A GEOSPATIAL DATA PLATFORM TO ASSESS, MANAGE, AND MARKET TRIBAL WATER RESOURCES

Bureau of Reclamation WaterSMART Applied Science Grant Application
Funding Opportunity Number R22AS00165

Applicant:

Agua Caliente Band of Cahuilla Indians

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List of Acronyms

ACBCI ..... Agua Caliente Band of Cahuilla Indians
ACIR ..... Agua Caliente Indian Reservation
ACWA ..... Agua Caliente Water Authority
AF ..... Acre-Feet
AFY ..... Acre-Feet per Year
CVWD ..... Coachella Valley Water District
CWA ..... Coachella Water Authority
DWA ..... Desert Water Agency
DWR ..... Department of Water Resources
EPA ..... US Environmental Protection Agency
GDP ..... Geospatial Data Platform
GIS ..... Geographic Information Systems
GSA ..... Groundwater Sustainability Agency
IWA ..... Indio Water Authority
MA ..... Management Area
MCL ..... Maximum Contaminant Level
MDMWC ..... Myoma Dunes Mutual Water Company
RAWS ..... Remote Automated Weather Station
SGMA ..... Sustainable Groundwater Management Act
SNMP ..... Salt and Nutrient Management Plan
SWP ..... State Water Project
SWRCB ..... State Water Resources Control Board
USGS ..... United States Geological Survey
USBR ..... United States Bureau Reclamation
WY ..... Water Year

Section 1: Executive Summary

Applicant: Agua Caliente Band of Cahuilla Indians
Project Location: Agua Caliente Indian Reservation, Riverside County, California

Project Need:

Ancestors of the Agua Caliente Band of Cahuilla Indians (ACBCI or Tribe) inhabited both the surrounding desert and mountain environs of the Coachella Valley for centuries before the United States Congress first established the Agua Caliente Indian Reservation (ACIR or Reservation) in 1876. Similar to today, early inhabitants were dependent upon the naturally occurring surface and groundwater resources that defined their cultural and economic diversity; available water supplies and seasonal climatic conditions determined sustainable living conditions. Today, after more than 100 years of recent development in the Coachella Valley, anthropogenic stresses have replaced natural variability and are now the dominant factors that impact water availability. Because of these stresses on the natural system, existing and future drought conditions in the Colorado River Basin, and future climate impacts, a comprehensive online Geospatial Data Platform (GDP) will be an invaluable tool needed to support the Tribe's water management decisions.

There are multiple municipalities, water, and wastewater purveyors that impact available water resources throughout Coachella Valley. These agencies import water for artificial recharge, generate treated wastewater for recycled water applications, pump groundwater, and control stormwater in a semi-coordinated effort to meet the needs of Indian and non-Indian inhabitants. While some of these activities are consistent with the State of California's State Water Resources Control Board (SWRCB) rules and regulations, they do not provide tools that allow the Tribe to manage its water resources. The proposed GDP will allow for water managers to monitor and assess impacts by others to better manage water resources and the Tribe's water rights.

Project Summary:

The Tribe, in conjunction with the Agua Caliente Water Authority (ACWA), its groundwater management authority, is proposing the development of an online GDP that will store and display geospatial and time-dependent datasets currently maintained in ACWA's database, including climate, groundwater, surface water, and water quality datasets. The GDP will integrate these datasets with the Tribe's Hydrogeologic Conceptual Model (HCM) to support 3-dimensional visualization and assessment based on available well logs, geophysical data, pump tests, and other related hydrogeologic datasets. Through integration with the HCM, the GDP will provide "Aquifer Mapping" in the Coachella Valley to support management decisions and promote sustainable use of the groundwater resource. The GDP tool will describe changes in the occurrence and movement of groundwater and water quality over time to provide water managers with an analytical tool to make informed decisions regarding water use and sustainability. The proposed budget for the GDP is $110,000 and it is anticipated to take 12 months to develop. The project is not located on a federal facility.

Section 2: Technical Project Description

As an Indian tribe located in California, ACBCI is a Category A applicant under the guidelines of the WaterSMART Applied Science Grant. The Tribe administers and manages its water resources through ACWA, which has authority in permitting the use of the Tribe's water. The project developed under this grant will improve the Tribe's water management through the development of hydrologic information and management tools that will be used for quantifying and assessing the use of the Tribe's water. Developing the GDP will directly support the following objectives:

Water Supply Reliability – managing naturally occurring water, artificial recharge, and reclaimed water sources to meet supply requirements impacted by long-term drought and climate change.

Improved Management of Water Deliveries – monitoring groundwater storage, pumping volumes, available streamflow, and recharge to avoid adverse impacts to resource through demand management.

Water Marketing Activities – monitoring groundwater in storage, long-term supply, and water rights to optimize the use of the Tribe's water in a sustainable manner.

Drought Management Activities – track long term delivery of Colorado River Aqueduct (CRA) releases, groundwater in storage, and alternative water sources to ensure long-term sustainability.

Water Rights Administration – track the Tribe's federal reserved water rights and State of California Water rights awarded under the Whitewater River Decree.

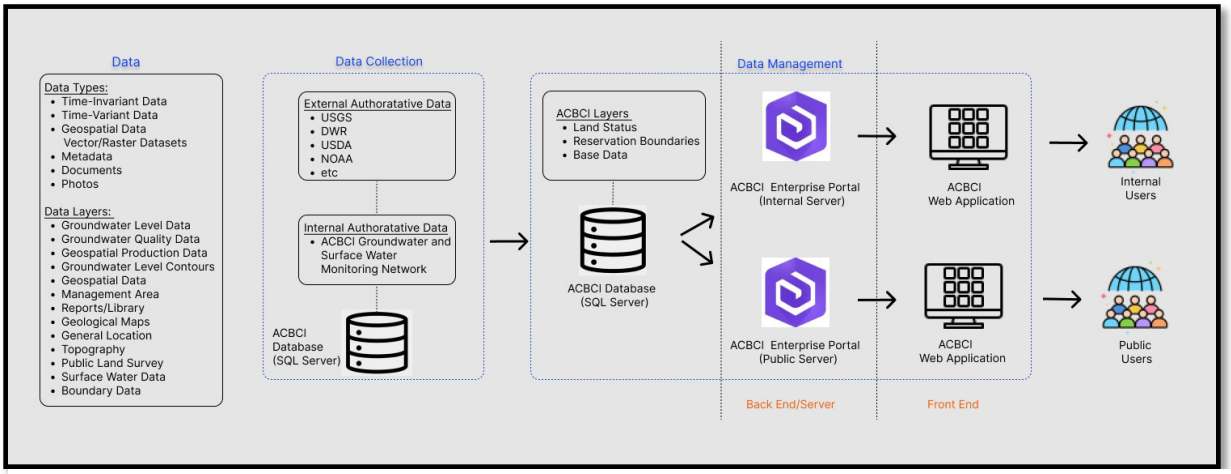
The GDP will incorporate datasets from several categories to support water management decision-making and contribute to the HCM. The various types and sources of data to be used are shown in Table 1. Four main categories of data will be integrated into the GDP: time-invariant data, time-variant data, geospatial data, and basin condition metadata. The sources for these datasets include but are not limited to: ACWA, ACBCI, local/regional government and water management agencies (City of Palm Springs, CVWD, DWA and Indio GSA, or "Districts," collectively), State agencies (DWR), and Federal agencies (USGS, NOAA, BLM).

TABLE 1: GDP DATA SETS AND DATE SOURCES

Data Set	Source(s)
Time-Invariant Data	
Well Locations	ACWA, DWR
Stream Gage Locations	USGS
Weather Station Locations	NOAA, WRCC
Reports and Publications	Tribal, Local, State, Federal agencies
Time-Variant Data	
Groundwater Levels	ACWA, DWR
Streamflow and Spring Flow	USGS
Precipitation	NOAA, WRCC
Artificial Recharge	Districts
Groundwater Production	ACWA, Districts
Recycled Water Consumption	ACWA, Districts
Geospatial Data	
Land Use Data	ACBCI
Geologic Maps	USGS
Topography	USGS
PLSS	BLM
Management Areas	ACBCI, Districts
Basin Condition Metadata	
Publication Data	All sources
External Links/Web Address	All sources
Digital Object Identifier	All sources

2.1 GDP System Architecture

The GDP will process data collected by the Tribe and external authoritative sources, organize, archive and house this data, and then provide users access to this data. These three parts of the system – collection, storage, and retrieval – interact and inform each-other (see Figure 1).



2.1.1 Data Collection – Data Import and Organization Layer

For the Tribe's water resources there are numerous sources and types of relevant data that are updated at varying frequencies by their respective publishers. Data publishers include the Tribe and authoritative sources outside of the Tribe, such as Federal (USGS, USDA, NOAA, USBR, BLM, etc.), State (DWR, SWRCB), and other local agencies. The first part of creating a successful GDP is developing the interfaces between these datasets and the server backend to allow the system to contain relevant and timely information (Figure 1, "Data Collection").

For many published data sets there are Application Programming Interfaces (APIs) that allow for computer-to-computer data request and retrieval. Programming and configuring access through these APIs to keep the database current will be the primary effort during the data import and organization phase of the project. For other data sets where data has not been standardized, work will require the following: (1) develop standardization protocols to make the data collected processable, and (2) program the software to ingest and store the data on the server database. Setting up and maintaining this data import layer is key to maintaining a relevant and up-to-date GDP.

2.1.2 Data Storage – Data Organization and Archive

The core of the GDP will be the servers and databases that house and store the various datasets. This will consist of two major components: an ESRI Enterprise GIS server and a Structured Query Language (SQL) database server (Figure 1, "Data Management"). The ESRI Enterprise GIS server is a robust system designed for hosing and maintaining primarily geospatial datasets and associated data. The SQL database server is relational database allows queries of larger datasets such as water level and water quality data. Storing data in these relational databases enables complex queries and data analysis which will support the functionality of the GDP as a water management tool. The configuration and design of the two primary servers represents the bulk of the work required to develop the GDP.

2.1.3 Data Retrieval – End User Access

The overarching goal of the GDP is to provide end users (primarily Tribal water managers) access to data that is stored within the servers discussed above. User interface for the GDP will communicate with the servers to present the information and datasets housed therein clearly and easily accessible for the end users.

The key deliverable for the project is a web application that end users will use to view and analyze the available data. This application will be used to aid the Tribe in communicating the hydrologic conditions to all Tribal Members and the larger Reservation community. Any public interface would go through additional vetting processes before being released to a public audience.

The application will be tied to dynamic servers that are constantly updating resulting in data that will remain relevant and timely. The web application will be informed by the HCM to allow the Tribe to have "at a glance" dashboard views of the of hydrologic information and management tools that will be used for quantifying and assessing the use of the Tribe's water. Other limited and more sophisticated data retrieval for end user access would be provided to specific authorized users to make use of applications that include GIS endpoints such as Web Map Service (WMS), Web Map Tile Service (WMTS), or ArcGIS REST services, or direct access for SQL queries.

2.2 Integrate Tribe's Hydrogeologic Conceptual Model

The Tribe has developed a Hydrogeologic Conceptual Model (HCM) to describe the occurrence and moment of groundwater and contaminants beneath Tribal lands. Because many of the datasets of the GDP are point-layers, integrating the HCM into the GDP will allow for a three-dimensional display of the data. The HCM will be incorporated into the GDP to show changes in groundwater storage using volumetric calculations supported by GIS.

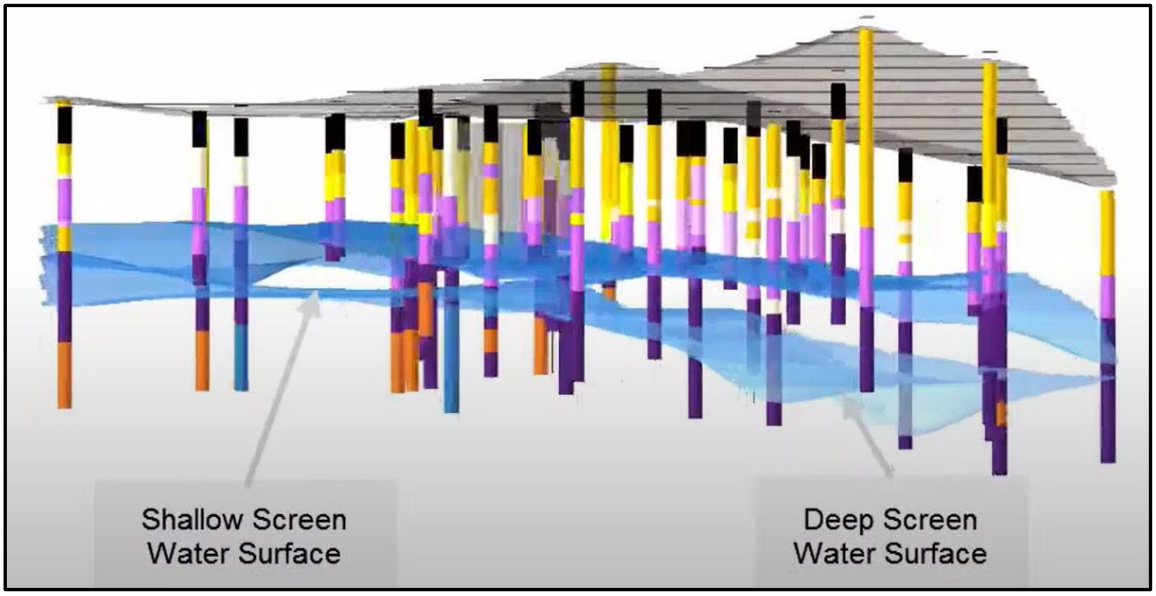


FIGURE 2: HYDROGEOLOGIC CONCEPTUAL MODEL VISUALIZATION

The HCM will be incorporated as a three-dimensional base layer where different GIS layers may be added by the user in order to identify changes and trends in both water quantity and water quality (Figure 2). The user will be able to compare different GIS layers that depict the time-dependent groundwater level surfaces in order to observe changes and trends over time. This information will allow assessment of how natural and artificial recharge sources impact Tribal resources. Both temporal and spatial analysis, using the three-dimensional HCM, will be fundamental for water managers to assess climate related impacts and assess resource reliability. The integration of the HCM into the GDP will support aquifer mapping and allow for improved

management of water deliveries, enhance water marketing capabilities, and support water supply reliability.

Section 3: Project Location

The project covers the Agua Caliente Indian Reservation, spanning the Cities of Palm Springs, Cathedral City and Rancho Mirage, and portions of unincorporated Riverside County, California.

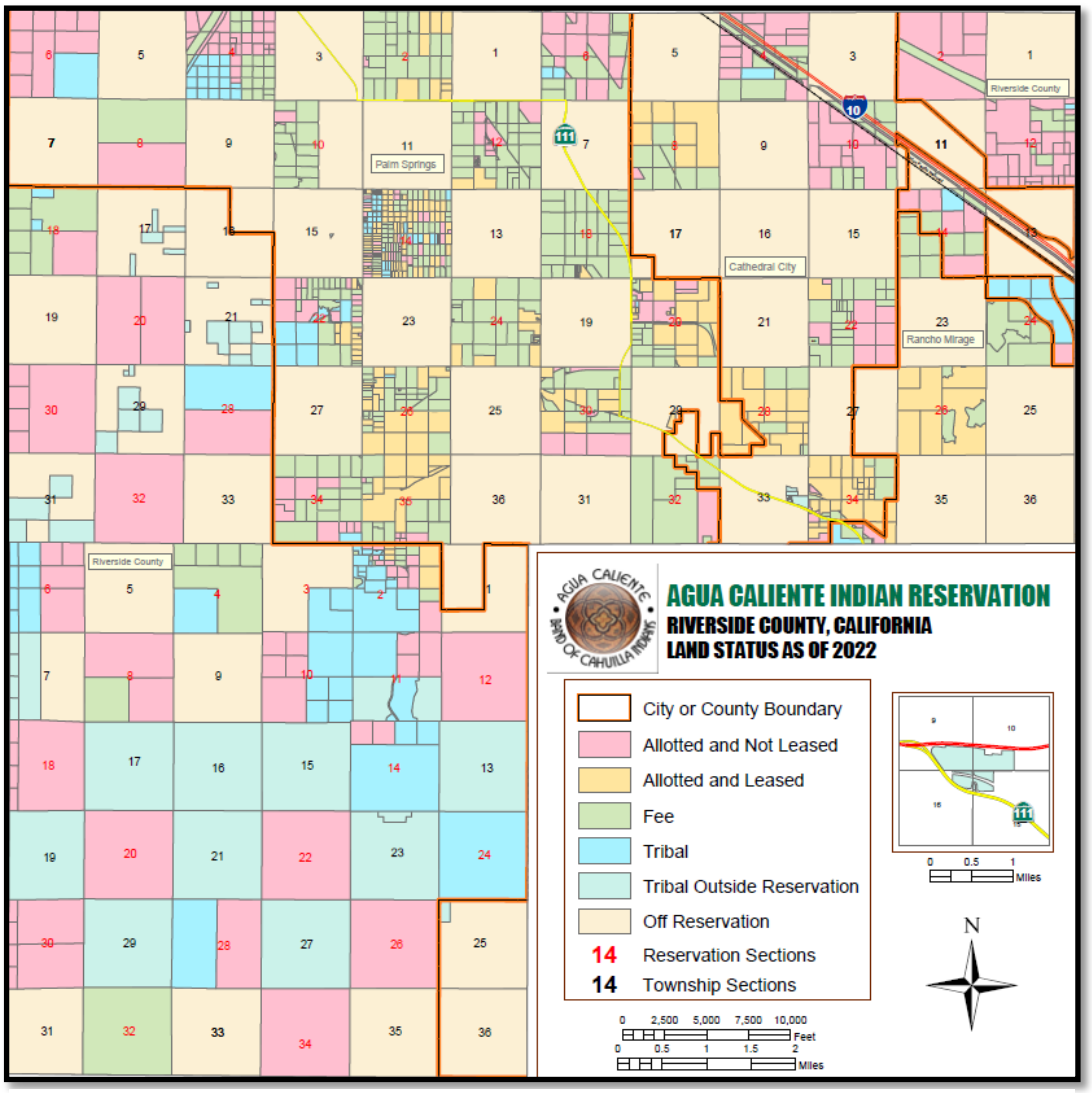


FIGURE 3: PROJECT LOCATION

Section 4: Evaluation Criteria

4.1 Criterion A – Benefits to Water Supply Reliability

Describe in detail the water management issue(s)that are occurring within your project area that your project will address. Describe the severity of the water management issues to be addressed with supporting details.

Threats to Tribal groundwater resources include climate change, long-term drought in the desert southwest, loss of groundwater in storage, and degradation of water quality. The multiple municipalities, water, and wastewater purveyors located throughout Coachella Valley impact the Tribe's water resources. However, despite their significant impact, these non-Tribal agencies have not developed a geospatial tool for tracking water supply and water demand that is accessible to the Tribe or the public. As the water management authority for the Tribe, ACWA must be able to make informed management decisions using reliable, organized, up-to-date data. Tribal groundwater resource management decisions have direct implications for regional planning activities, water supply reliability, management of quantity and quality of water delivered to the Reservation community, water marketing, drought management, and water rights administration.

The Tribe is a stakeholder in several regional planning and development processes such as the Salt and Nutrient Management Plan (SNMP), Urban Water Management Plan (UWMP), and Groundwater Sustainability Plan (GSP), each of which directly impacts the quantity and quality of water available to the Tribe. The Tribe relies on 100% of the natural safe yield of the Indio Subbasin to meet its customer's demands, so implementation of long-term monitoring and analysis is vital under future climate change and prolonged drought conditions. Coupled with the anthropogenic water management activities of nearby water purveyors, the variability in available groundwater in storage, as well as water quality, is impacted by monthly and seasonal patterns. All of these challenges to water supply management necessitate a tool for assessing impacts so that the Tribe may make informed management decisions using the best available data.

Explain how your project will address the water management issues identified in your response to the preceding bullets and provide support for your response.

Regional Planning Activities

Under California's Sustainable Groundwater Management Act (SGMA), a Groundwater Sustainability Agency (GSA) was formed to manage the Indio Subbasin. The GSA developed an Alternative GSP for the Indio Subbasin that is used for long-term plaining to reach sustainable groundwater production and avoid negative impacts to groundwater in storage or water quality. The Alternative GSP does not address Tribal resources, nor does it address the Tribe's water, necessitating the need for the Tribe to monitor and manage its own resources through the development of the GDP.

Coachella Valley Water District (CVWD), Desert Water Agency (DWA), and other water and wastewater purveyors are also developing an SNMP for the Coachella Valley. The Tribe is currently participating as a stakeholder in the SNMP process, which has been slowed due to numerous deficiencies in the 2015 SNMP submitted to (and rejected by) the Colorado Regional Water Quality Control Board; the deficiencies included omission of Water Quality Objectives (WQOs), assessment of Ambient Water Quality, and determination of assimilative capacity.

The proposed GDP will enable the Tribe to be a more effective participant in regional planning efforts by aggregating relevant datasets onto a centralized user-friendly platform. The reproducible datasets and visualizations created on the GDP will, for example, allow the Tribe to assess groundwater in storage for verification that the goals and constraints of the GSP are observed. It will also inform identification of data gaps in water quality monitoring under the SNMP for salts and nutrients.

Water Supply Reliability

The goal of the Tribe is to manage demand, supply, and available infrastructure to obtain the highest level of reliability to its customers. The GDP will enable improved management of infrastructure and sources of supply during catastrophic events or long-term drought by providing up-to-date data on facility status and current supply conditions. By integrating known resources on geology, water levels, and both existing and former groundwater production wells, the GDP would also support the Tribe in determining the best location for groundwater extractions to improve water supply reliability and customer access to high quality water.

Improved Management of Water Deliveries

Potable, non-potable, and raw water sources are all used on the Reservation to meet customer demands (Figure 4). These include treated potable water and tertiary-treated recycled water delivered to Tribal customers by local water purveyors,

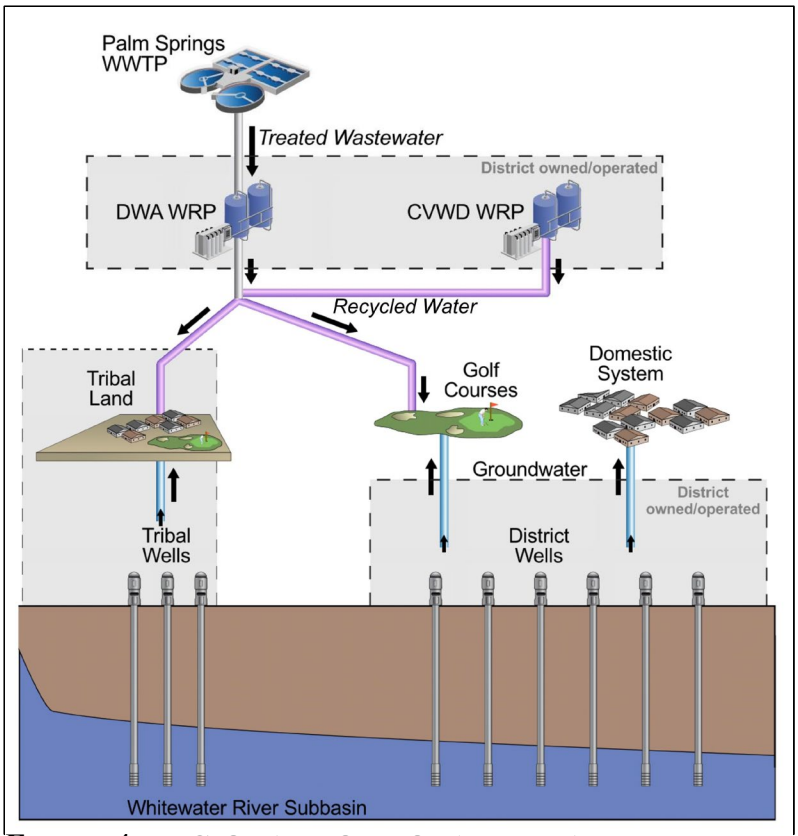


FIGURE 4: REGIONAL NON-POTABLE WATER DISTRIBUTION SCHEMATIC

groundwater wells on Tribal lands, and surface water diversions awarded under the Whitewater River Decree and managed by the Tribe. Many customers have access to multiple sources of water, making balancing supply with demand a challenge that will be improved through geospatial monitoring and reporting. As drought and climate change impacts increase in the region, allocating sources of water appropriately will be of increasing importance. The GDP will be an invaluable tool to quantify the amount of water delivered under each category and identify underutilized water resources.

Water Marketing Activities

The Tribe is currently underutilizing its water resources due to the inability to quantify both groundwater and surface water. Creating a GDP will allow for quantification of groundwater resources and allow the Tribe to determine appropriate incentives for customers to install wells and utilize resources. The same tool will quantify and track surface water as it is either diverted for direct use or allowed to recharge the groundwater aquifer for subsequent pumping. The visualization of the GDP, combined with the spatial orientation of the resources and customers will support long-term sustainability that allows for both the Tribe and customers to build appropriate facilities.

Drought Management Activities

The GDP will be used to track long term delivery of Colorado River Aqueduct (CRA) releases used for artificial recharge, groundwater in storage, and alternative water sources to ensure long-term sustainability even under drought conditions. The GDP will also be used to quantify streamflow and climate data which can be used to assess the severity of drought conditions, especially in relation to past conditions. Visualization of the Tribe's HCM (Figure 5), which incorporates each of these elements, will also be accomplished by the GDP, increasing understanding of how the natural systems interact. This tool will be instrumental in managing areas of natural recharge and areas of artificial recharge to best determine how to serve customers while reducing or eliminating negative impacts to the basin.

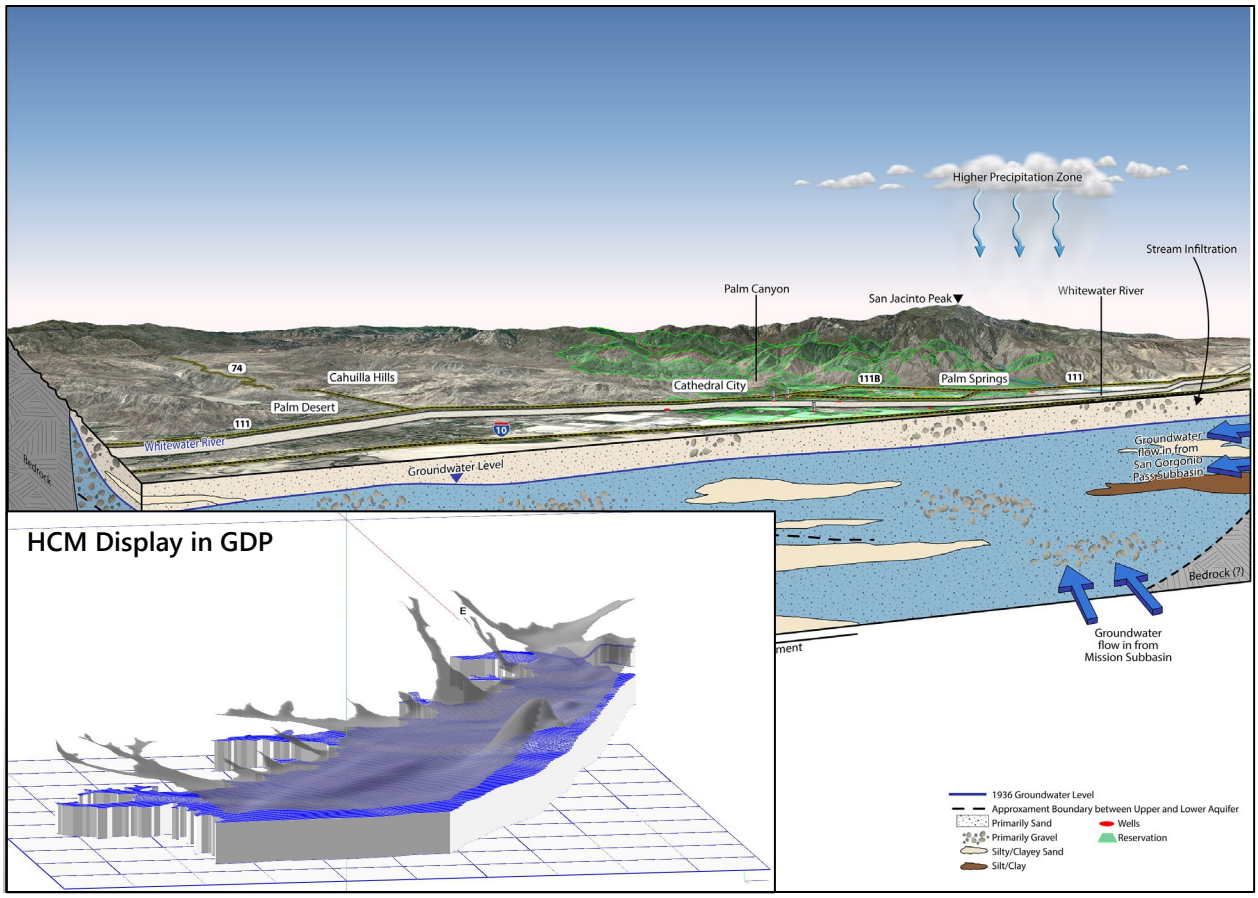


FIGURE 5: HYDROGEOLOGIC CONCEPTUAL MODEL

Water Rights Administration

The GDP will be used to track the Tribe's federal reserved water rights and State of California Water rights awarded under the Whitewater River Decree. The GDP will provide the monitoring, data storage, and reporting capabilities that are instrumental in protecting the Tribe's water rights. The GDP will be developed for the eventual installation of telemetry equipment on production wells to accurately manage and assess real-time water use. Actual water use will be coupled with on-going water conservation measures to assess the true and total use of the Tribe's water rights.

Describe to what extent your project will improve water management. Describe the significance or magnitude of the benefits of your project, either quantitatively or qualitatively, in improving water management, with supported details.

The primary benefit of the proposed GDP will be to improve the efficacy and scope of Tribal water management. With the GDP, ACWA will have more tools available to make water management decisions. The project is also expected to improve dissemination of information to the public, particularly to Tribal members. ACWA currently invests $589,000 per year into water

management activities and data management. Improving this process through use of the GDP will increase the productivity and return on investment for these activities. Although the initial creation of the GDP is expected to last approximately one year, the GDP will be an adaptable, ongoing, dynamic tool for the Tribe which will only improve in depth and scope over time.

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?

Development of the GDP is complementary to work already undertaken by the Tribe's GIS department to organize and display georeferenced datasets for the Tribe's use. Existing efforts by the Tribe are primarily geared toward land use and development management, whereas the proposed GDP would incorporate more data from a water resource management perspective. Together, these efforts create a comprehensive tool for Tribal leadership to make management decisions in the Tribe's best interests. Additionally, ACWA is currently expanding its data collection efforts with respect to groundwater production, groundwater levels, and water quality on the Reservation. Creation of the GDP will ensure a secure central repository for data collected by ACWA and allow for incorporation of that data into a broader picture of conditions on and near the Reservation. Creation of this GDP is not a duplication of effort since the GSA for the Indio Subbasin has not developed a digital platform that provides similar information.

4.2 Criterion B – Need for Project and Applicability of Project Results

Will the project result in an applied science tool(s) or information that is readily applicable, and highly likely to be used by water resource managers in the West?

Yes, the GDP will directly result in an applied science tool and data that will be used for Tribal water resource planning and management decisions made by the Tribe. Similar tribal based GDPs could be developed for other Indian tribes in the Colorado River Basin and the west.

Explain who has expressed the need and describe how and where the need for the project was identified (even if the applicant is the primary beneficiary of the project).

The Tribe has recognized the importance of storing long term water quality and quantity data, internally collected since 1999, in a reliable and easily accessible manner. To better water resources planning and management by the Tribe, and to provide open water data to Tribal Council, Tribal members, Tribal Staff, producers of the Tribe's groundwater, and the broader Reservation community, the Tribe has expressed the need to develop the Geospatial Data Platform.

Will the results of your project inform water resource management actions and decisions immediately upon completion of the project, or will additional work be required?

The results of this project will immediately inform Tribal water resource management actions and decisions upon project completion. The proposed GDP will provide the Tribe with an analytical tool to make informed decisions regarding water use and sustainability by water users within the Reservation, and the basin as a whole. We anticipate that a preliminary tool will be ready to launch in 2024.

If applicable, will the results of your project be transferrable to other users and locations?

The GDP will be built for the Agua Caliente Band of Cahuilla Indians, focusing on the West Whitewater Management Area of the Indio Subbasin. However, this open data platform will inform other interested parties within the Basin, and could be used to help other Tribes in the basin develop similar platforms specific to their own water resource programs.

4.3 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

The GDP will be developed through a collaboration of hydrogeologists, data scientists, GIS specialists, and web developers. Key to the Tribe's approach and methodology is a comprehensive understanding of the needs of the target audience that includes both water managers and tribal members. Questions that pertain to future impacts of climate change, water supply sustainability, the use of water rights, and marketing opportunities will be the foundation of developing the GDP. Therefore, development of the GDP will occur through an interactive process with stakeholders that are involved from project design, through project construction, and eventually through project testing.

While the web developers and data scientists will support the technical development of the GDP, the strength and power of the GDP will be centered on input from the Stetson Engineers hydrogeologists. Determining what data types are available, how they can be combined, and what information is required to make informed water management decisions will directly affect the performance of the GDP. Stetson Engineers hydrogeologists and geologists have developed four other geospatial database for water managers throughout California. Combined with input from stakeholders, Stetson Engineers will guide the web developers and data scientists to develop a human-based, easy to use, platform that is both educational and informative.

The workplan provided in the following section of the proposal outlines the general process of developing the GDP over 12 months. The interactive stakeholder process will occur during each of the major tasks to assure the final deliverable exceeds the users' expectations. While the goal of the project is to support water supply reliability and resiliency, it is also intended to provide a tool that will be used for long-term data storage and retrieval. Therefore, the architecture,

hardware, and software tools developed for this GDP will be documented for future developers to maintain and expand upon as future needs arise.

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

There are five main tasks which will be completed during the development of the GDP: project management (ongoing), system architecture development, display of the HCM, database migration and setup, and user interface development (Table 1). Stakeholder outreach is included in the Project Management task and will occur throughout the development and testing of the GDP. Due to the nature of GDP development, many of these tasks will be overlapping, as they are efforts which will require continuous updates and revisions. The project is estimated to be implemented over a 12-month period. The final product will be a functioning GDP which is accessible by ACBCI water managers and successfully incorporates all relevant datasets.

TABLE 2: GANTT CHART WITH ESTIMATED PROJECT COSTS

Month													
Task	**Cost**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Project Management	$33,432												
2. System Architecture	$5,030												
2a. Data and Interface													
2b. Configuration Steps													
3. Display Hydrogeologic Conceptual Model	$19,000												
4. Database Migration and Setup	$32,992												
4a. Identify Data for Inclusion													
4b. Initial Population of Databases													
4c. Develop update methods/procedures													
5. Develop User Interface	$19,546												
5a. Web App Interface Development													
5b. Integrate HCM Data and Visualization													
5c. Technical Web Interface Support													
Total Estimated Cost	$110,000												

Products and Deliverables

The expected products and deliverables for this project are shown in Table 2, along with estimated delivery dates for each.

TABLE 3: PROJECT PRODUCTS AND DELIVERABLES

Product/Deliverable	Description	Estimated Delivery Date
Project Plan/Schedule	Detailed project schedule adapted to project start date	October 2023
Data Source List	Complete list of data to be included in GDP	December 2023
System Architecture Map	Detailed conceptual map of system architecture	December 2023
Progress Report	Update on GDP status, tasks completed, tasks remaining	Quarterly (December, March, June)
HCM Visualization Application	Application for incorporation into GDP which allows for three-dimensional visualization of HCM	July 2024
Data Update Procedures	Detailed protocol for GDP updates, e.g., data importation, system updates, quality assurance/quality control procedures	July 2024
Web Application Interface	Functional user interface for accessing GDP	September 2024
User Introduction Presentation	Presentation intended for introducing the completed GDP to ACBCI water managers and decision makers	September 2024
Outreach Presentation	Presentation for Tribal members/Reservation community/public introduction GDP	September 2024

Project Team

All staff working on this project are employed by ACBCI or the water consulting firm Stetson Engineers Inc.. There are no plans to fill new positions or request technical assistance from Reclamation. The Tribe currently working with Stetson Engineers to advise on the development of the GDP. The project team is capable of proceeding with tasks within the proposed project immediately upon entering into a financial assistance agreement.

ACBCI Project Team Members

- **Beckie Howell, GISP** – Director of GIS – Beckie is the Agua Caliente Geospatial Information Systems (GIS) Program Director, and has been on the Tribal GIS team since 2003. She has a BA and MA in Geography from California State University Long Beach, and over 25 years of experience in the GIS field. Beckie oversees the activities and operations involved in

developing, enhancing and maintaining the content, accessibility, integrity, and security of the Tribe's Enterprise GIS.

- **Mark Ross, MS** – GIS Developer – Mark has a MS in Geospatial Information Systems (GIS) from the University of Redlands, and over 5 years of work experience within the GIS field. He has previously worked at Apple, Facebook and other biological consulting firms. Mark has a strong passion for GIS and building web applications. He works on the Agua Caliente GIS team maintaining and developing all web-based applications, as well as, serves as the administrator for the Tribe's extensive geospatial database.
- **Oscar Vizcarra** – GIS Technician – Oscar has over 6 years of experience working in Geospatial Information Systems (GIS). He has a BS in Computer Information Systems from California State University San Bernardino, and studied GIS for 2 years at the University of California, Riverside. He has been on the Agua Caliente GIS team since 2021, and is highly skilled at data management & compilation, spatial analysis, and cartographic production
- **Nicola Howarth** – GIS Analyst – Nicola studied Natural Resources and Planning at Humboldt State University, and received her BA in Geography/GIS at California State University Chico. She has over 10 years of work experience, bringing to the Agua Caliente GIS team her expertise in web application development, database management, geospatial data analysis, and map production.
- **Katarina Waszak –** Environmental Planner – Katarina is the Environmental Planner for ACBCI. She has broad background in environmental science, with experience working in the non-profit sector. She holds a BA in environmental studies-ecology.

Stetson Engineers Inc. Project Team Members

- **Stephen Reich, PE, PG, CHG –** Principal – Mr. Reich provides technical and administrative expertise required to manage multi-faceted water resource projects that require in-depth knowledge of water rights, environmental requirements, regulatory issues, and civil engineering solutions. As a California registered Professional Engineer, Geologist, and hydrogeologist, Mr. Reich has developed three other geospatial databases for clients in California. His ability to understand the relationship between geologic data and water supply facilities has supported numerous water resiliency projects. His expertise in hydrology, water quality, geomorphology, civil engineering, economics, state and federal water supply issues, and environmental concerns provides a wide range of experience for the successful completion of geospatial data platforms.
- **Miles M^{c}Cammon, PG, MS** – Hydrogeologist / Full Stack Developer – Miles is Stetson Engineer's full stack developer and has put together and maintained the data management systems for Camp Pendleton, Indian Wells Valley, and Santa Ynez. Miles is a Professional Geologist with a MS in Geology from Louisiana State University and BS in Geology from University of California Los Angeles, and over nine years of work experience at Stetson Engineers. This includes data management and building web applications to inform and communicate about geologic and water resources.
- **Anne Easterbrook** – Water Resources Engineer – Anne received her BS in Civil and Environmental Engineering at University of California, Berkeley. She has over four years of experience at Stetson Engineers Inc. She has participated in the development and implementation of the data management systems for Marine Corps Base Camp Pendleton and has supported several water supply and water management projects in Southern California, including in the Coachella Valley.

4.4 Criterion D – Dissemination of Results

Describe how the tools, frameworks, or analyses being developed will be disseminated, communicated, or made available to water resources managers who may be interested in the results.

The GDP will be presented and demonstrated at Agua Caliente Water Authority Board Meetings which are held five times per year. The ACWA Board members include individuals who have a range of qualified professional and academic experience related to water, and includes one ex officio Tribal Council Member. In addition, the GDP will be presented and discussed at a workshop presentation for ACWA Board, Tribal Council, and Tribal Members

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.

ACWA meetings are open to Tribal members and ACWA permitted producers, and will be the primary means of dissemination internally. As needed, additional workshops will be held for interested parties to demonstrate the GDP functionality and applicability for addressing water resource challenges.

4.5 Criterion E – Presidential and Department of Interior Priorities

E.O. 14008: Tackling the Climate Crisis at Home and Abroad focuses on increasing resilience to climate change and supporting climate-resilient development.

Southern California and the Colorado Basin are currently identified to be under moderate to extreme drought based on information from the North American Drought Monitoring. Climate change exacerbates future water supply issues due to the likelihood of more frequent heat waves and a shift in precipitation patterns. Because the Coachella Valley is impacted by local climate and regional climate in the Colorado Basin, water supply resiliency may only be achieved through monitoring and quantification of available resources. The GDP will monitor streamflow and recharge based on local hydrology and recharge that originates from the Colorado Basin. The balancing of groundwater in storage and the potential use of alternative sources (e.g., reclaimed water) will be monitored so the Tribe's water managers. The data will be used to assess if mandatory drought restrictions are necessary or whether new facilities are required to better manage multiple resources. Therefore, development of the GDP will assure the Tribe's resources are sustainably managed, increase water supply resiliency, and increase resilience to the real impacts of climate change.

E.O. 14008: Tackling the Climate Crisis at Home and Abroad directs Federal agencies to assess potential benefits to disadvantaged communities as part of funding allocation processes.

In general, the history of public lands in the United States is rooted in the dispossession of lands from Native Americans. Native Americans have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. For centuries, settler-colonists on the North American continent displaced Indian tribes from their ancestral homelands and engaged in

the deliberate destruction of vital natural resources—many with economic and cultural significance—as a tool of genocide against the Indigenous population. This legacy continues in the U.S. Government's repeated failure to live up to its obligations to Indian Country that are enshrined in the treaties through which it acquired large swaths of Indian land. The federal government is legally required to ensure that Indian tribes can access natural resources to protect their sovereignty, culture, and economic well-being. Too often, however, the government has sanctioned development that threatens sacred sites, weakens and circumvents tribal consultation, and ignores tribal concerns around environmental degradation. This GDP Project is an invaluable tool to support the Tribe's water management decisions, and track impacts by others to water resources and assess impacts to the Tribe's water rights.

The first Executive Order, E.O. 13985, signed by U.S. President Joe Biden on January 20, 2021 directs the federal government to revise agency policies to account for racial inequities in their implementation and defines Native American communities as "underserved" and disadvantaged community.

Tribal Benefits

Does the proposed project directly serve and/or benefit a Tribe?

The proposed GDP project will directly serve and benefit the Agua Caliente Band of Cahuilla Indians, a federally recognized Indian tribe.

Will the project improve water management for an Indian Tribe?

The proposed project will improve and inform water management decisions made by the Tribe.

Does the proposed project support Tribal resilience to climate change and drought impacts or provide other Tribal benefits such as improved public health and safety by addressing water quality, new water supplies, or economic growth opportunities?

The proposed project will support Tribal resilience to climate change and drought impacts, and address water quality concerns by creating an easily accessible georeferenced database with the Tribe's water quality and quantity data.

Section 5: Environmental and Cultural Resources Compliance

5.1 Environmental and Cultural Resource Considerations

This project does not pertain to NEPA, ESA or NHPA requirements.

5.2 Background on Federal Environmental and Cultural Resource Laws

National Environmental Policy Act – N/A
National Historic Preservation Act – N/A
Endangered Species Act – N/A

Section 6: Required Permits or Approvals

Development of the GDP does not require any permits or approvals.

Section 7: Overlap or Duplication of Effort Statement

The Tribe's GDP proposal does not overlap with any other active or anticipated proposals or projects in terms of activities, costs, or commitment of key personnel. The proposal submitted for consideration under this program is not in any way duplicative of any proposal or project that has been or will be submitted for funding consideration to any other potential funding source.

Section 8: Project Budget

8.1 Funding Plan and Letters of Funding Commitment

Describe how the non-Federal share of project costs will be obtained.

As detailed in the Tribal Resolution, the Tribe will contribute the required fifty percent (50%) cost share of total Project costs through cash contributions.

8.2 Budget Proposal

Please include the following chart (Table 3) to summarize all funding sources.

TABLE 4: SUMMARY OF NON-FEDERAL AND FEDERAL FUNDING SOURCES

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1. Agua Caliente Band of Cahuilla Indians (CASH CONTRIBUTION)	$55,000.00
Non-Federal Subtotal	**$55,000.00**
Federal Entities	
1. Bureau of Reclamation *(REQUESTED)*	$55,000.00
Federal Subtotal	**$55,000.00**

TABLE 5: TOTAL PROJECT COST TABLE

SOURCE	AMOUNT
Federal Share: Costs to be reimbursed with requested Federal Funding from Bureau of Reclamation	$55,000.00
Tribal Share: Costs to be paid by the applicant, Agua Caliente Band of Cahuilla Indians	$55,000.00
Value of third-party contributions	$0.00
TOTAL PROJECT COST	**$110,000.00**

TABLE 6: BUDGET PROPOSAL

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Unit	Quantity		
Salaries and Wages				
Employee 1: Environmental Planner	$30/hr	260	Hours	$7,800.00
Employee 2: Director of GIS	$59/hr	104	Hours	$6,136.00
Employee 3: GIS Developer	$48/hr	252	Hours	$12,096.00
Employee 4: GIS Technician	$28/hr	104	Hours	$2,912.00
Employee 5: GIS Analyst	$38/hr	104	Hours	$3,952.00
Fringe Benefits				
Full-Time Employees	31%	5		$10,104.00
Contractual/Construction				
Stetson Engineers				$67,000
TOTAL DIRECT COSTS				**$110,00.00**
Indirect Costs				
Type of rate	%	$base		**$0.00**
TOTAL ESTIMATED PROJECT COSTS				**$110,00.00**

8.3 Budget Narrative

Salaries and Wages

Please see project personnel in the table below.

TABLE 7: PROJECT PERSONNEL SALARIES AND WAGES

Task	Title	Hourly Rate	Hours	Total
Project Management	Environmental Planner	$30/hr	156	$4,680.00
	Director of GIS	$59/hr	52	$3,068.00
Architecture	GIS Developer	$48/hr	80	$3,840.00
Database Migration and Setup	GIS Analyst	$38/hr	104	$3,952.00
	GIS Technician	$28/hr	104	$2,912.00
User Interface Development	GIS Developer	$48/hr	120	$5,760.00
Meetings and Coordination	Environmental Planner	$30/hr	104	$3,120.00
	Director of GIS	$59/hr	52	$3,068.00
	GIS Developer	$48/hr	52	$2,496.00
Totals			**824 Hours**	**$32,896.00**

Fringe Benefits
The fringe benefit rate is 31%. Total fringe benefits cost for full-time personnel listed above in Table 4 is $10,104.00.

Travel – N/A
Equipment – N/A
Materials and Supplies – N/A

Contractual
The Tribe uses Stetson Engineers as Water Resource Consultants, and will contract with them to carry out this project in coordination with Tribal Staff. Their contracted costs for contribution to all tasks listed above is $67,000.00.

Third Party In-Kind Contributions – N/A
Environmental and Regulatory Compliance Costs – N/A
Other Expenses – N/A
Indirect Costs – N/A

Total Costs
Total estimated project cost is $110,000.

Section 9: Letters of Support

The Tribe, a Category A Applicant, is the primary stakeholder. Please see official Tribal Council Resolution.

Section 10: Official Resolution

Please see Attachment A: Official Tribal Council Resolution.

AGUA CALIENTE BAND OF CAHUILLA INDIANS
TRIBAL COUNCIL

REID D. MILANOVICH CHAIRMAN
VINCENT GONZALES III SECRETARY/TREASURER • JESSICA NORTE MEMBER • JOHN R. PRECKWINKLE III MEMBER

RESOLUTION No. 18-22

WaterSMART – Applied Science Grant Project

WHEREAS, the Agua Caliente Band of Cahuilla Indians (the **"Tribe"**) is a federally-recognized Indian tribe governing itself according to the Constitution and By-Laws of the Agua Caliente Band of Cahuilla Indians and exercising sovereign authority over the lands of the Agua Caliente Indian Reservation; and

WHEREAS, pursuant to paragraph (a) of Article V of its Constitution, the Tribal Council, among other things, has the authority to administer the affairs and manage the business of the Tribe; and

WHEREAS, the United States Department of the Interior (**"DOI"**), through the Bureau of Reclamation (**"BOR"**), issued a Notice of Funding Opportunity (**"NOFO"**) for WaterSMART Grants: Applied Science Projects (R22AS00165) on February 16, 2022; and

WHEREAS, through the WaterSMART grant for applied science projects (the **"WaterSMART Grant"**), BOR provides 50/50 cost share funding to states, tribes, irrigation districts, water districts, and other entities with water or power delivery authority to undertake applied science projects; and

WHEREAS, the Tribe, pursuant to P.L. 111-11, Section 9502, is eligible to apply for and receive a WaterSMART Grant; and

WHEREAS, due to increasing pressure from drought conditions and the continuous strain on water resources in Southern California, the Tribe desires to submit a WaterSMART Grant application for the proposed project entitled *""Tribal Hydrogeologic Data Management Platform"* (the **"Project"**) in response to NOFO No. R22AS00165; and

WHEREAS, the closing date to submit a WaterSMART Grant application is April 14, 2022; and

WHEREAS, the Tribe desires to submit a WaterSMART Grant application by the closing date for the purposes set forth herein.

NOW THEREFORE BE IT RESOLVED by the Tribal Council of the Agua Caliente Band of Cahuilla Indians that:

1. All of the recitals set forth above are true and correct, and the Tribal Council so finds and determines.

2. The Tribal Council hereby designates any elected officer of the Tribal Council (Chairman, Vice-Chairman, or Secretary/Treasurer) as an authorized agent of the Tribe with authority to execute for or on behalf of the Tribe the WaterSMART Grant application and any other document necessary for the Tribe's receipt of funds from the DOI to carry out the Grant purposes.

3. The Tribal Council has reviewed and supports the WaterSMART Grant application to be submitted to the BOR.

4. The Tribe is capable of contributing, and will contribute, the required fifty percent (50%) cost share of total Project costs through cash contributions.

5. The Tribal Council hereby authorizes its agent(s) set forth above to work with BOR to meet established deadlines for entering into a WaterSMART Grant agreement.

Dated: April 12, 2022

Reid D. Milanovich, Chairman

CERTIFICATION

I, the undersigned, the Secretary of the Agua Caliente Band of Cahuilla Indians, hereby certify that the Tribal Council is composed of five members of whom 4 constituting a quorum, were present at a meeting whereof duly called and noticed, convened and held this 12th day of April, 2022; that the foregoing resolution was duly adopted at such meeting by a vote of 3-0-0 members and that said Resolution has not been rescinded or amended in any way.

Vincent Gonzales III, ~~Secretary~~/Treasurer