JORDAN VALLEY WATER CONSERVANCY DISTRICT

REQUEST FOR PROPOSALS TO DEVELOP AN ONLINE DIGITAL TWIN FOR THE

Southeast Regional Water Treatment Plant Digital Twin Pilot Project

Project #4375

May 2025

Summary

Jordan Valley Water Conservancy District (JVWCD) invites you to submit a Written Qualification Proposal as defined in this request. Proposals shall be submitted in a sealed envelope to JVWCD's project manager, Conor Tyson, at 8215 S.1300 W., West Jordan, UT 84088, no later than 3:00 p.m. on Thursday, June 26, 2025, for consideration.

After the Written Qualifications Proposals are evaluated, three selected firms will be selected to provide an in-person presentation of their proposed Digital Twin Prototype and a cost proposal to provide an online digital twin of the Southeast Regional Water Treatment Plant (SERWTP) treatment process.

Introduction

JVWCD was created under the Water Conservancy Act as a political subdivision of the State of Utah. JVWCD was organized as a regional water supply agency to develop a water supply for rapidly growing areas outside of the Salt Lake City service area. JVWCD currently serves as a wholesale supplier to 17 member agencies and also operates a retail distribution system in several parts of Salt Lake County. In 2023, JVWCD delivered approximately 110,000 acre-feet of municipal and industrial water to its wholesale and retail customers.

Project Background

SERWTP faces a significant challenge in maximizing the utilization of its available source water. The plant treats water from two sources: canyon stream runoff water and water from the Deer Creek Reservoir. While the canyon water is essentially free, it is only available during the runoff season and its availability and water quality exhibit substantial fluctuations, both daily and seasonally. Conversely, the Deer Creek Reservoir provides a reliable supply but is a more expensive water source than the canyon water. Given the complex chemical reactions required for effective clarification of the water, SERWTP is regularly forced to turn away canyon water due to sudden changes in water chemistry that disrupt the treatment process to the point of jeopardizing finished water quality. This project aims to provide a tool for plant operators to fully utilize the canyon water when it is available.

Specific Project Information

SERWTP is a conventional surface water treatment plant that includes high-rate clarification, filtration, and disinfection and has a design capacity of 20 million gallons per day. This project seeks to develop a Digital Twin model to serve as a real-time simulation and decision-support system, enabling plant operators to optimize treatment processes in response to the dynamic nature of canyon water quality and quantity. The Digital Twin should include the following functionalities:

- **Predictive Modeling:** Develop a hybrid physics and machine-learning model capable of accurately predicting treatment process performance under variable canyon water quality conditions. The model should predict critical parameters such as treated water turbidity, unit filter runtime volume (UFRV), and necessary chemical dosages.
- **Optimization Engine:** Incorporate an optimization engine that determines the optimal setpoints for up to 15 key decision parameters, including chemical dosages, canyon water usage, and reservoir water blending.
- **Scenario Analysis:** Enable the evaluation of various optimization strategies, such as maximizing canyon water usage while maintaining target treated water quality and UFRV and minimizing chemical costs.
- **Cost Analysis:** Provide a comprehensive cost analysis module that quantifies the potential savings associated with each optimization strategy, accounting for the variable costs of canyon and Deer Creek Reservoir water, chemical consumption, and filter run times.
- **What-If Analysis:** Allow operators to perform what-if analyses by adjusting input parameters for the two water sources and treatment set points and then evaluating the impact on optimization outcomes.

Project Objectives

1. Create an online Digital Twin of the SERWTP Treatment Process that enables real-time optimization of using canyon water for plant operators.

2. Have an online Digital Twin Model that can improve treatment efficiency, improve plant operation, and improve operator decision making.

3. Have an online Digital Twin Model that SERWTP can continue to utilize on an on-going basis.

Scope of Work

The selected consultant shall provide comprehensive professional services to develop, implement, and support an online Digital Twin of the Southeast Regional Water Treatment Plant (SERWTP) treatment process. The Digital Twin must serve as a real-time simulation and decision-support system that enables plant operators to optimize the use of canyon water while maintaining water quality and operational efficiency.

1. Project Initiation and Discovery
   a. Conduct a project kickoff meeting with JVWCD stakeholders and SERWTP operations staff.
   b. Review and assess historical, real-time, and lab data relevant to plant performance and water quality.
   c. Document functional requirements, technical specifications, and performance goals collaboratively with JVWCD staff.
   d. Identify required data sources and integration points with existing JVWCD systems (e.g., SCADA, LIMS, historian).

2. System Design and Architecture
   a. Develop a high-level design and architecture of the Digital Twin system, including:
      - Data ingestion and processing pipelines
      - Hybrid physics/machine-learning model design
      - Optimization engine structure
      - User interface and interaction model
   b. Provide a digital twin roadmap that shows the how the system can be enhanced after the SERWTP pilot proofing period (2-3 years). The roadmap should show:
      - How the digital twin pilot, which will be implemented in the business network, would be implemented in the SCADA network,
      - How the system would be scaled to other facilities operated by JVWCD, and
      - How the enhancement will be done in a way that is secure and compatible with JVWCD's existing IT environment.
   c. Submit a design document for review and approval by JVWCD staff before full development begins.

3. Implementation
    a. Update the prototype developed during the procurement phase to align with the system design and architecture.
    b. Train and calibrate the hybrid model using historical and recent SERWTP data refining the model under varying operational conditions, particularly during spring runoff (May–August). Validate the model against a control period in the historical record.
    c. Integrate the Digital Twin with live operational data sources and existing JVWCD systems.
    d. Deploy the system in a secure, web-accessible environment accessed through JVWCD's business network with appropriate authentication and access controls.
        - Conduct comprehensive system testing, including final verification of predictive performance and optimization functionality and user acceptance testing (UAT).

4. Training and Documentation
    a. Provide comprehensive training for operations and engineering staff, including:
        - Hands-on use of the system to generate set point recommendations from current conditions and implement those set points in a way that mitigates the risk of process disruptions
        - Interpretation and optimization of results
        - Scenario and what-if analysis procedures
    b. Deliver full documentation, including user manuals and maintenance & support documentation.

5. Support and Ongoing Maintenance
    a. Provide post-deployment support for a period of two years with the option to extend for an indefinite number of years, including:
        - Software bug fixes and patches
        - Model and interface refinement as operators gain experience with the digital twin
        - Technical support for users
    b. Monitoring accuracy of the continual model training through the machine learning engines.

Sample Preliminary Schedule

Written Qualification Proposals Due	June 26, 2025
Review Proposals and select 3 firms	21 calendar days
Presentation and receive cost proposals	28 calendar days
Award of Consulting Contract: on or after	September 10, 2025
Contract Preparation:	28 calendar days
Initiation and Discovery Phase:	28 calendar days
Design and Architecture Phase:	90 calendar days
Implementation Phase	60 calendar days
Training and Documentation	45 calendar days
Ongoing Support and Maintenance	2 years

Proposers should revise this schedule as necessary to match their work plan.

Written Qualification Proposal Evaluation

Written Proposals shall not exceed ten (10) pages in length (excluding resumes, sample drawings, and references), up to two (2) of ten pages can be printed on 11x17 paper, the remaining pages shall be printed on 8.5x11 paper. Provide five (5) hard-copies and one digital copy of the proposal for review by the evaluation committee.

The written qualification proposal should include the following information:

- Qualifications: Identify the key members of the team listed by name including role and availability to the project in the format of a Project Team Chart. Indicate the education, experience, expertise, and location of each team member (it is acceptable to provide this in resume format in the appendix). Include past experience providing digital twins (similar requirements better). Include evidence demonstrating compliance with the Minimum Qualifications section of this Request for Proposals.

- Work Plan: Include a detailed work plan which addresses the approach to providing the digital twin and identifies key issues. A final agreed upon

work plan will be incorporated into Schedule A of the Agreement. Include a project schedule of the key tasks and note the availability of project team members with respect to current workload and project start and completion dates.

Include with the work plan a table showing the number of hours planned for the key positions for each major work task. Include subtotals of all labor hours. This information will be used to evaluate the work plan and the level of effort in each phase by the team and the key team members. **Do not include any billing rate or cost information in this work plan table**.

- Past Performance: Provide information about past completed projects which satisfy the Minimum Qualifications requirements. Information about additional completed projects which the Proposer feels would be relevant may also be submitted. The past project performance information shall include:

    1. Brief description of project and scope of services performed,
    2. Name of owner,
    3. Owner contact information (direct phone number preferred),
    4. Role which proposed Project Team member(s) fulfilled on past project,
    5. Original fee amount,
    6. Final fee amount,

    Incomplete projects (on-going work) may be used but may result in a lower grade for this section in the evaluation phase.

Professional Consulting Services Agreement

Comment on the acceptability of the enclosed Professional Consulting Services Agreement (Agreement) (Attachment A). Any suggested changes to the Agreement must be identified with the proposal (as an attachment), although JVWCD reserves the right to reject any suggestions. No changes will be considered after the proposal due date.

Selection Method

Selection of a consultant will be done in accordance with the State of Utah's Procurement Code for Professional Services (Utah Code Title 63G, Chapter 6a, Part 7).

Minimum Qualifications

Proposers are required to meet the minimum experience requirements to be considered responsive to the Request for Proposals. JVWCD defines a water treatment plant digital twin as a near real-time simulation and decision-support system enabling operators to optimize treatment processes in response to the dynamic nature of water quality and availability. Furthermore, a digital twin accomplishes this by integrating live data sources into a hybrid physics and machine-learning model capable of accurately predicting treatment process performance under variable conditions and visualizing those predictions through a user interface that recommends operational changes/set points and allows operators to test variations on those recommendations. The minimum experience requirements are:

- The Project Manager shall have successfully functioned as a Project Manager on at least:
  - One project delivering a digital twin, consistent with JVWCD's definition listed above, for an organization's operators to run a production process more effectively. This can be for a water utility, other utility provider, commercial, or industrial production processes.

- The Project Firm shall have successfully delivered at least:
  - Two hybrid model projects or advanced process control projects that include optimization engines that determine optimal set points for operators to implement from near real-time data.

- The project team and proposed work plan are responsive to the needs of the project.

Any proposals not meeting the minimum qualifications may be deemed non-responsive and removed from further consideration.

Evaluation Criteria

An evaluation committee approved by JVWCD's General Manager, will convene to consider all responsive proposals submitted and to rank the written qualifications proposals based on each criterion stated in this section.

Evaluation criteria are assigned a maximum number of points for evaluation purposes with a cumulative total of 100 points. Each Qualifications Proposal will be evaluated based on the following evaluation criteria:

Evaluation Criteria	**Grade**	**Weight**	**Maximum Points**
1. Demonstrated Qualifications to meet the scope of work:			
a. Firm Resources that satisfy the defined minimum qualifications. Demonstrated availability of firm resources to the project team.	0-5	3	15
b. Project Manager and key team members with the education, expertise, and experience necessary as required for the project.	0-5	3	15
c. Availability of Project Manager and key team members to the project. Current workload with the District may be considered.	0-5	1	5
2. Responsiveness of Work Plan:			
a. Clearly written work plan responding to the requirements of this request which indicates an understanding of the key issues and deliverables required for this project. Higher scores may be given to proposals which show familiarity with District facilities related to this project, or which note suggested revisions to the scope of work which would lead to an enhanced outcome.	0-5	6	30
b. Project schedule which identifies completion dates for key milestones and a final completion date.	0-5	1	5
3. Past Performance:			
a. Positive verified past references for the Proposing Firm indicating successful past performance on similar projects, including projects for JVWCD.	0-5	3	15
b. Positive verified past references for the Project Manager and other key team members indicating successful past performance on similar projects, including projects for JVWCD.	0-5	3	15
Total:			100

Each criterion will be graded on a scale of 0-5 with 5 being the highest grade. The grades will be multiplied by the appropriate weight factor to determine the total score. Written proposals shall have a level of effort appropriately matching the requirements, including efforts by key positions. Proposals falling short of an appropriate overall effort and/or effort by key positions may be considered non-responsive. JVWCD reserves the right to reject all proposals.

Presentation and Fee Proposal Instructions

The three firms with the highest scored written qualification proposals will be asked to come to JVWCD and present on their proposal and submit a fee proposal. These firms will schedule a time to present on their Digital Twin prototype and their proposed implementation to JVWCD. Each firm will also deliver a fee proposal which should be enclosed in a sealed envelope which will not be opened until after all presentation proposals are completed. The Final Score will be based on the qualifications proposal, the presentation, and the fee proposal.

The fee proposal shall be provided in a spreadsheet format similar to the sample fee proposal template in Attachment B. The hourly billing rate for each position, number of hours per task by position, and any fees for reimbursable expenses and overhead factors shall be clearly indicated. The total proposed fee will be considered a maximum not-to-exceed fee amount. The fee proposals will not be opened until all presentations have been made and all evaluations recorded. The fee proposals will be opened by a JVWCD staff member not participating on the evaluation committee and entered into a spreadsheet with the other scores already recorded in order to determine each proposer's final score.

For purposes of preparing the fee proposal make the following assumptions:

1. For each phase of the project:

    a. Increase by 10% the number of hours to be spent on each phase of the project for the purpose of establishing a contingency (except for Task 5 – Support and ongoing maintenance). The increase shall be proportional for each position.

    b. This 10% increase shall be included as a separate task and released only with written authorization of the JVWCD Chief Engineer.

Final Evaluation Criteria	**Weight**	**Scoring**		
		Score Method		**Maximum Points**
1. Written Qualification Proposal	30%	Qualification Proposal Score x 30%		30
2. Presentation	50%	Grade	Weight	
a. The proposed Digital Twin prototype is tailored to the SERWTP specific needs and meets the required functionality listed in the specific project information above.		0-5	2.5	12.5
b. The implementation plan to go from prototype to pilot is mapped out well and is feasible.		0-5	2.5	12.5
c. The proposed Digital Twin is technically robust and user friendly to operate.		0-5	2.5	12.5
d. The Proposed training and technical support are adequate and meet JVWCD needs.		0-5	2.5	12.5
3. Cost	20%	20 x (1 – (bid – low bid) / low bid)		20
Total:	100%			100

Upon execution of the Agreement by both parties, the Engineer will receive authorization to proceed with only those services identified in the Agreement. The

Engineer must receive prior written authorization before performing any services outside the scope and fee amount identified in the Agreement.

CONFIDENTIALITY: All information, documents, records and paperwork, including but not limited to proposals, bids, exhibits, or brochures (collectively, the "Paperwork") submitted to the District shall not be regarded by the District as secret or submitted in confidence, except as otherwise provided in a writing signed by the District. Please do not mark your Paperwork with legends such as "confidential," or "proprietary," or "not to be disclosed to third parties." The District is a Utah local district and is subject to the provisions of the Utah Government Records and Management Act ("GRAMA," Utah Code Ann. (1953) §§63-2-101 et seq.). Paperwork submitted to the District may be subject to disclosure to third parties under the District's interpretation of the provisions of GRAMA.

Questions or Suggestions

Proposers may ask questions or make suggestions to JVWCD on any element of this Request for Proposals. Questions or suggestions should be submitted to JVWCD's Project Manager, Conor Tyson, at 801-565-4300 or conort@jvwcd.org.

Potential proposers are welcome to discuss the project with District staff to better understand challenges and needs or to visit the treatment plant itself up to one week before the proposals are due. Please reach out to the Project Manager to set up any desired meetings.

ATTACHMENT A

PROFESSIONAL CONSULTING SERVICES AGREEMENT

PROFESSIONAL CONSULTING SERVICES AGREEMENT

This Agreement is made as of _____ ("Effective Date"), by and between the Jordan Valley Water Conservancy District, a Utah special district ("District"), and _____ a _____ corporation qualified to do business and doing business in the State of Utah ("Engineer").

RECITALS:

A. District desires to obtain professional services relating to _____;

B. Engineer represents it has the necessary expertise and experience to perform the services requested by the District, and that it is properly qualified and licensed in the State of Utah for this work; and,

C. Engineer has submitted a proposal outlining its proposed scope of activities for performance and completion of the services, and the Engineer is willing to perform the services requested by the District, consistent with the terms of this Agreement.

TERMS:

The parties agree as follows:

ARTICLE I
DEFINITIONS

1.1 Unless the context requires otherwise, the terms defined in this Article shall, for all purposes of this Agreement and for all schedules attached or referenced, have the meanings specified as follows:

1.1.1 Agreement: This Professional Services Agreement, including attachments.

1.1.2 Project: The Project is described in attached Schedule A.

1.1.3 Engineer's Fee: The Engineer's compensation for performing services.

1.1.4 Reimbursable Expenses: Non-salary expenditures made by the Engineer, its employees or its sub-consultants when performing services for the Project. Reimbursable Expenses include:

1.1.4.1 Reasonable expenses of all reproduction, postage and handling of drawings, specifications, reports or other Project-related instruments of service of the Engineer.

1.1.4.2 Reasonable expense of computer time.

1.1.4.3 Other reasonable reimbursable expenses approved by the District.

1.1.5 Hourly Billing Rate: The hourly fee which the Engineer charges for time expended on the Project. The hourly billing rate shall be considered full compensation for time expended on the Project. Specific hourly billing rates for the Project are identified in attached Schedule B.

ARTICLE II
ENGINEER'S SERVICES

2.1 Basic Services: The Engineer shall complete those tasks and services identified in Schedule A.

2.2 Additional Services: The District and the Engineer recognize and agree that services not expressly set forth in Schedule A are not covered by the Engineer's Fee and are considered to be additional services. No additional services may be provided by the Engineer, and no compensation shall be paid therefore by the District, except upon written confirmation by the District as an amendment to this Agreement.

ARTICLE III
TIME TO COMPLETE

The Engineer's services, as defined in Article II, shall be completed in accordance with the following schedule:

_____
_____

ARTICLE IV
KEY PERSONNEL

The following key personnel shall perform the Engineer's services in the capacities assigned as follows:

_____
_____
_____

Any substitution of key personnel and/or changes in assignments from those shown must first be approved by the District in writing before such substitution or change may be made by the Engineer.

ARTICLE V
COMPENSATION

5.1 Basic Services: The District shall pay to the Engineer as compensation for services attributable to the Project, the hourly billing rates as set forth in Schedule B multiplied by the number of hours expended in providing services. Reimbursable expenses will be compensated at cost, multiplied by 1.1. In no event, however, shall the total amount due the Engineer as compensation for services and reimbursable expenses exceed _____ and ___/100 Dollars ($_____).

5.2 Additional Services: In the event this Agreement is amended to provide for additional services by the Engineer, the Engineer's compensation for additional services shall be the hourly billing rate multiplied by the hours expended for additional services and reimbursable expenses attributable to the additional services, multiplied by 1.1.

5.3 Progress Payments: The Engineer's invoices for services performed and for reimbursable expenses shall be delivered to the District after the end of the first calendar month following the Effective Date of this Agreement, and monthly thereafter so long as the Engineer's services shall continue. The compensation requested on any such invoice shall be itemized to show the hourly billing rate multiplied by time charged to the Project and reimbursable expenses actually incurred in the month identified in the invoice.

5.4 Payment of Invoice: The amount shown on each invoice for the Engineer's Fee and reimbursable expenses shall be due and payable by the District on receipt of each such invoice. The Engineer may levy a simple interest charge of twelve percent (12%) per annum on invoice amounts not paid within forty-five (45) days of the date of delivery of the invoice. Late payments made by the District shall be credited first to accrued interest charges and then to principal.

ARTICLE VI
SPECIAL TERMS AND CONDITIONS

6.1 Conflict of Interest: The Engineer shall not establish or otherwise continue any conflict of interest created by virtue of this Agreement, which is prohibited under any law.

6.2 Termination Prior to Completion: This Agreement may be terminated at any time by the District prior to completion of the Engineer's services upon written notice to the Engineer. Upon receipt of such notice, the Engineer shall immediately stop any

further work in progress, and in such event, the Engineer shall be entitled to payment for all of its services performed to the date of cancellation and for all work required to organize and deliver to the District the materials developed in the course of the Engineer's services. Payment shall be due to the Engineer within forty-five (45) days after delivery of such materials and receipt of a verified and itemized invoice therefore.

6.3 Indemnity and Insurance: The Engineer shall indemnify, defend, and hold the District harmless from any claims under the Workers' Compensation Act, and from any claims, demands, suits, causes of action, or liability for bodily injury, death, or damages to property, real or personal, to the extent caused by or resulting from breach of contract, negligence, recklessness or intentional misconduct by the Engineer or by negligence of the Engineer's subconsultants, in the performance of the Engineer's services under this Agreement. During the course of this Agreement, and for a period of four (4) years following substantial completion of the Engineer's services under this Agreement, the Engineer shall maintain professional errors and omissions liability insurance providing coverage for all liability arising out of the performance of services in connection with the Project and this Agreement. The professional errors and omissions liability insurance shall include "prior acts" coverage for all services rendered for the Project and shall be written with a limit of liability of $500,000.00 per claim and an aggregate of $1,000,000.00.

ARTICLE VII
GENERAL TERMS AND CONDITIONS

7.1 Standards of Performance: The Engineer shall perform its services in a manner consistent with the professional skill and care ordinarily provided by other design professionals with the same or similar professional license, providing the same or similar design professional service in the same or similar locality at the same or similar time under the same or similar circumstances.

7.2 Force Majeure: Neither party shall hold the other responsible for damages or delays in performance caused by acts of God, strikes, lockouts, accidents, acts of any governmental entity having jurisdiction over the parties and/or the subject matter of this Agreement (other than those governmental entities named as parties or beneficiaries to this Agreement), or other events beyond the reasonable control of the other or the other's employees and agents. In the event either party claims that performance of its obligation is prevented or delayed by such cause, that party shall promptly notify the other party of that fact and the circumstances preventing or delaying performance.

7.3 Assignment: Neither the District nor the Engineer shall delegate and/or assign their respective duties and/or rights under this Agreement without the prior written consent of the other. The Engineer may subcontract, however, portions of its services as it deems necessary to efficiently accomplish the Basic Services. Nothing

in this paragraph shall release the Engineer from full compliance with the terms and conditions of Article IV.

7.4 Severability; Waiver: In the event a court, governmental agency or regulatory agency with proper jurisdiction determines that any provision of this Agreement is unlawful, that provision shall terminate. If a provision is terminated, but the parties can legally, commercially and practicably continue to perform this Agreement without the terminated provision, the remainder of this Agreement shall continue in effect. One or more waivers by either party of any provision, term, condition or covenant shall not be construed by the other party as a waiver of any subsequent breach of the same by the other party.

7.5 Governing Law: This Agreement shall be governed by, construed and enforced according to the laws of the State of Utah.

7.6 Merger; Amendments: This Agreement represents the entire and integrated agreement between the District and the Engineer, and supersedes all prior negotiations, representations or agreements, whether written or oral, regarding the subject matter contained in this Agreement. The Agreement may be amended only by written instrument executed by all parties.

7.7 Attorney's Fees: In the event of a default or breach of this Agreement, the defaulting party agrees to pay all costs incurred by the non-defaulting party in enforcing this Agreement, or in obtaining damages, including reasonable attorney's fees, whether incurred through legal proceedings or otherwise.

7.8 Notice: Any notice or communication to be given under this Agreement shall be deemed given when sent by registered or certified mail, return receipt requested, to the parties at their respective addresses stated below or to any other address when notice of such change of address has been given to the parties.

7.9 Third Party Beneficiaries: Nothing contained in this Agreement shall create a contractual relationship with a cause of action in favor of a third party against either the District or the Engineer. The Engineer’s services under this Agreement are being performed solely for the District’s benefit, and no other entity shall have any claim against the Engineer because of this Agreement or the performance or non-performance of services hereunder. The District agrees to use reasonable efforts to include a provision in all contracts with other contractors and other entities involved in the Project to carry out the intent of this paragraph.

"District":	"Engineer":
Jordan Valley Water Conservancy District 8215 South 1300 West West Jordan, UT 84088	_____ _____ _____
By: _____ Alan E. Packard Its General Manager/CEO	By: _____ Its: _____

SCHEDULE A

ENGINEER'S SERVICES

SCHEDULE B

ENGINEER'S COMPENSATION

ATTACHMENT B

SAMPLE FEE PROPOSAL

Project Name
Fee Proposal Template Example

Client: Jordan Valley Water Conservancy District ***Firm Name:***

Date:

Tasks	Project Manager (Name)						Total Hours	Cost By Task
Team Member	$_____/hr	$_____/hr	$_____hr	$_____/hr	$_____/hr	$_____/hr		
Project Initiation and Discovery								
1.								
2.								
							Subtotal:	
System Design and Architecture								
1.								
2.								
							Subtotal:	
Implementation								
1.								
2.								
							Subtotal:	
Training and Documentation								
1.								
2.								
							Subtotal:	
Support and Ongoing Maintenance								
1.								
2.								
							Subtotal:	
Total Hours by Team Member								
							TOTAL CONSTRUCTION MANAGEMENT COST	$
Direct Charges:								
							TOTAL DIRECT CHARGES	$
							TOTAL FEE	$

_____
Principal's Name

_____
Principal's Signature

_____
Date

APPENDIX A

Problem Statement from Original RFI

SERWTP Digital Twin Problem Statement
Jordan Valley Water Conservancy District
02/10/2025

The Southeast Regional Water Treatment Plant (SERWTP), a vital component of Jordan Valley Water Conservancy District's (JVWCD) infrastructure serving over 750,000 people, faces a significant challenge in maximizing the utilization of its available source water. The plant, with a capacity of 20 million gallons per day, is a conventional surface water treatment process that includes high-rate clarification, filtration, and disinfection. SERWTP treats water from two sources: canyon water and water from the Deer Creek Reservoir. While the canyon water is essentially free, its availability and quality exhibit substantial fluctuations, both seasonally and daily. Conversely, the reservoir water provides a reliable supply but comes at a cost of approximately $160/acre-ft. Given the complex chemical reactions required for effective clarification of the water, the fluctuating nature of canyon water chemistry poses a challenge to the current treatment process.

Operators are regularly forced to turn away canyon water due to sudden changes in water chemistry that disrupt the treatment process to the point of jeopardizing finished water quality. It is important to maximize the use of the canyon source water because:

1. It provides significant cost savings compared to paying for an equivalent volume of water from the Deer Creek Reservoir.
2. The average volume of water that operators had to turn away over the last five years was 656 acre-ft per year. As growth in demand continues to approach the availability of supply, it becomes more critical to put this water to use. Doing so will delay or eliminate the need for one new well.

Thus far, the complexities of treating the canyon water have not been able to be fully addressed with operator expertise and available modeling tools. **JVWCD believes that implementing an online digital twin of the SERWTP treatment process, leveraging advanced machine learning techniques, will provide the tools needed for operators to fully utilize the canyon water.** As such, JVWCD is making SERWTP data available to companies with an interest in developing machine learning solutions to water treatment problems, with the intent to procure digital twin services/software from them.

The data will be made available to companies for them to develop a prototype of the digital twin that will be used in JVWCD's selection process. Companies wishing to develop a prototype will be required to sign a nondisclosure agreement (NDA) defining the allowable

uses and required handling of the data. The Request for Information (RFI) to which this problem statement is attached provides more details about the procurement process. This document summarizes the desired functionality of the SERWTP Digital Twin, desired outcomes, and data that will be made available.

Desired Functionality

The digital twin should serve as a real-time simulation and decision-support system, enabling operators to optimize treatment processes in response to the dynamic nature of canyon water quality and availability. The digital twin should encompass the following functionalities:

- **Predictive Modeling:** Develop a hybrid physics and machine-learning model capable of accurately predicting treatment process performance under variable canyon water quality conditions. The model should predict critical parameters such as treated water turbidity, unit filter runtime volume (UFRV), and chemical dosages.
- **Optimization Engine:** Incorporate an optimization engine that determines the optimal setpoints for up to 15 key decision parameters, including chemical dosages, canyon water usage, and reservoir water blending.
- **Scenario Analysis:** Enable the evaluation of various optimization strategies, such as maximizing canyon water usage while maintaining target treated water quality and UFRV and minimizing chemical costs.
- **Cost Analysis:** Provide a comprehensive cost analysis module that quantifies the potential savings associated with each optimization strategy, accounting for the variable costs of canyon and reservoir water, chemical consumption, and filter run times.
- **What-If Analysis:** Allow operators to perform what-if analyses by adjusting input parameters for the two water sources and treatment set points and then evaluating the impact on optimization outcomes.

Desired Outcomes

The implementation of a digital twin at SERWTP is expected to yield several significant benefits, including:

- **Increased Canyon Water Utilization:** By enabling real-time optimization based on canyon water quality, the digital twin will facilitate increased usage of this essentially free water source. Initial estimates indicate expected average annual operational cost savings of $100,000 with significant variation from year-to-year based on canyon water availability. It is also believed that better utilization of the

canyon water will defer or eliminate the need for a new supply well in the JVWCD system, which would save $5M-$10M.

- **Enhanced Treatment Efficiency:** The digital twin's ability to predict optimal setpoints for critical process parameters will significantly improve treatment efficiency by reducing chemical consumption, extending filter run times, and minimizing the need for manual adjustments.
- **Reliable Plant Operation:** By incorporating UFRV as a key optimization parameter, the digital twin will ensure sustainable plant operation even with increased canyon water usage, preventing the occurrence of low UFRV conditions that could render the water untreatable.
- **Improved Decision-Making:** The digital twin will empower operators with real-time insights into the trade-offs between different operational strategies, enabling more informed and data-driven decisions that balance cost savings, water quality, and operational stability.

Data Index

The following data points will be provided to companies that sign the required nondisclosure agreement, along with a schematic showing the location of the source instrumentation for each data point.

Schematic Location	Description	Tag Name
1	Total Flow Bell Canyon	SERWTP.SE_INT_BC_FIT00104_F_PV.F_CV
2	West Flow Bell Canyon	SERWTP.SE_INT_BC_FIT00103_F_PV.F_CV
3	Draper Diversion Turbidity	SERWTP.SE_INT_BC_AIT03403_TB_PV.F_CV
4	Draper Diversion Weir Level	SERWTP.SE_INT_BC_LIT03402_LEV_PV.F_CV
5	Draper Diversion Gate Position	SERWTP.SE_INT_BC_VLV03400_V_PV.F_CV
6	SLC Aqueduct Flow	SERWTP.SE_INT_RWV_FIT2019_F_PV.F_CV
7	SLC Aqueduct Turbidity	SERWTP.SE_INT_RWV_AIT1707_TB_PV.F_CV
8	SLC Valve Position	SERWTP.SE_INT_RWV_VLV1101_V_PV.F_CV
9	Canyon Flow	SERWTP.SE_INT_RWV_FIT2006_F_PV.F_CV
10	Canyon Influent Turbidity	SERWTP.SE_INT_RWV_AIT1706_TB_PV.F_CV
11	Canyon Valve Position	SERWTP.SE_INT_RWV_VLV1102_V_PV.F_CV
12	Total Influent Flow	SERWTP.SE_INT_IS_FIT1731_F_CALC.F_CV
13	Combined Influent Temperature	SERWTP.SE_INT_IS_TIT1106_T_PV.F_CV
14	Combined Influent Turbidity	SERWTP.SE_INT_IS_AIT1107_TB_PV.F_CV
15	Reclaim Flow	SERWTP.SE_RC_FIT4114_F_PV.F_CV
16	Bpoly Train 1 Pump Dose Setpoint	SERWTP.SE_CG_BPF_FIC2991_DOSE_SP.F_CV
17	Bpoly Train 2 Pump Dose Setpoint	SERWTP.SE_CG_BPF_FIC2992_DOSE_SP.F_CV
18	Sludge Flow In MGD	SERWTP.SE_RC_FIT2008A_F_PV.F_CV

Schematic Location	Description	Tag Name
19	Intended PACL Dose to Flash Mix	SERWTP.SE_CG_PACL_FIC6213_DOSE_SP.F_CV
20	Intended PACL Dose to Filters	SERWTP.SE_CG_PACL_FIC6211_DOSE_SP.F_CV
21	PEC Intended Dosage	SERWTP.SE_CG_PEC_FIT5010_DOSE_CALC.F_CV
22	Total Intended PRE CL2 Doseage	SERWTP.SE_TC_CL2_FIC6360_DOSE_CALC.F_CV
23	Actiflo Influent Particle Counts	SERWTP.SE_ACT_FM_AIT2781_PC_PV.F_CV
24	Influent Actiflo Turbdity	SERWTP.SE_ACT_FM_AIT2002_TB_PV.F_CV
25	Actiflo Train 1 Turbidity	SERWTP.SE_ACT_T1_AIT2014_TB_PV.F_CV
26	Actiflo Train 2 Turbidity	SERWTP.SE_ACT_T2_AIT2016_TB_PV.F_CV
27	Train 1 Sand Conc Target (Manual Enter)	SERWTP.SE_ACT_T1_CONC2471_SP.F_CV
28	Train 1 Sand Actual Concentration (g/L)	SERWTP.SE_ACT_T1_CONC2471_CONC_CALC.F_CV
29	Train 2 Sand Conc Target (Manual Enter)	SERWTP.SE_ACT_T2_CONC2472_SP.F_CV
30	Train 2 Sand Actual Concentration (g/L)	SERWTP.SE_ACT_T2_CONC2472_CONC_CALC.F_CV
31	Total Filter Influent Flow	SERWTP.SE_FL_FC3773_F_CALC.F_CV
32	Filter Influent CL2	SERWTP.SE_FL_AIT3136_CL2_PV.F_CV
33	Filter Influent Turbidity	SERWTP.SE_FL_AIT6581_TB_PV.F_CV
34	Filtration Rate	SERWTP.SE_FL_FC3772_RATE_CALC.F_CV
35	Surface Wash Flow	SERWTP.SE_FL_FIT3037A_F_PV.F_CV
36	Filter 1 Level	SERWTP.SE_FL_FL1_LIT3014_LEV_PV.F_CV
37	Filter 2 Level	SERWTP.SE_FL_FL2_LIT3024_LEV_PV.F_CV
38	Filter 3 Level	SERWTP.SE_FL_FL3_LIT3034_LEV_PV.F_CV
39	Filter 4 Level	SERWTP.SE_FL_FL4_LIT3044_LEV_PV.F_CV
40	Filter 5 Level	SERWTP.SE_FL_FL5_LIT3054_LEV_PV.F_CV
41	Filter 6 Level	SERWTP.SE_FL_FL6_LIT3064_LEV_PV.F_CV
42	Filter 1 Turbidity	SERWTP.SE_FL_FL1_AIT3016_TB_PV.F_CV
43	Filter 2 Turbidity	SERWTP.SE_FL_FL2_AIT3026_TB_PV.F_CV
44	Filter 3 Turbidity	SERWTP.SE_FL_FL3_AIT3036_TB_PV.F_CV
45	Filter 4 Turbidity	SERWTP.SE_FL_FL4_AIT3046_TB_PV.F_CV
46	Filter 5 Turbidity	SERWTP.SE_FL_FL5_AIT3056_TB_PV.F_CV
47	Filter 6 Turbidity	SERWTP.SE_FL_FL6_AIT3066_TB_PV.F_CV
48	Filter 1 Particle Counts	SERWTP.SE_FL_FL1_AIT3017_PC_PV.F_CV
49	Filter 2 Particle Counts	SERWTP.SE_FL_FL2_AIT3027_PC_PV.F_CV
50	Filter 3 Particle Counts	SERWTP.SE_FL_FL3_AIT3037_PC_PV.F_CV
51	Filter 4 Particle Counts	SERWTP.SE_FL_FL4_AIT3047_PC_PV.F_CV
52	Filter 5 Particle Counts	SERWTP.SE_FL_FL5_AIT3057_PC_PV.F_CV
53	Filter 6 Particle Counts	SERWTP.SE_FL_FL6_AIT3067_PC_PV.F_CV
54	Filter Effluent CL2 Residual	SERWTP.SE_FW_AIT5002_CL2_PV.F_CV
55	Total POST CL2 Dose	SERWTP.SE_TC_CL2_FIC6310_DOSE_CALC.F_CV

Schematic Location	Description	Tag Name
56	Combined Filter Effluent Turbidity	SERWTP.SE_FW_AIT5001_TB_PV.F_CV
57	Backwash Water Flow In Gpm	SERWTP.SE_FL_FIT3131A_F_PV.F_CV
58	Backwash Water Turbidity	SERWTP.SE_FL_AIT4102_TB_PV.F_CV
59	Reclaim Basin Being Used Level	SERWTP.SE_RC_LIT4100_LEV_PV.F_CV
60	Plant Effluent Flow	SERWTP.SE_FW_FIT6405_F_PV.F_CV
61	Reclaim Turbidity	SERWTP.SE_RC_AIT4105_TB_PV.F_CV
62	Influent pH	SERWTP.SE_INT_IS_AIT1103_PH_PV.F_CV
63	Influent Alkalinity	SERWTP.SE_FW_LAB_AC1747_CALC.F_CV
64	Influent Hardness	SERWTP.SE_FW_LAB_AC1744_CALC.F_CV
65	Influent Temperature	SERWTP.SE_ACT_FM_TIT2005_T_PV.F_CV

Summary

This problem statement and data provided with it is intended to guide the development of digital twin prototypes that JVWCD will evaluate to select a company to provide a digital twin of the SERWTP treatment process. Additional details about the procurement process are provided in the RFI. The successful implementation of the digital twin will transform the operation of SERWTP, enabling JVWCD to effectively address the challenges posed by the variable nature of canyon water. The expected result is substantial cost savings while ensuring the reliable delivery of high-quality treated water to its customers.