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:

The Mojave River Basin Integrated Groundwater/Surface Water Model Development

October 17, 2023

Applicant: Mojave Water Agency

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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

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. 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).

Project Summary

MWA is seeking funds through this Notice of Funding Opportunity to support its **The Mojave River Basin Integrated Groundwater/Surface Water Model** (Proposed Project). The Proposed Project is a comprehensive update of MWA's existing model in addition to adding the surface water component which is currently lacking, including calibration to at least 2020 using state of the art modeling code to replace the obsolete existing model. It is anticipated that the steps below will be taken to complete the Proposed Project:

- Data compilation, pre-processing, and analysis
- Revised and updated groundwater/surface water conceptual model
- Model building and calibration to historical water levels.
- Various projects scenario run for planning and decision-making.

The MWA is seeking to implement a comprehensive decision-making tool using artificial intelligence (AI). MWA anticipates the AI will integrate global circulation climate change models, the updated groundwater model, demand projections, water rates, and SWP Table A and Article 21 Water to help optimize the use of human and natural resources, energy efficiency, and efficient distribution of imported water.

Project Schedule and Budget

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

Table 1 – Proposed Project Schedule and Budget

Task	Duration	Start Date	End Date	Estimated Budget
Task 1 - Project Management	24 months	04/01/2024	04/01/2026	$19,623
Task 2 - Data collection and review	6 months	04/01/2024	10/01/2024	$104,176
Task 3 - Conceptual Model and Model Construction	6 months	07/01/2024	01/01/2025	$74,564
Task 4 - Model Calibration	3 months	01/01/2025	04/01/2025	$57,923
Task 5 - Independent Model Review	6 months	04/01/2025	10/01/2025	$100,000
Task 6 - Scenario Runs	4 months	10/01/2025	02/01/2026	$46,018
Task 7 - Final Report and Public Presentation	2 months	02/01/2026	04/01/2026	$5,105
			Total Budget	**$407,408**

As seen from the table, it is anticipated that the project will be completed within a two-year window, at an estimated cost of approximately $407,408. It is noted, the “Start Date” listed in the table above is contingent on acceptance of this grant application.

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

The MWA service area, like most of California, is experiencing a 20-year drought. To mitigate the impact of drought and secure water for various disadvantaged communities a list of projects aimed at improving access to water are being implemented. These include increasing recharge capacity through infrastructure expansion to take full advantage of State Water Project (SWP) allocation and water banking to improve basin health. An integrated groundwater/surface water model for the whole of MWA service area is a crucial tool for planning, decision making and overall basin understanding. Currently, only less than half of the basin has an up-to-date model. The existing regional model that covers most of the MWA service area has not been updated since 2000.

MWA is seeking funds through this Notice of Funding Opportunity to support its **Mojave River Basin Integrated Groundwater/Surface Water Model Development** (Proposed Project). The Proposed Project is a comprehensive update of MWA's existing model in addition to adding the surface water component which is currently lacking, including calibration to at least 2020 using state of the art modeling code to replace the obsolete existing model. It is anticipated that the steps below will be taken to complete the Proposed Project:

- Data compilation, pre-processing, and analysis
- Revised and updated groundwater/surface water conceptual model
- Model building and calibration to historical water levels.
- Various projects scenario run for planning and decision-making.

The MWA is seeking to implement a comprehensive decision-making tool using artificial intelligence (AI) in the future and a calibrated model is an essential component of this approach. MWA anticipates the updated groundwater model coupled with demand projections, the availability of SWP Table A and Article 21 Water will help optimize the use of natural resources and efficient distribution of imported water. A calibrated regional model will also help MWA prepare for adequate data collection scheme ensuring better decision and forecasting in the future.

Details of the Proposed Project include:

- Project Management (Task 1)
- Data Collection and Review (Task 2)
- Conceptual Model and Model Construction (Task 3)
- Model Calibration (Task 4)
- Independent Model Review (Task 5)
- Scenario Run (Task 6)
- Final Report and Presentation (Task 7)

Specific tasks for this Proposed Project are presented below.

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

Task 2 Data Collection and Review:

This task will include data gathering, processing and analysis. Existing data will be collected, organized, and processed to make it readily available for the modeling work ahead. Data gaps will also be identified so that additional data, if needed will have to be collected. These data will include reports, cross-sections, well completion reports, geophysical studies, lithology and stratigraphy, water levels, water quality, rainfall and streamflow time series. MWA staff anticipate additional surface geophysical survey might be needed to fully characterize the basin.

Task 3 Conceptual Model and Model Construction:

The data gathered and processed in Task 2 will be used here to revise and update the conceptual model. The conceptual model is the hydrogeologist understanding of how the natural hydrological system works based on the observed data. An accurate conceptual model is the foundation of a correct numerical model. The conceptual model will then be translated into a numerical model by pre-processing the data for a specific numerical modeling code. MWA staff is anticipating that the MODFLOW family of numerical modeling codes will be used but the final choice will be determined by the modeling staff.

Task 4 Model Calibration:

This task consists of running the model constructed in Task 3 and calibrating it to historical data. Calibration is conducted by modifying the model parameters so that output from the model run matches observed data. Groundwater level elevations and streamgages will be used as observed data. Multiple models run and various statistical analyses are usually needed to

achieve calibration. A combination of manual and automatic calibration tools will be needed to complete this task.

Task 5 Independent Model Review:

This task consists of having the model peer-reviewed by experts outside the MWA. This will ensure that the model is validated and more defensible.

Task 6 Scenario Run:

Once the model is properly calibrated it can be used to run scenarios to support decision making and water resources management. Currently the MWA is in the process of implementing various water resources projects to improve basin health in its service area. These include (but are not limited to), infiltration basins, water banking, purchased State Water Project releases into the Mojave River, etc. By implementing these potential projects in the model, MWA can get a better sense of their impact on water resources, also different alternatives can be tested so that the best solution is selected for implementation. The model can also be used to mitigate the impact of climate change as future scenarios under various climate conditions can be simulated. Ultimately the model can also be used to produce changes in storage across MWA's service area over the years.

Task 7 Final Report and Presentation:

A final report will be written to summarize the steps taken to build and calibrate the numerical model along with the results and recommendations for the scenarios run. A final presentation will also be given to the MWA Board of Directors and the public.

Deliverables associated with the Proposed Project include:

- 3D lithological model and cross-sections
- Final modeling report with a revised conceptual model and updated model results
- Numerical model files
- Change in storage time series.

1.3 Goals

Specific goals associated with the Proposed Project include:

1. Build and calibrate an integrated groundwater/surface water model for the MWA service area.
2. Improve the conceptual model understanding of the basin.
3. Support water resources management and decision making in MWA service area.
4. Support drought resiliency and climate change adaptability

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 storm water flows, infiltration of the Mojave river and tributaries, SWP imports to recharge basins, wastewater imports, and irrigations and wastewater return flows.

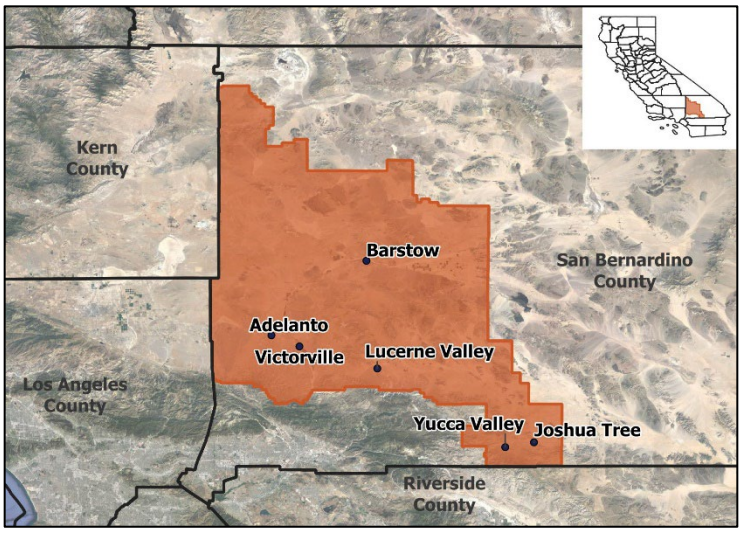

Figure: MWA Service Area

3 Data Management Practices

All necessary data required for the Proposed Project will be acquired through normal operating procedures (USGS downloads, etc.). Data developed from the Proposed Project will meet current industry standards, and formats will be compatible with standard information system systems.

4 Evaluation Criteria

4.1 Evaluation Criteria A – Water Management Challenge

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

The MWA service area is 4,900 square miles with a complex geology and a growing water demand. Groundwater levels in most of the service area have been declining since the 1930s, and recent drought in southern California has created a water crisis with some domestic wells in disadvantage communities drying. To ensure the reliability of groundwater supply, MWA has relied on the State Water Project (SWP) to supplement dwindling natural recharge. Although the MWA has an annual SWP allocation of 89,000 acre-feet, the lack of infrastructure and planning tools has led MWA to lose a portion of its SWP annual allocation when it was available during wet years. Delivery of SWP to the area is challenging because of the sheer size and the complexity of the MWA service area. Subsurface heterogeneities and the presence of groundwater flow barriers (faults) means that some areas like Centro which is experiencing a rapid decline of groundwater levels will not benefit from upgradient recharge project. MWA is expanding its infrastructure to take full advantage of its SWP allocation by developing a water bank

and building more infiltration basins. A calibrated groundwater model is the perfect tool to support planning, design and management of these projects.

4.1.2 *Describe the **concerns or outcomes** if this water management challenge is not addressed?* With the current trend in demand increase and declining water levels, portions of the MWA service area will run out of water. Some domestic wells have already dried and some well owners have had to drill deeper to access water.

4.1.3 *Explain **how** your project will address the water management issues identified.* The integrated groundwater/surface water will be used as a management tool to manage groundwater deliveries, conjunctive use, watershed health, drought management, and climate change resiliency. Future climate change scenarios derived from global circulation model will be run to help prepare the MWA for climate variability and climate change. As stated in the previous section, the model will be used to manage the imported water delivery more effectively by supporting planning and design of infrastructure, delivery locations and impact assessment of various water projects.

4.2 Evaluation Criteria B – Project Benefits

4.2.1 *Describe how the **need for the project** was identified.* The need for a groundwater model was identified through discussions between the MWA board of directors and the MWA water resources staff.

4.2.2 Describe **how** the tool, method, or information will be applied and **when** will it be applied. The integrated groundwater/surface water model will be used immediately as it will be used to assess the impact of existing delivery facilities as well as some that are being planned in the next few months. Currently, three infiltration basins are being planned for the next year or so, and the model will be used as a decision-making tool for these. It will be used mainly as a planning tool for various water resources projects. And also, as an assessment tool for existing projects so that a decision can be made about how useful they have been for basin health and how they can either be improved or discontinued. This model will also help refine the current Basin Management Plan and Drought Resiliency Plan.

4.2.3 Describe, in detail, the extent of benefits that can be expected to occur upon implementation of the project, and provide support for your responses. The model will be used mainly by the MWA staff but will benefit all the residents of the MWA service area as it will be used as a long-term planning tool. Population projection and water demand will be implemented in the model so that long term sustainability can be planned and achieved. As a planning and management tool the model will help optimize available water resources and improve delivery for future water import and supplies.

4.2.4 *Explain how your project complements other similar efforts in the area where the project is located.* A groundwater model is first and foremost a management and decision-making tool hence it will support existing and future projects. As stated in previous

sections, three infiltration basins and a water banking project will benefit from the model support. There are also ecosystems assessment for some endangered species that will benefit from the model.

4.3 Evaluation Criteria C – Project Implementation

4.3.1 *Briefly describe and provide support for the approach and methodology that will be used to meet the objectives of the project.* The project will be conducted in phases. The first phase will include data existing gathering, interpretation, processing, and analysis. Potentially new data collection. The second phase will include conceptual model design and refinement. The third phase will include model construction and modeling code selection. The fourth and fifth phase will be concerned with model calibration followed by model review. Finally, the sixth and last phase will involve the application of the model to various scenarios and project to aid management and decision making.

4.3.2 *Describe the work plan for implementing the proposed scope of work.* The development of the integrated groundwater/surface water model will take two (2) years to complete. The table below summarizes the overall timeline and the estimated budget for each phase.

Table 2 – Proposed Project Approximate Task Schedule and Budget

Task	Duration	Estimated Budget
Task 1 - Project Management	24 months	$19,623
Task 2 - Data collection and review	6 months	$104,176
Task 3 - Conceptual Model and Model Construction	6 months	$74,564
Task 4 - Model Calibration	3 months	$57,923
Task 5 - Independent Model Review	6 months	$100,000
Task 6 - Scenario Runs	3 months	$46,018
Task 7 - Final Report and Public Presentation	2 months	$5,105
	Total Budget	**$407,408**

4.3.3 Provide a summary description of the products that are anticipated to result from the project. Products which will result from this project are:

- 3D lithological model and cross-sections.

- Final modeling report with a revised conceptual model and updated model results.
- Calibrated numerical model files.
- Mojave river groundwater basin change in storage time series.

4.3.4 Who will be involved in the project as project partners? No partner other than MWA will be part of this project.

4.3.5 *Identify staff with appropriate credentials and experience and describe their qualifications.* The lead investigator is an experienced groundwater modeler who has over 15 years of experience performing similar tasks. Two more staff members will be supporting the project. Their task will include various geographical information science (GIS) analyses and various data processing and manipulation. Our GIS staff person has over 20 years' experience and is highly qualified. The third staff member has limited experience but has enough spreadsheet and general quantitative capabilities to support the main investigator under close supervision and direction.

4.4 Evaluation Criteria D – Dissemination of Results

4.4.1 *Explain how project results will be disseminated.* The results of this project will be shared with the MWA's Board of Directors and MWA manager as a public workshop during a Board Meeting. The board meeting is open to the general public. Some of the results will also be presented at local conferences. Ultimately the final report will be made available on the MWA website so that the results are available to the public. The model files will be made available on demand due to their large size.

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

4.5.1 *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?* This project will incorporate the impact of climate change in future scenario runs. The model that will be produced will make use of downscaled global circulation models (GCM) which are based on different projections of the world CO_2 emissions. By incorporating climate change scenarios in this model, MWA will be able to implement water resources projects which take into account climate variability and droughts. This model will remain a living document, it is anticipated that MWA will update this model every five years for the foreseeable future.

4.5.2 *If applicable, describe how the project benefits those disadvantaged or underserved communities identified using the Environmental Quality's interactive Climate and Economic Justice Screening Tool.* 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.

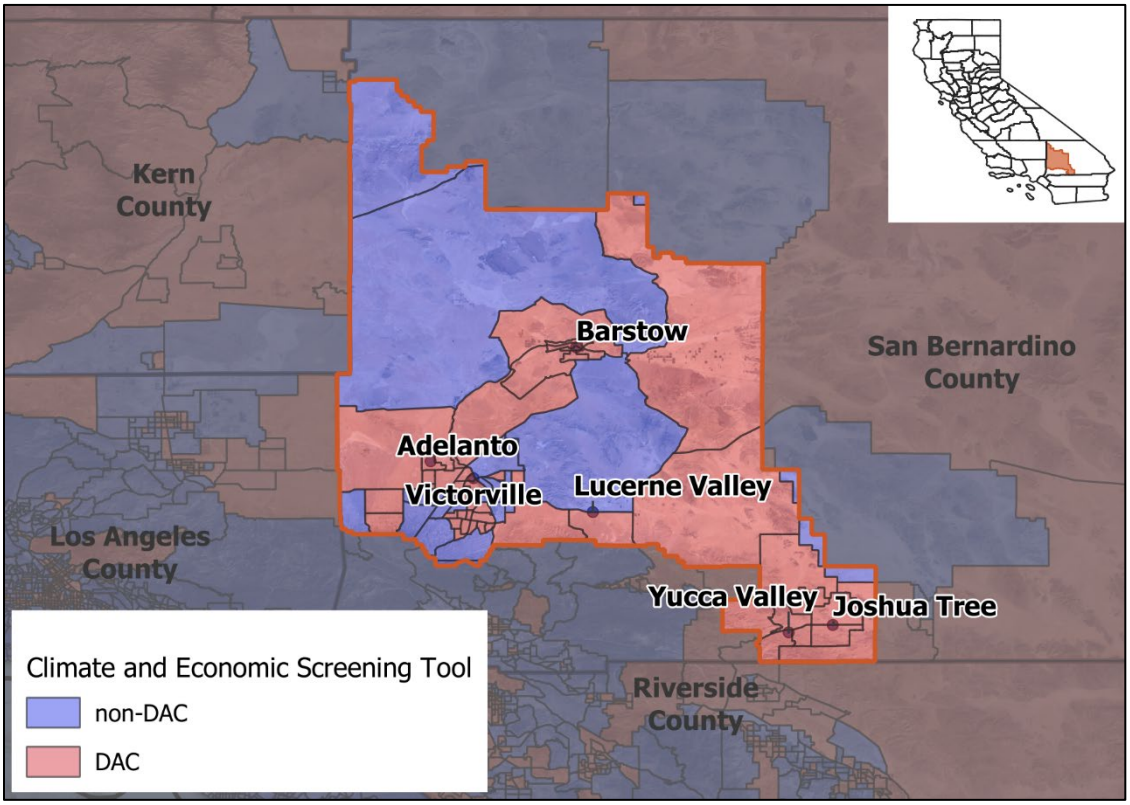

Figure 1 – Council on Environmental Quality's Climate and Economic Justic Screening Tool

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 costs for the Proposed Project is $407,408. MWA is proposing a non-Federal contribution of $203,704 and a Federal contribution of $203,704 (50/50 cost share match) under this NOFO. The proposed budget for each task is presented in the table below.

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	$9,811.50	$9,811.50	**$19,623**
Task 2 - Data collection and review	$52,088.00	$52,088.00	**$104,176**
Task 3 - Conceptual Model and Model Construction	$37,282.00	$37,282.00	**$74,564**
Task 4 - Model Calibration	$28,961.50	$28,961.50	**$57,923**
Task 5 - Independent Model Review	$50,000.00	$50,000.00	**$100,000**
Task 6 - Scenario Runs	$23,009.00	$23,009.00	**$46,018**
Task 7 - Final Report and Public Presentation	$2,552.50	$2,552.50	**$5,105**
Total	**$203,704**	**$203,704**	**$407,408**

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 the grant application.

6 Environmental and Cultural Resources Compliance

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)?**

  Proposed Project entails only updating an existing groundwater model, and therefore, no impacts to surrounding environments are anticipated.

- **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 Federal 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 Unites States"?**

  No activities associated with the Proposed Project will impact any wetlands or other surface waters that potentially fall under CWA jurisdiction as "Waters of the United States".

- **When was the water delivery system constructed?**

  No activities associated with the Proposed Project will impact any conveyance system as there will be no impacts to surrounding environments.

- **Will the proposed project result in any modifications of or effects to, individual features of irrigation system (e.g., headgates, canals, or flumes)?**

  No activities associated with the Proposed Project will modify or effect any individual features of irrigations systems as there will be no impacts to surrounding environments.

- **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 impacts to surrounding environments.

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

  No activities associated with the Proposed Project will impact 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 population as there will be no impacts to 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 to 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 not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species as there will be no impacts to surrounding environments.

7 Required Permits or Approvals

The Proposed Project is a groundwater model development and therefore, no permits are anticipated.

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 interests 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 4.2.1, the need of the Proposed Project was identified through correspondence with MWA Board of Directors and Water Resources Staff.

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 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.

6. Budget Object Category	Total Cost	Federal Estimated Amount	Non-Federal Estimated Amount
a. Personnel	$307,408		
b. Fringe Benefits	$0		
c. Travel	$0		
d. Equipment	$0		
e. Supplies	$0		
f. Contractual	$100,000		
g. Construction	$0		
h. Other Direct Costs	$0		
i. Total Direct Costs	$0		
j. Indirect Charges	$0		
Total Costs	**$407,408**	**$203,704**	**$203,704**
Cost Share Percentage		50%	50%

Table 1 – Proposed Project Estimated Budget Summary

Personnel (Salary and Wages)

Key Personnel include a Principal Hydrogeologist (Kapo Coulibaly, PhD, Principal Hydrogeologist), Senior Hydrogeologist (Wesley Massoll), Hydrogeologist I (Kyle Pena, Hydrogeologist I), and a Senior Water Resources Data Analyst (Brian Hammer). Mr. Coulibaly has eighteen (18) years of groundwater modeling experience. Mr. Massoll has seven (7) years of hydrogeology experience, Mr. Hammer has over twenty (20) years of GIS and data analysis experience, and Mr. Pena has four (4) years of hydrogeological experience. The following table (Table 2) provides an approximate number of hours per task for each personnel identified.

Project Task Description	Project Level of Effort, in Person-hours				
	Principal Hydrogeologist	Senior Hydrogeologist	Hydrogeologist I	Senior Water Resources Data Analyst	TOTAL HOURS BY TASK OR SUBTASK
Task 1: Project Management and Meetings					
1.1 Project Management and Coordination	80	5			85
1.4 Conceptual Model Development Meeting	18	4	12	8	42
1.5 Model Calibration Review Meeting	8	4	12	8	32
1.6 Predictive Scenario Design Meeting	4	4	12	8	28
1.7 Final Presentation (Webinar)	8	4	12	16	40
Task 1: Total	**118**	**21**	**48**	**40**	**227**
Task 2: Data Collection and Review					
2.1 Data gathering	240		240		480
2.2 Data processing, cleaning and organization	320		240	240	800
Task 2: Total	**560**	**0**	**480**	**240**	**1280**
Task 3: Conceptual Model and Model Construction					
3.1 Groundwater system conceptual model	240		200	8	448
3.2 Model Construction	240		120	80	440
Task 3: Total	**480**	**0**	**320**	**88**	**888**
Task 4: Model Calibration					
4.1 Model Calibration	320		160		480
4.2 Model Calibration Result Processing	80		80	40	**200**
Task 4: Total	**400**	**0**	**240**	**40**	**680**
Task 5: Independent Model Review					
5.1 Outside Consultant Review					0
Task 5: Total	**0**			**0**	**0**
Task 6: Scenarios Run					
6.1 Scenario Selection and Design	120	16	120	80	336
6.2 ScenarioRun and Results post-processing	80		80	80	**240**
Task 6: Total	**200**	**16**	**200**	**160**	**576**
Task 7: Final Report and Presentation					
6.1 Final Report	120	80	40	40	280
7.1 Final Presentation	24	3	8	24	59
Task 7: Total	**144**	**83**	**48**	**64**	**339**
PROJECT TOTAL ESTIMATED LABOR HOURS:	**1902**	**120**	**1336**	**632**	**3990**

Table 2 – Estimated Labor Hours for Key Personnel Identified for Proposed Project

Table 3, below, utilizes the expected labor hours and current rates for Key Personnel to estimate the total costs for “Personnel” for the Proposed Project.

Project Task Description		Project Level of Effort, as Cost				COST TOTALS		
		Principal Hydrogeologist	Senior Hydrogeologist	Hydrogeologist I	Senior Water Resources Data Analyst	TOTAL LABOR COST BY TASK	OTHER DIRECT COSTS	TASK COSTS SUBTOTAL
	Hourly Rate	$103.31	$70.82	$55.49	$82.03			
Task 1: Project Management and Meetings								
1.1	Project Management and Coordination	$ 8,265	$ 354	$ -	$ -	$ 8,619	$ -	$ 8,619
1.4	Conceptual Model Development Meeting	$ 1,860	$ 283	$ 666	$ 656	$ 3,465	$ -	$ 3,465
1.5	Model Calibration Review Meeting	$ 826	$ 283	$ 666	$ 656	$ 2,432	$ -	$ 2,432
1.6	Predictive Scenario Design Meeting	$ 413	$ 283	$ 666	$ 656	$ 2,019	$ -	$ 2,019
1.7	Final Presentation (Webinar)	$ 826	$ 283	$ 666	$ 1,312	$ 3,088		$ 3,088
	Task 1: Total	**$ 12,191**	**$ 1,487**	**$ 2,664**	**$ 3,281**	**$ 19,623**	**$ -**	**$ 19,623**
Task 2: Data Collection and Review								
2.1	Data gathering	$ 24,794	$ -	$ 13,318	$ -	$ 38,112	$ -	$ 38,112
2.2	Data processing, cleaning and organization	$ 33,059	$ -	$ 13,318	$ 19,687	$ 66,064	$ -	$ 66,064
	Task 2: Total	**$ 57,854**	**$ -**	**$ 26,635**	**$ 19,687**	**$ 104,176**	**$ -**	**$ 104,176**
Task 3: Conceptual Model and Model Construction								
3.1	Groundwater system conceptual model	$ 24,794	$ -	$ 11,098	$ 656	$ 36,549	$ -	$ 36,549
3.2	Model Construction	$ 24,794	$ -	$ 6,659	$ 6,562	$ 38,016	$ -	$ 38,016
	Task 3: Total	**$ 49,589**	**$ -**	**$ 17,757**	**$ 7,219**	**$ 74,564**		**$ 74,564**
Task 4: Model Calibration								
4.1	Model Calibration	$ 33,059	$ -	$ 8,878	$ -	$ 41,938	$ -	$ 41,938
4.2	Model Calibration Result Processing	$ 8,265	$ -	$ 4,439	$ 3,281	$ 15,985	$ -	$ 15,985
	Task 4: Total	**$ 41,324**	**$ -**	**$ 13,318**	**$ 3,281**	**$ 57,923**		**$ 57,923**
Task 5: Independent Model Review								
5.1	Outside Consultant Review	$ -	$ -	$ -	$ -	$ -	$ 100,000	$ 100,000
	Task 5: Total		**$ -**	**$ -**	**$ -**	**$ -**	**$ 100,000**	**$ 100,000**
Task 6: Scenarios Run								
6.1	Scenario Selection and Design	$ 12,397	$ 1,133	$ 6,659	$ 6,562	$ 26,752		$ 26,752
6.2	ScenarioRun and Results post-processing	$ 8,265	$ -	$ 4,439	$ 6,562	$ 19,266	$ -	$ 19,266
	Task 6: Total	**$ 20,662**	**$ 1,133**	**$ 11,098**	**$ 13,125**	**$ 46,018**	**$ -**	**$ 46,018**
Task 7: Final Report and Presentation								
7.1	Final Presentation	$ 2,479	$ 212	$ 444	$ 1,969	$ 5,105	$ -	$ 5,105
	Task 7: Total	**$ 2,479**	**$ 212**	**$ 444**	**$ 1,969**	**$ 5,105**	**$ -**	**$ 5,105**
PROJECTED TOTAL ESTIMATED COST		**$ 184,098**	**$ 2,833**	**$71,915**	**$ 48,562**	**$307,408**	**$ 100,000**	**$407,408**

Table 3 – Total Estimated Costs for Proposed Project (Includes "Personnel" and "Contractual")

As seen from the table, the Proposed Project anticipates approximately $307,408 for "Personnel". The remaining $100,000 provided in the table accounts for "Contractual" presented later in this Budget Narrative.

The hourly rates used for budget development and shown in Table 3 **represent actual labor rates of the personnel identified and are consistently applied to Federal and Non-Federal activities**.

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
No travel costs are associated with the Proposed Project.

Equipment
No equipment costs are associated with the Proposed Project.

Supplies
No supply costs are associated with the Proposed Project.

Contractual
The Proposed Project includes a task and budget line-item for "Contractual" based on the proposed peer-review of the groundwater model and results. It is anticipated that this task will be accomplished in approximately six months, amounting to $100,000, as shown in the summary table presented above. This estimate is based on similar work performed during other groundwater modeling efforts. The contractor will be selected through a public process.

Construction
No construction costs are associated with the Proposed Project.

Other Direct Costs
No other direct costs are associated with the Proposed Project.

Indirect Costs
No indirect costs are associated with the Proposed Project.

Total Costs
Total costs for the Proposed Project amount to $407,408. The requested Federal Funding amount is $203,704 (50% of total costs), with the remaining $203,704 (50% of total costs) being met through Mojave Water Agency in-kind contributions.