

EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

Proposal to Develop Eastern San Joaquin Groundwater Authority Annual Net Groundwater Impact Accounting Framework

March 2026

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March 9, 2026

Julia Berry

Eastern San Joaquin Groundwater Authority

Via email: Julia@firstwaterpartners.net

RE: Development and Implementation of an Annual Net Groundwater Impact Accounting Framework

Zanjero is pleased to provide this proposal to the Eastern San Joaquin Groundwater Authority to support development and implementation of a consistent Annual Net Groundwater Impact Accounting Framework for the Eastern San Joaquin Subbasin. Our firm has extensive experience assisting public agencies across California with the practical implementation of the Sustainable Groundwater Management Act (SGMA), including development of groundwater accounting methodologies and allocation support tools that enable agencies to track groundwater use and implement data-driven management policies.

As groundwater sustainability agencies (GSAs) transition from plan development into long-term implementation of their groundwater sustainability plans (GSPs), effective groundwater management will depend on technically sound and transparent analytical methods capable of producing defensible results. Zanjero is well positioned to support this effort based on our experience developing and implementing groundwater accounting methodologies that integrate satellite-based evapotranspiration data, surface water delivery records, and parcel-scale spatial analysis to produce consistent and defensible estimates of groundwater use. We are currently supporting four GSAs within the Eastern San Joaquin Subbasin in applying similar analytical approaches, providing our team with direct familiarity with basin datasets, institutional considerations, and implementation needs.

Zanjero is a unique water resources consulting firm that takes pride in providing strategic water planning, policy, and management support to resolve complex water resource challenges for our clients throughout California and the American West. We bridge the gap between conventional law firms and engineering firms by synthesizing the legal, technical, economic, and political elements that permeate every water issue and water plan. Zanjero's

action tag line, **Advise-Manage-Solve**, embodies our approach to addressing our clients' water management issues.

Zanjero has assembled an experienced team to support this effort. Greg Young will serve as Project Manager and primary point of contact with the Authority, guiding the overall approach and coordinating directly with Authority staff and member GSAs on development and implementation of the Net Groundwater Impact Accounting Framework. Adriel Ramirez will support project management and technical development, ensuring continuity, responsiveness, and high-quality work products throughout the engagement. Omar Samara will support technical development and provide technical analytical support, contribute to data evaluation, documentation, and development of repeatable calculation workflows. Additional skilled staff members will provide support as needed. Together, this team brings the experience and technical capability necessary to successfully support development and implementation of a consistent subbasin-wide accounting framework for the Authority and its member GSAs.

Thank you for the opportunity to respond to your request. Please contact any member of the project team listed below if you have questions or require additional information.

Sincerely,

Greg Young, PE

Greg Young, PE
Principal
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Adriel Ramirez

Adriel Ramirez
Sr Resource Planner
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Omar Samara, Ph.D.

Omar Samara, Ph.D.
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Firm Qualifications & Relevant Experience

Firm Qualifications

Zanjero, a Trinity Consulting Company, is a strategic water management and planning firm offering customized consulting and program management services. We are acknowledged leaders in water resources management consulting with a unique programmatic approach to addressing the legal, economic, technical, and political aspects of water planning. Zanjero's staff combines water resources engineering, water law, water policy and public outreach professionals in a single firm to offer full range programmatic support. Our programmatic management expertise includes:

• *Comprehensive Water Planning* • *Recycled Supply Development* • *Water Rights and Entitlements* • *Water Transfers and Exchanges* • *BDWQCP, Delta Reform Act, and SGMA Analysis and Implementation* • *Water Resource Legislative and Policy Support*	• *Water Conservation and Recycling* • *Water Master Plans and Modeling* • *WSA and WSV Development* • *Urban, Environmental, and Agricultural Water Demand Analyses* • *Alternative Water Supply Investigations* • *Capital Improvement Plans*

Key Personnel

Greg Young, PE – Senior Principal

Greg is a Senior Principal at Zanjero with extensive experience advising public agencies on complex water management, policy, and regulatory issues throughout California. His work focuses on developing practical governance frameworks that translate legal requirements, technical analysis, and stakeholder input into implementable programs. He has supported numerous agencies in navigating evolving regulatory conditions while maintaining operational reliability and long-term resource sustainability.

Greg has played a leading role in translating complex water policy and regulatory requirements into actionable guidance at both the state and local level. He contributed to the development of the California Department of Water Resources' 2020 Urban Water Management Plan Guidebook, providing regulatory guidance relied upon by hundreds of

agencies statewide. This work reflects a broader ability to synthesize mandates and technical standards into clear direction that agencies can implement with confidence.

He currently serves as the principal strategic advisor to the Merced Subbasin Groundwater Sustainability Agency, where he has guided groundwater sustainability planning and implementation efforts since initial development of the Groundwater Sustainability Plan. Greg led the formal drafting and adoption of the MSGSA's Groundwater Allocation Rule, an 18-month process requiring sustained coordination across agricultural stakeholders, public agencies, technical advisors, and state regulators, and continues to support ongoing refinement and implementation as conditions evolve.

Across multiple San Joaquin Valley basins, Greg has advanced the practical integration of satellite-based evapotranspiration data and spatial analysis into defensible allocation, accounting, and demand management programs. He is also directly involved in strategic implementation of the Groundwater Accounting Platform to support transparent tracking of groundwater use and compliance. Through this work, Greg brings demonstrated experience aligning data systems, regulatory mandates, and diverse institutional interests into durable, operational programs. Greg is also a member of the Consortium's Critical Water Accounting Response Committee, providing expert input on development of groundwater accounting tools, polices, and practices to support water management under extreme weather conditions.

Adriel Ramirez – Senior Water Resources Planner

Adriel is a Senior Water Resources Planner at Zanjero with extensive experience in groundwater sustainability, water supply planning, and regulatory compliance across California. His work focuses on developing practical, implementable solutions to complex water management challenges through integration of technical analysis, policy considerations, and stakeholder engagement. He has supported numerous public agencies in navigating evolving regulatory requirements while maintaining reliable water supplies and advancing long-term resource management objectives.

Adriel brings a combination of technical depth and governance experience grounded in both groundwater sustainability and broader statewide water planning efforts. Prior to joining Zanjero, he held roles supporting local government water resource programs, including serving in a leadership capacity supporting GSA operations in the Merced Subbasin. In that role, he supported GSA governance, policy development, budget administration, and coordination among member agencies responsible for implementing SGMA.

In addition to supporting development and implementation of groundwater allocation and demand management programs, Adriel has prepared a wide range of regulatory planning documents and compliance reports for irrigation districts, urban water suppliers, and other public water agencies across California. This work includes long-range water supply

planning, annual supply and drought assessments, reporting associated with statewide water-efficiency standards, and water rights filings, giving him extensive experience working with a wide range of water data sources and reporting requirements.

Across these efforts, Adriel routinely integrates geospatial analysis, satellite-based evapotranspiration data, and groundwater accounting tools to support development of defensible analytical frameworks for tracking groundwater use and informing SGMA implementation. He works directly with GSAs, irrigation districts, and groundwater users to translate complex analytical outputs into practical information that agencies can rely upon for groundwater accounting, allocation administration, and long-term resource management. Adriel is also a member of the Consortium's Critical Water Accounting Response Committee, providing expert input on development of groundwater accounting tools, polices, and practices to support water management under extreme weather conditions.

Omar Samara, Ph.D. – Water Resources Planner

Omar is a Water Resources Planner at Zanjero with a background in agricultural engineering and quantitative analysis of water resources systems. He holds a Ph.D. in Biological Systems Engineering from the University of California, Davis, where his doctoral research focused on evaluating agricultural systems to improve resource sustainability under changing water availability conditions. His work combines engineering analysis, data-driven evaluation, and applied water resource planning to support informed decision-making by public agencies.

Omar brings nearly a decade of experience working on issues related to water use, environmental sustainability, and long-term resource management. His technical expertise includes scientific and mathematical modeling, geospatial analysis, evaluation of agricultural water demands, and application of satellite-based evapotranspiration data to better understand crop water use and groundwater pumping patterns.

His research and professional work have focused on improving understanding of how agricultural systems respond to water supply constraints and management policies. This includes applying engineering and statistical methods to evaluate irrigation efficiency, crop water use, and the impacts of water management strategies on long-term resource sustainability. Through this work, Omar has developed strong expertise in integrating field data, remote sensing information, and spatial analysis into analytical frameworks that support water planning and management decisions.

At Zanjero, Omar contributes to the development of multi-year and multi-decade decision-support tools that allow water agencies to evaluate supply reliability, understand trade-offs among management strategies, and plan for long-term resource sustainability. His experience with scientific modeling, evapotranspiration analysis, GIS based spatial analysis,

and technical documentation support the development of transparent and defensible analytical approaches used by agencies to inform water management and planning decisions.

Relevant Experience

Merced Subbasin Groundwater Sustainability Agency Strategic Support

Zanjero provides ongoing strategic advisory services to the Merced Subbasin Groundwater Sustainability Agency (MSGSA), a multi-agency joint powers authority responsible for implementing the Sustainable Groundwater Management Act across a large, highly productive agricultural basin. Our work supports the Governing Board and staff in translating complex regulatory mandates, technical analyses, and stakeholder concerns into implementable policies and programs. Greg serves as lead advisor to the Board on governance, policy formulation, and regulatory strategy, while Adriel supports technical analysis, program design, preparation of materials for Board deliberations, and routine coordination with groundwater users, particularly growers, regarding the implementation of allocation requirements and use of the Groundwater Accounting Platform (GAP).

A central component of this engagement was development and adoption of the MSGSA Groundwater Allocation Rule, a comprehensive framework governing groundwater use, accounting, and demand management. Drafting and adoption of the rule required sustained coordination among agricultural producers, local agencies, technical consultants, and state regulators, as well as extensive public meetings and advisory committee discussions. Greg led policy development and Board facilitation throughout the process, with Adriel supporting analysis, documentation, and integration of monitoring approaches into operational provisions. The adopted rule established procedures for tracking groundwater use, administering allocations, and supporting compliance under SGMA while remaining adaptable to evolving hydrologic conditions and regulatory guidance.

Zanjero has also played a significant role in operationalizing the data systems necessary to implement the allocation program, including hands-on support for deployment and refinement of the GAP. Adriel has worked directly with platform developers and GSA staff to evaluate functionality, identify needed adjustments, and ensure the system effectively supports allocation policy requirements and the practical needs of groundwater users. This work includes routine interaction with growers using the platform and conveying user feedback to development teams to improve usability and reporting workflows. Based on this experience, Zanjero and MSGSA were selected to participate as a pilot implementation partner in a state initiative to expand open-source tools, data, and modeling capabilities for improved groundwater accounting under extreme weather conditions, with Greg and Adriel serving individually on the project's advisory body. This long-term engagement demonstrates

Zanjero's ability to guide complex, multi-party decision processes where outcomes have significant economic, legal, and community implications.

Reference: Lacey McBride, Merced County Water Resources Manager; Lacey.McBride@countyofmerced.com

Eastern San Joaquin GSAs Groundwater Pumping Analysis

Zanjero has completed similar technical and analytical efforts for North San Joaquin Water Conservation District (NSJWCD) and Stockton East Water District (SEWD) and is currently working with Central San Joaquin Water Conservation District (CSJWCD) and South San Joaquin Irrigation District (SSJID) on analyses directly relevant to development and implementation of an Annual Net Groundwater Impact Accounting Framework. For these agencies, Zanjero conducted district-level evaluations of agricultural water use using satellite-based evapotranspiration (ET) data, including analysis of OpenET outputs combined with agency-provided surface water delivery records. This work improved understanding of groundwater pumping and consumptive use associated with irrigated lands within each district's service area through the application of consistent analytical methods and clearly documented assumptions.

Across these engagements, Zanjero focused on developing repeatable approaches that allow groundwater use and applied water estiamtes to be evaluated consistently across agencies and over multiple years. This work involved coordinating closely with district staff to collect and review data, evaluating surface water delivery records to distinguish groundwater reliance, and preparing parcel- and district-level summaries of ET, applied water, and estimated groundwater use. The analyses were intentionally structured to support transparency and facilitate discussion with agency staff and governing boards regarding methodology assumptions, data limitations, and interpretation of results.

These efforts demonstrate Zanjero's experience working with multiple public agencies within the Eastern San Joaquin region on groundwater accounting and water use analysis that require coordination, consistency, and clear technical documentation. The methodologies developed for these four agencies provide a strong foundation for supporting the Authority's objectives of establishing a shared and defensible accounting framework.

Reference: Steve Schwabauer, NSJWCD General Manager; steve@nsjwcd.com

Reference: Justin M. Hopkins, P.E., SEWD General Manager; JHopkins@sewd.net

Reference: Steve Knell, CSJWCD Interim General Manager; knellsteve66@gmail.com

Reference: Brandon Nakagawa, SSJID Water Resources Coordinator; brandon.nakagawa@ssjid.gov

Schedule and Scope of Work

The following scope of work describes Zanjero's approach to supporting the Eastern San Joaquin Groundwater Authority (ESJGWA) in developing and implementing a consistent Annual Net Groundwater Impact Accounting Framework for the Eastern San Joaquin Subbasin. Our approach focuses on establishing a transparent and repeatable methodology, supporting coordinated data collection across member GSAs, and producing annual calculations and reporting that can be consistently applied over time. The tasks described below are structured to guide the Authority and its member GSAs from methodology refinement through implementation, ensuring that the resulting framework is technically defensible, clearly documented, and suitable for ongoing annual application across the subbasin.

Task 1: Finalize Net Groundwater Impact Methodology

Task Timeline: Q1-Q3 2026

Task 1.1 – Methodology Review and Refinement

Zanjero will work collaboratively with ESJGWA staff and the member GSAs to review, refine, and finalize an accurate, consistent, and transparent methodology for calculating net groundwater impacts across the Eastern San Joaquin Subbasin. This will build upon the efforts recently completed or underway for four of the largest agricultural-focused GSAs, but will need to address including municipal data, industrial use, and other non-agricultural pumping. This effort will include evaluating existing assumptions, identifying data needs, sources and limitations, and ensuring the methodology is repeatable on an annual basis and suitable for operational reporting.

***Deliverable*:** Documentation of methodology considerations, assumptions, and refinements for ESJGWA and GSA review.

Task 1.2 – Define Standardized Data Inputs and Calculation Components

Zanjero will define and document standardized data inputs and calculation components required to implement the Net Groundwater Impact Accounting Framework. This will include establishing consistent treatment of agricultural pumping through the use of satellite-based evapotranspiration data and agreed upon assumptions, as well as sourcing and incorporating municipal and industrial pumping, domestic pumping, return flows, and surface water deliveries and recharge.

Deliverable: Standardized data input specifications and calculation documentation.

Task 1.3 – Technical Memorandum and Board Presentation

Zanjero will prepare a technical memorandum describing the recommended Net Groundwater Impact Accounting Framework, including the finalized methodology, data

sources, assumptions, and calculation procedures. Zanjero will present the recommended methodology to the ESJGWA Board for consideration and adoption in accordance with the Authority's targeted July Governing Board meeting.

Deliverable: Technical memorandum and ESJGWA Board presentation materials.

Task 2: Data Collection and Annual Net Groundwater Impact Calculations

Task Timeline: Q2-Q3 2026

Task 2.1 – Standardized Data Request and Collection

Zanjero will develop standardized annual data request templates and guidance materials to support consistent data collection of required inputs from each GSA. Templates will be aligned with the adopted methodology and structured to facilitate efficient review, validation, and annual updates. Zanjero will coordinate with member GSAs to distribute templates, provide technical support as needed, and collect data submissions in a consistent format and within agreed-upon timelines. Where possible, Zanjero will utilize data from existing state reporting programs, including but not limited to Annual Water Supply and Demand Assessments, Monthly Drought and Conservation Reporting, and Urban Water Management Plans, to inform estimates of municipal, industrial, and domestic groundwater use. Leveraging these sources will promote consistency with existing reporting and reduce the potential for conflicting estimates.

Deliverable: Standardized annual data request templates and compiled annual data submissions organized by GSA and Water Year.

Task 2.2 – Data Review and Validation

Zanjero will review GSA data submissions for completeness and consistency with the adopted methodology. This step will include evaluating data inputs, confirming assumptions used to address any data gaps, and coordinating with GSAs to resolve questions or inconsistencies. The objective of this review is to ensure that all data inputs used in the accounting framework are transparent, well-documented, and suitable for repeatable annual calculations.

Deliverable: Data validation summary and documentation of assumptions used for each Water Year.

Task 2.3 – Annual Net Groundwater Impact Calculations

Using the adopted methodology and validated data inputs, Zanjero will calculate the annual Net Groundwater Impact for each GSA on a Water Year basis (October 1 through September 30). Calculations will be performed using consistent analytical procedures and clearly documented workflows to ensure results are reproducible and suitable for ongoing annual implementation by ESJGWA and its member GSAs.

Deliverable: Annual Net Groundwater Impact calculation tables, summaries, maps, and supporting files for each member GSA.

Task 3: Reporting

Task Timeline: Q4 2026 – Q1 2027

Task 3.1 – Preparation of Draft Annual Net Groundwater Impact Report

Zanjero will prepare a draft report summarizing the methodology, data sources, assumptions, and Net Groundwater Impact results for each member GSA. The report will include basin-wide summaries, tables, figures, and technical appendices as appropriate.

Deliverable: Draft Net Groundwater Impact report for ESJGWA and member GSA review.

Task 3.2 – Report Finalization and Production

Zanjero will circulate the draft report to member GSAs for review, compile and track comments from GSAs and ESJGWA staff, and incorporate revisions to produce a final Net Groundwater Impact report. The final report will be prepared consistently with ESJGWA and member GSA reporting schedules and structured to support integration with GSP Annual Report requirements.

Deliverable: Final Annual Net Groundwater Impact report submitted to ESJGWA and member GSAs in accordance with the Authority's schedule including:

- By December 1, 2026: Report calculating Net Groundwater Impact for Water Years 2024 and 2025.
- By March 1, 2027: Report calculating Net Groundwater Impact for Water Year 2026.

Task 4: Coordination and Meetings

Task Timeline: Q2 2026 – Q1 2027

Task 4.1 – Ongoing Coordination with ESJGWA and Member GSAs

Zanjero will regularly coordinate with ESJGWA staff and member GSAs to support implementation of the Net Groundwater Impact Accounting Framework. Coordination will include scheduled meetings, technical discussions, and follow-up communication as necessary to address methodology questions, confirm data inputs, and ensure consistent application of the accounting framework across the subbasin.

Deliverable: Meeting agenda materials, coordination summaries, and action item documentation.

Task 4.2 – ESJGWA Board Coordination and Presentations

Zanjero will attend ESJGWA Board meetings as requested to present methodology recommendations, annual results, and key findings. Zanjero will support Board discussions

by clearly communicating analytical methods, assumptions, and results and responding to questions related to the accounting framework.

Deliverable: Board presentation materials and presentation support.

Project Schedule

This schedule anticipates timely coordination with ESJGWA and member GSAs for meetings and receipt of requested data.

ESJGWA Net Groundwater Impact Accounting Framework Schedule

Task	2026										2027		
	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Task 1 - Finalize Net Groundwater Impact Methodology	■	■	■	■	■								
1.1 Methodology Review and Refinement	■	■	■										
1.2 Define Standardized Data Inputs and Calculation Components		■	■	■									
1.3 Technical Memorandum and Board Presentation				■	◆								
Task 2 - Data Collection and Annual Net Groundwater Impact Calculations				■	■	■	■						
2.1 Standardized Data Request and Collection				■	■				■	■			
2.2 Data Review and Validation					■	■	■		■	■	■		
2.3 Annual Net Groundwater Impact Calculations						■	■			■	■		
Task 3 - Reporting								■	■	■	■	■	■
3.1 Preparation of Draft Annual Net Groundwater Impact Report								■	■	■	■		
3.2 Report Finalization and Production										◆	■	■	◆
Task 4 - Coordination and Meetings	■	■	■	■	■	■	■	■	■	■	■	■	■
4.1 Ongoing Coordination with ESJGWA and Member GSAs	■	■	■	■	■	■	■	■	■	■	■	■	■
4.2 ESJGWA Board Coordination and Presentations	■	■	■	■	■	■	■	■	■	■	■	■	■

◆ Project Milestone

■ Scheduled Activities

Proposed Budget

Zanjero will work on this project on a time and materials basis at our standard 2026 billable rates. Costs to complete work under this proposal will not exceed $150,000, assuming adequately available data, and timely input and review by GSAs. The table below reflects Zanjero's estimated distribution of cost across the tasks and subtasks. The project is expected to be managed to the total budget, however.

Zanjero Cost Proposal for ESJGWA Net Groundwater Impact Accounting Framework					
Task Description	Principal	Senior Planner	Planner	Admin / Analyst	Totals
Task 1 - Finalize Net Groundwater Impact Methodology, Q1-Q3 2026					
1.1 Methodology Review and Refinement	12	10	12	0	34
1.2 Define Standardized Data Inputs and Calculation Components	8	10	10	0	28
1.3 Technical Memorandum and Board Presentation	15	8	20	8	51
Subtotal (hours)	35	28	42	8	113
Task 2 - Data Collection and Annual Net Groundwater Impact Calculations, Q2-Q3 2026					
2.1 Standardized Data Request and Collection	10	20	25	0	55
2.2 Data Review and Validation	10	30	60	10	110
2.3 Annual Net Groundwater Impact Calculations	15	35	45	0	95
Subtotal (hours)	35	85	130	10	260
Task 3 - Reporting, Q4 2026 - Q1 2027					
3.1 Preparation of Draft Annual Net Groundwater Impact Report	5	50	40	10	105
3.2 Report Finalization and Production	5	25	25	10	65
Subtotal (hours)	10	75	65	20	170
Task 4 - Coordination and Meetings, Q2 2026 - Q1 2027					
4.1 Ongoing Coordination with ESJGWA and Member GSAs	10	10	8	0	28
4.2 ESJGWA Board Coordination and Presentations	10	10	5	0	25
Subtotal (hours)	20	20	13	0	53
Total Labor Hours	100	208	250	38	596

Project Cost Proposal					
Labor Rates ($/hr)	$350	$250	$230	$140	--
Total Labor Costs	$35,000	$52,000	$57,500	$5,320	$149,820
				Project Total	**$149,820**