WaterSMART: Applied Science Grants for Fiscal Year 2023

NOFO No. R23AS00446

Knowledge Systems Development Through Integrated Santa Ana River Model Enhancements to Quantify a Century of Managed Aquifer Recharge and Build Forecasting Capacity for the San Bernardino Basin

San Bernardino Valley Water Conservation District

San Bernardino Valley Water Conservation District

UEI: C6XYWHVC1S15

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1.0 Technical Proposal & Evaluation Criteria

Date: 10/17/2023

Applicant: San Bernardino Valley Water Conservation District

Location: 1630 West Redlands Blvd., Suite A, Redlands, San Bernardino County, California 92373

1.1 Executive Summary

Project Summary:

The San Bernardino Valley Water Conservation District, in collaboration with California State University, Sacramento, will make several enhancements to the existing Integrated Santa Ana River Model, a combined groundwater and surface water model that is a foundational tool used for water management in the Upper Santa Ana River Watershed, and the San Bernardino Basin in particular. The model enhancements will extend the calibration period to incorporate recharge data available from 1912-2023, incorporate updated designs for proposed new recharge facilities and modifications to existing recharge facilities, and evaluate climate change scenarios using the most recent predictions. The updated model will quantify the benefits and trends over the past century of groundwater recharge, building a comprehensive systems knowledge base to support robust forecasting capabilities that incorporate climate change, inform accurate cost benefit analyses for proposed projects, and optimize facility operations. This information is expected to increase confidence and alignment among regional water managers around which infrastructure investments to prioritize and result in increased collaboration and timely implementation of critical projects to increase water supply reliability, improve management of water deliveries, improve drought management, and enhance conjunctive use of groundwater.

Length of Time and Estimated Completion Date:

The proposed project tasks will take place from June 1st, 2024 through May 31st, 2026. All project work will be completed by July 1, 2026.

Federal Facilities:

The proposed project includes analysis of existing and in-construction groundwater recharge basins owned and operated by the San Bernardino Valley Water Conservation District (Conservation District) located on lands owned by Conservation District and the Bureau of Land Management. The proposed project will not affect or alter these facilities in any way.

1.2 Technical Project Description

Applicant Category:

The Conservation District is a water conservation district in California organized under Division 21 of the California Water Code and regulated by Sections 74000 to 76501. Section 74522 of the California Water Code provides that a water conservation district may “conserve, store, spread, and sink water and for such purposes may acquire or construct dams, damsites,

reservoirs and reservoir sites, canals, ditches and conduits, spreading basins, sinking wells, and sinking basins". Section 74522 of the California Water Code provides that "a district may drill, construct, install, and operate wells, pumps, pipelines, conduits, valves, gates, meters, and other appurtenances to such wells, pipelines and conduits, and may pump water therefrom and thereby for sale, delivery, distribution, or other disposition". Therefore, the Conservation District is eligible to pursue funding as a Category A applicant as a public organization with water delivery authority.

1.2.1 Detailed Project Description

The proposed project utilizes the Integrated SAR (Santa Ana River) Model, an integrated surface and groundwater flow model developed by GeoScience Support Services, Inc. (Geoscience. 2020) and maintained by San Bernardino Valley Municipal Water District, to develop comprehensive knowledge systems related to the historic and future managed aquifer recharge in the Upper Santa Ana Valley Groundwater Basin. This model is an important management tool to understand SAR streamflow as well as evaluate responses from streamflow and groundwater levels to historic and proposed managed aquifer recharge.

The proposed project will extend and update the existing Integrated SAR Model by calibrating the model for a longer run period, incorporating proposed future recharge projects and evaluating their contribution to water resiliency in the basin by considering various climate change scenarios applicable for the Basin, including:

1. Extend the model period from January 1966 - December 2016 to January 1912 - December 2023 and calibrating this period using historic and recent groundwater level and streamflow data. Running this extension with and without the Conservation District's managed aquifer recharge efforts to date will quantify outcomes on aquifer levels since the start of relevant data collection in 1912, and build knowledge of system interactions to inform the District's operations and regional capital improvement investments.

2. Incorporate the most current design of proposed new recharge facilities or modifications to existing facilities (collectively referred to as Program for Expansion of Recharge Capacity (PERC) projects) into the Integrated SAR Model. The early conceptual designs for these facilities are included in the current model; our work will update and rerun the model based on their current, revised designs. Incorporating these new projects into the model will allow us to conduct a cost-benefit analysis to inform prioritization of these projects on a cost-per-acre-foot basis. Regional water groups such as the Basin Technical Advisory Committee and the Upper Santa Ana River Watershed Infrastructure Financing Authority will use this information to inform investments in regional projects that increase water supply reliability, improve water management, and utilize nature-based solutions.

3. Run scenarios to quantify the effects of a changing climate on the Basin's groundwater levels and quantify the potential resiliency benefits of the PERC projects under a rapidly changing and uncertain climate. We will utilize the ensemble analysis of climate models developed by the Climate Change Technical Advisory Group, formed by the California Department of Water Resources as part of the Sustainable Groundwater Management Act (SGMA), provided as

downscaled projections of monthly climate change factors for precipitation and evapotranspiration (ET) over California.

4. Use an open science collaborative approach to develop and disseminate the modeling framework and results, including formation of an advisory group of relevant stakeholders throughout the United States to engage and provide feedback throughout all the phases of the project. In addition, code and data generated by the project will be published in open repositories to ensure replicability, scaling up the potential impact of the project results. The project outcomes will be disseminated via a public workshop with the advisory group and other interested parties as well as state and national conferences. The Conservation District will also participate in a Reclamation-sponsored webinar, which may be open to the public, to share project accomplishments, the final results of the identified tasks, and any lessons learned. A flow chart for planned project activities is provided in Figure 1.

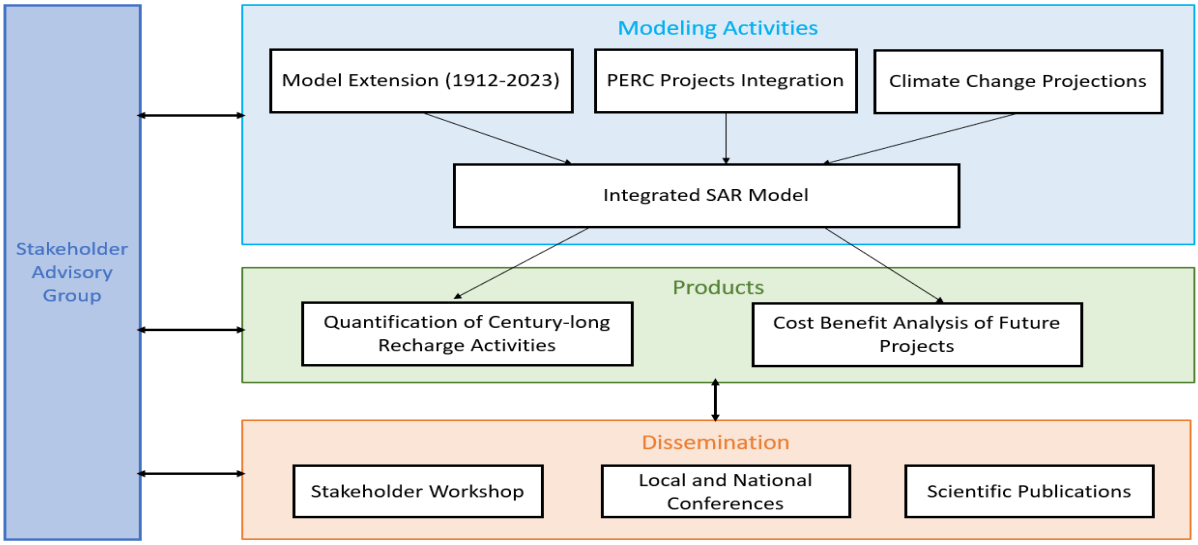

Figure 1. Project Activity Flow Chart

The total project cost is $814,243, including a request for $361,117 (44%) in federal assistance and $453,126 (56%) in matching funds.

1.2.2 Goals

The four goals of the proposed project are: 1) Extend the existing Integrated SAR Model to cover the period of January 1912 through December 2023 to evaluate the impact of over a century of managed aquifer recharge efforts on aquifer levels; 2) Incorporate the new design of the proposed PERC projects into the Model; 3) Evaluate the benefits of the PERC projects in the frame of a changing climate to inform prioritized investments in infrastructure by regional water managers; and 4) Use an open science collaborative approach, including the formation of an advisory group with relevant stakeholders, to develop and disseminate the results.

1.3 Project Location

Figure 2. Project Location Map

The technical work and modeling will occur in Claremont, (GeoScience Support Services, Inc.), Sacramento (California State University, Sacramento), and San Bernardino, CA (San Bernardino Valley Water Conservation District). The project study area includes the larger Upper Santa Ana Valley Groundwater Basin (Yucaipa, San Bernardino, Lytle, Rialto-Colton, Riverside-Arlington, Chino, and Temescal Groundwater Basins) with a focus on the San Bernardino Basin, an approximately 896,000-acre area with a usable aquifer storage capacity of 5,690,000 acre feet located in the upper Santa Ana River Watershed in western San Bernardino County, California. As shown in Figure 2.

1.4 Evaluation Criteria

1.4.1 Criterion A – Water Management Challenge

1. *Describe the water management challenge(s). Describe in detail the water management challenge is occurring within your project area. Describe the severity of the challenge to be addressed with supporting details. For example, will your project address water supply shortfalls or uncertainties, the need to meet competing demands for water and the lack of reliable water supplies for municipal, agricultural, tribal, environmental or recreational water uses, complications arising from drought, conflicts over water, or other water management issues?*

Despite over a century of commitment to managed aquifer recharge resulting in percolation of 1,396,421 AF of local surface and storm water since 1912, water levels in the San Bernardino Basin in San Bernardino County have dropped from surface levels in 1993 to over 300 feet below surface in 2022, with the Basin was over 1,000,000 AF below full. As a result, the region has identified a need to invest in increased capture of local surface and storm water, building on our long-term stewardship of the aquifer by evolving to meet the needs of a population that has increased by 40 times since 1910 and is projected to reach 1.25 million people by 2045, as well as the challenges of water delivery and aquifer recharge in a changing climate.

2. *Describe the concerns or outcomes if this water management challenge is not addressed?*

Without increased understanding of the effects of historic recharge, informed investments in new facilities, and operational approaches optimized for our changing climate, , the water levels in the San Bernardino Basin are expected to continue dropping, resulting in significant capital expenditures to deepen wells, increased risks of land subsidence, and increased reliability on imported water – and thus increased carbon footprints and water costs – for millions of residents, including many low-income and disadvantaged communities (approximately 29 census tracts within the region).

3. *Explain how your project will address the water management issues identified in your response:*

The project will build on long-standing commitments to local water supply and groundwater management, supporting western San Bernardino County as our regional group of 16 municipal and water agencies work together to identify, prioritize, and implement the next generation of local water infrastructure. Specifically, the proposed modeling will inform 1) how over a century

of historic managed aquifer recharge has affected the San Bernardino Basin, allowing us to look at specific climate cycles and building a strong knowledge system base to inform future operations; 2) optimization of existing recharge operations for climate scenarios that are not similar to those under which we have operated for over a century, and 3) design, cost-benefit analysis and prioritization of new/retrofitted/optimized groundwater recharge facilities in our region.

These expanded modeling results will provide robust projections and support cost benefit analyses to allow the Conservation District and our partners on the Basin Technical Advisory Committee (BTAC), a collaborative regional groundwater management group for the San Bernardino Basin, to better identify, plan, collaborate, and respond to challenges facing our goals of long-term water reliability, drought resilience, and conjunctive use of groundwater. All of the agencies in the BTAC will benefit from the model enhancements to inform their water management decisions, including Bear Valley Mutual Water Company, City of Colton, City of Loma Linda, City of Redlands Municipal Utilities and Engineering Department, City of Rialto, City of Riverside Public Utilities Department, East Valley Water District, Elsinore Valley Municipal Water District, Fontana Water Company, San Bernardino County Flood Control District, San Bernardino Municipal Water Department, San Bernardino Valley Municipal Water District, San Bernardino Valley Water Conservation District, West Valley Water District, Western Municipal Water District, and Yucaipa Valley Water District.

This project will improve water management by supporting water supply reliability. Modeling to advance understanding of the outcomes of managed aquifer recharge to-date, quantify expected benefits from construction of new recharge facilities, and optimize existing facilities will allow the region to proactively address these lowered groundwater levels in advance of water supply emergencies, supporting intelligent design and conscious operation of facilities to benefit both water supply and the natural environment.

The project will support drought management activities by informing the approach to significant augmentation of a critical piece of the region's "drought-proofing" strategy. With long-term drought cycles, the amount of surface water available annually for managed aquifer recharge since 1912 has varied widely: Modeling the response of basin levels to managed aquifer recharge within wet, dry, and average precipitation periods will provide the Conservation District with the data needed to operate optimally in today's climate extremes. Evaluation and construction or optimization of facilities is needed to ensure that more water can be recharged during infrequent wet years and the major storm events to increase storage for drought years, when up to 70% of the region's water needs are met through groundwater pumping. With our long-term dedication to sustainable groundwater management, our region is excited to share our approach, successes, and lessons learned with other regions, states, and nations to encourage successful aquifer stewardship worldwide.

1.4.2 Criterion B – Project Benefits

1. *Describe how the need for the project was identified. Was the proposed project identified using a collaborative process with input from multiple and diverse stakeholders?*

In response to long-term drought and data showing significant declines in aquifer levels, the Conservation District began testing new operational approaches to maximize recharge at our existing facilities nearly a decade ago, see Figure 3. While these efforts have resulted in significant new recharge, they have also resulted in significant new maintenance needs calculated at approximately $5,000,0000. With the modeling of past managed aquifer recharge proposed herein, the Conservation District seeks to build a systems knowledge base to understand the response of the aquifer to recharge in order to optimize future operational strategies.

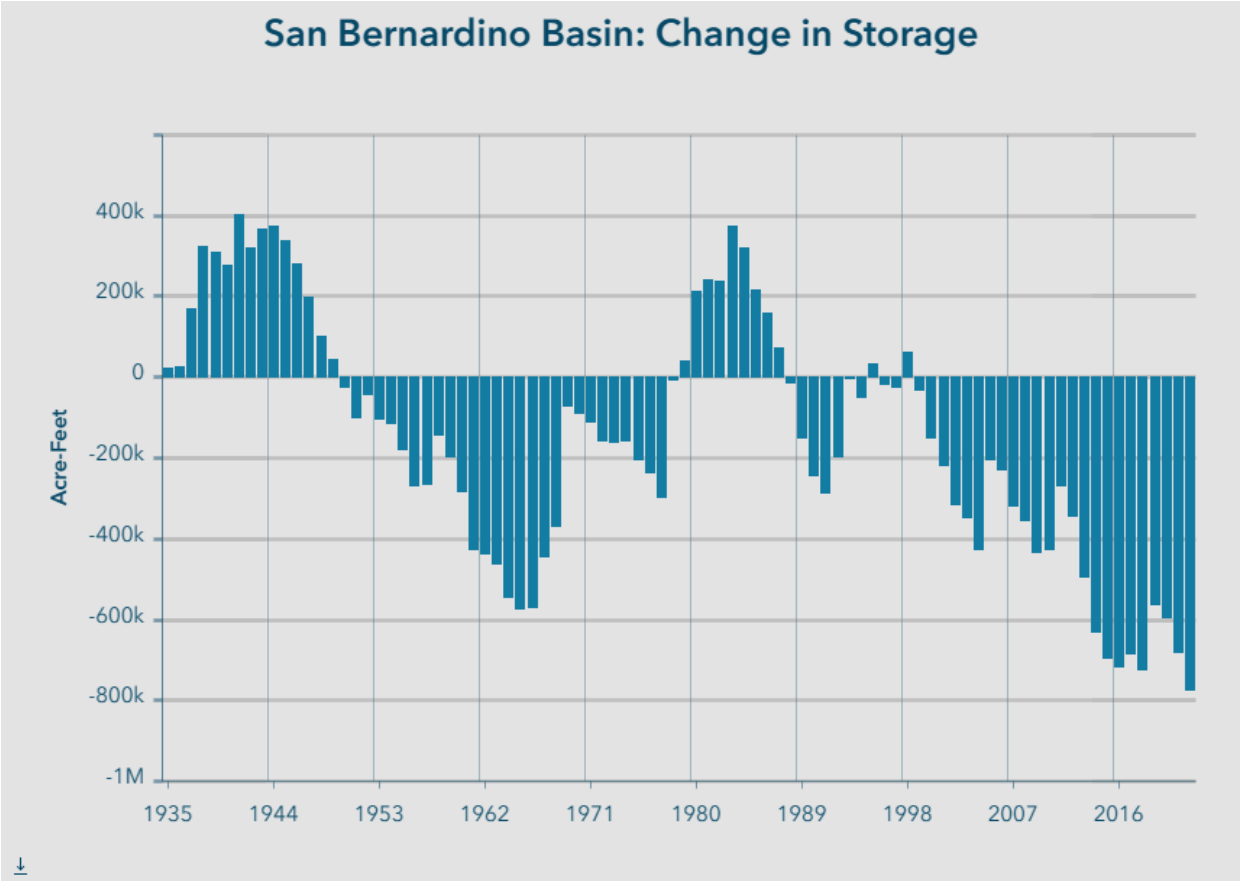

Figure 3. Change in Storage

The eight conceptual projects (PERC projects) proposed for climate change scenario modeling were developed in response to monitoring data showing significant, long-term decreases in regional groundwater levels. These projects were developed with extensive input from regional agencies, including groups such as the Basin Technical Advisory Committee and the San Bernardino Basin Groundwater Sustainability Council, and have been vetted through the comprehensive public input process conducted for the Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan (2020). While the proposed PERC projects expand recharge capacity throughout the San Bernardino Basin, certain projects specifically address the need for additional recharge on the western side of Basin where limited facilities are currently located.

2. *Describe how the tool, method, or information will be applied and when it will be applied.*

The project results will be incorporated into the cost benefit and prioritization analysis for the PERC projects, with funding allocation scheduled to occur within months of the completion of grant-funded tasks. All other work needed for the prioritization is in process, including portions that are proposed as matching funds. In addition, these results will be used to inform optimization of the Conservation District's operations strategies as detailed in their Operations Plan, which is updated biannually. The updates to the Upper SAR Integrated Regional Model and PERC-specific models will be made available to local water agencies and researchers to support additional modeling and research within the San Bernardino Basin.

3. *Describe, in detail, the extent of benefits that can be expected to occur upon implementation of the project, and provide support for your responses.*

Direct beneficiaries of the project include the San Bernardino Valley Water Conservation District, who will use the results to inform the approach to annual recharge operations, the 15 additional agencies that collaboratively manage the Basin through the BTAC, and the 57 companies, water agencies and municipalities that pump this water to meet their needs.

In addition, the regional water wholesale and retail agencies and municipal water departments will benefit from incorporating the expected recharge benefits under various climate scenarios into the prioritization assessment for the PERC projects. With double to quadruple the capacity for local recharge following construction, groundwater levels would be expected to return to historic levels and aquifer storage will be maximized to reliably support regional water needs during future droughts.

The results of this work will be appropriate for general extrapolation of the benefits of new recharge facilities across Southern California, and will be shared with agencies throughout our region. Work to model the effects of the Conservation District's efforts on aquifer levels using recharge and pumping data from 1912-2023 will be applicable to informing and encouraging managed aquifer recharge in groundwater dependent areas across the globe.

4. *Explain how your project complements other similar efforts in the area where the project is located. Will your project complement or add value to other, similar efforts in the area, rather than duplicate or complicate those efforts? Are there other similar efforts in the area that have used a similar methodology successfully which can be complimented?*

There is a long history of managed aquifer recharge along the Santa Ana River and throughout southern California. Our proposed work to quantify the effects of such work in the Upper Santa Ana River region will be of use to other water agencies considering similar efforts throughout the larger region by demonstrating the long term benefits of implementing managed aquifer recharge and the value of developing a robust integrated model to inform water management decisions.

The current Integrated SAR Model is the primary tool used in the region to inform water management decisions and evaluate the benefits and impacts of proposed projects and actions so the enhancements made by this project will provide additional functionality and forecasting capabilities to improve other regional efforts. For example, one effort currently underway is

the Upper Santa Ana River Salt and Nutrient Management Plan (SNMP), which uses the Integrated SAR Model to evaluate water quality impacts from recycled water recharge and assess the mitigation potential from existing and proposed surface water recharge (including the PERC projects). The enhanced Model will add value to the SNMP by providing a longer period over which to evaluate trends, refined information on the PERC projects, and improved climate change scenarios, which are needed to understand the potential range of future impacts.

Additionally, the enhanced Integrated SAR model would add value when evaluating future conjunctive use projects or water banking operations in the region by building knowledge of effects of new recharge and extraction in conjunction with existing and planned recharge operations under a range of future climate change conditions.

The PERC projects are a key piece of our region's future water reliability puzzle, along with 1) existing recharge, 2) recharge from new facilities currently in construction, 3) water imported through the State Water Project, and 4) significant recycled water recharge projects such as the East Valley Water District Sterling Natural Resource Center and San Bernardino Municipal Water Department Tertiary Treatment System.

- Existing facilities include 71 recharge basins (182 acres of recharge area) operated by the Conservation District since the early 1900s, which today recharge both local and State Water Project flows;
- Twenty new recharge basins are currently under construction by San Bernardino Valley Municipal Water District on Conservation District property under an agreement between the Conservation District, San Bernardino Valley Water Conservation District, and Western Municipal Water District, which will add up to 80,000 AF of annual recharge to the Basin;
- Since 1972, over 850,000 AF of water imported via the State Water Project by San Bernardino Valley Municipal Water District has been recharged into the San Bernardino Basin to augment local surface water recharge; and approximately 11,715 AFY of recycled water is currently available for use within the San Bernardino Basin with an additional ~7,000 AFY planned and analyzed in the 2016 Regional Recycled Water Concept Study, which also includes significant discharge into the Santa Ana River to maintain flows for the Santa Ana sucker.

1.4.3 Criterion C – Project Implementation

1. Briefly describe and provide support for the approach and methodology that will be used to meet the objectives of the project.

The Integrated SAR Model is an important water management tool to understand the interactions between streamflow and groundwater levels in the Upper Santa Ana River; the model has been made available by SBVMWD for use by interested agencies including the Conservation District. Model calibration indicates that the model provides a very good fit to collected field data (Geoscience. 2020). This project proposes important updates to the existing Integrated SAR model to ensure its continued applicability in the SAR and service as a

management tool contributing to the region's efforts to promote water resiliency. The project includes the following efforts:

Extending the model period to January 1912 through December 2023: The existing Integrated SAR Model is calibrated for the period from January 1966 through December 2016, thus is not capturing the entire time period of managed aquifer recharge in the Basin which spans from 1912-2023. In order to quantify the total benefits of these efforts on aquifer levels, the model will be extended to cover 1912 - 2023. The extended model will be calibrated and validated with historical and newly available data and run with and without the managed aquifer recharge data to quantify the increase in groundwater levels attributed to these efforts. The model results will include changes in groundwater storage in the basin as well as changes in groundwater levels that can be visualized in groundwater contour maps.

Incorporate new proposed recharge facilities into the model: There are currently eight proposed recharge projects (PERC projects) located at 1) Waterman Basins 2) Twin Creek 3) Lynwood/29th Street, 4) Plunge Creek 5) Oak Creek 6) Mill Creek 7) Bledsoe Creek and 8) Cook Creek. They include a mixture of new basins, existing flood control facilities retro-fitted and operated to also perform recharge functions, and optimization of existing groundwater recharge facilities. The projects are currently included in the model in their conceptual design, which were available when the model was created in 2016. As part of this work, all eight projects will be updated within the model using their revised designs. Predictive scenarios will be developed and run using the extended Integrated SAR Model to evaluate the effects of proposed activities on groundwater levels, and streamflow under various climate change scenarios.

Climate Projections: Downscaled climate projections for SAR will be incorporated into the Integrated SAR Model as boundary conditions. We will base our analysis on the Guidance for Climate Change Data Use During Groundwater Sustainability Plan Development document by the California Department of Water Resources (DWR). This includes an ensemble analysis of climate models to develop monthly climate change factors for precipitation and evapotranspiration (ET) for a downscaled grid covering California. SGMA monthly climate change factors will be used to alter the monthly Integrated SAR Model hydrology, which is based on historical hydrologic data.

Sharing Results: The agencies working the Upper Santa Ana River have learned through experience that collaboration is the best path to solving water dilemmas and delivering water to our communities. We proposed to model this approach by engaging others with interest and/or knowledge in managed aquifer recharge in the project through an advisory group and presenting our results at a public workshop. In addition, code and data generated by Sacramento State University will be published in open repositories to ensure replicability, scaling up the potential impact of the project results. The Conservation District will also participate in a Reclamation-sponsored webinar, which may be open to the public, to share project accomplishments, the final results of the identified tasks, and any lessons learned.

2. Describe the work plan for implementing the proposed scope of work.

Task 1: Model Extension (June 2023 – October 2024): The Integrated SAR Model will be extended to ensure its continued applicability in the SAR basin and to serve as a management tool by the BTAC and individual agencies such as the Conservation District. Extensions include improvement to the model parameters as well as extension of the model period to 1912 through 2023, which will require additional calibration and validation. The majority of this work will be performed by GeoScience Support Services, Inc. in collaboration with Dr. Dokou, her students, and Conservation District staff. Dr. Dokou will provide technical expertise and act in an advisory role in this task. Dr. Dokou will also review the existing model parameters and suggest improvements to the model; oversee the model extension, calibration and validation; and contribute to the interpretation of the results. CSUS students will also assist in this task through data analysis and visualization of the results.

Milestone: Updated Integrated SAR model with new calibration period 1912-2023.

Costs: *Projected staff costs include $10,763 for Dr. Dokou (salary, fridge and CSUS negotiated indirect costs), $5,451 for the students (salary, fridge and CSUS negotiated indirect costs), $14,405 for Ms. Miller (salary, fringe), and $194,847 for GeoScience (contracted personnel costs). Please note that salaries for each task are rounded to the nearest integer value. Projected equipment cost is $14,200 (including CSUS negotiated indirect costs), for purchasing of software and computers for the students.*

Total cost for Task 1 is anticipated to be $ 239,666, of which $ 98,819 is requested in federal assistance and $140,847 is matching funds.

Task 2: PERC Project Integration (July 2023 – April 2025): This task involves the integration of the proposed recharge facilities (PERC projects) into the Integrated SAR model and will be mainly performed by Dr. Dokou and CSUS students in collaboration with Conservation District staff. GeoScience Support Services, Inc. will provide the most updated version of the Integrated SAR Model and modifications will be made to incorporate the latest designs of the PERC models. Calibration and validation of the model will be performed at this stage as needed. The CSUS students will be trained and supervised by Dr. Dokou in the use of the model, including scraping and cleaning model input data, performing model simulations, performing model calibrations and validations, and postprocessing model results.

Milestone: Updated Integrated SAR model to include current design of PERC projects.

Cost: *Projected staff costs include $32,289 for Dr. Dokou (salary, fridge and CSUS negotiated indirect costs), $32,706 for the students (salary, fridge and CSUS negotiated indirect costs), $5,000 for Ms. Miller (salary, fringe) $72,527 for CASC (contracted personnel costs), $109,512 for Q3 (contracted personnel costs), $94,698 for TetraTech (contracted personnel costs).*

Total cost for Task 2 is anticipated to be $ 252,034, of which $ 69,995 is requested from reclamation and $182,039 is matching funds.

Task 3: Climate Change Scenarios (April 2025 – November 2025): Predictive modeling scenarios will be developed and run by the CSUS team using the extended Integrated SAR Model to evaluate the effects of the PERC projects activities on groundwater storage and levels under various climate change scenarios. Downscaled climate projections for SAR will be

incorporated into the Integrated SAR Model by using SGMA monthly climate change factors to alter the monthly Integrated SAR Model hydrology baseline. Dr. Dokou, in collaboration with Conservation District staff and other advisory board members, will develop various modeling scenarios. The CSUS students will be trained by Dr. Dokou in the development of climate projections for the model scenarios and implement the corresponding runs. They will also post-process and analyze the results with guidance and supervision by Dr. Dokou.

Milestone: Climate change projections for the region. Model simulations using the climate projections.

Cost: *Projected staff costs include $21,526 for Dr. Dokou (salary, fridge and CSUS negotiated indirect costs), $32,706 for the students (salary, fridge and CSUS negotiated indirect costs) and $1,000 for Ms. Miller (salary, fringe).*

Total cost for Task 3 is anticipated to be $55232, all of which is requested in federal assistance.

Task 4: Cost Benefit Analysis (November 2025 – March 2026): Following the successful implementation of climate change scenarios for the PERC projects, a cost-benefit analysis will be performed to prioritize these potential projects. The cost benefit analysis will be performed by the CSUS team with input from Conservation District staff and other advisory board members, based on the model results which will quantify the benefits to groundwater storage and levels of each individual recharge project and their associated costs to inform the Conservation District's capital budget and regional funding decisions.

Milestones: Cost-benefit analysis for PERC projects. Prioritization list.

Cost: *Projected staff costs include $21,526 for Dr. Dokou (salary, fridge and CSUS negotiated indirect costs), $16,353 for the students (salary, fridge and CSUS negotiated indirect costs) and $10,000 for Ms. Miller (salary, fringe).*

Total cost for Task 4 is anticipated to be $47,879, all of which is requested in federal assistance.

Task 5: Post-processing of model results (March 2026 – May 2026): Updated results from the Integrated SAR model will be post-processed and prepared for presentation to both technical and non-technical audiences by the CSUS team and Conservation District staff. These presentations will focus on highlighting the region's century-long efforts in groundwater recharge by quantifying the benefits to groundwater storage and levels, the impact of climate change on planned recharge projects, and how this project can assist the region in prioritizing future recharge projects and management to increase water resiliency.

Milestones: Post-processed model results and interpretations ready to be included in dissemination efforts.

Cost: *Projected staff costs include $10,763 for Dr. Dokou (salary, fridge and CSUS negotiated indirect costs), $10,902 for the students (salary, fridge and CSUS negotiated indirect costs), $8,000 for Dr. Escriva-Bou (contracted personnel costs) and $10,000 for Ms. Miller (salary, fringe).*

Total cost for Task 5 is anticipated to be $39,665, all of which is requested in federal assistance.

Task 6: Dissemination of Results (ongoing during the project duration): This project will utilize an open science collaborative approach to disseminate the modeling framework and results. An advisory group formed by the members of the team (CSUS, Conservation District, and Dr. Escriva-Bou) and other relevant stakeholders throughout the United States will engage and provide feedback throughout the project. The project outcomes will be disseminated by a) conducting a public workshop with the advisory group and other interested parties, b) presenting to both technical and non-technical audiences, as well as at local and national meetings, and c) publishing scientific results in peer-reviewed journals. The Conservation District will also participate in a Reclamation-sponsored webinar, which may be open to the public, to share project accomplishments, the final results of the identified tasks, and any lessons learned.

Milestones: Formation of advisory board, workshops, presentation of project results, scientific publication. The scientific publication and possibly the presentations to conferences might be completed after the end of the project.

Costs: *Projected staff costs include $10,763 for Dr. Dokou (salary, fridge and CSUS negotiated indirect costs), $10,902 for the students (salary, fridge and CSUS negotiated indirect costs), $20,000 for Dr. Escriva-Bou (contracted personnel costs) and $10,000 for Ms. Miller (salary, fringe). Travel costs to the site (1 trip), project workshops and meetings (1 trip) and conferences (1 trip) for Dr. Dokou and CSUS students are estimated at 22,311 (CSUS negotiated indirect costs.*

Total cost for Task 6 is anticipated to be $77,526, all of which is requested in federal assistance.

3. Provide a summary description of the products that are anticipated to result.

The main products anticipated from this work are listed below in Table 1.

Table 1. Anticipated Products

Product	Description
Extended Integrated SAR Model	Model results will include: 1) Groundwater contour maps over the basin showing changes due to historical recharge activities (1912-2023) 2) Hydrographs of groundwater levels and without historical recharge activities (1912-2023) for various locations in the basin
Climate Change Projections	Precipitation and ET climate projections will be developed for the basin following DWR guidelines as described above.
PERC Prioritization List	The PERC projects will be prioritized based on the cost benefit analysis, using the mode results.
PowerPoint Presentations	To be potentially presented at local and national meetings such as:

Product	Description
	Local meetings: Basin Technical Advisory Committee, California Water Association (CWA) Conference, CSU-Water Conference, Water Summit, BSMAR Recharge Symposium National meetings: National Ground Water Association (NGWA) Conference, American Geophysical Union (AGU) Fall Meeting, Environmental & Water Resources Institute (EWRI) Congress
Scientific Publication	To be submitted to a peer-reviewed journal such as: Journal of Hydrology, Groundwater, Frontiers in Water, Water, Hydrogeology

4. *Who will be involved in the project as project partners? What will each partner or stakeholder/s role in the project be? How will project partners and stakeholders be engaged in the project and at what stages?*

Conservation District General Manager Betsy Miller will serve as the Project Manager for work completed by CASC, GeoScience, Q3, and TetraTech. She will also support interactions between these consulting groups and Dr. Dokou. Ms. Miller will coordinate with Dr. Dokou and Dr. Escriva-Bou to create and engage the advisory group and will serve as the project liaison to regional water agencies.

Dr. Zoi Dokou at Sacramento State University will serve as the Principal Investigator, working closely with GeoScience on expansion of the Integrated SAR Model and incorporating results from CASC, Q3, and TetraTech's PERC modeling into the Integrated Model and the cost-benefit analysis. Dr. Dokou with manage students working on the project and will coordinate with Ms. Miller and Dr. Escriva-Bou on the creation and engagement of the advisory group.

Dr. Johnson Yeh at GeoScience will oversee expansion of the Integrated SAR Model to cover 1912-2023 and associated model runs, working in coordination with Dr. Dokou.

Dr. Alvar Escriva-Bou at University of California Los Angeles will guide the creation and engagement of the advisory group and provide significant support to project dissemination, working closely with Ms. Miller and Dr. Dokou.

Local project stakeholders will be engaged through quarterly meetings of the BTAC, with an initial presentation following the project award, regular project status updates, and solicitation of input.

Advisory group members will be solicited within the first quarter following project award from professionals or agencies known to conduct or be interested in conducting managed aquifer recharge or have a demonstrated history of aquifer stewardship. Advisory group members will be sought to represent a large geographic area if possible.

5. *Identify staff with appropriate credentials and experience and describe their qualifications.*

Ms. Betsy Miller is the General Manager of the San Bernardino Valley Water Conservation District. Ms. Miller has worked in habitat and water conservation for over twenty years, currently overseeing regional aquifer recharge operations, development of key projects to expand local groundwater sustainability, and implementation of the Upper Santa Ana River Wash Habitat Conservation Plan. Prior to this role, she worked in Parks and Planning for the City of San Diego. Ms. Miller graduated from Whitman College with a degree in Biology and holds a Master of Arts from San Diego State University in Geography with a specialty in Natural Resources Management.

Dr. Dokou is Assistant Professor at the Civil Engineering Department, California State University. She has over 20 years of experience in groundwater modeling, with significant experience in managed aquifer recharge and the quantification of climate change impacts on groundwater resources. She has developed, calibrated and validated numerous groundwater flow models, using a variety of software including MODFLOW, which is the software used in the Integrated SAR model. Dr. Dokou has published 36 peer-reviewed journal articles, written three book chapters and participated in 53 conference presentations, and is associate editor for the Journal of Hydrology. Dr. Dokou received her Ph.D. in Environmental Engineering from the University of Vermont.

One undergraduate and one graduate Civil Engineering student from CSUS will be hired to assist with data analysis and modeling efforts. Priority will be given to students from underrepresented groups in STEM (first generation college students, women engineers, BIPOC students, among others) that traditionally have limited opportunities for research experiences.

Dr. Johnson Yeh is a principal and lead groundwater modeler at Geoscience. He serves as project manager for groundwater modeling efforts, geohydrologic investigations, groundwater basin/water quality studies, and artificial recharge projects. Dr. Yeh received his Ph.D. in Geology from the University of Southern California.

a. Have the project team members accomplished projects similar in scope to the proposed project in the past either as a lead or team member?

Dr. Dokou has developed multiple groundwater models in the past, using MODFLOW or other software. A list of relevant publications or other reports and activities can be found here:

- 1. F.K. Khadim*, Z. Dokou, A.C. Bagtzoglou, R. Lazin, E.N. Anagnostou (2023) Groundwater Modeling to Assess Climate Change Impacts and Sustainability in the Tana Basin, Upper Blue Nile, Ethiopia, Sustainability, 15(7), 6284. https://doi.org/10.3390/su15076284
- 2. F.K. Khadim*, Z. Dokou, R. Lazin, S. Moges, A.C. Bagtzoglou, E.N. Anagnostou (2020) Groundwater Modeling in Data Scarce Aquifers: The case of Gilgel-Abay, Upper Blue Nile, Ethiopia, Journal of Hydrology, 590, 125214; doi.org/10.1016/j.jhydrol.2020.125214
- 3. O. Tzoraki, Z. Dokou, G. Christodoulou, P. Gaganis, G.P. Karatzas (2018) Assessing the efficiency of a coastal Managed Aquifer Recharge (MAR) system in Cyprus. Science of the Total Environment, 626, 875-886; doi.org/10.1016/j.scitotenv.2018.01.160
- 4. C. Gamvroudis*, Z. Dokou, N.P. Nikolaidis and G.P. Karatzas (2017) Impacts of surface and groundwater variability response to future climate change scenarios in a

large Mediterranean watershed, Environmental Earth Sciences, 76:385; doi: 10.1007/s12665-017-6721-7

- 5. V. Garcia (2023), A distributed stormwater collection and managed aquifer recharge system: Modeling applications and evaluation, MS thesis under Dr. Dokou's supervision (expected Dec. 2023)

Dr. Yeh led the team responsible for development of the Integrated SAR Model in 2016.

b. Is the project team capable of proceeding with tasks within the proposed project immediately upon entering into a financial assistance agreement?

The project team is capable of proceeding with the tasks within the proposed project immediately upon entering into the financial assistance agreement.

1.4.4 Criterion D – Dissemination of Results

1. Describe how the tools, frameworks, or analyses developed under the proposed scope of work will be disseminated, communicated, or made available to water resources managers who may be interested in the results.

An explicit goal of this project is the development of an open science collaborative approach to develop and disseminate the modeling framework and the results, including:

1) Convene an advisory group of professionals and agencies with experience or interest in conducting managed aquifer recharge or with a demonstrated history of aquifer stewardship across the United States including academics, members of agencies with similar groundwater challenges, and local and state officials to provide feedback on technical, regulatory and policy issues throughout each project phases.

2) The modeling framework and the data generated by CSUS in the project will be published in open repositories to ensure replicability of the approach in other locations, supporting greater impact and scalability of the project.

3) The project team will convene a public workshop with the selected advisory group, inviting other relevant stakeholders to present the final results. These outputs will also be converted into a technical scientific article, and presented in academic and technical conferences in California and other states with similar groundwater problems.

1.4.5 Criterion E – Presidential and Department of the Interior Priorities

1.4.5.1 Sub-criterion No. E1. Climate Change

1. If applicable, describe how the project addresses climate change and increases resiliency.

The proposed grant tasks support informed, intelligent development and implementation of the PERC projects, which represent a critical piece of the region's reliable water supply strategy as detailed in the Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan (2020). As described in the Plan, the regional evaluation for the Los Angeles area included in the State of California's Fourth Climate Change Assessment (2019) noted continued future warming, with Cal-Adapt's Extreme Heat tool predicting the number of days in San Bernardino over 95°F increasing from 32 for the historical baseline to 72 by 2050. This increase affects residential, industrial, and agricultural water demands; increases in dry and wet

precipitation extremes, which directly affects stormflow capture for groundwater recharge; and increases in areas burned by wildfire, which indirectly affects stormwater capture for groundwater recharge by limiting the amount of sediment-laden flows directed to facilities in an attempt to limit decreases in percolation and associated major increases in facility maintenance costs. While every piece of the region's diversified water reliability portfolio and strategy are needed, optimizing groundwater recharge into the San Bernardino Basin may be the most critical piece of the puzzle due to the ability of the aquifer to supply water during drought conditions when imported water is not available using proven methods in use for over a century and to do so at an extremely low cost (currently $16.95/AF for operations).

2. *How will the project build long-term resilience to drought? How many years will the project continue to provide benefits?*

The project will build long-term resilience to drought by expanding methods (i.e. managed aquifer recharge) proven in Western San Bernardino County for over a century. It is anticipated that results from this project will provide benefits for many decades into the future. Together with our region's diverse water portfolio and conservation efforts, the optimized operation of existing facilities and construction of planned facilities are expected to more than meet the area's annual water demands of approximately 114,000 AF.

3. *Will the proposed project reduce greenhouse gas emissions by sequestering carbon in soils, grasses, trees, and other vegetation? Does the proposed project seek to reduce or mitigate climate pollutants such as air or water pollution? Does the proposed project contribute to climate change resiliency in other ways not described above?*

The proposed modeling supports operation of existing facilities and planned future projects that significantly improve the reliability of western San Bernardino's water supply in a manner that significantly limits air pollution and greenhouse gas emissions. The existing and planned recharge facilities are operated using free, reliable, climate-friendly gravity, with small emissions associated only with exhaust from equipment to clean the basins every 2-3 years (which will end once emissions-free equipment is readily available for lease). Increases in groundwater levels also reduce the pumping energy required to produce the water for delivery to customers and limits the need for high cost, high emission recycled and imported water. The high-quality surface water recharged by the existing and planned surface water recharge projects will help to offset water quality impacts from recycled water recharge and will reduce the need for energy intensive reverse osmosis treatment to protect water quality in the Basin.

The existing groundwater recharge basins are located in areas surrounded by natural habitat which sequesters carbon and is managed for the benefit of rare, threatened and endangered species under the Upper Santa Ana River Wash Habitat Conservation Plan.

1.4.5.2 Sub-Criterion No. E2. Disadvantaged or Underserved Communities

1. *Please use the Council on Environmental Quality's interactive Climate and Economic Justice Screening Tool to identify any disadvantaged communities that will benefit from your project.*

The following 29 disadvantage census tracts will benefit from the proposed project: 06071006100, 06071005100, 06071006100, 06071007403, 06071005200, 06071006201, 06071006203, 06071012300, 06071006301, 06071006302, 06071007407, 06071007408, 06071007410, 06071007409, 06071005600, 06071006401, 06071006402, 06071007601, 06071007603, 06071006500, 06071005800, 06071005701, 06071012400, 06071007200, 06071007303, 06071007305, 06071008002, 06071008404, and 06071008100.

2. *If applicable, please describe how the project benefits those disadvantaged or underserved communities identified using the tool.*

The proposed modeling will support expanded groundwater recharge into the San Bernardino Basin, which provides up to 70% of the region's annual water supply. Continued use of stormwater capture/groundwater storage to meet local water needs is a critical piece of the region's water reliability portfolio, improves the quality of stored groundwater, and ensures that local water rates can benefit from the Conservation District's low groundwater charge of $16.95/AF for a significant portion of their deliveries in order to provide low cost, high quality water to disadvantaged communities.

2.0 Project Budget

2.1 Funding Plan

The Conservation District is California special district funded through a groundwater charge collected under California Water Code, Division 21, Part 9. The PERC projects are funded by sale of conservation easements on lands owned by the Conservation District. Matching contributions for this project will be provided by the Conservation District through direct costs paid to consultants. No non-Federal funding will be provided by a source other than the applicant, so no letters of commitment are required.

2.2 Budget Proposal

Table 2. Summary of Non-Federal and Federal Funding Sources

Funding Sources	Amount
Non- Federal Entities	
Conservation District	$453,125
Non- Federal Subtotal	**$453,125**
Requested Reclamation Funding	**$361,117**

Table 3. Total Project Cost Table

Source	Amount
Cost to be reimbursed with the requested Federal funding	**$361,117**
Cost to be paid by the applicant	**$453,125**
Value of third-party contributions	**$0**
Total Project Cost	**$814,242**

Table 4. Total Project Budget Proposal

Budget Item Description	$/Unit	Quantity	Quantity Type	Total Cost
Personnel				
Betsy Miller, PM	$128	280	Hours	**$35,739**
Fringe Benefits				
Betsy Miller, PM	41.5%	$35,739	Percentage	**$14,666**
Travel				
None				
Construction				
None				
Contractual				
Geoscience Support Services, Inc.				**$194,847**
CASC				**$72,527**
Q3				**$109,512**
TetraTech				**$94,698**
Dr. Alvar Escriva-Bou, Ph.D.				**$28,000**
Dr. Zoi Dokou, Ph.D., CSUS[1]				**$256,712**
Indirect				
De minimis	10%	$75,406	Percentage	**$7,541**
Total Estimated Project Costs				**$814,242**

1. Subaward - California State University, Sacramento

2.3 Budget Narrative

All costs included in this proposal are directly related to the project and necessary for its implementation. The non-federal contribution is 56 percent; the federal contribution is 44 percent. Information provided in the Budget Narrative below focuses on the Conservation District costs, and a detailed budget and budget justification for California State University, Sacramento costs (subaward) are provided in **Appendix C**. In addition, a Budget Detail and

Narrative spreadsheet has been submitted via grants. gov in support of information provided here.

Personnel: The Conservation District requests federal assistance for salary costs ($128/hour) for Project Manager Betsy Miller, General Manager, who will commit twelve hours/month for the project duration for a total of 280 hours. The labor rate represent the actual labor rate of the General Manager and is consistently applied to Federal and non-Federal activities.

Fringe Benefits: 41.5% Conservation District benefits for permanent, full-time employees (Table 5). The General Manager is compensated $52.38/hour for the project duration of a total of 280 hours ($14,666).

Table 5. Fringe Benefit Breakdown

Source	Amount
Social Security	**14.9%**
Medicare	**3.0%**
Unemployment	**15.7%**
WCI	**3.0%**
Medical, Dental, and Vision	**38.5%**
Retirement	**24.0%**

Travel: None.

Equipment: None.

Supplies: None.

Contractual: Six contracts are included in the proposed project, including GeoScience Support Services, Inc. to update the Integrated SAR Model; CASC, Q3, and TetraTech to develop groundwater models specific to each PERC project; Dr. Alvar Escriva-Bou to support outreach, engagement and outcomes dissemination; and a subaward to Dr. Zoi Dokou at California State University, Sacramento, to lead integration of the PERC groundwater models into the Integrated SAR Model and run climate change scenarios. Additional details regarding the budget for California State University, Sacramento (UEI N58JMBDDUGU7, EIN 94-1337638, CAGE #1VR20) is provided in **Appendix C,** and as an attachment to support the Budget Detail and Narrative spreadsheet submittal via grants.gov.

Third-Party In-Kind Contributions: Not applicable to the proposed project.

Environmental and Regulatory Compliance Costs: Please review responses in the Environmental and Cultural Resources section. The Conservation District does not anticipate additional costs associated with environmental compliance.

Construction: None.

Other Direct Expenses: None.

Total Direct Costs: Federal assistance is requested for $353,576 in direct costs. The Conservation District will provide a match of $453,125.

Indirect Costs: The Conservation District does not have a federally negotiated indirect cost rate agreement; therefore, $7,541 in federal assistance for de minimus (10%) indirect costs related to project accounting support is requested.

3.0 Environmental & Cultural Resources Compliance

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The proposed project is comprised of modeling and dissemination of modeling results; therefore, there are no impacts to the surrounding environment, earth-disturbing work, or any effects to air, water or animal habitat in the project area. Operation of existing facilities is conducted in compliance with the Upper Santa Ana River Wash Habitat Conservation Plan (2020). If prioritized for construction, conceptual projects would complete all required environmental analysis and permitting and would be constructed in compliance with the draft Upper Santa Ana River Habitat Conservation Plan.

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

The Upper Santa Ana River Wash Habitat Conservation Plan (2020) includes slender-horned spineflower, Santa Ana River woolley-star, California gnatcatcher, cactus wren, and San Bernardino kangaroo rat as Covered Species. Designated critical habitat for San Bernardino kangaroo rat is located near existing groundwater recharge facilities. The proposed project focuses on groundwater modeling and therefore will not affect any of the HCP Covered Species or designated critical habitat.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.

Waters of the United States have been mapped in the vicinity of current and proposed future groundwater recharge facilities as part of jurisdictional delineations prepared for environmental analysis of the Upper Santa Ana River Wash Habitat Conservation Plan (2020) and the draft Upper Santa Ana River Habitat Conservation Plan and associated permits. The proposed modeling will not impact these resources.

When was the water delivery system constructed?

The existing groundwater recharge basins were constructed from the late 1800s through the 1930s.

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

The proposed project will not result in the modification of an irrigation system.

Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

Cultural resource surveys were conducted on the existing recharge basins and surrounding lands for the EIR for the Upper Santa Ana River Wash Habitat Conservation Plan (2020) and for the draft Safe Harbor Agreement for the Mill Creek facilities: Three historic sites may be eligible for NRHP but additional information is needed prior to making that recommendation.

Are there any known archeological sites in the proposed project area?

Yes, archaeological sites were recorded during the cultural resource surveys completed for the EIR for the Upper Santa Ana River Wash Habitat Conservation Plan (2020) and for the draft Safe Harbor Agreement for the Mill Creek facilities. These reports can be shared with USBR upon request. No impacts to these sites will occur as the result of the proposed project.

Will the proposed project have a disproportionately high and adverse effect on low income and minority populations?

The proposed project would support continued delivery of low cost, high quality water to areas of low income and minority populations. The project would not result in any adverse effects to these populations.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts to tribal lands?

The land surrounding the existing groundwater recharge facilities is subject to a Memorandum of Agreement between the San Manuel Band of Serrano Mission Indians and the Conservation District, which ensures that the Tribe and tribal members have access to plant materials used for cultural purposes including traditional gathering and management of culturally important plants.

Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

No.

4.0 Required Permits or Approvals

No permits or approvals are required for the pre-construction activities proposed for the grant.

5.0 Overlap or Duplication of Effort Statement

The proposal submitted for consideration under this program does not in any way duplicate any proposal or project that has been submitted for funding consideration to any other potential funding source—whether it be Federal or non-Federal.

6.0 Conflict of Interest Disclosure Statement

To the best of our knowledge, no actual or potential conflict of interest exists at the time of submission.

7.0 Uniform Audit Reporting Statement

The Conservation District was not required to complete a Single Audit for the most recently closed fiscal year (ending June 30, 2022). The Conservation District's EIN is 95-3532750.

8.0 Disclosure of Lobbying Activities

As this application requests more than $100,000 in Federal funding, the applicant certifies the statements in 43 CFR Part 18, Appendix A. Standard Form-LLL, "Disclosure Form to Report Lobbying" was submitted with this application.

9.0 Letters of Support

Attached in **Appendix A**

10.0 Official Resolution

Attached in **Appendix B**

11.0 Unique Entity Identifier

The Conservation District's UEI is C6XYWHVC1S15.

12.0 Mandatory Federal Forms

The following Mandatory Federal Forms were submitted via grants.gov.

1. SF-424: Application for Federal Assistance
2. SF-424A: Budget Information for Non-Construction Programs
3. SF-424B: Assurances for Non-Construction Programs
4. SF-LLL: Disclosure of Lobbying Activities
5. Grants.gov Lobbying Form: Certification Regarding Lobbying

Appendix A Letters of Support

No.	Letters of Support
1	San Bernardino Valley Conservation Trust
2	San Bernardino Valley Municipal Water District
3	City of San Bernardino Municipal Water Department

SAN BERNARDINO VALLEY CONSERVATION TRUST

Established 2016

1630 West Redlands Boulevard, Suite A
Redlands, CA 92373-8032
(909) 793-2503
Fax: (909) 793-0188

Email: sbvct@sbvwcd.org
Website: www.sbvct.org

October 12, 2023

Bureau of Reclamation
Water Resources and Planning Office
Mail Code: 86-63000
P.O. Box 25007
Denver, CO 80225-0007

Subject: Support for the Program for Expanded Recharge Capacity Climate Change Modeling Project

Dear Colleagues:

On behalf of San Bernardino Valley Conservation Trust, I would like to express our enthusiastic support for the San Bernardino Valley Water Conservation District's (Conservation District) application for WaterSmart Applied Science Grant funding for the Program for Expanded Recharge Capacity Climate Change Modeling Project.

The San Bernardino Valley Conservation Trust works closely with the Conservation District implementing the Upper Santa Ana River Wash Habitat Conservation Plan (Wash Plan). Under the Wash Plan, the Conservation District has extensive landholdings devoted both to stormwater capture and recharge basins for water supply security, and managed habitats for state and federal threatened and endangered species and protected aquatic resources. Working closely with the Conservation District on issues tied to natural resource management on these protected lands, we recognize the Conservation District faces unique challenges in their efforts to maximize recharge of the underlying aquifer in an increasingly variable climate while also balancing the needs of the community and public to preserve and maintain critical natural and built assets.

The Conservation District has proven to be an effective and critical partner in our efforts to recover federally threatened and endangered species while also supporting critical water supply for the surrounding region. We are confident the progress made by the Conservation District with regards to water conservation over the last 100 years will expand, perhaps exponentially, with funding from the Bureau of Reclamation. From our perspective, the Conservation District has shown it has both the capability and political will to apply broad and integrated regional solutions to solving issues of water availability. With increased investment in modeling efforts to inform their work, we are confident the Conservation District will be able to effectively prioritize capital projects to optimize existing recharge facilities and build new facilities to recharge the local aquifer in a sustainable way that continues to balance natural resources needs with the need for regional water supply solutions.

SAN BERNARDINO VALLEY CONSERVATION TRUST

Established 2016

1630 West Redlands Boulevard, Suite A
Redlands, CA 92373-8032
(909) 793-2503
Fax: (909) 793-0188

Email: sbvct@sbvwcd.org
Website: www.sbvct.org

For all the foregoing reasons, we strongly support the Conservation District's application, and encourage your most favorable consideration of their application. Thank you.

Sincerely,

Milan Mitrovich, PhD
Executive Officer

SAN BERNARDINO VALLEY | A REGIONAL WATER AGENCY SINCE 1954

SAN BERNARDINO VALLEY
MUNICIPAL WATER DISTRICT
380 East Vanderbilt Way
San Bernardino, CA 92408
909.387.9200 | sbvmwd.com

October 11, 2023

Bureau of Reclamation
Water Resources and Planning Office
Mail Code: 86-63000
P.O. Box 25007
Denver, CO 80225-0007

Subject: Support for the Program for Expanded Recharge Capacity Climate Change Modeling Project

To Whom It May Concern:

On behalf of San Bernardino Valley Municipal Water District (Agency), I would like to express support for the San Bernardino Valley Water Conservation District's (Conservation District) application for WaterSmart Applied Science Grant funding for the Program for Expanded Recharge Capacity (PERC) Climate Change Modeling Project.

The PERC Climate Change Modeling Project informs capital investment priorities and Conservation District operations by leveraging the Upper Santa Ana River Integrated Model, prepared by our Agency, to update modeling results with revised engineering designs and the latest climate models. The proposed project will support both current water management decisions while guiding long-term resource planning efforts.

This approach to planning is critical for maintaining resiliency and sustainability of the Bunker Hill Groundwater Basin, which has experienced declining groundwater levels in recent decades, even while this region has had a long-standing commitment to managed aquifer recharge. The future does not look like the past, and while our region is proud of this long-term stewardship, we are also committed to evolving to meet the needs of a population and the challenges of aquifer recharge in a changing climate. This project will maximize the regional benefit of our Agency's significant investment in development of the Integrated Model and capital projects to increase local water reliability.

We support this project and request your thoughtful consideration of the Program for Expanded Recharge Capacity Climate Change Modeling Project.

Sincerely,

Heather Dyer, MS, MBA
CEO/ General Manager

CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT

"Trusted, Quality Service since 1905"

October 9, 2023

Bureau of Reclamation
Water Resources and Planning Office
Mail Code: 86-63000
P.O. Box 25007
Denver, CO 80225-0007

Subject: **Support for the Program for Expanded Recharge Capacity Climate Change Modeling Project**

To Whom It May Concern:

On behalf of the City of San Bernardino Municipal Water Department, I would like to express support for the San Bernardino Valley Water Conservation District's (Conservation District) application for WaterSmart Applied Science Grant funding for the Program for Expanded Recharge Capacity Climate Change Modeling Project.

The Program for Expanded Recharge Capacity Climate Change Modeling Project informs capital investment priorities and Conservation District operations by leveraging and updating existing regional models to inform prioritization of capital projects to optimize existing recharge facilities and build new facilities to recharge our local aquifer. The proposed tasks will support concrete actions to increase water levels within the Bunker Hill Basin, which have dropped from surface level in 1993 to over 300 feet below surface in 2022, with a decrease in the aquifer storage of 651,262 acre-feet over the same time, despite our region's long-standing commitment to managed aquifer recharge that resulted in percolation of 1,396,421 acre-feet since 1912. While our region is proud of this long-term stewardship, we are also committed to evolving to meet the needs of a population that has increased by 40 times since 1910 and the challenges of aquifer recharge in a changing climate – including significant additional recharge in the western part of the basin that is crucial to our water supply.

We support this project and respectfully request your thoughtful consideration of the Program for Expanded Recharge Capacity Climate Change Modeling Project.

Sincerely,

Miguel J. Guerrero, P.E.
General Manager
City of San Bernardino Municipal Water Department

Appendix B Official Resolution

RESOLUTION NO. 616
A RESOLUTION AUTHORIZING
THE GENERAL MANAGER OF THE SAN BERNARDINO VALLEY WATER CONSERVATION DISTRICT
TO FILE AN APPLICATION FOR A UNITED STATES BUREAU OF RECLAMATION WATERSMART APPLIED SCIENCE GRANT, INLCUDING PROVIDING NECESSARY ASSURANCES REQUIRED AS PART OF THE APPLICATION PROCESS, AND COMMITTING TO PROVIDE MATCHING FUNDS THEREFOR

WHEREAS, San Bernardino Valley Water Conservation District, herein after called "District", is a water conservation district duly organized and existing under the Water Conservation District Law of 1931, Sections 74000 et. seq. of the Water Code; and

WHEREAS, the District has received and reviewed a Notice of Funding Opportunity from the United States Bureau of Reclamation ("Burec") for a WaterSmart Applied Science Grant program ("Grant"), through which Burec provides funding to non-Federal entities for the development of tools and information to support water management for multiple uses. Grant-eligible projects include the development of modeling and forecasting tools, hydrologic data platforms, and new data sets; and

WHEREAS, the District desires to pursue certain funding opportunities through the Grant to refine and expand existing modeling to assess the effectiveness and contributory role the District's recharge has played over the full time the District has been in operation, to use as a tool to determine the most cost effective manner and locations of the District's groundwater recharge facilities and activities on a going-forward basis to assure that funding for facilities, and the District's partnership efforts toward expanding and improving groundwater recharge infrastructure in its region, are best directed to maximizing the beneficial application of these limited resources; and

WHEREAS, the Grant application process requires a resolution from the District's governing body authorizing and supporting the filing of a Grant Application, identifying the District official with signature authority to enter into a Grant-related agreement; and committing to work with Burec to meet established deadlines for entering into a grant or cooperative agreement;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the San Bernardino Valley Water Conservation District as follows:

Section 1. The Board hereby supports and authorizes the submission of an application for funding under the Grant, and affirms its commitment to provide all required matching funding thereunder in the event the Grant application is successful.

Section 2. The District's General Manager, Ms. Betsy Miller, is hereby authorized by the Board to file an application for the Grant, and is delegated the authority to sign all required Grant application materials required for consideration of Grant funding, including funding agreements, memoranda of understanding, and appropriate assurances with respect to lobbying, compliance with federal laws and policies, and enter into, any required funding agreements as may be necessary to secure Grant funding; and

Section 3. The General Manager, and her designee(s), are hereby authorized and directed in the name of and on behalf of the District to take all actions and to make and execute any and all appropriate assurances, certificates, requisitions, agreements, notices, consents, warrants and other documents, which they, or any of them, might deem necessary or appropriate in order to accomplish the purposes of this Resolution, and otherwise to commit the District to the financial and legal obligations associated with receipt of a financial assistance award under the Grant.

Section 4. The undersigned, Betsy Miller, certifies that she is duly appointed General Manager/Secretary of this District, and that the above is a true and correct copy of the resolution that was duly adopted at a meeting of the Board of Directors, which was held in accordance with State law.

Section 5. This Resolution shall take effect at the earliest date permitted by law.

PASSED AND ADOPTED by the San Bernardino Valley Water Conservation District Board of Directors at a regular meeting of said Board held on the 11th day of October 2023, by the following vote:

YES:
NO:
ABSTAIN:
ABSENT:

Melody McDonald
President

ATTEST:

Betsy Miller
General Manager/Board Secretary

1.0 Project Budget

1.1 Funding Plan

The Conservation District is California special district funded through a groundwater charge collected under California Water Code, Division 21, Part 9. The PERC projects are funded by sale of conservation easements on lands owned by the Conservation District. Matching contributions for this project will be provided by the Conservation District through direct costs paid to consultants. No non-Federal funding will be provided by a source other than the applicant, so no letters of commitment are required.

1.2 Budget Proposal

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Table 2. Total Project Cost Table

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Contractual				
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De minimis	10%	$75,406	Percentage	**$7,541**
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1. Subaward - California State University, Sacramento

1.3 Budget Narrative

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Narrative spreadsheet has been submitted via grants. gov in support of information provided here.

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Fringe Benefits: 41.5% Conservation District benefits for permanent, full-time employees (Table 5). The General Manager is compensated $52.38/hour for the project duration of a total of 280 hours ($14,666).

Table 4. Fringe Benefit Breakdown

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Unemployment	**15.7%**
WCI	**3.0%**
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Retirement	**24.0%**

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Equipment: None.

Supplies: None.

Contractual: Six contracts are included in the proposed project, including GeoScience Support Services, Inc. to update the Integrated SAR Model; CASC, Q3, and TetraTech to develop groundwater models specific to each PERC project; Dr. Alvar Escriva-Bou to support outreach, engagement and outcomes dissemination; and a subaward to Dr. Zoi Dokou at California State University, Sacramento, to lead integration of the PERC groundwater models into the Integrated SAR Model and run climate change scenarios. Additional details regarding the budget for California State University, Sacramento (UEI N58JMBDDUGU7, EIN 94-1337638, CAGE #1VR20) is provided in **Appendix C,** and as an attachment to support the Budget Detail and Narrative spreadsheet submittal via grants.gov.

Third-Party In-Kind Contributions: Not applicable to the proposed project.

Environmental and Regulatory Compliance Costs: Please review responses in the Environmental and Cultural Resources section. The Conservation District does not anticipate additional costs associated with environmental compliance.

Construction: None.

Other Direct Expenses: None.

Total Direct Costs: Federal assistance is requested for $353,576 in direct costs. The Conservation District will provide a match of $453,125.

Indirect Costs: The Conservation District does not have a federally negotiated indirect cost rate agreement; therefore, $7,541 in federal assistance for de minimus (10%) indirect costs related to project accounting support is requested.