Proposal To:

Unites States Department of Interior, Bureau of Reclamation

WaterSMART – Applied Science Grants for Fiscal Year 2023

Notice of Funding Opportunity No. R23AS00446

Proposed Project:

Runoff and Groundwater Recharge Evaluations of Ephemeral Washes – Phase 2

October 17, 2023

Applicant: Mojave Water Agency

Project Manager: Wesley Massoll, PG
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Mandatory Federal Forms

A. SF-424 Application for Federal Assistance.....submitted via grants.gov
B. SF-424A Budget Information.....submitted via grants.gov
C. SF-424B Assurances.....submitted via grants.gov
D. SF-LLL Disclosure of Lobbying Activities.....submitted via grants.gov

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Executive Summary

Date

October 17, 2023

Applicant Information

Mojave Water Agency
Wesley Massoll, PG, Project Manager

Project Summary

Runoff and Groundwater Recharge Evaluations of Ephemeral Washes – Phase 2 (Project) seeks to build on the efforts initiated in Phase 1. Specifically, the Project proposes to evaluate recharge at the five key study reaches with a) surface geophysical surveys at each wash to assess subsurface conditions for groundwater recharge, b) construction of monitoring wells, stream gages, and rain gages at locations identified in Phase 1, and c) data collection, development of stream-rating curves, calculations and estimates of basin contributions from the ephemeral washes.

Project Schedule and Budget

The proposed Project Schedule and Budget is presented in the following figure and table.

Figure 1 – Proposed Project Schedule

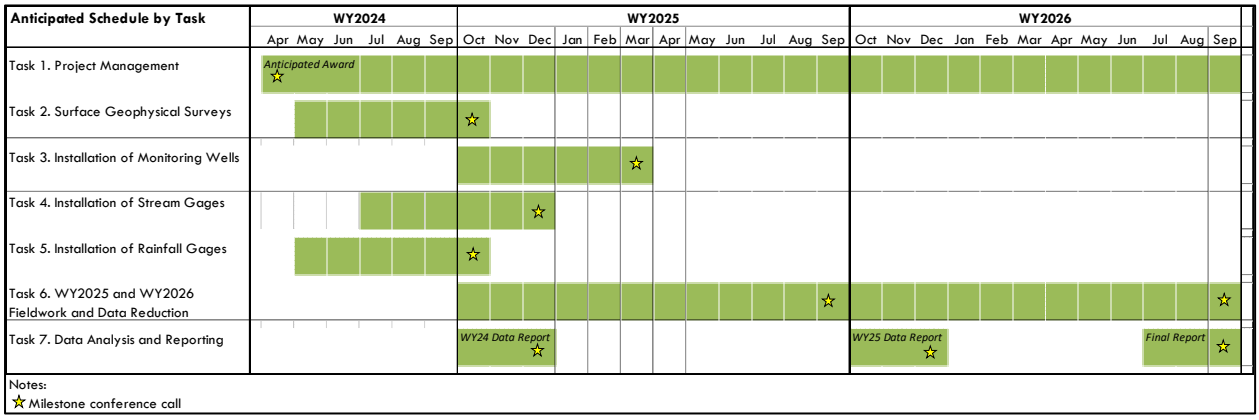

Table 1 – Proposed Project Budget (all tasks)

6. Budget Object Category	Total Cost	Federal Estimated Amount	Non-Federal Estimated Amount
a. Personnel	$197,408		
b. Fringe Benefits	$0		
c. Travel	$0		
d. Equipment	$100,000		
e. Supplies	$0		
f. Contractual	$600,000		
g. Construction	$0		
h. Other Direct Costs	$0		
i. Total Direct Costs	$0		
j. Indirect Charges	$0		
Total Costs	**$897,408**	**$400,000**	**$497,408**
Cost Share Percentage		44.6%	55.4%

1 Technical Project Description

1.1 Applicant Category

The Mojave Water Agency (MWA) was formed in 1960 as a special district codified in Chapter 97 of the California Water Code Appendix as the Mojave Water Agency Law. This law states that MWA was created, in part, "to do any and every act necessary to be done so that sufficient water may be available for any present or future beneficial use of the lands and inhabitants of the agency…".

Considering the foregoing, MWA qualifies under "Category A" pursuant to United States Bureau of Reclamation's (Reclamation) Notice of Funding Opportunity for the WaterSMART – Applied Science Grants for Fiscal Year 2023 (No. R2300446).

1.2 Detailed Project Description

MWA manages seven adjudicated groundwater subareas and all or a portion of 36 groundwater basins – an exceptionally large service area in an arid climate, sourced almost entirely from pumped groundwater. Groundwater is recharged in the service area by a) natural storm-water flows, b) infiltration of the Mojave River and tributaries, c) State Water Project imports to recharge basins, d) wastewater imports, and e) irrigation and wastewater return flow. As a State Water Project contractor, adjudication watermaster and administrator, and wholesale supplier to numerous retail water suppliers, MWA's long-term water-supply management actions focus on optimal utilization of its annually available supply sources and protection of its pre-stored supply sources. To improve allocations, MWA is implementing a field-based approach to better understand natural runoff and recharge from numerous springs and ephemeral washes within their service area.

MWA is currently in the process of developing a 5-year plan to (1) identify surface water and groundwater recharge data gaps within the basin, (2) prioritize opportunities for selecting ephemeral-wash recharge areas, installing monitoring wells, and installing gaging stations for rainfall, streamflow, and spring discharge, and (3) provide recharge and runoff estimates for inclusion in groundwater modeling. The 5-year plan will facilitate an increased understanding of groundwater basin characteristics and provide valuable information regarding optimizing groundwater recharge operations. Phase 1 of the 5-year plan includes reconnaissance gaging during WY2024 to establish specific sites and methods for the evaluations. Five ephemeral-wash study areas have been initially identified, the U.S. Geological Survey has reoccupied their two former gaging stations, and a consulting hydrology firm and a consulting geophysical firm have been selected through a public process. The estimated time for completion of Phase 1 is scheduled for the end of Water Year 2024 (September 30, 2024).

Runoff and Groundwater Recharge Evaluations of Ephemeral Washes – Phase 2 (Project) seeks to build on the efforts initiated in Phase 1. Specifically, the Project proposes to evaluate

recharge at the five key study reaches with a) surface geophysical surveys at each wash to assess subsurface conditions for groundwater recharge, b) construction of monitoring wells, stream gages, and rain gages at locations identified in Phase 1, and c) data collection, development of stream-rating curves, calculations and estimates of basin contributions from the ephemeral washes.

Streamflow measurements, rainfall data, and rating curves are valuable pieces of standard scientific information necessary to increase estimates of contributions from these ephemeral streams and washes. Current estimates for these contributions lack the necessary scientific basis required to accurately characterize the runoff and recharge elements of groundwater basin contributions. The proposed Project aims to increase the confidence of the estimates of aquifer contributions from ephemeral streams through data collection, analysis, and application.

Streamflow losses from the Mojave River – a focus of much study to date – represent the primary source of recharge in the service area. Other areas of recharge include mainly ungaged mountain-front watersheds and alluvial fan systems. With a headwaters mean annual precipitation of about 40 inches, the following canyon four washes draining the San Bernardino Mountains have been identified to represent peripheral basin recharge areas currently unaccounted for in basin recharge estimates: Sheep Creek, Arratre Canyon, Cushenbury Canyon, and Pipes Canyon. Much of the remaining MWA service area has precipitation much less than 10 inches per year and is estimated to produce no groundwater recharge from rain. However, Kane Wash drains an additional mountainous area with marginally higher rainfall and has been identified for potential peripheral basin recharge.

Details of the proposed Project study at these five areas include:

- Secure pertinent permits, rights of way, and easements for installation of monitoring wells, stream gages, and rain gages – All permits, rights of way, and easements will be identified through Phase 1. Phase 2 will secure the required permits, rights of way, and/or easements as applicable.
- Perform surface geophysical surveys at each wash study site identified in Phase 1 to assess groundwater recharge pathways, and subsurface constraints to recharge such as clay layers, depth to perched water, and depth to bedrock. The resulting subsurface map of the alluvial bed is important for the understanding of infiltration and recharge potential at each of the study reaches. The results will also assist with the siting of the monitoring wells and stream gages.
- Installation of monitoring wells, stream gages, and rain gages at locations identified during Phase 1 – High-priority sites will be identified through Phase 1 activities. The proposed Project will install the required scientific instrumentation (i.e. gages, sensors,

dataloggers, telemetry) at the identified locations for inclusion in the monitoring network.

- Collection of monitoring well, streamflow, and rainfall data – Monitoring well, streamflow and rainfall data will be collected using dataloggers and where appropriate using cellular or satellite real-time connection to MWA's current data network. Hand measurements of water level or stream stage, streamflow, specific conductance, and temperature will be collected to calibrate the automated data. Quality control and assurances will be performed on these data as it is collected.
- Development of rating curves at the stream gages to estimate a flow record – Rating curves will be developed based on stream geometry and flow conditions using standard scientific approaches. The rating curves will be used to convert the datalogger water-level record to a record of streamflow at each gage. The synoptic gaging records will be used to estimate the amount of recharge to groundwater within the study reach.
- Groundwater flow within the underlying alluvium of the wash – Groundwater level data collected at the monitoring wells will be used to evaluate groundwater flow gradients with which to estimate alluvial inflows into the modeled groundwater basin using commonly applied Darcian groundwater methods.
- Collection and post-processing of data for use as groundwater modeling inputs – Data will be post-processed for inclusion in MWA's current groundwater modeling efforts, which aim to provide information pertinent to recharge operations and overall basin health.

Specific tasks for the proposed Project are presented below.

Task 1 Project Management: Task 1 will be completed throughout all stages of the Proposed Project. This includes communication and coordination between pertinent MWA staff, consultants/contractors, and identified stakeholders. This task also includes internal team meetings, which will be arranged and attended as appropriate for the Proposed Project.

Task 2 Characterization of Ephemeral-Wash Reaches with Surface Geophysical Surveys: Based on a review of the five ephemeral-wash reaches by the geophysical consultant, electromagnetic (EM) and/or seismic surveys of the reaches will be performed during water year 2025. These geophysical methods are commonly applied to alluvial basins to evaluate subsurface lithology and are readily recommended by Federal and State agencies.

Task 3 Installation of Monitoring Wells: Based on recommended sites from Phase 1 and the results of the geophysical surveys (Task 2), monitoring wells will be installed at the ephemeral-wash reaches during water year 2025. The monitoring wells will be installed by a C-57 licensed driller following State and County standards, and lithology logged by a California professional geologist (PG). We envision the monitoring wells to 'bracket' each reach – one at the upstream

end of the reach and the other at the downstream end. Each monitoring well will be equipped with a submersible water-level logger, programmed to automate water-level measurements each hour. Depth to water in each monitoring well will be hand-measured at a quarterly interval with an electronic water-level sounder to calibrate the datalogger record. The elevation and coordinates of the top of casing of each monitoring well will be surveyed. The top of casing is the reference point (RP) elevation from which hand depth-to-water measurements are taken to calibrate the datalogger record.

Task 4 Installation of Stream Gages: Some stream gages will have been installed in Phase 1 during water year 2024. Based on the recommended sites from Phase 1 and the results of the geophysical surveys (Task 2), additional stream gages will be installed during water year 2025. We envision a stream gage to 'bracket' each reach – one at the upstream end of the reach and the other at the downstream end. Conventional open-channel flow gaging methods will be employed (c.f., Rantz and others, 1982). The gaging stations will be equipped with one or more U.S. Geological Survey 'Style C' staff plate and water-level datalogger, based on the number of braided channels in the wash in need of monitoring. The dataloggers will be programmed to record automated water-level measurements every 15 minutes, and where appropriate using cellular or satellite real-time connection to MWA's current data network. An empirical stage-discharge 'rating-curve' equation will be used at each station to convert the 15-minute record of the stage to a flow record per Division of Water Rights standards.

Task 5 Installation of Rainfall Gages: Many rainfall gages are currently active in the watersheds of the study reaches. In areas where rain gages are required based on site recommendations from Phase 1, an 8-inch tipping bucket rain gage conforming to the National Weather Service standards will be installed, and if possible, using cellular or satellite real-time connection to MWA's current data network.

Task 6 WY2025 and WY2026 Fieldwork and Data Reduction: Field work would involve measuring wadable flows, conducting a survey of the channel geometry at each gaging location each year and/or following a major channel-modifying event, and estimating the discharge volume and groundwater recharge in each ephemeral wash. If possible, an indirect peak-discharge calculation would be performed and, using the water-level record from the datalogger, estimate the volume of runoff at each gaging station. In addition, a drone flight would be carried out to map the wash and estimate the area of runoff and groundwater recharge.

Task 7 Data Analysis and Reporting: This task provides time to analyze the data and prepare a written report summarizing the results of flow and recharge gaged during water years 2025 and 2026. Observations and measurements collected will be documented with maps, figures, data

tables, photos, and drone flight images. The objective of the report is to detail the gaging site locations and methods used to calculate flow and recharge.

Deliverables of the proposed Project include:

- Expanded monitoring network through the installation of scientific instrumentation (streamflow and rain gages).
- Site-specific streamflow rating curves.
- Streamflow and rainfall data.
- Post-processed streamflow and rain-fall data used for groundwater modeling.

Results from this scientific endeavor will facilitate MWA's efforts in identifying appropriate locations to construct recharge basins, water rights administration, assessment of overall groundwater basin health, management of water delivery, drought management operations, and restoration of the natural features that are the groundwater basins.

Currently, contributions to groundwater aquifers from ephemeral streams are poorly understood. Results of the 5-year study are expected to provide insight to other water managers in the region regarding ephemeral streams contribution to groundwater aquifers in the form of recharge and runoff.

1.3 Goals

Specific goals associated with the Proposed Project include:

1. Synthesize previous data collection efforts conducted in Phase 1;
2. Installation of streamflow gages, rainfall gages, and spring discharge at locations identified in Phase 1;
3. Provide runoff and groundwater recharge estimates at poorly understood ephemeral washes.

On overall goal is to increase understanding of hydrologic inputs to the groundwater basin, which can be incorporated into groundwater models for accurate assessment of current conditions which informs on recharge amounts and locations. Accurate assessment and overall health of the groundwater basins are dependent on proper understanding of the fundamental recharge inputs to the groundwater basin. Further, the information will be leveraged to assess the groundwater basins more accurately under future scenarios, including increased population (competing demands) and future climate change scenarios (impacts to future recharge).

2 Project Location

MWA provides various water management services within its 4,900 square mile service area located in eastern San Bernardino County in Southern California. MWA, as the region's wholesale water provider, imports water from the California State Water Project (SWP) for subsequent recharge and delivery throughout the basin to local retail water suppliers. The primary source for end-users within the service area is pumped groundwater, which is recharged by natural stormwater flows, infiltration of the Mojave River and tributaries, SWP imports to recharge basins, wastewater imports, and irrigations and wastewater return flows.

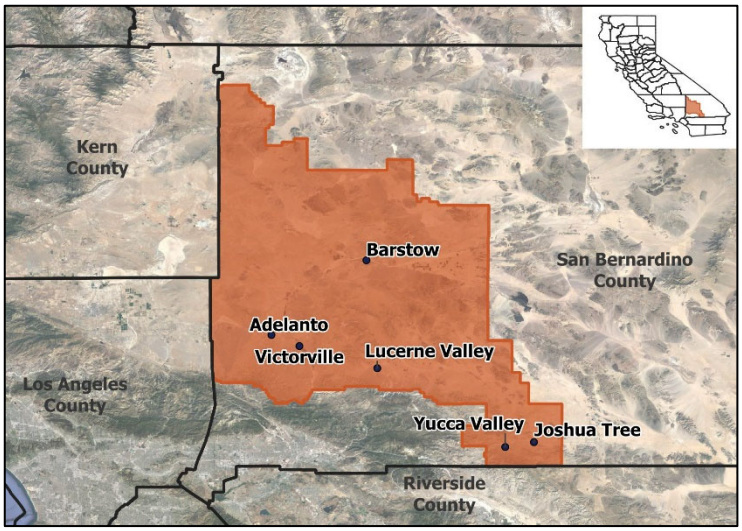

Figure: MWA Service Area

To fulfill its mission and augment natural groundwater supply, MWA has implemented and participated in projects such as the Regional Recharge and Recovery Project (R3) and the State Water Project (SWP), and numerous data collection and investigative projects through a partnership with the USGS. Critical to MWA's ability to fulfil its mission of sustainably managing groundwater resources in our basins, the understanding and quantification of mountain-front recharge throughout the service area is necessary.

Specific project locations associated with the Proposed Project will be identified through Phase 1 activities. These locations will be prioritized on applicability and influence of recharge on the local groundwater basins. The Proposed Project will expand the spatial extent of the study of groundwater recharge from ephemeral streams.

3 Data Management Practices

The primary data that will be collected under the Proposed Project include streamflow and rainfall data. This data will be collected using MWA's existing data network. Quality control and assurance measures will be implemented regarding the collection and storing of this data. This data will be post-processed for inclusion in MWA's groundwater modeling efforts. The groundwater modeling will use this primary data input to provide secondary data including, but not limited to, changes in groundwater levels under various hydrological and demand conditions, assessment of water quality issues (if applicable), potential locations for construction of recharge facilities, and well interference or impairment issues.

4 Evaluation Criteria

4.1 Evaluation Criteria A – Water Management Challenge

*A1. Describe in detail the **water management challenge** occurring within your project area.*

MWA manages seven adjudicated groundwater subareas and all or a portion of 36 groundwater basins – an exceptionally large service area in an arid climate sourced almost entirely from pumped groundwater. As a State Water Project contractor, adjudication watermaster and administrator, and wholesale supplier to numerous retail water suppliers, MWA's long-term water-supply management actions focus on optimal utilization of its annually available supply sources and protection of its pre-stored supply sources. Streamflow losses from the Mojave River – the primary source of recharge in the service area – has been the focus of major study. However, other areas of important recharge to the basin include mainly ungaged mountain-front ephemeral watershed and alluvial fan systems are poorly defined. Data gaps regarding runoff and recharge estimates provide a major water management challenge with respect to assessing conditions in groundwater basins located throughout MWA's service area. Currently, the impacts to groundwater basins from ephemeral streams and washes is poorly understood and recharge and runoff quantities are roughly estimated. Without rigorous scientific study of these mountain-front recharge areas, corrections to basin water balances are not possible given the uncertainties of current recharge estimates. The need to correct the recharge estimates is compounded by recent drought conditions and a warming climate, impacting runoff and State Water Project import to the groundwater basins. The results of the proposed Project aim to provide critical data that may be used to correct basin water balances and to improve the management of wholesale distributions to the numerous retail water suppliers.

*A2. Describe the **concerns or outcomes** if this water management challenge is not addressed.*

As noted above, without the proposed Project, corrections to basin water balances are not possible given the uncertainties of current recharge estimates. The water management challenge, if left unaddressed, may result in the continuation of using low-confidence data regarding the current estimates for recharge and runoff used in MWA's groundwater model(s). This creates uncertainties in the computation of available groundwater in storage which affects annual groundwater allocations and pumping limitations, siting of future recharge locations, and consideration of infrastructure expansion and improvements.

A3. *Explain **how** your project will address the water management issues identified.*

The proposed Project will provide basic hydrologic data – rainfall, streamflow, and shallow groundwater level data – for ungaged mountain-front ephemeral watershed and alluvial fan systems. These recharge areas are poorly defined and have not been fully quantified. Currently, rough regional estimates have been applied to basin water balances and

groundwater models for management of water deliveries under adjudicated protocols, and for drought and climate-change forecasts. The result of the proposed Project will provide needed data to improve the management of the groundwater basins. In addition, the Project proposes to analyze the collected data to better understand and describe the hydrologic processes of the mountain-front ephemeral watershed and alluvial fan systems. This understanding may lead to estimates that can be applied to other mountain-front sites.

4.2 Evaluation Criteria B – Project Benefits

B1. *Describe how the **need for the project** was identified.*

The need for the proposed Project was identified by the MWA Board of Directors and in their 2020 Urban Water Management Plan, when through a public review and comment process.

*B2. Describe **how** the tool, method, or information will be applied and **when** will it be applied.*

Following completion of the proposed Project, analysis of the collected two to three years of gaging data will provide results that can be immediately utilized in refining basin water balance and groundwater modeling results. Typically, additional years of gaging is carried out to monitor various water year types, and storm types, or evaluated across a cycle of years of major recharge and of drought years. Ongoing improvements to management of water allocations and master planning are consistent with the available data.

B3. Describe, in detail, the extent of benefits that can be expected to occur upon implementation of the project, and provide support for your responses.

As noted above, MWA manages seven adjudicated groundwater subareas and all or a portion of 36 groundwater basins. The basic hydrologic data and recharge estimates of the ungaged mountain-front ephemeral watershed and alluvial fan systems would directly benefit MWA basin water balances and groundwater models of these managed subbasins. Water management planning, changes to groundwater model parameters, and changes in water allocations go through a strict public review and comment process. Rigorous scientific studies are required to justify improvement to management calculations and modeling tools. The proposed Project will benefit this management process, decisions by MWA Board of Directors, and distributions to numerous retail water suppliers. In addition understanding of recharge from mountain-front ephemeral wash systems would broadly benefit other areas and districts with similar water management challenges.

B4. *Explain how your project complements other similar efforts in the area where the project is located.*

Aquifer recharge through ephemeral streambeds is believed to be a major source of groundwater recharge in arid areas; however, comparatively few studies quantify this streamflow recharge (Shanafield and Cook, 2014). Research needs include a) quantitative uncertainty analysis, b) long-term data collection and analysis, c) understanding of the role

of riparian vegetation, and d) reconciliation of transmission losses and infiltration estimates with actual aquifer recharge. Due to the inherent difficulties of gaging flow in the desert braded-channels washes and estimating recharge from mountain-front ephemeral watershed and alluvial fan systems, results of a rigorous gaging program as proposed in the Project would complement other sites in Southern California and desert southwest groundwater basins such at Owens Valley and other East-side Sierra Nevada Valleys, and across the Basin and Range province. The methods proposed are commonly applied but difficult to implement in dynamic desert washes where sediment loads high and flash floods shift the braded-channel geometry and flow conditions. Results of the proposed project would address needed research.

4.3 Evaluation Criteria C – Project Implementation

C1. *Briefly describe and provide support for the approach and methodology that will be used to meet the objectives of the project.*

Methods proposed are commonly applied and recommended by State and Federal agencies. Conventional open-channel flow gaging methods will be employed (c.f., Rantz and others, 1982). The monitoring wells will be installed by a C-57 licensed driller following State and County standards, and lithology logged by a California professional geologist (PG). Commercially available gaging instrumentation will be installed. Geophysical methods are commonly applied to alluvial basins to evaluate subsurface lithology, and are readily recommended by Federal and State agencies. Estimates of alluvial inflows into the modeled groundwater basin will use commonly applied Darcian groundwater methods.

C2. *Describe the work plan for implementing the proposed scope of work.*

The proposed Project is anticipated to be completed by the end of Water Year 2026 as shown by the proposed schedule in the figure below.

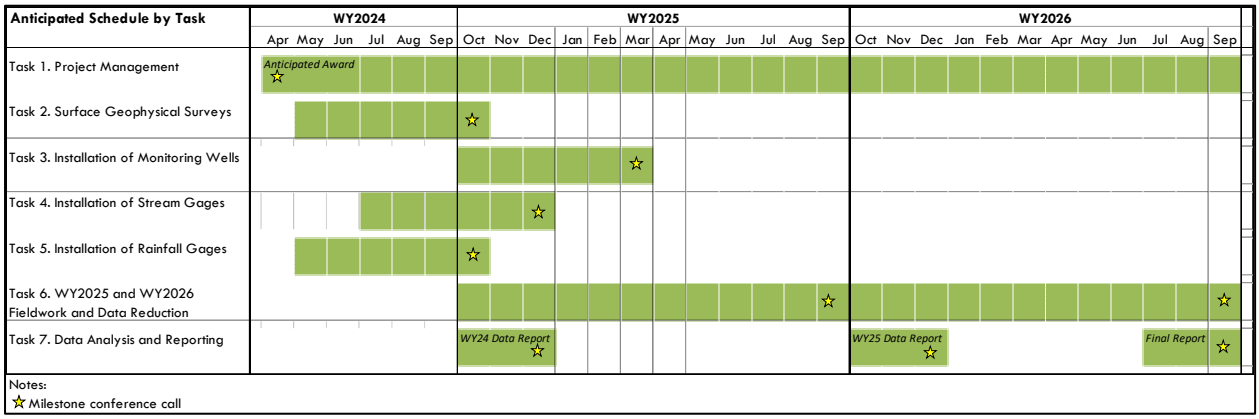

Figure 2 – Proposed Project Schedule by Task

Project Management (Task 1) will be accomplished through all phases of the proposed Project. Installation of stream gages and rainfall gages (Tasks 4 and 5) will be completed concurrently with surface geophysical surveys (Task 2). Installation of monitoring wells (Task 3) is anticipated to be started at the beginning of Water Year 2025, as shown in the figure above. Fieldwork and data reduction (Task 6) will be performed beginning Water Year 2025, with data analysis and reporting (Task 7) be performed after completion of the previous water year.

C3. *Provide a summary description of the products that are anticipated to result from the project.*

Table 2 – Summary Description of Deliverables by Anticipated Task

Anticipated Schedule by Task	List of Deliverables
Task 1. Project Management	Milestone team calls and monthly update emails
Task 2. Surface Geophysical Surveys	Cross-section, longitudinal, and block maps of geophysical results.
Task 3. Installation of Monitoring Wells	Well completion report and record of water elevation in each well.
Task 4. Installation of Stream Gages	Channel geometry and record of flow at each gage.
Task 5. Installation of Rainfall Gages	Record of rainfall at each gage.
Task 6. WY2025 and WY2026 Fieldwork and Data Reduction	Observers log, calculations, and datalogger records.
Task 7. Data Analysis and Reporting	Runoff and recharge results in water year data reports and final report.

C4. *Who will be involved in the project as project partners?*

Mojave Water Agency is the project manager and principal investigator (all Tasks), Balance Hydrologics, Inc. is the subcontracted hydrology firm (all Tasks), and Collier Geophysics, LLC is the subcontracted geophysics firm (Task 2). The U.S. Geological Survey has re-occupied two former mountain-front canyon gages.

C5. *Identify staff with appropriate credentials and experience and describe their qualifications.*

Mojave Water Agency staff include Wesley Massoll, Kapo Coulibaly and Jerry Burns. Mr. Massoll serves as Mojave Water Agency's Senior Hydrogeologist and is a licensed Professional Geologist with over six years of experience in the field. Mr. Massoll holds a Bachelor of Science and a Master's degree in Geology from the University of North Carolina, Wilmington. Mr. Coulibably serves as Mojave Water Agency's Principal

Hydrogeologist and is a licensed Professional Geologist with over 20 years of experience in his field. Mr. Coulibaly holds a Master's degree in Environmental Sciences from Universite Abobo-Adjame (Cote D'Ivoir) and a PhD in Hydrogeology from North Carolina State University. Mr. Burns is a Water Resources Specialist I with approximately two years of experience as a geologist and water resources specialist. Mr. Burns holds a Bachelor of Science in Environmental Geology from the California State University, San Bernardino, and a Masters Of Hydrology and Water Security from the University of Oklahoma.

Balance Hydrologics, the consulting hydrology firm, and Collier Geophysics, the consulting geophysical firm have been selected through a public process. Both consulting firms have provided substantial qualifications and have decades of experience of similar projects.

Balance Hydrologics (Balance) is a full-service hydrology firm, founded in 1988, with extensive experience in hydrology, groundwater supply development, watershed management, wetland and riparian dynamics, restoration design, construction oversight, and permitting. With offices in Berkeley, Santa Cruz, and Truckee, our staff consists of over 30 field-oriented hydrologic professionals with diverse backgrounds and advanced graduate degrees in engineering, geomorphology, hydrogeology, geochemistry, and water-resources management. A hallmark of Balance's work has been our ability to interpret geologic and landscape processes with emphasis on intensive field study, qualitative and quantitative analyses, and often modeling, structured to meet the specific needs of the habitat, watershed, or land/district manager. With gross revenues of roughly $6,000,000, Balance holds small business certifications with the State of California (SBE #1532), with many counties, and is a self-certified Federal Small Business.

Collier Geophysics is a service-disabled, veteran-owned, small business founded in 2018 with offices in Texas, Colorado, Georgia, Massachusetts, North Carolina, Tennessee, and Wisconsin.

4.4 Evaluation Criteria D – Dissemination of Results

D1. *Explain how project results will be disseminated.*

The applicant is the primary beneficiary of the proposed Project. Wesley Massoll, PG and the principal investigator at MWA will coordinate internally with Kapo Coulibaly, PhD, PG, Principal Hydrogeologist and groundwater modeler at MWA. Mr. Massoll will present the results to the MWA Board of Directors and disseminate the results to MWA resource managers. U.S. Geological Survey gaging results will be included to develop a runoff and groundwater white paper. Results may be presented at the Western Groundwater Congress.

4.5 Evaluation Criteria E – Presidential and Department of the Interior Priorities

E1. If applicable, describe how the project addresses climate change and increases resiliency. How will the project build long-term resilience to drought? Will the proposed project reduce greenhouse gas emissions by sequestering carbon in soils, grasses, trees, and other vegetation?

The results of the proposed Project will provide basic data with which to improve drought predations and 30-year climate change predations.

E2. If applicable, describe how the project benefits those disadvantaged or underserved communities identified using the tool.

SB 535 Disadvantaged Communities within the MWA service area will indirectly benefit from the basic data results of the proposed Project. The Council on Environmental Quality's interactive Climate and Economic Justice Screening Tool (Screening Tool) was used to identify census tracts that are deemed "disadvantaged" and are within the MWA service area. The following figure displays the spatial extent of the areas designated as "Disadvantaged" (DAC) pursuant to the Screening Tool.

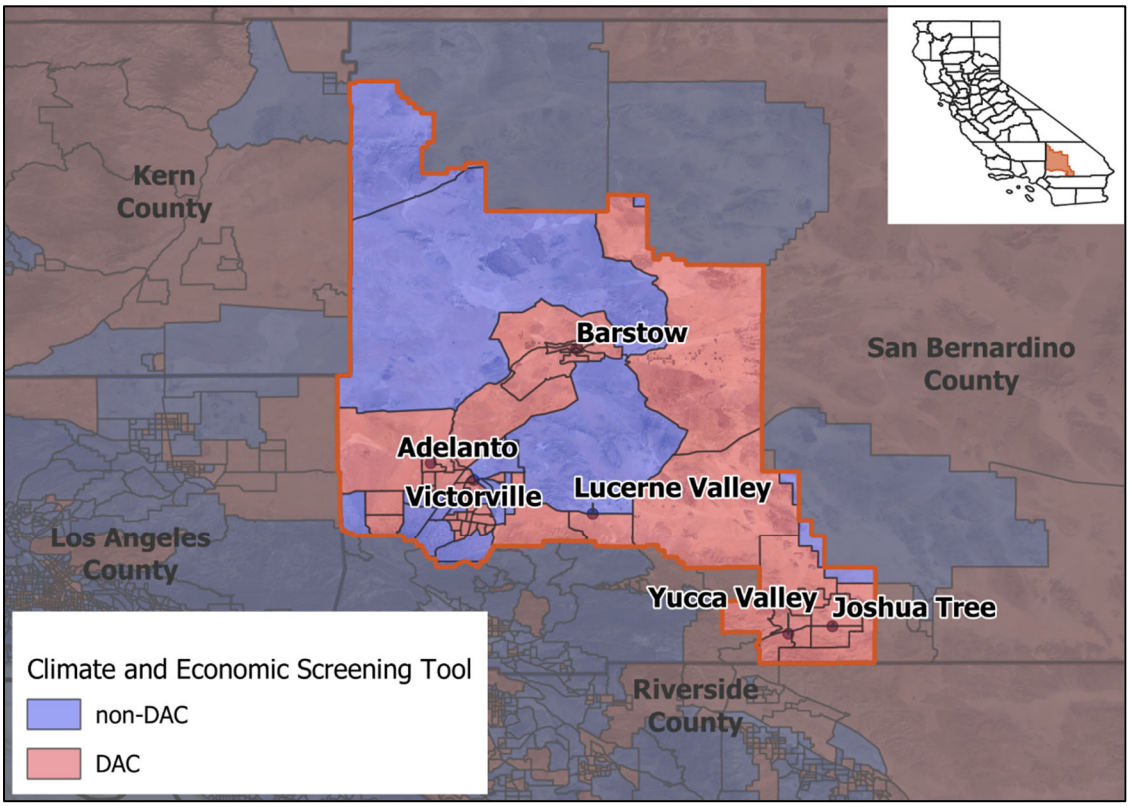

Figure 2 – Council on Environmental Quality's Climate and Economic Justic Screening Tool

The reported population for the DACs within the MWA service area is approximately 326,704, representing 68.9% of the total population within the service area. The

Proposed Project aims to increase understanding of hydrogeologic processes with respect to future climate change scenarios (including droughts) throughout the service area, and therefore, DACs will inherently benefit from efforts associated with the Proposed Project.

5 Project Budget

The total estimated cost for the proposed Project is $897,408. MWA is proposing a non-Federal contribution of $497,408 and $400,000 in Federal funds under this NOFO. The proposed budget for each task is presented in the table below. The resulting Cost-Share Percentage is 44.6% of Federal contributions and 55.4& of non-Federal contributions.

Table 3 – Summary of Task Budget by Funding Sources (Federal and Non-Federal Sources)

Task	Non-Federal Share Cost	Federal Share Cost	Total Budget
Task 1 Project Management	$25,000	$25,000	**$50,000**
Task 2. Surface Geophysical Surveys	$75,000	$75,000	**$150,000**
Task 3. Installation of Monitoring Wells	$100,000	$100,000	**$200,000**
Task 4. Installation of Stream Gages	$75,000	$75,000	**$150,000**
Task 5. Installation of Rainfall Gages	$25,000	$25,000	**$50,000**
Task 6. WY2025 and WY2026 Fieldwork and Data Reduction	$75,000	$75,000	**$150,000**
Task 7. Data Analysis and Reporting	$25,000	$25,000	**$50,000**
Total	**$497,408**	**$400,000**	**$897,408**

The Non-Federal Cost Share presented above will be sourced from MWA as there are no third-party contributions associated with the Proposed Project.

A "Budget Narrative" is attached to this application and provides information on each item included in Section 6 of Standard Form SF-424A, which is also included as part of this grant application.

6 Environmental and Cultural Resources Compliance (as applicable to the project)

Provided here are answers to specific questions contained in Section H of the Notice of Funding Opportunity.

- **Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)?**
  Activities associated with the proposed Project may impact surrounding environments with the installation of various gages and monitoring wells. These impacts will be limited to the surrounding areas of the proposed sites, which are in general away from urban areas, population centers, and animal habitats.

- **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?**
  No activities associated with the proposed Project will impact any species listed or proposed to be listed as a federally threatened or endangered species or designated critical habitat.
- **Are there any wetlands or other surface water inside the project boundaries that potentially fall under Clean Water Act (CWA) jurisdiction as "Waters of the United States"?**
  There are no wetlands or other surface water bodies inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States".
- **When was the water delivery system constructed**?
  Not applicable.
- **Will the proposed project result in any modifications of or effects to, individual features of irrigation system (e.g., headgates, canals, or flumes)?**
  The proposed Project will not result in any modifications or effects to individual features of irrigation systems.
- **Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places?**
  No activities associated with the proposed Project will impact any buildings, structures, or features that may be listed on the National Register of Historic Places as there will be no impact to surrounding environments.
- **Are there any known archeological sites in the proposed project area?**
  No activities associated with the proposed Project will impact on any known archeological sites as there will be no impacts to surrounding environments.
- **Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?**
  No activities associated with the proposed Project will have a disproportionately high and adverse effect on low-income or minority populations as there will be no impacts on surrounding environments.
- **Will the proposed project limit access to, and ceremonial use of, Indian sacred sites or result in other impacts on tribal lands?**
  No activities associated with the proposed Project will impact access to, and ceremonial use of, Indian sacred sites or result in other impacts on tribal land as there will be no impacts on surrounding environments.
- **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 activities associated with the Proposed Project will contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species as there will be no impacts on surrounding environments.

7 Required Permits or Approvals

County well drilling permits to install the monitoring wells. Coordination with County Flood Control to install some of the stream gages.

8 Overlap or Duplication of Effort Statement

There is no overlap between the Proposed Project and any other active or anticipated proposals or projects in terms of activities, costs, or commitment of key personnel.

The Proposed Project is not duplicative of any proposal or project that has been or will be submitted for funding consideration to any other potential funding source, including Federal and non-Federal funding sources.

9 Conflict of Interest Disclosure Statement

No actual or potential conflicts of interest exist at the time of this proposal. Should any conflict of interest arise during any course of the Proposed Project, MWA will disclose the nature of such conflicts to Reclamation.

9.1 Notification

Internal controls will be established that include procedures to identify, disclose, and mitigate or eliminate identified conflicts of interest associated with the Proposed Project. MWA will notify the Financial Assistance Officer of any identified conflicts of interest should they arise.

9.2 Restrictions on Lobbying

MWA acknowledges the prohibition on using awarded funds under a grant or cooperative agreement for lobbying activities.

10 Uniform Audit Reporting Statement

MWA is required to submit a Single Audit report for the most recently completed fiscal year (Fiscal Year 2021-2022). The Employer Identification Number (EIN) associated with that report is 952283025; the report is available through the Federal Audit Clearinghouse website (https://facdissem.census.gov/SearchA133.aspx).

11 SF-LLL: Disclosure of Lobbying Activities (if applicable)

A copy of the mandatory Federal form SF-LLL (Disclosure of Lobbying Activities) is included in this grant application.

12 Letters of Support

Letters of Support are not included in this application. As stated in Section 4.2.B.1, the need of the Proposed Project was identified through correspondence with MWA Board of Directors.

13 Official Resolution

Due to timing constraints with MWA's Board of Directors, an official Resolution is not currently available. The official Resolution will be adopted by the Board of Directors and supplied to Reclamation upon adoption by the Board of Directors. It is anticipated that the Resolution will be adopted at the regularly scheduled Board meeting on October 26th, 2023.

14 Letters of Funding Commitment

No third-party cost share is associated with this application as all non-Federal cost share requirements will be provided by MWA. Therefore, no third-party letters of funding commitment are included in this application.

Budget Narrative

This Budget Narrative attachment provides information on each item included in Section 6 of Standard Form SF-424A. The Budget Summary table below reports the total estimated costs and estimated Federal and Non-Federal contributions for the Proposed Project.

Table 1 – Proposed Project Budget Summary Table

6. Budget Object Category	Total Cost	Federal Estimated Amount	Non-Federal Estimated Amount
a. Personnel	$197,408		
b. Fringe Benefits	$0		
c. Travel	$0		
d. Equipment	$100,000		
e. Supplies	$0		
f. Contractual	$600,000		
g. Construction	$0		
h. Other Direct Costs	$0		
i. Total Direct Costs	$0		
j. Indirect Charges	$0		
Total Costs	**$897,408**	**$400,000**	**$497,408**
Cost Share Percentage		44.6%	55.4%

Personnel (Salary and Wages)

Key Personnel include the Project Manager (Wesley Massoll PG, Senior Hydrogeologist), a Senior Hydrogeologist (Kapo Coulibaly, PhD, PG) and a Water Resources Specialist I (Jerry Burns). The following table (Table 2) provides an approximate number of hours and associated cost for each task for the Project Manager.

Table 2 – Proposed Project Budget "Personnel" Table

Task	Principal Hydrogeologist	Senior Hydrogeologist	Water Resources Specialist I	Task Total
Hourly Cost	$ 103.31	$ 70.82	$ 51.37	n/a
Task 1. Project Management (hours)	65	650	0	715 hours
Sub Total	$ 6,715	$ 46,033	$ -	$ 52,748
Task 2. Surface Geophysical Surveys (hours)	10	20	40	70 hours
Sub Total	$ 1,033	$ 1,416	$ 2,055	$ 4,504
Task 3. Installation of Monitoring Wells (hours)	10	30	40	80 hours
Sub Total	$ 1,033	$ 2,125	$ 2,055	$ 5,213
Task 4. Installation of Stream Gages (hours)	5	10	40	55 hours
Sub Total	$ 517	$ 708	$ 2,055	$ 3,280
Task 5. Installation of Rainfall Gages (hours)	2	10	40	52 hours
Sub Total	$ 207	$ 708	$ 2,055	$ 2,970
Task 6. WY2025 and WY2026 Fieldwork and Data Reduction (hours)	130	650	1300	2080 hours
Sub Total	$ 13,430	$ 46,033	$ 66,781	$ 126,244
Task 7. Data Analysis and Reporting (hours)	10	20	0	30 hours
Sub Total	$ 1,033	$ 1,416	$ -	$ 2,450
Total	**$ 23,968**	**$ 98,440**	**$ 75,000**	**$ 197,408**

As seen from the table, costs associated with the listed personnel amount to $197,408.

Fringe Benefits

Fringe Benefits for MWA employees as they relate to the Proposed Project will be accounted for by MWA through normal operating costs. No incurred fringe benefit costs related to the Proposed Project will be sourced from grant funds. Contractor/Consultant fringe benefits are included in the billing rates under the "Contractual" portion of the proposed budget.

Travel

Not applicable.

Equipment

Standard, commercially available instrumentation will be installed at each stream gage station, including staff plates, water-level sensors, dataloggers, and telecommunications equipment. The average equipment cost for each gaging station is $9,000. The estimated total cost for 10 stations is $90,000.

A submersible water-level logger will be installed in each well, costing $1,000 per well. The estimated total cost for 10 wells is $10,000.

Total equipment cost is $90,000 + $10,000 = $100,000.

Supplies
Not applicable.

Contractual
Three sub-consultants will be contracted for the proposed Project:

1. The geophysical consultant, Collier Geophysics will carry out electromagnetic (EM) and/or seismic surveys at each of the five study reaches (Task 2). Estimated costs are $30,000 per reach. The total cost for all five reaches is $150,000.
2. The monitoring wells will be installed by a C-57 licensed driller following State and County standards, and lithology logged by a California professional geologist (Task 3). The estimated cost for 1,000 feet of well drilling at $200 per foot is $200,000.
3. The hydrology consultant, Balance Hydrologics will install the stream gaging stations and rain gages (Tasks 4 and 5), conduct fieldwork during WY2025 and WT2026 (Task 6), and analyze the data and prepare the report (Task 7). The total estimated cost is $250,000.

Construction
Not applicable.

Other Direct Costs
Not applicable.

Indirect Costs
Not applicable.