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APPLICATION
WaterSMART
Applied Science Grants

GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management

Riverside County, California

Western Municipal Water District
14205 Meridian Parkway
Riverside, CA 92518

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LIST OF ACRONYMS

GIS	Geographic Information System
GPS	Global Positioning System
QA	Quality assurance
QC	Quality control
Reclamation	Bureau of Reclamation
Western Water	Western Municipal Water District

APPENDICES

SECTION 1: TECHNICAL PROPOSAL AND EVALUATION CRITERIA

1.1 EXECUTIVE SUMMARY

Date:	October 17, 2023
Applicant:	Western Municipal Water District
Applicant City, County, State:	Riverside, Riverside County, California
Project Name:	GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management – Murrieta Service Area

Western Municipal Water District (Western Water) is seeking to implement the GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management project (Improved GIS Database or Project) which will field, verify and collect global positioning system (GPS) data to correct spatial inaccuracies in Western Water's existing GIS Database, improve the workflow of adding new data into the database, expand Western Water's capabilities regarding asset management, address business needs, improve efficiency, and provide data for decision-making. The Project will encapsulate all sewer and potable water assets within the Murrieta area of Western Water's service area, with other areas of Western Water planned in the future. Grant funds will contribute to the in-field visual inspection and GPS data collection of sewer assets, potable water assets, and any relevant attributes. Following GPS data collection, there will be a "calibration" of Western Water's GIS. Grant funds will contribute to subsequent adjustment of other assets in GIS based on the field verified locations of known facilities. The GPS information will be made user-friendly through the development of various GIS application dashboards. The total project cost is $485,800. Western Water requests $242,900 and will provide a match of $242,900 (50%) towards the Project. Currently assets are missing completely from the data, or the actual location has been incorrectly placed. The Project will resolve this, allowing planners to better model systems for further growth and water supply to Western Water's expanding population, assisting field crews to locate assets more easily in an emergency, helping reduce water loss and related property damage, and assisting GIS staff in providing more accurate GIS tools to decision makers.

The Project will be completed within approximately 2 years of award of the grant, anticipated to start April 2024 and to be complete by March 2026.

The Project is not located on a federal facility. The proposed project does not have a physical location; it involves sewer and potable facility data across the city of Murrieta and will map Western Water facilities in the Murrieta service area.

1.2 TECHNICAL PROJECT DESCRIPTION

1.2.1 APPLICANT CATEGORY

Western Water is a Category A applicant as it is a public water agency which provides water, wastewater, and recycled water services to nearly 1 million people in Riverside County, California.

1.2.2 DETAILED PROJECT DESCRIPTION

Improved GIS Database will consist of five tasks: Project Initiation; GIS Data Update and Work Murrieta Service Area; Calibration; Deployment and Refinement, and Project Closeout and Results Dissemination. During Project Initiation (Task 1), data standards and protocols for data collection will be established. During GIS Data Update for Murrieta Service Area (Task 2), field staff will use GPS equipment to collect potable water and sewer asset GPS coordinates across Murrieta, as well as collect other attribute data that is available. For the potable system, an estimated total of 5,838 assets will be assessed, including blowoffs, system valves, water meters, hydrants, control valves, air releases, and backflows. For the sewer system, an estimated total of 912 assets will be assessed, including manholes, control valves, and cleanouts. All other assets will be adjusted using GPS information, e.g., triangulation will be used to determine pipeline locations and coordinates. Additionally, any attributes that can be confirmed in the field will be done so, and all assets for both potable water and sewer will be visually inspected for condition if visible. It's estimated that 80 assets per day (on average) can be collected by a team of two field staff. All collected information will be used to verify and/or update existing data in the GIS database. Following GPS data collection, Task 3 will also include a plan review that will act as a "calibration" of the current GIS database; field verification of GPS coordinates and other attributes will point out any other inaccuracies in the database that resulted from the previously flawed data. Task 4 will be the deployment step and include the development of four application dashboards within the GIS database to make the information user-friendly. This will include a leaks dashboard, water use dashboard, project status dashboard, and tentative assets dashboard. The leaks dashboard will show where leaks have happened in the district over the years. The water use dashboard will show current water usage within the district. The project status dashboard will display what data has been field verified/corrected and how many assets have been affected. The tentative assets dashboard will show planned potable water and sewer projects that have not yet been constructed, such as planned wells, turnouts, etc. Since these are planned, their data will be imported from record drawings rather than field verified. The Project will act as a "pilot" for Western Water's broader rollout of Enterprise GIS. As part of Task 5, Western Water will develop an overall description of the implementation steps, costs, and lessons learned (good or bad) for the funded project. This will take the form of a presentation that Western Water GIS Team can provide to the Board of Directors, and

Executive Management. This will allow Western Water to improve the process before tackling other geographies. Western Water will also discuss their experiences with their retail water agencies, and local professional organizations such as the Inland Empire GIS Users Group, American Public Works Association, American Waterworks Association, Santa Ana Watershed Project Authority.

1.2.3 GOALS

The goals of the Project include:

- Expanded GIS capabilities to support engineering, water resources planning, operations, and customer service needs,
- Improved access to GIS information by all Western Water staff members,
- Improved data accuracy,
- Improved efficiency in departmental data sharing,
- Improved decision making for water and sewer management.

1.3 PROJECT LOCATION

The Project does not have a physical location, though it will encapsulate potable, non-potable and recycled water assets and attribute data over the Murrieta area of Western Water's service area. Figure 1 provides a detail of Western Water's Murrieta Service Area.

The Murrieta Service Area is approximately 6.5 square miles. Western Water's overall service area is 527 square miles. Within its broader wholesale service area Western Water serves a population of nearly 1 million; including 13 retail water agencies such as the cities of Corona, Norco, and Riverside; operates 435 miles of pipeline; and operates 38 water storage reservoirs.

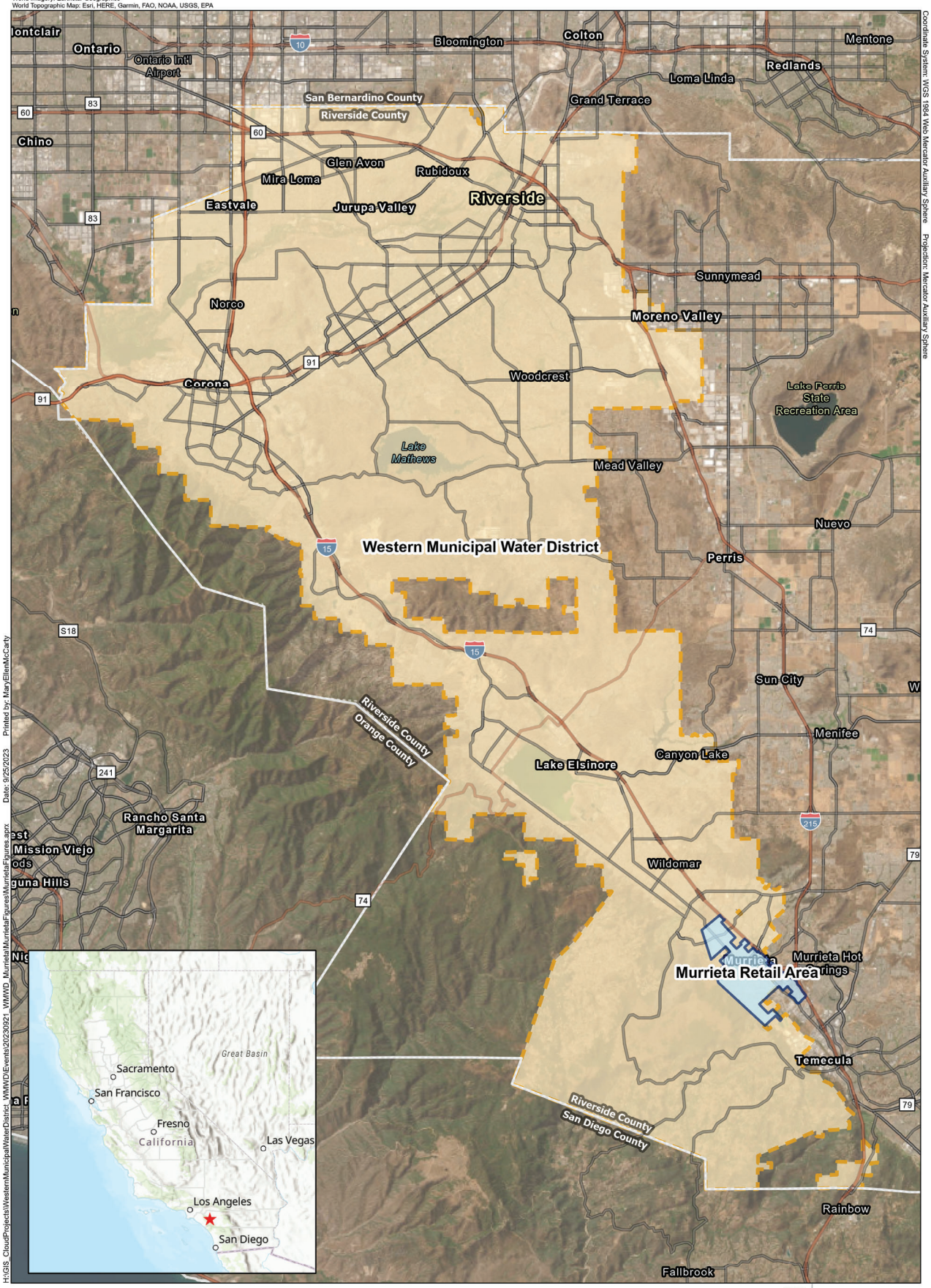
1.4 DATA MANAGEMENT PRACTICES

Any spatially explicit data or tools developed as part of the Improved GIS Database will be guided by Western Water's GIS Strategic Plan and will be done in a manner consistent with professional standards, Western Water's applicable software licenses, and standard formats compatible with GIS platforms.

1.5 EVALUATION CRITERIA

1.5.1 EVALUATION CRITERION A – WATER MANAGEMENT CHALLENGE

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



Legend

- County Boundaries
- Western Municipal Water District
- Murrieta Retail Area

N

0 2.5 5
Miles

Kennedy Jenks

Western Municipal Water District
Riverside County, California

Western Water Murrieta Service Area

2344225*00

Figure 1

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?

Western Water's existing data GIS database has shortcomings with negative downstream effects in other systems and business processes. Incomplete data is making it difficult for staff and consultants to produce accurate models that can help plan for future development to make sure Western Water provides potable water and sewer services to customers. Data updates are coming from multiple functional units through inconsistent formats, both digital and paper-based, that in turn creates data gaps and poor data timeliness. Each functional unit interviewed described their own unique methods for conveying new GIS data or updates to existing GIS data that makes data maintenance challenging. This also increases the risk for data loss during the update processes. Parcel data from the local county has known inaccuracies and because water mains and sewer pipes are tied to the poor parcel data, the specific location and elevations of these facilities are also inaccurate. The repercussions of this:

- Western's Field Operations cannot quickly or accurately locate resources. This is particularly troubling when so much of Western Water's assets are buried assets (e.g., pipelines) and the steps to locate them without accurate GIS involve digging in the street, trenching, and other time-consuming activities. This is particularly troublesome when field crews need to respond quickly to avoid cascading damages, such as a sewer line break, leaking water pipeline, or malfunctioning valve. Western Water has recent experience with this issue. The existing sewer siphon on Lemon Street was "discovered" following a Sanitary Sewer Overflow which caused property damage to a school. The siphon was not shown on Western Water's GIS maps. Since the spill event, the siphon has been added to the Collections Team maintenance schedule and is maintained on a quarterly basis. Because Western Water inherited the Murrieta system, and the sewer is commingled with Eastern Municipal Water District and Rancho California Water District systems, there are likely other unknown and unmaintained assets and delineations.
- Western Water does not have an efficient way to eliminate water loss. Based on its filing to the State of California, in 2021 Western Water estimates that throughout the Murrieta Service Area real water losses (e.g., leaks) accounted for loss of 16.81 gallons per connection per day. Currently Western Water does not have the data to identify subtle patterns and relationships related to leaks, high water use, and water theft in any specific geography. Having an understanding of when and where these patterns occur would give Western Water the opportunity to correct these deficiencies.

- Western Water's Planners do not have an accurate basis for planning work such as modeling of system hydraulics, water usage, or research for annexations. For example, there is not an easy "desktop" method to confirm what well might be contaminated by sewer spills in a given location.

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

Without implementation of the Improved GIS Database Project, Western Water will not address known inefficiencies. Water leaks will continue to be high. Western Water's Water Planners will be limited in the geographic data available to them. Planners will continue to confirm that a given planned operation is feasible by confirming elevations through field surveys but will not be able to fully optimize operations because they will not be able to accurate computer models to manipulate the flow, quality, pressure of networks, and energy use.

Explain how your project will address the water management issues identified in your response to the preceding bullets and provide support for your response. Explain how your project will improve any of these examples:

- *Water supply reliability for municipal, agricultural, tribal, environmental or recreational water uses,*
- *Management of water deliveries,*
- *Water marketing activities,*
- *Drought management activities,*
- *Conjunctive use of ground and surface water,*
- *Water rights administration,*
- *Ability to meet endangered species requirements,*
- *Watershed health,*
- *Restore natural features or use a nature-based feature to reduce water supply and demand imbalances, the risk of drought or flood, or to increase water supply reliability for ecological values,*
- *Conservation and efficiency*
- *Other improvements to water supply reliability?*

This Project will increase the accuracy of data for the existing GIS database. This will correct information on the potable water distribution system and sewer collection system. By increasing the spatial and attribute accuracy of the GIS database, Western Water will be able to provide better and more reliable service to their customers. More accurate data will allow planners to better model systems for further growth and water supply to Western Water's expanding population. It will also assist field crews to easier locate assets in an emergency, less water loss and possible property damage. Additionally, it will improve asset management/replacement schedules. Lastly it will help

GIS staff to provide more accurate dashboards and tools to decision makers, improving stewardship of public funds.

In addition, it will expand capabilities by advancing processes to support asset management and business needs. Other benefits include improved data accuracy and timeliness, increased efficiency in department collaboration and data sharing, expanded GIS knowledge and capabilities among all District staff, and improved decision-making at all levels.

1.5.2 EVALUATION CRITERION B – PROJECT BENEFITS

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?

The need for the Project was identified as an early step in Western's GIS Strategic Plan. As part of the GIS Strategic Plan the existing Western Water business environment associated with all department processes, systems, staff activities, data, and policies were assessed, including a review of existing information systems and the existing GIS system. Interviews were conducted with 20 functional units within Western Water including: field services, customer service and billings, development services, engineering, Emergency Operations Center, GIS, information services, mechanical services, fleet services, production/distribution, environmental compliance, water quality, and water resources. The Murrieta Service Area was chosen as an early geography for rolling out the GIS improvements (the project in this funding application) because (1) it is a small and manageable area and (2) Western Water inherited the Murrieta Service Area and the assets of the system are not fully documented.

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

The Improved GIS Database will be online before December 2025 and will be put to use immediately. Western Water anticipates having GIS applications for field staff no later than December 2025 and these staff can use the information at any time when working in the Murrieta Service Area. Western Water's Development Services Department will put the data to immediate work to assist understanding the infrastructure and infrastructure upgrades needed (water supply, sewer lines, pipelines, meters, tanks) for proposed developments in the Murrieta Service Area.

Water mains and sewer pipes are improperly located because the record drawings note an offset distance from parcels and centerlines. Due to shifting and incomplete data field crews struggle with finding the location of valves and other important assets. This causes leaks to go on longer than expected and causes a greater water loss. The improved GIS data will be used for the following planning efforts and programs in the Murrieta Service Area:

- Murrieta Reservoir Water Quality Management. Currently Western Water tanks in the Murrieta area are drawn down to get rid of old water that has lost its chlorine residual. This drawdown is undesirable as it wastes water and is in conflict with keeping the tanks full for fire flows and to meet peak demands. The draw down of the tank is also ignorant of energy costs and pumps to move the water may operate when energy is scarce, when renewable energy is offline, or when energy is most expensive. Accurate GIS will allow appropriate hydraulic models to be developed that will allow Western Water to run various operational scenarios to reduce water waste and to improve energy efficiency in system pumping.
- The Pipeline Replacement Program is an annual program to maintain Western's pipelines and to systematically fund timely replacement based on asset life cycle in advance of major emergencies and costly or potentially high-risk repairs. This annual replacement program focus' on buried assets. Upgrading the aging pipeline infrastructure will ensure Western continues to deliver reliable water and wastewater services. However, because Western Water took over the struggling system in the Murrieta area, the mapping of pipelines and their attributes (material, size, age) is lacking and pipeline replacement tends to be reactive rather than proactive. The Project, GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management, will allow Western to appropriately plan pipeline replacement in the Murrieta Service Area.

Will the tool or information be used immediately or will additional work need to be done before the tool will be used?

Western Water's GIS database is already in use, though not in optimal condition and only used by a small niche set of Western staff. By the end of the Project, the GIS system will be a true "enterprise" system benefitting multiple departments and functions within Western. The GIS database relating to Murrieta will be ready for use and display accurate potable and sewer asset locations, relevant dashboards, and various attribute data. As part of this grant funding Western will roll out the improved GIS for the Murrieta area and this will act as a "pilot" project. It will create the data standards, data collection protocols, develop templates and dashboards for various departments to upload and utilize data, and acquire the field collection devices needed for GIS data collection. However, the GIS database will still need to be updated and built upon in future projects for all other areas within Western Water's district. Additionally, more attributes may be added over time (following project conclusion) such as other water types (i.e., raw, recycled), geographies, queries, etc.

Who will use the tool or data developed under this proposal and how will they benefit from the project? Support could include but is not limited to letters from stakeholders expressing support for the project and explaining how they will benefit

The Improved GIS Database will be made more accessible to Western Water staff by user-friendly applications developed from the data. This is a significant expansion from the current database's limited group of technical users, who are GIS staff who have the training and knowledge to view and work directly with the GIS databases. This will improve the accessibility of all Western Water departments to utilize GIS information in their activities, increasing efficiency and capability across the agency. To ensure that the GIS database will be maintained and used effectively and that data protocols are followed, Western Water will maintain within their organizational structure an Enterprise GIS Team. Western Water would provide information to the City of Murrieta to improve their capital project planning. Western Water would provide updated fire hydrant locations to both the City of Murrieta and CalFire.

- *How will the project improve water management decisions?*

The Project will improve water management decisions through its increased data accuracy and user-friendly operability. Planners will now be able to easily obtain more accurate data from which they can base forecast models for systems serving expanded population and demands. GIS staff will be able to create and provide more accurate tools to decision makers. Additionally, the improved data accuracy will expand capabilities in asset management. Overall, the improvement in data accuracy and accessibility of data will significantly improve Western Water's water management decisions.

- *Describe if the results of your project will be applicable elsewhere. What additional work would need to be done to make the project results transferable to others?*

Western Water has a GIS Strategic Plan. The GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management – Murrieta Service Area is an early implementation step of the strategic plan. Lessons learned in the Murrieta Service Area will be applicable to this broader wholesale Western service area. By starting with the Murrieta Service Area, Western Water can fine tune the interface and templates. For example, Western Water will get feedback from the Field Operations crew about what search queries are helpful and what parts of the input forms are working and what parts are cumbersome or unnecessary. Water Resources Planners can weigh in on how easy it is to organize and search data and recommend changes to the user interface. The GIS Team will see where their GIS protocols are working and where more user education is needed. This will give Western Water an understanding of cost of equipment, training, and staff time before tackling the broader service area. These lessons learned will also be passed on to the Inland Empire GIS Users Group and Western Water's 13 retail agencies as well as Western Water's neighboring wholesale colleagues such as Eastern Municipal Water District, San Bernardino Valley Municipal Water District, Orange County Water District, and San Diego County Water Authority.

- *To what extent will the project address the water management challenges described in E.1.1.?*

The project will address the challenges described in Section 1.5.1.

- Once complete Western Water's Field Operations will be able to locate Western's assets while in the field using laptops equipped with a Western Water GIS application.
- Western Water will have an efficient way to reduce water loss. GIS mapping of areas with likely leaks can be used in tandem with leak detection equipment to track the flow of water and identify where ruptures may have occurred. The GIS data will allow operators to quickly figure out what parcels are involved in the leak and what entities, persons, and property owners need to be informed for leak repair work.
- The GIS data will provide accurate basis for water resources planning. The locations and elevations and other relevant features (age, material) of infrastructure will be understood.

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? Applicants should make a reasonable effort to explore and briefly describe related ongoing projects.

This Project complements another data effort being undertaken by Western Water in the Data Warehouse Phase 1 – Implement Data Management Software and Develop a Data Sharing Module project (Data Warehouse Phase 1). Data Warehouse Phase 1 consists of the development of a common data management software platform, a "Data Warehouse," to act as a data repository for potable production and delivery data over Western Water's entire service area. The two projects are similar in that they are both efforts to improve Western Water's data accuracy, organization, and accessibility. However, they differ in that the Improved GIS Database focuses on Western Water's assets, e.g., geographic locations, attributes, conditions, whereas Data Warehouse Phase 1 focuses on Western Water's production and delivery of the water itself. These two projects complement each other in that their databases can be used together to combine production/delivery data with associated asset and geographic information.

As a specific example, using the Data Warehouse with the Improved GIS Database, Western will be able to identify areas of water loss. Western Water operators will be able to use production and delivery patterns (through the Data Warehouse) in a given geography (through GIS) to identify likely areas of leaks and then use leak detection

equipment in tandem with GIS mapping to track the flow of water and identify where ruptures may have occurred. The GIS data will allow operators to quickly figure out what parcels are involved in the leak and what entities, persons, and property owners need to be informed for leak repair work to being.

1.5.3 EVALUATION CRITERION C – PROJECT IMPLEMENTATION

Briefly describe and provide support for the approach and methodology that will be used to meet the objectives of the project. You do not need to repeat the full technical project description. However, you should provide support for your chosen methodology, including use of any specific models, data, or tools.

The Project is an implementation step of the Western Water Enterprise GIS Strategic Plan. The purpose of the Strategic Plan is to move Western Water's GIS from an informal team to a true service and comprehensive data set applicable to facility planning, operations, water supply and water usage analytics. The GIS Strategic Plan has looked at the mission and organizational structure to serve the needs of Western Water, looked at applicable software and needed software configurations, looked at the customer support of different software vendors, considered alternatives, and has created a roadmap for implementing GIS to benefit all of Western Water's functions. The GIS Strategic Plan and the proposed project are based on an extensive needs assessment, a review of the existing GIS environment, existing staffing, GIS governance, existing technology, existing workflow and a comparison to the potential for enterprise GIS.

Describe the work plan for implementing the proposed scope of work. Such plans may include, but are not limited to:

- *An estimated project schedule that shows the stages and duration of the proposed work,*
- *Milestones for each major task,*
- *Start and end dates for each task and milestones, and*
- *Costs for each task*

The project work plan is summarized below:

Task 1: Project Initiation

In this phase Western Water will acquire the necessary software and licenses needed for GIS database access and data uploading. The ability to use this software on applicable hardware will be confirmed. A GPS Antenna and datalogger will be acquired. A survey drone will be reserved. Data acquisition protocols will be put in place (what equipment will be used, what software is to be used, what units will be used, what attributes will be collected, what "layer' a given data point is associated with) and these protocols will include systems to ensure cyber security.

Task 2: GIS Data Update

Field staff will use GPS equipment to collect information on approximately 6,000 potable water system assets and approximately 1,000 sewer system assets. The condition of visible assets will be noted. The location of buried assets will be triangulated using manholes, blowoffs, system valves, meters, hydrants, control valves, air releases, and cleanouts.

Task 3: Calibration/Quality Control

In this step the collected data will be compared against existing location data and calibrated. Calibration will also involve import of CAD files for planned/tentative assets.

Task 4: Deployment and Refinement

In this step Western Water will train the approximately 100 end users on how to use the GIS. Dashboards, or pre-set system queries, will be developed to make the system user friendly. The Western Water GIS Team will seek feedback from staff in Field Operations, Water Resources, and Customer Service to improve the dashboards, data input, and user experience. Consultant will develop a workflow for Develop workflow for upkeep of new information.

Task 5: Project Closeout and Results Dissemination

This step is to complete the grant reporting steps including final reporting and reimbursement requests. This step will also include developing an overall description of the implementation steps, costs, and lessons learned (good or bad). This will take the form of a presentation that Western Water GIS Team can provide to the Board of Directors, Executive Management, retail water agencies, ESRI Water Meeting, and local professional organizations such as the American Public Works Association, American Waterworks Association, Santa Ana Watershed Project Authority.

The estimated schedule and milestones of the Project are provided in Table 1.

Table 1. Project Schedule

Task	Start Date	End Date	Cost
1. Project Initiation Milestones: • Notice to Proceed GIS/GPS consultant • Acquisition Arc GIS licenses* • Acquisition GPS and Datalogger • Survey Drone • Draft and Final GIS Protocols	04/01/24	10/01/24	$90,200
2. GIS Data Update & Work Murrieta Service Area Milestones: • Completed mapping water system assets • Completed mapping sewer system assets • Conversion of planned assets from CAD to GIS	10/01/24	6/01/25	$204,600
3.Calibration/Quality Control Milestones: • Memorandum on notable discrepancies existing GIS and GPS positions mapped • Memorandum describing correlation of assets in GIS to assets in maintenance	3/1/25	7/1/25	$90,000
4.Deployment and Refinement Milestones: • Creation of “dashboards” as noted by screenshots • Western GIS user manual • Notes from meetings/surveys of user feedback • Develop workflow for upkeep of new information	8/1/25	12/1/25	$85,000

Table 1 cont.

Task	Start Date	End Date	Cost
5. Project Closeout and Results Dissemination Milestones: • Complete accounting of project costs • Final Project Schedule • Presentation on Western Water Experience Implementing Enterprise GIS Murrieta Service Area	10/01/25	03/31/26	$16,000

* Acquisition of the necessary licenses is an important milestone. However the ArcGIS licenses will be broader than just the federally funded project and cannot be directly allocated to the project. For this reason the ArcGIS license is not included in the grant budget.

Provide a summary description of the products that are anticipated to result from the project. These may include data, metadata, digital or electronic products, reports, and publications. Note: using a table to list anticipated products is suggested.

1. More accurate Data to help the following:
    a. Dig alert – more accurate markings
    b. Asset management
    c. Leak Response and Water loss
    d. System modeling for planning and growth
    e. To assist the sewer flushing team
2. New Applications created.
    a. Leak Dashboard – showing water loss and locations.
    b. Water Use dashboards – The water use dashboard will show current water usage within the district.
    c. Project status dashboard to track tentative data.
    d. A dashboard for tracking how this project in progressing
2. Data collection standards will be created
3. Corrected workflows to get data in after the initial GPS
4. GPS equipment for tracking further leaks and other occurrences.

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 stakeholder be engaged in the project and at what stages?

At this part of implementing Enterprise GIS, the work is internal to Western Water. As part of the GIS Strategic Plan the existing Western Water business environmental associated with all department processes, systems, staff activities, data, and policies were assessed, including a review of existing information systems and the existing GIS system. Interviews were conducted with 20 functional units within Western Water including: field services, customer service and billings, development services, engineering, Emergency Operations Center, GIS, information services, mechanical services, fleet services, production/distribution, environmental compliance, water quality, and water resources. The Project is an early step in implementing the GIS Strategic Plan.

Identify staff with appropriate credentials and experience and describe their qualifications. Describe the process and criteria that will be used to select appropriate staff members for any positions that have not yet been filled. Describe any plans to request additional technical assistance from Reclamation or via a contract. Have the project team members accomplished projects similar in scope to the proposed project in the past either as a lead or team member? Is the project team capable of proceeding with tasks within the proposed project immediately upon entering into a financial assistance agreement? If not, please explain the reason for any anticipated delay.

Project implementation will primarily be conducted by specialized consultants, however long-term use of the tool will be by Western Water staff.

The Western Water Enterprise GIS Strategic Plan, of which this project is a part was developed by Western Water staff in coordination with a consultant with expertise in Enterprise GIS migration and enhancement and GIS strategic planning. The GIS Strategic Plan identified the needed staffing for long-term operation of the Project.

The Project will be managed by current Western Water Application Specialist IV and Program Manager, Robert Conrad, GISP. Robert is a Certified Geographic Information System Professional (GISP) who has over 24 years of GIS project management experience and has been a GIS Coordinator at Western Water since 2008. The Project will also be supported by Application Specialist II, Nicolette Hernandez, who has been a GIS Analyst at Western Water since 2017. Nicolette has over seven years of GIS experience, and currently manages and maintains several of Western Water's GIS tools. The appropriate staff member for this position will be chosen based on ability to update and create GIS data within defined schemas, perform filed surveys, update static maps, and assist customers with basic services for mapping. If the position cannot

be filled, Western Water intends to utilize additional services of their existing GIS consultant.

The project team will be capable of proceeding with tasks within the Project immediately upon entering into a financial assistance agreement.

1.5.4 EVALUATION CRITERION D – DISSEMINATION OF RESULTS

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.

If the applicant is the primary beneficiary of the project, explain how the project results will be communicated internally, and to interested stakeholders and interested water resources managers in the area, if appropriate.

If the applicant is not the primary beneficiary of the project (e.g., universities or research institutes), describe how project results will be communicated to project partners and interested water resources managers in the area.

Describe how the project results will be shared with other water managers in the West that could use the information to support water management objectives.

As part of Phase 5, Western Water will develop an overall description of the implementation steps, costs, and lessons learned (good or bad). This will take the form of a presentation that Western Water GIS Team can provide to the Board of Directors, Executive Management, retail water agencies, and local professional organizations such as the Inland Empire GIS Users Group, the Regional Drought Task Force, American Public Works Association, American Waterworks Association, Santa Ana Watershed Project Authority. All meetings provided to the Board of Directors are recorded and available to the general public.

1.5.5 EVALUATION CRITERION E – PRESIDENTIAL AND DOI PRIORITIES

Please address only those priorities that are applicable to your project. It is not necessary to address priorities that are not applicable to your project. A project will not necessarily receive more points simply because multiple priorities are addressed. Points will be allocated based on the degree to which the project supports one or more of the priorities listed, and whether the connection to the priority(ies) is well supported in the application.

1.5.5.1 CLIMATE CHANGE

Climate Change: E.O. 14008 emphasizes the need to prioritize and take robust actions to reduce climate pollution; increase resilience to the impacts of climate change; protect public health; and conserve our lands, waters, oceans, and biodiversity. If applicable, describe how the project addresses

climate change and increases resiliency. For example, does the project help communities respond to or recover from drought or reduce flood risk?

The project will allow Western Water to map climate risks relative to infrastructure and thereby build and plan for resilient infrastructure. With accurate maps of infrastructure and proposed facilities, Western Water can evaluate what infrastructure is likely to be affected by wildfire, by extreme weather events that lead to landslide and mudflows, by high surface water flows, what infrastructure is in areas of poor drainage and potential inundation, and what facilities are in areas of potential subsidence. This information will allow Western Water to plan future infrastructure or rehabilitation of infrastructure in a way that is more resilient.

1.5.5.2 DISADVANTED OR UNDERSERVED COMMUNITIES

Disadvantaged or Underserved Communities: E.O. 14008 and E.O. 13985 affirm the advancement of environmental justice and equity for all through the development and funding of programs to invest in disadvantaged or underserved communities. Please use the Council on Environmental Quality's interactive Climate and Economic Justice Screening Tool, available online at Explore the map - Climate & Economic Justice Screening Tool (geoplatform.gov) to identify any disadvantaged communities that will benefit from your project.

No portion of the Murrieta Service Area meets the criteria of Disadvantaged or Underserved based on the Climate and Economic Justice Screening Tool.

1.5.5.3 TRIBAL BENEFITS

Tribal Benefits: The Department of the Interior is committed to strengthening tribal sovereignty and the fulfillment of Federal Tribal trust responsibilities. The President's memorandum, Tribal Consultation and Strengthening Nation-to Nation Relationships, asserts the importance of honoring the Federal government's commitments to Tribal Nations. If applicable describe how the project directly serves and/or benefits a Tribe.

Based on data from the Bureau of Indian Affairs, the Murrieta Service Area does not contain tribal lands.

SECTION 2: PROJECT BUDGET

2.1 BUDGET PROPOSAL

The following tables (Tables 2 and 3) summarize total costs and funding sources for the proposed Project. The total cost of the Project is estimated to be $485,800. Funding sources for the project include funding from Western Water and requested funding from Reclamation. No other Federal funding has been requested or received for the proposed project.

Table 2. Total Project Cost

Source	Amount
Costs to be reimbursed with the requested Federal funding	$242,900
Costs to be paid by the applicant	$242,900
Value of third-party contributions	$0
Total Project Cost	**$485,800**

Table 3. Summary of Non-Federal and Federal Funding Sources

Funding Sources	Amount
Non-Federal Entities	
1. Western Municipal Water District	$242,900
2. N/A	$0
3. N/A	$0
Non-Federal Subtotal	**$242,900**
Requested Reclamation Funding	**$242,900**

The budget proposal consists of costs associated with implementation of the Project which fall under the Contractual/Implementation and Other categories. The budget proposal is provided in Table 4 and is described in more detail in the following Budget Narrative.

Table 4. Budget Proposal

Budget Item Description	Computation		Quantity Type	Total Cost
	$/Unit	Quantity		
Salaries and Wages (a)				
Not applicable.				$0
Fringe Benefits				
Not applicable, Western does not have an Indirect Cost Agreement and will not seek Fringe Benefits	-	-	-	$0
Travel				
Not applicable, travel by contractors included in Contractual cost	-	-	-	$0
Equipment				
GPS Antenna and Datalogger	$18,000	4	ea	$72,000
Supplies and Materials				
Survey Grade Drone	$4,000	1	ea	$4,000
Contractual				
Project Initiation	See details Table 5.			$ 14,200
GIS Data Update and Work Murrieta Service Area				$ 204,600
Calibration/Quality Control				$ 90,000
Deployment and Refinement				$ 85,000
Project Closeout and Results Dissemination				$ 16,000
Other – Environmental and Regulatory Compliance				
Not applicable	-	-	-	
			TOTAL DIRECT COSTS	**$485,800**
Indirect Costs				
Not applicable				
			TOTAL ESTIMATED PROJECT COSTS	**$485,800**

2. BUDGET NARRATIVE

2.2.1 PERSONNEL

Project implementation will primarily be conducted by specialized consultants whose costs are further detailed below. Western Water will not seek reimbursement for staff time spent on the Project, such as project management activities, as it is considered to fall under normal staff activity.

2.2.2 FRINGE BENEFITS

Western Water will not bill for personnel costs or related Fringe Benefits. Western Water does not have an Indirect Cost Agreement and will not seek Fringe Benefits.

2.2.3 TRAVEL

Consultant travel will be required to conduct the GPS data collection for the Project. These costs are included under contractual costs.

2.2.4 EQUIPMENT

The purchase of a GPS Antenna and Datalogger will be required to conduct the GPS data collection for the Project. This piece of equipment is estimated to cost $18,000, based on vendor quotes and cost $72,000 for four sets. It would cost approximately $2900 a month to rent an antenna and datalogger set, so to rent 4 sets over a 7 month period would be $81,200 (7*4*2900).

2.2.5 SUPPLIES

The purchase of a Survey Grade Drone will be needed to conduct the field GPS data collection and asset condition assessment for the Project. This supply is estimated to cost $4,000, based on vendor quote. It would cost approximately $30/acre to rent a survey drone, so for the Murrieta area this would be more than $124,800 (6.5 square miles * 640 * $30/acre= $124,800) to rent/lease this equipment.

2.2.6 CONTRACTUAL

Contractual work to be performed for this Project includes project management, QA/QC, field work, and application development completed by a consultant for potable water and sewer asset GPS subprojects. It also includes consultant project management, QA/QC, and GIS technician labor (offshore) for potable water and sewer asset calibration subprojects. Western Water will follow their procurement standards to advertise and select a consultant to perform the project work; Western Water procurement standards are consistent with 2 CRF Part 200 Subpart D.

Contractual costs are detailed in Table 5 and include consultant travel for both GPS subprojects, and consultant labor for both GPS and calibration subprojects. Costs are outlined by scope task for both the potable water and sewer systems.

Table 5. Contractual Costs

Consultant Labor	Hours/Days	Rate	Total Cost
Project Initiation			
Project Manager	60	200	$ 12,000
GIS Technician	44	50	$ 2,200
			$ 14,200
GIS Data Update & Work Murrieta Service Area			
Water System			
Project Manager	40	200	$ 8,000
QA/QC	82	150	$ 12,300
Field Work	1175	100	$ 117,500
Lodging	72	150	$ 10,800
Per Diem	72	50	$ 3,600
Flights	30	130	$ 3,900
Vehicle Expenses	1	10000	$ 10,000
Sewer System			
Project Manager	16	200	$ 3,200
QA/QC	20	150	$ 3,000
Field Work	190	100	$ 19,000
Lodging	10	150	$ 1,500
Per Diem	10	50	$ 500
Flights	10	130	$ 1,300
Vehicle Expenses	1	10000	$ 10,000
			$ 204,600
Calibration/Quality Control			
Water System			
Project Manager	40	200	$ 8,000
QA/QC	80	150	$ 12,000
GIS Technician	750	50	$ 37,500
Sewer System			
Project Manager	20	200	$ 4,000
QA/QC	40	150	$ 6,000
GIS Technician	450	50	$ 22,500
			$ 90,000

Table 5. cont.

Consultant Labor	Hours/Days	Rate	Total Cost
Deployment and Refinement			
Project Manager	110	200	$ 22,000
Application Development	350	180	$ 63,000
			$ 85,000
Project Closeout and Results Dissemination			
Project Manager	80	200	$ 16,000
			$ 16,000
Total Consultant Costs			**$ 409,800**

2.2.7 CONSTRUCTION

No construction tasks will be undertaken for this Project.

2.2.8 OTHER DIRECT COSTS

No other direct costs are anticipated that are not captured under the above categories.

2.2.9 INDIRECT COSTS

No indirect costs are included in the proposed budget.

SECTION 3: ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

Ground disturbing work is not anticipated as part of the Project. The Project will not have any impact on the environments local to Murrieta, nor will it have a disproportionately high and adverse effect on low-income or minority populations. Furthermore, the project will not limit access to or ceremonial use of Indian sacred sites or result in other impacts on tribal lands.

SECTION 4: OTHER

4.1 REQUIRED PERMITS OR APPROVALS

There are no applicable permits or approvals required for the completion of this Project.

4.2 OVERLAP OR DUPLICATION OF EFFORT STATEMENT

There is no overlap between the Project and any other active or anticipated proposals or projects in terms of activities or costs, or commitment of key personnel. Western Water has reviewed potential funding for the Project and does not anticipate submitting the Project to other funding sources federal or non-federal.

4.3 CONFLICT OF INTEREST DISCLOSURE STATEMENT

There is no actual or potential conflict of interest at the time of submission.

4.4 UNIFORM AUDIT REPORTING STATEMENT

Western Municipal Water District was required to submit a Single Audit Report for the fiscal year ending June 30, 2022 (the most current reporting year available) and this is available at the Federal Audit Clearinghouse website. The applicable Employer Identification Number is: 956005108.

4.5 DISCLOSURE OF LOBBYING ACTIVITIES

This application requests more than $100,000 in Federal funds, therefore the Authorized Official's signature on the appropriate SF-424, Application for Federal Assistance form also represents the entities' certification of the statements in 43 CFR Part 18, Appendix A.

4.6 LETTERS OF SUPPORT

Letters of support from the following agencies are included in Appendix A:

- Santa Ana Watershed Project Authority (SAWPA)
- City of Murrieta

4.7 LETTERS OF PARTNERSHIP

There are no applicable letters of partnership required for the completion of this Project.

4.8 OFFICIAL RESOLUTION

A resolution from Western Water's Board of Directors to submit this grant application, commit to the financial and legal obligations, and negotiate and execute the grant agreement is provided in Appendix B.

4.9 LETTERS OF FUNDING COMMITMENT

There is no anticipated third-party cost share applicable to this Project.

4.10 UNIQUE ENTITY IDENTIFIER AND SYSTEM FOR AWARD MANAGEMENT

Western Water is registered in the System for Award Management. Western Water's unique Entity ID is QJFRKG8CLNX1. Western Water will maintain an active SAM registration during any period in which Western Water has an active Federal award or application under consideration by a Federal entity.

SECTION 5: REFERENCES

Western Municipal Water District. 2023. Draft GIS Strategic Plan – 2023 to 2028. July

APPENDIX A

Letters of Support

- Santa Ana Watershed Project Authority
- City of Murrieta

Santa Ana Watershed Project Authority

Over 50 Years of Innovation, Vision, and Watershed Leadership

October 2, 2023

Craig Miller, General Manager
Western Municipal Water District
14205 Meridian Parkway
Riverside, CA 92518

Re: Support for Western Municipal Water District's WaterSMART Applied Sciences Grant Application

Dear Mr. Miller,

We understand that Western Municipal Water District (Western Water) is applying to the U.S. Bureau of Reclamation's WaterSMART Applied Science Grants for Fiscal Year 2023 (R23AS00446) to implement the 'GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management Project'. The Project will use the global positioning system (GPS) to improve data location accuracy of customer meters, valves, hydrants, and wholesale meters and develop a geographic information system (GIS) layer to assist in identifying leaks.

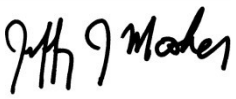
Currently, Western Water's existing GIS database is causing system shortcomings that have negative downstream effects in other systems or business processes. This project is needed to allow Western Water to modernize and centralize this workflow into a unified process and/or system to maintain GIS data integrity, correct existing potable water distribution system and sewer collection system data, and increase the spatial and attribute accuracy of data for the existing GIS database.

The WaterSMART Applied Sciences Grants support Presidential and Department of the Interior priorities by providing financial assistance to water managers to implement projects that increase resilience to the effects of climate change, benefit disadvantaged or underserved communities, and/or promote tribal sovereignty. The proposed Project accomplishes the climate change resiliency goals of the funding opportunity by allowing planners to better model systems for further growth and water supply to an expanding population, assisting field crews to locate assets more easily in an emergency, helping with less water loss and possible property damage, and assisting GIS staff in providing more accurate dashboards and tools to decision makers.

SAWPA is proud to support Western Water's WaterSMART grant application for the GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management Project.

Sincerely,

Jeff Mosher



General Manager

CITY OF MURRIETA

October 9, 2023

Attn: Craig Miller, General Manager
Western Municipal Water District
14205 Meridian Parkway
Riverside, CA 92518

Re: Support for Western Municipal Water District's WaterSMART Applied Sciences Grant Application

Dear Mr. Miller,

On behalf of the City of Murrieta, I write in support of Western Municipal Water District's (Western Water) application for the U.S. Bureau of Reclamation's WaterSMART Applied Science Grants for Fiscal Year 2023 (R23AS00446) to implement the 'GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management Project'. The Project proposes to use the global positioning system (GPS) to improve data location accuracy of customer meters, valves, hydrants, and wholesale meters, and develop a geographic information system (GIS) layer to assist in identifying leaks.

Currently, Western Water's existing GIS database is causing system shortcomings that have negative downstream effects on Water and Sewer services to Western Water customers. Incomplete data, inconsistent formats, data gaps, and poor data timeliness make it difficult for Western Water to attain accurate models and plan for future development. The County of Riverside parcels have confirmed Western Water's inaccuracies in locating water main and sewer pipe locations caused by these limitations. The proposed improvements to the existing GIS database would allow for more accurate models, better coordination for future development planning, and ultimately provide better Water and Sewer services for our Western Water residents.

By using GPS to improve GIS data location accuracy field crews will be able to locate assets more easily in an emergency, mitigate water loss, and possible property damage. Minimizing the effects of water leaks would also result in a cost benefit to our residents, as water loss charges are built into the rate structure and absorbed by the community.

The City of Murrieta is proud to support Western Water's WaterSMART grant application for the GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management Project.

Sincerely,

Kim Summers

City Manager

APPENDIX B

Official Resolution

RESOLUTION 3297

RESOLUTION OF THE BOARD OF DIRECTORS OF WESTERN MUNICIPAL WATER DISTRICT OF RIVERSIDE COUNTY AUTHORIZING THE DISTRICT'S APPLICATION, AND APPROVING NEGOTIATION AND EXECUTION OF A COOPERATIVE AGREEMENT WITH THE DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, FOR FEDERAL FUNDING UNDER THE APPLIED SCIENCES GRANT PROGRAM

WHEREAS, the Western Municipal Water District of Riverside County ("District") is a municipal water district established pursuant to Section 71000 et seq. of the California Water Code; and

WHEREAS, the Department of the Interior, Bureau of Reclamation, (USBR) under the Applied Sciences Grant Program will make funding available to qualifying applicants; and

WHEREAS, the Board of Directors of the Western Municipal Water District has identified a project that exemplifies the objectives of the Applied Sciences Program in its GIS Data Acquisition and Leak Mapping Analysis for Improved Water Management Project; and

WHEREAS, all applicants wishing to obtain State and Federal funding are required to provide a Resolution designating Authorized Agents to act on behalf of the applicant to receive these funds from USBR; and

WHEREAS, the District desires to designate the General Manager and his designee as Authorized Agents for this purpose; and

WHEREAS, the District agrees to the administration and cost requirements of the grant criteria.

NOW, THEREFORE BE IT RESOLVED BY the Board of Directors that:

1) The District is hereby authorized to receive, if awarded, the USBR funding and will make a good faith effort to enter into an agreement with the USBR for the receipt and administration of said grant funds and agree to abide by the Federal award terms and conditions as set forth in the Articles of Agreement;
2) The General Manager, Craig Miller, or his designee, is hereby authorized to take any and all action which may be necessary for the completion and execution of the project agreement and to take any and all other action which may be necessary for the receipt and administration of the grant funding in accordance with the requirements of the USBR;
3) This resolution officially becomes a component part of the District's grant application that will be submitted to the USBR before October 17, 2023;
4) The District is capable of providing the amount of funding and/or in-kind contributions specified in the grant application funding plan;
5) This resolution shall be effective as of the date of adoption.

ADOPTED this 20th day of September, 2023.

MIKE GARDNER
President

September 20, 2023

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution 3297 adopted by the Board of Directors of Western Municipal Water District of Riverside County at its Regular Meeting held September 20, 2023.

FAUZIA RIZVI
Secretary-Treasurer