.67
Bond	$3,115.42
Total	**$155,690.08**

Exclusions

- Damaged to unmarked underground utilities.
- Testing and terminating the fiber.
- Overtime or after-hours work.
- Trench, conduit, fiber, and innerduct to secondary clarifiers and offices.

Regards,
Danny Burson
Project Manager

City of Santa Fe - Waste Water SCATA

MATERIAL	QUANTITY	RETAIL COST	UNIT	EXTENDED COST
STAINLESS JUNCTION BOXES	20	$699.87	E	$13,997.40
FIBER CABLE	18042	$105.54	C	$19,041.53
1" INTERDUCT	18000	$104.15	C	$18,747.00
1" INTERDUCT COUPLING	100	$0.61	E	$61.00
ASPHALT	17	$145.81	E	$2,478.77
2" RIGID	100	$1,797.92	C	$1,797.92
2" RIGID 90	12	$73.94	E	$887.28
2" RIGID COUPLING	12	$20.47	E	$245.64
2" RIGID NIPPLES	12	$11.10	E	$133.20
2" LOCKNUTS	20	$150.89	C	$30.18
2" PLASTIC BUSHINGS	30	$89.65	C	$26.90
2" EMT	300	$690.63	C	$2,071.89
2" EMT 90	8	$28.58	E	$228.16
2" EMT COUPLING	30	$643.06	C	$192.92
2" EMT CONNECTORS	8	$579.51	C	$46.36
2" MINERALLAC STRAPS	20	$182.47	C	$36.49
FULL STRUT	100	$953.53	C	$953.53
2" CONDUIT STRAPS	50	$349.53	C	$174.77
ALL THREAD	20	$370.11	C	$74.02
2" PVC	500	$363.38	C	$1,816.90
2" PVC COUPLINGS	20	$67.70	C	$13.54
2" PVC FEMALE ADAPTERS	20	$98.45	C	$19.69
TAPE	500	$52.37	M	$26.19
		$0.00		$0.00
Total Retail Cost				**$63,101.26**
10% DISCOUNT				**$6,310.13**
TOTAL				**$56,791.14**

N.M. License # 93237

3310 GIRARD N.E.
ALBUQ., N.M. 87107
(505) 881-6525
Fax (505) 881-6396

City of Santa Fe – Waste Water SCATA
#17 equipment rental or utilization breakdown

2018 caterpillar 259D	35@$29.10	$1,018.50
2018 caterpillar 301.7D	100@$66.80	$6,680.00
2006 caterpillar 416C	105@$48.10	$5,050.50
2017 Bomag BT 65 Tamper	55@$5.90	$324.50
Total		$13,073.50

Hazen and Sawyer
100 Sun Ave. NE, Suite 206
Albuquerque, NM 87109

March 18, 2024

John Dupuis
Public Utilities Director
City of Santa Fe Public Utilities Department
801 W. San Mateo Rd
Santa Fe, NM 87505

Re: Paseo Real Water Reclamation Facility (PRWRF)
Engineering, Operational Support, and Related Services in
Response to EPA Administrative Order CWA-06-2024-1745

Dear Mr. Dupuis:

We appreciated the opportunity to meet with the City of Santa Fe (City) on Wednesday, March 13, 2024 to discuss the referenced Administrative Order (AO) the City received from the U.S. Environmental Protection Agency (EPA) Region 6. As we discussed, the City would like to implement an overall plan that 1) responds to and resolves the AO, and 2) prepares the City for long-term, future success in operating and managing the Paseo Real Water Reclamation Facility (PRWRF) and similarly at a future facility being considered and visioned by the City as an eventual replacement for the PRWRF. The City's plan focuses on improving current data collection, regulatory compliance, operational, knowledge management / transfer, and management practices at the PRWRF, combined with selective capital improvements to existing PRWRF facilities. This comprehensive plan can be broken down into the following nine (9) steps:

1. Provide sampling and regulatory support to ensure compliance with existing permits.

2. Support the City's external communications with the New Mexico Environment Department (NMED).

3. Build a comprehensive base of knowledge management tools / decision trees to guide PRWRF staff in day-to-day operations and management of the facility.

4. Improve PRWRF laboratory practices, data management, workflows, and communications for all testing performed to ensure regulatory compliance and/or support treatment operations.

5. Provide an inventory of all PRWRF instrumentation, calibration practices, data flows, and uses of information currently collected and rectify gaps to improve process monitoring and control.

6. Develop a model for treatment operations using open-source software that integrates information available from lab test results and real-time supervisory control and data acquisition (SCADA) data.

7. Develop a "digital twin" model of PRWRF to simulate and help optimize treatment plant operations.

8. Develop tools for remote simulation and testing of proposed changes to plant operations.

9. Provide engineering support for short-term treatment plant improvement projects.

The following narrative further defines the specific activities and services Hazen and Sawyer ("Hazen") proposes to provide. This work will be performed under a new engineering services agreement between the City and Hazen to be issued in response to EPA Administrative Order CWA-06-2024-1745.

Scope of Work

1. Sampling and Regulatory Support

Hazen will coordinate one soil sampling event and four quarterly groundwater sampling events at the PRWRF, with the samples being analyzed for poly- and perfluoroalkyl substances (PFAS). Both the soil and groundwater samples will be analyzed using EPA Method 1633. The sampling and reporting will be conducted by a third party in the place of City staff, with minor support from City staff. We have assumed that a total of 10 soil samples will be collected during one soil sampling event (including duplicate samples), and that each sample will be collected from a depth of 2 to 3 feet below ground surface using a hand auger. Ten groundwater samples will be analyzed during each groundwater sampling event (7 PRWRF monitor wells and 3 quality assurance samples). The groundwater sampling for PFAS will begin before Hazen begins supporting the groundwater sampling that is required by the facility's discharge permits (discussed below).

Hazen will coordinate the quarterly groundwater sampling and analysis that is required under discharge permits DP-289 (Wastewater Reclamation Facility) and DP-135 (Sludge Disposal Facility) issued by the NMED Ground Water Quality Bureau (GWQB) for six (6) quarters, starting with the second quarter sampling event in 2024. Hazen will also coordinate the required reporting under these permits. The sampling and reporting will be conducted by a third party in the place of City staff, with minor support from City staff (e.g., for purge water disposal). The City will provide additional information (e.g., monthly totalized average daily and peak daily influent volumes, monthly volumes discharged to each reclaimed domestic wastewater recipient, discharge monitoring reports) for inclusion in the quarterly discharge permit reports prepared for NMED. This task will support the City in achieving compliance with the requirements of these permits.

2. Communications Support

Along with City leadership and staff, Hazen staff (Amy Ewing) will participate in weekly phone calls that will be scheduled with NMED to discuss the current and planned activities and progress made in support of responding to and resolving the AO.

3. **Build a comprehensive base of knowledge management tools / decision trees for PRWRF operations**

Daily activities by PRWRF operations, maintenance, and management staff will support routine and consistent compliance with permit limits established by the City's National Pollutant Discharge Elimination System (NPDES) Permit NM 0022292 once staff have a clear understanding of:

- The purpose of each unit process
- Key Performance Indicators (KPIs) for measuring its performance
- Its relationship to upstream and downstream unit processes
- Information needed to monitor the process, and
- Expectations for each level of staff on how to achieve performance goals set for the process

Hazen proposes to develop these understandings by developing a series of documents called Area Procedures and Expectations (APEs) for each of the seven (7) liquid stream unit processes and four (4) solids handling processes at PRWRF. Each APE, developed as a PowerPoint presentation, will provide a clear guide for each level of operations, maintenance, and management staff, and will provide specific guidance for how and when to adjust the process, by how much, and by whom. Hazen's production of APEs will leverage existing Operation and Maintenance (O&M) Manual and Standard Operating Procedure (SOP) documentation the City may already have in place for PRWRF.

APE production will also document gaps between available information routinely collected (e.g., lab tests and SCADA data) versus what is needed to achieve reliable performance, how such information is distributed, and what improvements to information management are needed so that key items are communicated to staff who need it the most and at a frequency that supports their needs. APE production will also identify information and records currently being collected that do not serve the purpose of optimizing a treatment process. Lastly, APEs will capture information provided during the development of Items 4 and 5 described below.

Once the APEs have been prepared, Hazen will provide on-site staff training for each. This will include administering knowledge assessment quizzes to confirm staff are absorbing the critical information needed to successfully operate and maintain each unit process.

The collection of APEs will form the foundation for PRWRF knowledge management / transfer to which existing staff can refer as they work to optimize facility operations and to train future staff. As "living documents", APEs can be periodically updated by the City to reflect new facilities and capital improvements implemented at PRWRF.

The next element of this PRWRF knowledge management program summarizes the information contained in the 11 APEs (7 for liquid processes / 4 for solids handling) and provides an overview for how each process is supposed to work. This document called **Unit Process Operating Strategies** provides a useful reference to all levels of PRWRF staff and will serve as a tool for newcomers so they can quickly become familiar with "the right way" to operate plant facilities.

The final element of the knowledge management program currently envisioned will be preparation of a PRWRF **Operational Plan**. This document will provide information on the staff hierarchy, command and

communications structure, state and federal regulatory permits, plant safety programs, interrelationships with other City work groups (e.g., purchasing and materials management), and key summaries about PRWRF unit processes extracted from the **Unit Process Operating Strategies** document. Whereas the latter focuses on the information needed to optimize plant treatment operations, the **Operational Plan** focuses on the PRWRF enterprise as a whole and the communications within each internal and external City work group needed to achieve the best performance possible from PRWRF.

4. Improve PRWRF laboratory practices, data management, workflows, and communications

Hazen will provide the City with external sampling and reporting support for samples that are collected by PRWRF staff and analyzed by the in-house laboratory to demonstrate compliance with applicable state and federal discharge permits and to support operational control of PRWRF unit processes. We will work with City staff to ensure that all lab process documentation is current and complete and will assist in clearly defining appropriate workflows for PRWRF staff involved in sample collection, testing, and reporting of results. This task will include performing a review of lab operations, external collection and testing of laboratory samples for a period of up to 4 weeks, and assistance with the transition back to in-house sampling and analysis after PRWRF staff roles and responsibilities have been clearly defined for future lab activity. Item 4 includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

5. Provide an inventory of all PRWRF instrumentation

Hazen will develop an updated inventory of all instrumentation installed at PRWRF including calibration procedures and how this information is managed, stored, accessed, and communicated (e.g., paper logbooks, SCADA, Operator10™ software, or an alternate operational data storage platform/historian). This inventory will identify existing instruments that do not perform their intended function and/or could be re-deployed to provide the information needed by Operations staff. This inventory will also note opportunities to add instruments that will support real-time monitoring of treatment processes, as needed to accomplish Items 6 through 8 below. If practical, Hazen will use the City's current asset database format and structure to prepare this inventory of PRWRF instrumentation, which might then be used as an input to the City's asset management program.

6. Develop a model for treatment operations

Hazen will use the available information from lab data and SCADA data including any improvements to these sources realized through the outcomes of the work on Items 3 through 5 above, and will develop an operational model for PRWRF performance. This model will be developed using open-source software (e.g., SUMO™, BioWIN™, or similar product) and calibrated using the available data set. This model will be tested using the updated procedures for controlling and adjusting plant operations developed under our work for Item 3. This item includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

7. **Develop a "digital twin" model of plant operations to simulate and help optimize treatment plant operations**

The modeling work for Item 6 will next be used to develop a more advanced model that will serve as a "digital twin" the City can use for a variety of purposes including:

- A testbed for proposed changes to existing modes of operation for a particular treatment process
- Observing responses to upset / unexpected conditions for influent wastewater
- Assessing the impact that mechanical breakdown of treatment plant equipment may have on plant performance

As described, the "digital twin" should allow the City to evaluate the plant's response to a suite of unexpected stressors and determine what facility improvements or changes to normal operating procedures will foster a more resilient operation. Item 7 includes an initial workshop with Hazen and City staff to further define the City's specific goals and objectives for the work to be completed.

8. **Develop tools for remote simulation and testing of proposed changes to plant**

The City has expressed interest in having Hazen partner with a nationally recognized firm to perform remote modeling, testing, and optimization of PRWRF operations, such as are provided by the company AM-Team or a similar entity. This item will build upon the work completed by Hazen for Items 3 through 7. The specific scope for Item 8 will be further refined once the outcomes for Items 3 through 7 have been established.

9. **Provide engineering support for short-term plant improvement projects at PRWRF**

The City has engaged the services of AAC Construction to perform select construction projects at PRWRF that are characterized as limited scope, remove-and-replace in-kind for specific treatment plant equipment / systems that are out of service or are no longer working. Examples of these limited scope projects include restoring two (2) former traveling bridge filter systems to working condition and installing a new mechanical bar screen the City previously procured. Hazen will provide the engineering support the Contractor may need to properly install and commission these equipment systems so that they perform as intended. There may be other projects of this type that the City decides to undertake, in addition to these two projects, for which Hazen can provide the engineering support the Contractor may need. We have included an allowance of $400,000 to cover the effort we anticipate may be needed for engineering support for short-term plant improvement projects.

Project Management

Hazen will perform ongoing project management activities including cost control and monitoring, invoicing, and general coordination with the City's project manager and staff for each of the 9 items of support described under **Scope** that the City authorizes. Each month, we will provide an overall progress report and invoice for authorized tasks similar to the reporting and invoicing process we currently employ for Engineering On-call Contract #23-0516.

Schedule

The work elements described under **Scope** are expected to be completed over the next 30 months, as needed and as directed by City staff. We are prepared to begin our work for the City immediately upon receipt of its written authorization to proceed.

Compensation

We are requesting an initial authorization of $2,718,000 including NMGRT to provide the services that are described under the Scope. Attachment 1 provides a budget breakdown for Items 1 through 7 and 9. As requested by the City, we have deferred estimating the effort for Item 8, pending completion of Items 1 through 7. All work will be performed on a time and materials basis using the labor rates attached to this letter. Please note these labor rates are the same rates used by Hazen for its work under Engineering On-Call Contract #23-0516 with the City of Santa Fe, and which get adjusted annually at the beginning of the City's fiscal year. Expenses may include reimbursable mileage, printing, mailing, supplies, and other similar costs incurred to perform the work. The Hazen Project Manager will provide status reports indicating percent complete by task with each monthly invoice.

Please call me at (505) 259-1679 or Charlie Leder at (505) 236-3889 if you have any questions or would like to discuss further Hazen's plan for providing services to help the City respond to EPA Administrative Order CWA-06-2024-1745.

Sincerely,

Greg Gates, PE
Vice President

Charles S. Leder, PE
Senior Associate

Accepted by City of Santa Fe Public Utilities Department

By: _____ Date: _____

Name: John Dupuis

Title: City of Santa Fe Public Utilities Director

Attachment 1

Proposed budgets for Engineering, Operational Support, and Related Services in Response to EPA Administrative Order CWA-06-2024-1745

Service Item	Proposed time and materials budget
1. Regulatory support	$ 250,000
2. Communications support	$ 25,000
3. Build a comprehensive base of knowledge management tools / roadmaps for PRWRF operations	$ 750,000
4. Improve PRWRF laboratory practices, data management, workflows, and communications	$ 350,000
5. Provide an inventory of all PRWRF instrumentation	$ 250,000
6. Develop a model for treatment operations	$ 300,000
7. Develop a "digital twin" model of plant operations to simulate and help optimize treatment plant operations	$ 200,000
8. Develop tools for remote simulation and testing of proposed changes to plant	TBD
9. Provide engineering support for short-term plant improvement projects at PRWRF	$ 400,000
Total estimated budget for all Items	$ 2,525,000
NMGRT Allowance[1]	$ 193,000
Total budget including applicable NMGRT	$ 2,718,000

1. Estimate calculated using the Albuquerque FY 2024 NMGRT rate of 7.625%. NMGRT will be assessed on labor and subconsultant work performed in New Mexico.

LABOR RATES FOR HAZEN AND SAWYER STAFF

	Rates over next 4 years			
	2023-2024	2024-2025	2025-2026	2026-2027
Vice President / Project Director	$348.91	$359.38	$370.16	$381.26
Senior Associate	$281.39	$289.83	$298.52	$307.48
Associate	$225.11	$231.86	$238.82	$245.98
Senior Principal Engineer	$191.33	$197.07	$202.98	$209.07
Principal Engineer	$168.83	$173.89	$179.11	$184.48
Engineer	$157.58	$162.31	$167.18	$172.20
Assistant Engineer	$135.06	$139.11	$143.28	$147.58
Technician	$112.55	$115.93	$119.41	$122.99
Effective date for rates	7/1/2023	7/1/2024	7/1/2025	7/1/2026

1. Work performed by subconsultants will be billed at cost plus a 10% mark-up

AQUASIGHT
INTELLIGENT WATER SOLUTIONS

March 19, 2024

John Dupuis
Director, Public Utilities Department
City of Santa Fe
200 Lincoln Avenue
Santa Fe, New Mexico 87501

Subject: Proposal for Aquasight APOLLO™ Intelligent Treatment Plant Solution

Dear Mr. Dupuis,

Aquasight is pleased to submit our proposal for implementation the APOLLO™ Intelligent Treatment Plant Solution for the City of Santa Fe Public Works Department.

With the primary goal of supporting your operations team and their successful work to meet all regulatory requirements at the Paseo Real Water Reclamation Facility, the APOLLO™ solution also will support many other benefits such as improved data visibility and mining for laboratory insights, identification of gaps in plant instrumentation, integration of Digital Twin capabilities for better process control, process optimization, and deeper knowledge capture for workforce training and support.

Our implementation program is collaborative, and we will work with your team to ensure project goals are achieved, and the City is provided with a strong foundational program for intelligent water and wastewater solutions.

If you have any questions, feel free to let us know. We look forward to working with the team.

Jonathan Hasson, PE

Vice President, Smart Water Solutions

Cc: Mahesh Lunani, CEO Aquasight

1650 W. Big Beaver Road | Troy, MI 48084 | info@aquasight.io | 248-590-2190 | www.aquasight.io

AQUASIGHT
INTELLIGENT WATER SOLUTIONS

SANTA FE PUBLIC UTILITIES

PASEO REAL WATER RECLAMATION FACILITY PROCESS OPTIMIZATION PROJECT PROPOSAL

March 19, 2024

BACKGROUND

The City of Santa Fe, NM provides wastewater collection, treatment, and disposal services for nearly 90,000 residents and businesses. The City owns and operates the 9 MGD annual average daily flow (AADF) (rated for 13 MGD) Paseo Real Water Reclamation Facility which is a conventional activated sludge plant that includes screening and sedimentation for primary treatment, oxidation ditch basins, aeration, and clarification for secondary treatment plus nitrogen reduction, and disk and sand filters, chlorination, and dechlorination for tertiary treatment before discharging into the Santa Fe River (**Figure 1**). The City recently received an Administrative Order for permit exceedances in both E. Coli and Nitrogen. As a measure to ensure improved plant effluent performance, optimize data usage and process performance, the City desires a rapidly deployable, data-driven solution for increase opportunities for successful permit compliance.

The PRWRF has adequate data for some process control, but also could benefit from additional sensors and instrumentation to make it a more data rich facility. Data is generated and stored in a variety of different systems, and many of those systems do not share/communicate data well for daily operational benefits. There is an abundance of untapped potential to integrate and mine this data using science or ML/AI-based algorithms to help with process optimization, capture energy and chemical savings, store process knowledge, create maintenance insights, and assist with troubleshooting. This will require a tool that can provide streaming analytics, smart advisors, Aquasight COPILOT^{TM}, and actionable assistance to the staff to create a data driven O&M culture.

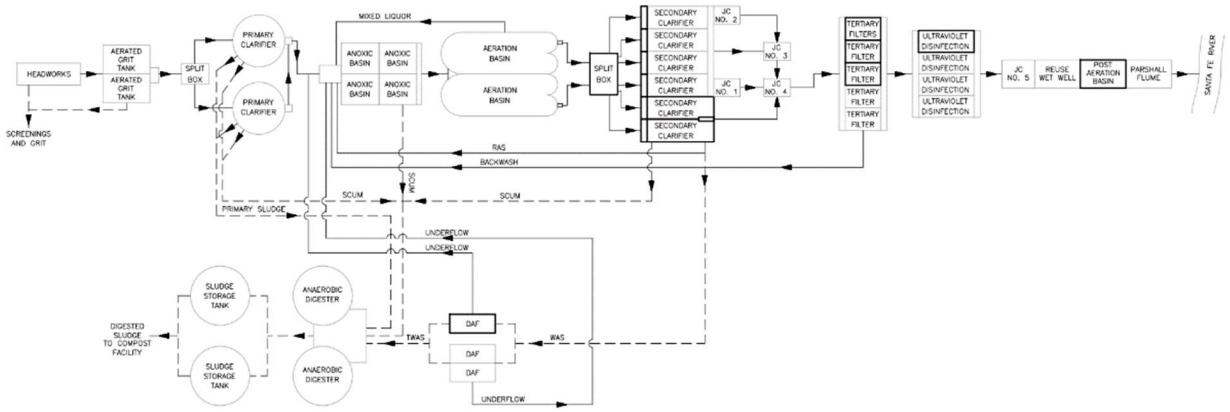

Figure 1: PRWRF Process Flow Diagram

PROJECT GOALS & EXPECTED BENEFITS

The City of Santa Fe Public Works is implementing a strategic initiative to further improve treatment plant effluent performance and reduce operating and maintenance costs by leveraging Aquasight's APOLLO™. The overall goal of this project is to implement a modular real-time advanced analytics and Copilot™ system for liquid unit processes that will support operator success for meeting permit discharge limits and support operational efficiencies for liquid processes that consume the greatest amount of power and chemicals. APOLLO™ will support the City's goals of continuous and measured progress towards the PRWRF optimization goals over time.

Benefits anticipated by implementation of the Aquasight APOLLO™ solution include:

- Deeper integration and sharing of Laboratory sampling data and insights supporting more informed operations.
- Identification of gaps in instrumentation throughout plant processes leading to a more data rich environment for improved process control, optimization, and decision making.
- Implementation of operator focused digital twin functionality allowing for improved real-time streaming insights into potential operational changes and their impacts on process performance KPIs.
- Capture of operational and institutional knowledge by providing a historical record of plant data and operational KPIs for improved new operator training and information recall.

In pursuit of this vision, Aquasight's APOLLO™ software is proposed to assist the City of Santa Fe by:

- Providing a one-stop integrated intelligence dashboarding and analysis solution.
- Integrating a copilot system with built in smart advisors.
- Driving energy and chemical savings and enabling fine tuning of control setpoints.
- Improving daily plant workflow and empowering a data driven decision culture.

- Storing operator knowledge to de-risk operator churn and retirements.
- Providing management visibility through remote off-site access.
- Highlighting compliance risks while providing quick access to process data.
- Enabling predictive maintenance of aeration and disinfection equipment.
- Providing robust tools for workforce training on plant performance at various flows and loads.
- Providing quick access of data for planning and engineering teams.
- Including monitoring and notifications on complex parameters.

Examples of the main dashboard for the aeration and secondary clarifier modules in action are provided in **Figure 2** and **Figure 3**, respectively.

Figure 2: Example of APOLLO's™ Activated Sludge (Aeration) Module

Appendix A: Background, Vision, Approach, and Scope

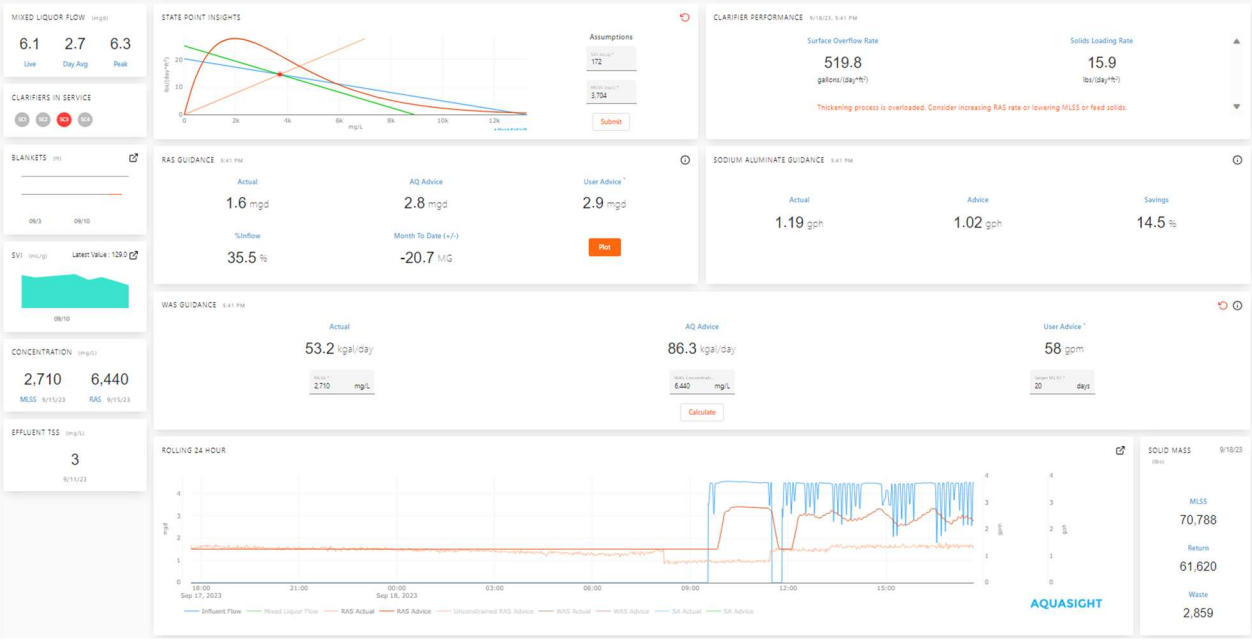

Figure 3: Example of APOLLO's™ Secondary Clarifier Module

SCOPE OF WORK

Generally, the scope of this project includes onboarding the PRWRF to Aquasight's APOLLO™ software equipped with seven (7) modules. The SCOPE OF WORK may change in the future depending on the needs of the plant. The final SOW will be determined in collaboration with the Utility team.

Table 1: Proposed APOLLO modules for PRWRF

Module	Description
Plant Dashboard	Default APOLLO™ module – Customizable dashboard that allows users to centralize analytics from various APOLLO™ modules to a single screen.
Weather	Default APOLLO™ module – Live weather radar with various meteorological layers.
Secondary Treatment – Activated Sludge	Focused on the aeration process, this module includes monitoring, analytics, and copilot dashboard and a detailed decode feature for analyzing aerator and process performance.
Secondary Treatment – Secondary Clarifiers	Focused on the secondary clarification process and RAS/WAS pumping, this module includes monitoring, analytics, and copilot

Module	Description
	dashboard and a detailed decode feature for analyzing process performance.
Disinfection	Focused on the UV disinfection with supplemental chlorination and dechlorination process, this module includes monitoring, analytics, and copilot dashboard and a detailed decode feature for analyzing permit compliance and process performance.
Lab Insights	Default APOLLO™ module – Provides users with a robust plotting tool for lab, live, and analytical data.
SAMI	Default APOLLO™ module – Digital alert system with customizable alert thresholds for parameters of the most critical interest.

Additionally, Aquasight will review data sources, data completeness, and instrumentation coverage for the PRWRF. We will make recommendations for additional instrumentation as may be necessary to optimize the data rich environment necessary for an optimized process solution.

The project goals described above will be completed through the following tasks:

Task 0 – Project Management
Task 1 – Data Polling
Task 2 – Site Visit and Plant Review Including Instrumentation Review and Recommendations
Task 3 – Aeration Onboarding
Task 4 – Secondary Clarifier & RAS/WAS Pumping Onboarding
Task 5 – UV Disinfection/Chlorination/Dechlorination Onboarding
Task 6 – Default Module Configuration
Task 7 – Training and Adoption

Appendix B: Project Milestones, Timeline, and Deliverables

The Aquasight scope of work for this project will have four key milestones and associated deliverables and will be implemented with approximately the following timelines (**Table 2)**. The timeline is subject to change by mutual agreement between Aquasight and the City of Santa Fe.

Table 2: Project Delivery Calendar

Milestones	WEEKS from Notice to Proceed	Aquasight Deliverables
1. Design Review, Instrumentation Review, Data Polling, Connections, Lab & Live Insights	~ 12 weeks	• APOLLO™ Release 1 – Lab Insights • Milestone 1 Report
2. Secondary Process & Aeration Modules	~ 16 weeks	• APOLLO™ Release 2 – Secondary & Aeration Modules • Milestone 2 Report
3. Disinfection Module & SAMI Alerts	~ 22 weeks	• APOLLO™ Release 3 – Disinfection Module & SAMI Alerts • Milestone 3 Report
4. Plant Dashboard, Training & Adoption	~ 26 weeks	• APOLLO™ Release 4 – Plant Dashboard, Training, & Adoption • APOLLO™ User Manual • Virtual Training Sessions

Appendix C: Required Participation from Santa Fe Public Works

DATA REQUIREMENTS

The following information is required from Santa Fe Public Works for successful project completion:

- Public Works SCADA Data Historian access,
- Public Works LIMS database access,
- Any applicable sensor/instrumentation API details,
- Where applicable, process data spreadsheets and mechanism to routinely upload,
- Process SOP's,
- Process design data,
- Equipment manufacturer information (specs, O&M manuals, etc.)
- Plant drawings of relevant processes,
- Energy bills,
- Control strategy documentation for automated control systems, and
- Plant budget and cost sheets

Where information is not available, assumptions will be made and discussed with Santa Fe Public Works team before implementing it in the APOLLO™ System.

O&M, SCADA, LAB, AND DESIGN CLARIFICATION MEETINGS

During deployment, in addition to or as a part of any project management meetings, Aquasight may request meetings with key Public Works staff. Such meetings are important to clarify operations, understand assumptions, and agree on key configurations in APOLLO™ systems.

Appendix D: Project Fee

Aquasight proposes the following Not-To-Exceed project fee for the APOLLO™ solution implementation for the City of Santa Fe Public Works Paseo Real Water Reclamation Facility:

APOLLO™ Onboarding Fee: **Not to Exceed $200,000**
APOLLO™ Annual Fee: **$50,000 per year, minimum three-year contract**

The project billing schedule will be included in the final contract documents, and shall have the basic invoice timing noted below:

- The Onboarding Fee shall be billed in monthly payments during the Onboarding period (estimated over 6 months) with the first Onboarding payment due at contract signing.
- The Annual Fee shall be billed at the beginning of each calendar year, with the first year Annual Fee billed at contract signing.

The following activities are covered in the annual fee:

- **APOLLO™ technology usage:** APOLLO™ technology that has been developed by Aquasight is the core foundation of this project. The technology will be the backbone for releases, metrics, advisors, KPIs and is accessible anywhere, on any device and at any time.
- **APOLLO™ system operations:** APOLLO™ system operations include lab and live database management, analytical scripts management, API management and user preferences, credential, and security management.
- **Infrastructure management:** APOLLO™ runs on several virtual machines and servers. These servers require upkeep and maintenance include software library updates, monitoring of infrastructure metrics and hardware management.
- **Advisor upkeep and maintenance:** Advisors require quality data inputs; unforeseen bad data quality events do occur in practical environment and advisors must be evolved to ensure it discards bad data or debugged to ensure optimal performance of smart advisors.
- **Ticket management and Help desk:** Access Aquasight help desk will operate 8:00 am to 5:00 pm EST during weekdays for any issues such as user access, applications and/or routine troubleshooting. Any high priority issue Aquasight will address in 1-to-4-hour time frame depending on type and nature of this issue during business hours and during weekend and holidays within 24-to-48-hour time frame.
- **SAMI:** Alert's system that manages e-mails, notifications, alert statistics, thresholds management and user settings.
- **Bug fixes:** If we detect any issues or bugs in optimal running of software or technology, Aquasight will fix free of cost and repair those bugs.
- **Data polling maintenance:** Polling software is installed in virtual machine within Santa Fe Public Works. When tag names are changed and database connections are reconfigured, this require polling software to be updated. Public Works should inform or discuss with Aquasight

before making changes on setting and access credentials which may disrupt the flow of data streaming to APOLLO™.

- **Free feature upgrade as part of APOLLO™ product roadmap:** Aquasight continuously evolves its technology and features for driving more value to customers. Such features will be available for free at no additional cost if they are part of the standard product roadmap.

Rain For Rent
2495 Lakeside Dr
Las Cruces, NM, 88007
575-524-0879
rainforrent.com
kconnell@rainforrent.com

BUCKMAN DIRECT DIVERSION
Account: 134939
341 CAJA DEL RIO RD Dba City Of Santa Fe
Santa Fe, NM, 87506
Michael Dozier
505-577-1132
Mldozier@santafenm.gov

Dear Michael Dozier,

Thank you for your inquiry. As requested, please find attached our proposal 1101-IND-2113715 for City of Santa Fe WWTP. We value this opportunity to provide a solution for your liquid handling need and we are committed to partnering with you to ensure your project's safe execution and completion.

To convert this proposal into a confirmed order WITHOUT ANY CHANGES, please click the "Start Signing" button to begin the electronic signature process.

If you would like to CHANGE anything in this proposal or discuss anything further, please call Kimbro Connell at 575-524-0879.

Thank you, and I look forward to working with you.

Regards,

Kimbro Connell
kconnell@rainforrent.com
Mobile: 505-436-0920
Branch: 575-524-0879
2495 Lakeside Dr
Las Cruces, NM, 88007

Project Name	City of Santa Fe WWTP	Jobsite	City of Santa Fe WWTP
Date Prepared	3/22/2024	Est. Delivery Date	4/1/2024
Prevailing Wage	No	Est. Completion Date	4/1/2025

Project Location

73 Paseo Real
Santa Fe, NM, 87507

Project Description and Overview

PROJECT DESCRIPTION

Quoted as 28day cycle rental

Does not include applicable sales tax or services

PROJECT OVERVIEW

Provide pump and filtration equipment for max flows of 5mgd at final clarification.

STATEMENT OF WORK

RFR Responsibilities & Scope of Work

Rain for Rent (RFR) will provide the following: Provide pump and filtration equipment for max flows of 5mgd at final clarification. (2) 60-4SK, (1) 48-4SK, DV200E pump, HDPE pipe and misc fittings.
Delivery, installation, removal, pickup of all quoted materials/equipment

Due to the multitude of economic factors, materials, labor, hauling and freight are currently in a period of above average volatility. If, during the performance of work, the price of materials, labor, hauling or freight increases by 5% or greater through no fault of Rain for Rent, the contract price shall be equitably adjusted by an amount reasonably necessary to cover any such price increases. Equipment subject to availability at time of project.

Reference Materials

Project is quoted based on applicable/customer provided reference materials noted below:
Job Walk(s) 3-13-2023

Operating Parameters

System includes: Sand Media
System is designed to operate at a flow rate of 5mgd peak @ 80tdh
The water source location will be clarifor and discharging at location after clarifor. .

Customer Responsibilities

It is the customer's responsibility to inform RFR about prevailing wage at time of proposal. If RFR is informed after the quote is issued that certified payroll is required, quote will be subject to additional charges.

Jobsite:
Customer is responsible for:
1. Informing RFR of any jobsite or general requirement(s) to perform work on location.
2. Securing permits, fees, bonding, right of ways, vehicular/pedestrian traffic control, and security.
3. Providing safe, secure access and egress to an adequate staging area throughout the job which could include brush clearing, grading, and removal or replacement of any landscape or hardscape in the temporary right of way for the equipment.
4. Any damage to the environment including trees, vegetation, stream banks, or any other part of the site caused by the installation, removal, construction, pulling or dragging of equipment, or operation of the equipment that would require site restoration or environmental countermeasures.

5. Any excavation, saw cutting, trench plating for the purpose of road crossings, backfilling, restoration, modification, or alteration of any permanent structure or site element including changes to pump pad preparation, suction, or discharge chambers during duration of job (including installation and removal).

System:

1. Customer will provide dedicated equipment with operator and fuel to perform all needed unloading, testing, operations, maintenance, relocating, cleaning, and reloading of provided equipment/system. Equipment must be capable of lifting 9000 Lbs.
2. If installation provided by RFR and Customer is operating system, this Transfer of Operation form will need to be reviewed and signed by both parties upon completion of setup. (sample form only): **https://rainforrentcorp.box.com/v/systemtransferoperation**
3. Customer will provide fueling.
4. Customer will provide preventative maintenance as recommended by manufacturer or per the Rental Agreement. **https://rainforrentcorp.box.com/v/pumpmaintenance**
5. Customer will supply all needed water for the commissioning, startup, and system testing. Project specific criteria for hydrotesting can be provided at an additional charge.
6. By accepting this quotation, the customer has acknowledged that the equipment proposed herein is suitable for its intended application and accepts all liabilities associated with its use. Customer is responsible for compliance with appropriate liquid/material quality standards, regulations, and testing protocols to meet all federal, state, local and job location specific requirements. Customer is responsible for all waste materials associated with this equipment/system.
7. RFR recommends a small-scale trial run of this product application to ensure system effectiveness. RFR does not warranty the water quality or degree of filtration. At customer request, RFR can perform a Total Suspended Solids (TSS) bench test to better select the appropriate media for optimized filtration effectiveness. Customer will be responsible for the cost of all media.
8. The customer will be designated as the generator for all liquid/solids processed with the use of RFR equipment. All used filtration media, such as carbon, sand, cartridges, bags, coalescing packs, etc. becomes the property of customer and is the responsibility of customer for proper disposal.
9. To activate carbon, customer will need to pre-soak for 24 hours.
10. RFR has not included the cost of the removal and regeneration for non-hazardous carbon. Customer is responsible for TCLP sample for TCLP VOC's, TCLP SVOC's, TCLP RCRA 8, pH. **https://rainforrentcorp.box.com/v/carbongenerator** If the carbon is deemed hazardous and cannot be regenerated, customer is responsible for additional disposal costs and/or final disposal. No media or materials will leave the site unless the TCLP RCRA 8 has been received and deemed non-hazardous unless otherwise noted.
11. RFR equipment/vessels will be taken off rent when the required testing has been submitted and accepted by RFR/Source Carbon Supplier for recycling and or disposal. Vessels cannot be removed until we receive and accept the testing that indicates the carbon is deemed NON-HAZARDOUS. At that time, the equipment will be taken off rent and be scheduled for pick-up from the site. Should the carbon be deemed HAZARDOUS the customer will be responsible to pay a third party for the chain of custody, transportation, and disposal of this material.
12. Additional cleaning and/or inspections may be required if tested material is deemed anything besides non-hazardous.

Customer is responsible for:

1. Any work in confined spaces.
2. Protecting system from damage including any freeze protection necessary to safeguard equipment from damage. Should equipment become frozen and damaged, customer is responsible for repair of equipment. RFR can provide necessary freeze protection at an additional charge per executed change order. Equipment stays on rent until it can be returned.
3. Using equipment in a safe and proper manner in accordance with manufacturers' recommendations, regulatory standards, and industry best practices. Improper usage may cause equipment/system failure, damage, possible incidents, injuries, and spills.

Upon Pickup:

Contact the RFR office at 575-524-0879 to schedule pickup when equipment/system is cleaned and ready to be released.
Flushing and cleaning of equipment must be performed to RFR's standards prior to being called off rent. RFR personnel will perform a visual inspection. It is recommended to have a customer representative on-site during inspection. Equipment found not to be in "delivered condition" will not be picked up. e picked up.

Project Scheduling & Billing

This quote is valid for 30 days. For the quoted items, RFR requires a signed quote not less than 14 days prior to delivery.

Estimated schedule durations:
Mobilization: 2 days
Installation: 3 days
Operation: TBD
Removal: 2 days
Demobilization: 1 day
System Rental Duration: 1 year or more

Customer acknowledges that availability of equipment/system and/or media will be confirmed at time of order. Additional freight charges may

apply subject to mutually agreed upon change order.

Billing

1. This is an estimate only. Actual Time and Material used for this job will be billed to the customer.
Any re-rented equipment may be billed according to the third party's billing period. All billing subject to our standard terms and conditions in the rental agreement.
A minimum 2 hour charge will be assessed in the event the crew is at site and weather forces cancellation of work for remainder of day.

Rain for Rent's standard hours of operation are 7:30am – 4:00pm Monday – Friday. Time outside of normal business hours will be billed at 1.5x the base rate for Transportation and Service

Safety

Each employee is expected to adhere to the RFR Environmental, Health and Safety programs, which will protect the environment, the health and safety of the customer, employees, and others. RFR asks for your full cooperation to succeed in this expected outcome.

PROJECT COSTS	
Estimated Rental Total	$21,159.93
Estimated Environmental Recovery Fees	$687.70
Total Estimated Recurring Charges	$21,847.63
PROJECT COSTS	
Estimated Sale Total	$9,479.40
SERVICES	
Estimated Delivery	$14,818.04
Estimated Installation	$13,883.00
Estimated Removal	$8,018.00
Estimated Pickup	$2,618.04
GRAND TOTAL	$70,664.11

-Estimated costs do not include taxes

-Recurring rental project costs will be on a cycle/week/day basis+ tax

Engine driven equipment will be delivered with at least 50% fuel. A Fuel Convenience Charge will be implemented on a per gallon basis up to the delivered fuel level. Customer acknowledges that the Fuel Convenience Charge is not a retail sale of fuel. Customer may avoid the Fuel Convenience Charge if the Customer returns the Equipment at delivered level. The fuel convenience fee will be charged per gallon. No refunds will be given for a higher level of fuel upon return.

Customer Name _____ Customer Signature _____ Date _____

Proposal Acknowledgement

By signing this proposal, customer represents that he/she has read and agreed to both the Statement of Work and Quote Agreement sections, and is also agreeing to the grand total amount listed above, plus any recommended optional items if accepted and initialed. If customer requires a Purchase Order number to process and submit payment, it must be supplied to Rain for Rent at the time of acceptance of this proposal.

PO Number: _____

Rental Protection Plan

I have received and reviewed the Rental Protection Plan Agreement incorporated as the last page of this estimate. By initialing this paragraph, I understand that I am agreeing to enter into and be bound by the terms of the Rental Protection Plan Program Agreement and that I am authorized to enter into this Agreement on behalf of Customer. FOR ALL RENTALS OF EQUIPMENT, EXCEPT THOSE SPECIFICALLY EXCLUDED, YOU MAY EITHER SHOW PROOF OF PROPERTY INSURANCE IN ACCORDANCE WITH INSURANCE REQUIREMENTS AND RENTAL AGREEMENT OR PURCHASE THE RENTAL PROTECTION. THE PURCHASE OF THE RENTAL PROTECTION PLAN FOR RENTALS OF EQUIPMENT IS NOT MANDATORY AND MAY BE DECLINED IF YOU HAVE PROOF OF ALL RISK PROPERTY INSURANCE AS REQUIRED BY CONTRACT.

RPP	$3,174.00	**Accept** ○	**Decline** ○

INITIAL	

Created Date: 3/20/2024

Quote Agreement

If Customer has entered into a Master Service Agreement with Rain for Rent and there is a conflict between these terms and conditions of this Quotation Agreement and the Customer's Master Service Agreement, then the terms and conditions in the Customer's Master Service Agreement signed by Rain for Rent will prevail. Availability of products and services is subject to change without notice. Payment terms are net 30 days from invoice date. Interest at the rate of 18% per year shall be charged on any past due invoice. A Fuel Surcharge will be calculated and invoiced based on the diesel fuel price as published by the Department of Energy on https://www.eia.gov/petroleum/gasdiesel An Environmental Recovery Fee shall apply to all rental charges invoiced for the duration of the rental pursuant to this quote/Estimate to help offset direct and indirect costs associated with regulatory compliance, obtaining permits, and obtaining licenses. California Air Quality Fee will be added to the cost of diesel pumps used in California only. This is a State mandated fee. Customer is prohibited from deducting retention from Rain for Rent invoices and charging Rain for Rent liquidated damages. Customer is responsible for flushing and cleaning tanks, roll off boxes, pipelines, pumps, filters and other Rain for Rent equipment prior to return unless specifically agreed to by both parties in writing. The Terms and Conditions of the Rain For Rent Rental and Hazardous Material and/or Non-Hazardous Waste Agreement, Credit Application/Master Rental & Sales Agreement, Invoice and this Quotation (also known as the Rain for Rent Rental/Sale Estimate as may be referenced in any Master Service Agreement, Blanket Purchase Order, or any other contractual document executed between the parties) contain the complete and final agreement between Rain for Rent and Customer and no other agreement in any way modifying or adding to any of said Terms and Conditions will be binding upon Rain for Rent unless made in writing and signed by a Rain for Rent Corporate Officer or Rain for Rent authorized representative. The Customer cannot alter the equipment without Rain for Rent's prior written approval. Customer is responsible for equipment, repairs, maintenance and damage, excluding normal wear and tear or damage caused by Rain for Rent. Rain for Rent will service all engine driven equipment at 400 hours of runtime or as required by manufacturer specifications, if less than 400 hours. Labor will be billed on a time and materials basis, portal to portal from nearest Rain for Rent location. Prorated billing will occur if rental is returned prior to 400 hours. All returned equipment is subject to inspection by Rain for Rent personnel. Damages and accrued rent will be invoiced to Customer while equipment is out of service for repairs. The Customer is responsible for damage caused by reactive, corrosive or abrasive material; including, but not limited to sand, sodium hydroxide, chlorine, and acids. Customer must notify Rain for Rent immediately of any spill so that any necessary repairs to the system can be made and to minimize service interruption. The Customer assumes all risks of loss due to operation and use of the equipment. Customer will provide "all risk" property insurance for rented equipment. Customer shall pay Rain for Rent additional expenses caused by unforeseen or changing conditions, including, but not limited to, soil, underground conditions, rock formations, environmental conditions, weather events, regulations or restrictions, hard pan, boulders, cesspools, gas lines, waterlines, drain pipes, underground electrical conduits or other above ground or underground obstructions. All equipment rented or used products sold are provided "AS IS, WHERE IS" in their present condition. Rain for Rent makes no warranties, expressed or implied of any kind whatsoever with respect to the equipment or products. Sold equipment is not to be rented. Customer agrees that customer is renting equipment or purchasing used products based on their judgment and evaluation, without reliance upon any statements of representations by Rain for Rent, and that Rain for Rent is not responsible for any defects in their operation or for any repairs, parts or services, unless otherwise noted. All new products sold are provided without warranty beyond the terms of such warranty offered by the manufacturer, if any. Customer must comply with all original manufacturer's terms and conditions for any warranty claims that may arise. Neither Rain for Rent nor the manufacturer warranties the product if it has failed due to corrosion, misuse or damage; (2) it has been altered, repaired or modified in any way that would adversely affect its operation; or (3) it was installed or operated other than in accordance with manufacturer's operating instructions. Products supplied by Rain for Rent are warranted to be free from any defect in workmanship and material under conditions of normal use and service. Rain for Rent's obligation under this warranty is limited to replacing or repairing at the designated manufacturer's or Rain for Rent facility any part or parts returned to it with transportation charges prepaid, which Rain for Rent determines in its sole discretion to be defective. This Quotation excludes any additional costs to Rain for Rent associated with Owner Controlled Insurance (OCIP) or WRAP insurance programs that will be added to Rain for Rent's prices. De-watering, Roll-off, Vacuum boxes and similar equipment are not liquid tight. Rentee accepts full responsibility for all losses, damages and costs caused by or arising out of spills, leakage or discharge from this equipment. Rain for Rent will not be held liable for any structural or soils subsidence. This Quotation is valid for 30 days and is subject to credit approval. Rain for Rent will take every effort to protect our customers and employees. Due to the current pandemic, all quoted equipment and services are subject to delay, change, or unilateral cancelation by Rain for Rent. Please be assured every effort will be made to execute the quote as written. The customer is responsible to inform Rain for Rent of any jobsite hazards, precautions, or entry requirements relating to the Corona Virus prior to Rain for Rent personnel going onsite to perform work or deliver equipment. This includes informing Rain for Rent if anyone at the jobsite has tested positive and provide a list of actions taken to protect Rain for Rent personnel.

Rental Protection Plan Program Agreement

If you elect to maintain All Risk Property Insurance coverage, and the certificate of insurance You provide to Rain for Rent to evidence Your insurance coverage expires or is cancelled for any reason, You agree Rain for Rent may charge RPP for Your rentals until such time as You provide an acceptable and valid certificate of insurance to Rain for Rent. This Rental Protection Plan Program Agreement (this "RPP Agreement") is entered into between the undersigned Rentor and Rentee in relation to the Master Rental and Sales Agreement (MRSA) between Rentor and Rentee. If Rentee has checked or initialed, as applicable, the Rental Protection Plan Program (the "RPP Program") box on the quote, then Rentee has opted-in to the RPP Program and this RPPP Agreement shall supplement the MSRA whether or not executed by Rentee. Rentee understands and agrees that the RPP Program is not insurance and that the RPP Program provides only limited coverage, as described below.1.Cost; Deductible; Maximum Coverage; Rentee shall pay a fee equal to 15 percent (15%) of the rental charge for each covered item, which fee shall be listed on each invoice during which period Rentee has opted to participate in the RPP Program. In the event of a Covered Occurrence, as defined below, Rentee shall further be responsible for the lesser of $500 or 10 percent (10%) of the total loss, as a deductible. The maximum coverage available under the RPP Program is $150,000 per Covered Occurrence, whether or not there is more than one piece of equipment involved in the occurrence.2.Coverage; The RPP Program provides coverage only for losses involving Covered Equipment, as defined below, in the following instances: fire that was not caused by Rentee's gross negligence or willful misconduct; theft for which a police report was filed, and that occurred despite Rentee's reasonable precautions to protect and secure the covered equipment; and vandalism for which a police report was filed (individually, "Covered Occurrence," and collectively, "Covered Occurrence"). The RPP Program provides coverage only for the following types of equipment: pumps, electric submersible pumps, tanks, generators, light towers, filtration, boxes, heaters, spillguards, safety products, sprinklers, hoses, pipe, valves and fittings ("Covered Equipment"). Coverage does not extend to any equipment not owned by Rentor such as re-rented equipment.3.Exclusions; The RPP program does not cover any equipment or event of loss that is not specifically described in Section 2.Without limiting the foregoing, the RPP Program does not provide coverage for the following: misuse of equipment; willful abuse of equipment; failure to maintain equipment; failure to secure items from theft (including but not limited to failing to store items in a fenced, locked area or failing to maintain personnel on site); damage or theft while in transit to or from a jobsite; corrosion from any source; any damage caused by named storm events; any instance that occurs while the account is not in good standing, such as a default as defined in the MRSA or upon written notice of non-payment; and any occurrence not reported to Rentor within 24 hours after the occurrence. The RPP program does not provide coverage for: electronic equipment (controls, instrumentation, and wiring), flow meters, water meters, wheel wash systems & accessories, Freezesentry items, or tires.4.Claims; All claims must be submitted within 24 hours of the Covered Occurrence. Rentor's mechanic will inspect the equipment following any claim. The mechanic's findings as to the cause of the damage and cost of repair will be final. In the event of a theft or vandalism, Rentee must also provide supporting evidence that the site was secured at the time of loss.

Emergency Determination Form WW AO Support

Final Audit Report 2024-04-04

Created:	2024-04-03
By:	Kristy Miera (kamiera@santafenm.gov)
Status:	Signed
Transaction ID:	CBJCHBCAABAAf0L7Wg8VU-YEpL4sCq3jWDcINOsdtZl3

"Emergency Determination Form WW AO Support" History

Document created by Kristy Miera (kamiera@santafenm.gov)
2024-04-03 - 10:59:58 PM GMT

Document emailed to Travis Dutton-Leyda (tkduttonleyda@santafenm.gov) for signature
2024-04-03 - 11:02:57 PM GMT

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Document emailed to Marcos Martinez (mdmartinez@santafenm.gov) for signature
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Document emailed to jwblair@santafenm.gov for signature
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Email viewed by Marcos Martinez (mdmartinez@santafenm.gov)
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Document e-signed by Marcos Martinez (mdmartinez@santafenm.gov)
Signature Date: 2024-04-03 - 11:03:48 PM GMT - Time Source: server

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Signer jwblair@santafenm.gov entered name at signing as John Blair
2024-04-04 - 0:09:49 AM GMT

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Signature Date: 2024-04-04 - 0:09:51 AM GMT - Time Source: server

Document e-signed by John Dupuis (jedupuis@santafenm.gov)
E-signature obtained using URL retrieved through the Adobe Acrobat Sign API
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2024-04-04 - 4:46:21 PM GMT

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Signature: XAVIER VIGIL
XAVIER VIGIL (Dec 14, 2024 17:51 MST)

Email: xivigil@santafenm.gov

24-0710 Hazen and Sawyer

Final Audit Report 2024-12-16

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"24-0710 Hazen and Sawyer" History

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2024-12-16 - 3:30:51 PM GMT- IP address: 174.240.17.78

Signer axsalazar@santafenm.gov entered name at signing as Andrea Salazar
2024-12-16 - 3:32:23 PM GMT- IP address: 174.240.17.78

Document e-signed by Andrea Salazar (axsalazar@santafenm.gov)
Signature Date: 2024-12-16 - 3:32:25 PM GMT - Time Source: server- IP address: 174.240.17.78

Agreement completed.
2024-12-16 - 3:32:25 PM GMT