

# Surface Water Conservation for Drought and Climate Resilience in the Altar Valley Watershed, Pima County, Arizona

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A Proposal  
Submitted to the  
Bureau of Reclamation

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WaterSMART  
Environmental Water Resources Projects for Fiscal Year 2023  
Category B Applicant

March 24, 2023

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# Executive Summary

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Surface water conservation for drought and climate resilience in the Altar Valley Watershed, Pima County, Arizona

*March 24, 2023*

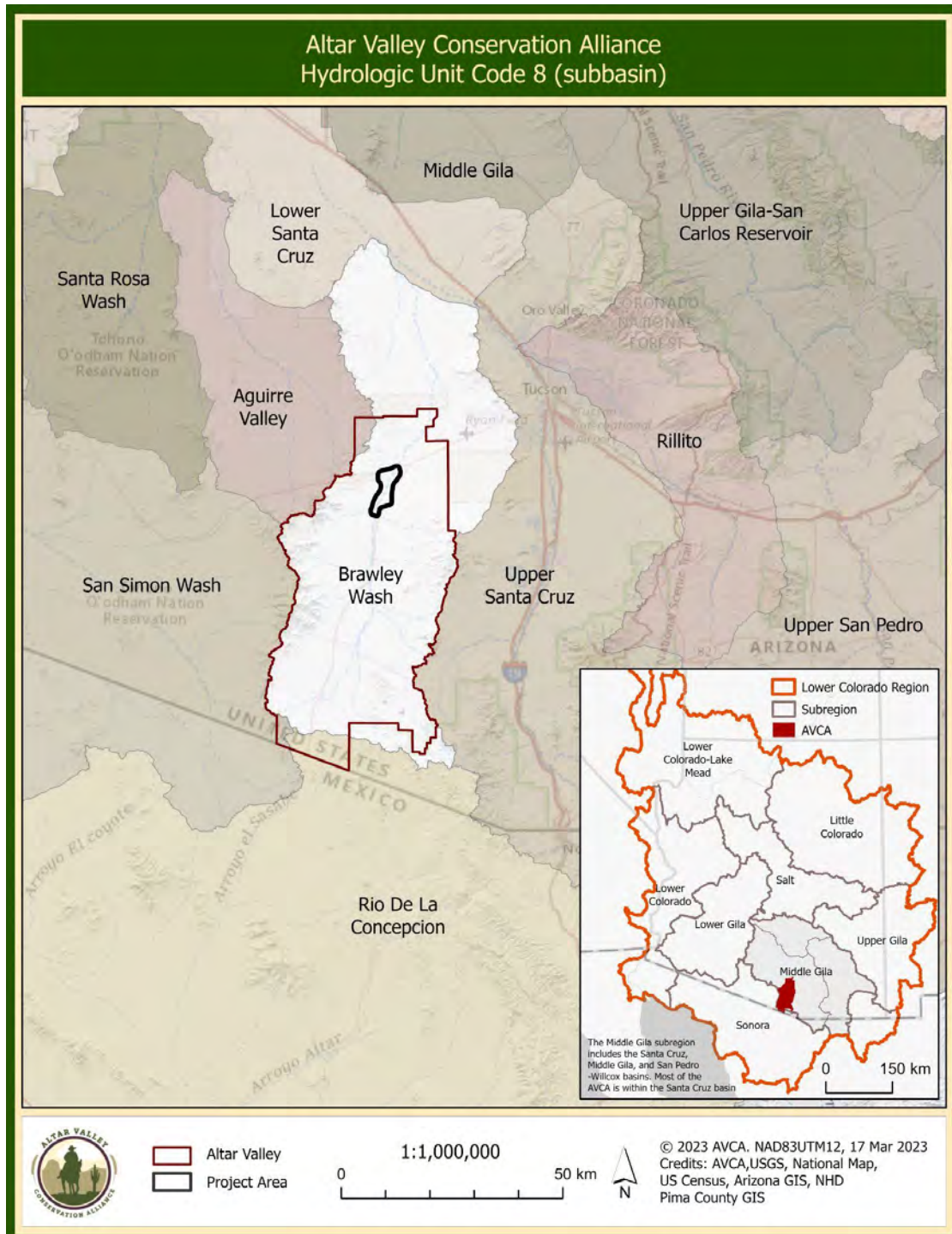
Applicant: Altar Valley Conservation Alliance (AVCA)  
Tucson, Pima County, Arizona

The Altar Valley Conservation Alliance, in conjunction with the Pima County Regional Flood Control District and other partners of the Altar Valley Watershed Working Group, will conserve surface water for environmental uses in the Altar Wash watershed, southwest of Tucson, Pima County, Arizona. Co-benefits of the project will include: enhanced drought and climate change resilience, reduction of downstream flood impacts, and sustainability of agricultural operations and habitat. The Altar Wash watershed (known as the Altar Valley) is an ephemeral system rich in biodiversity and agricultural resources that is experiencing drought, soil loss, surface erosion and instability, and vegetation type conversion as a result of decreased surface water infiltration. This project builds on the collaboratively authored Altar Valley Watershed Plan, a USBR WaterSmart Phase I project, by scaling up agreed upon, effective methods for conserving surface water: low-tech Natural Infrastructure in Dryland Streams (NIDS) made of rock, wood or earth, in and around tributaries to the Altar Wash and the Altar Wash itself, along with appropriate road maintenance. These structures slow and broaden the flow of water and increase water infiltration and soil retention, thereby reducing erosion and instability, enhancing native and perennial grasses, increasing resilience to drought and climate change. These treatments will moderate peak flows of the Altar Wash (which flows into the Santa Cruz River in Marana, AZ) and reduce downstream flood impacts. The project area includes high priority projects identified in the Altar Valley Watershed Plan (2022). Planning, construction, and monitoring of this project will take place over a 3 year period beginning approximately January 1, 2024 and ending December 31, 2026. No federal land or facilities will be involved in the project. This project is an opportunity to utilize proven methods of surface water conservation at a truly impactful scale.

# Project Location

The 8,985 acre project area is located in the northern end of the Altar Valley about 30 miles southwest of Tucson, Arizona in unincorporated Pima County.

Figure 1. Project location



The project area is located in HUC10-1505030404 Upper Brawley Wash. The majority of the Altar Valley is within the Brawley Wash sub-basin of the Santa Cruz River basin. The largest drainage in the Valley is the Altar Wash, which flows south-north from the Arivaca watershed and joins the Santa Cruz River in Marana, Arizona. The Santa Cruz River flows into the Gila River and eventually the Colorado River. The Altar Valley is a 580,000-acre working landscape of Sonoran desert, semi-desert grassland, and mountain ranges. It is approximately 52 miles long and 20 miles wide. The Valley stretches from the US-Mexico border north to the Ajo Hwy/Route 86 and between the Baboquivari, the Arivaca Creek Drainage, and the Sierrita Mountains.

Figure 2. Land ownership

The Altar Valley is sparsely populated and the predominant land uses are agriculture (primarily livestock grazing and some ecotourism) and conservation. It is a place where landowners and partners have worked together as the Altar Valley Conservation Alliance (AVCA) since 1995. Land use in the project area consists of conservation by Pima County and the Anvil Ranch, agricultural operations by the Anvil Ranch, and groundwater recharge by Tucson Water, a division of the City of Tucson.

The project area has a nexus with numerous completed and ongoing regulatory and planning projects, summarized in Table 1.

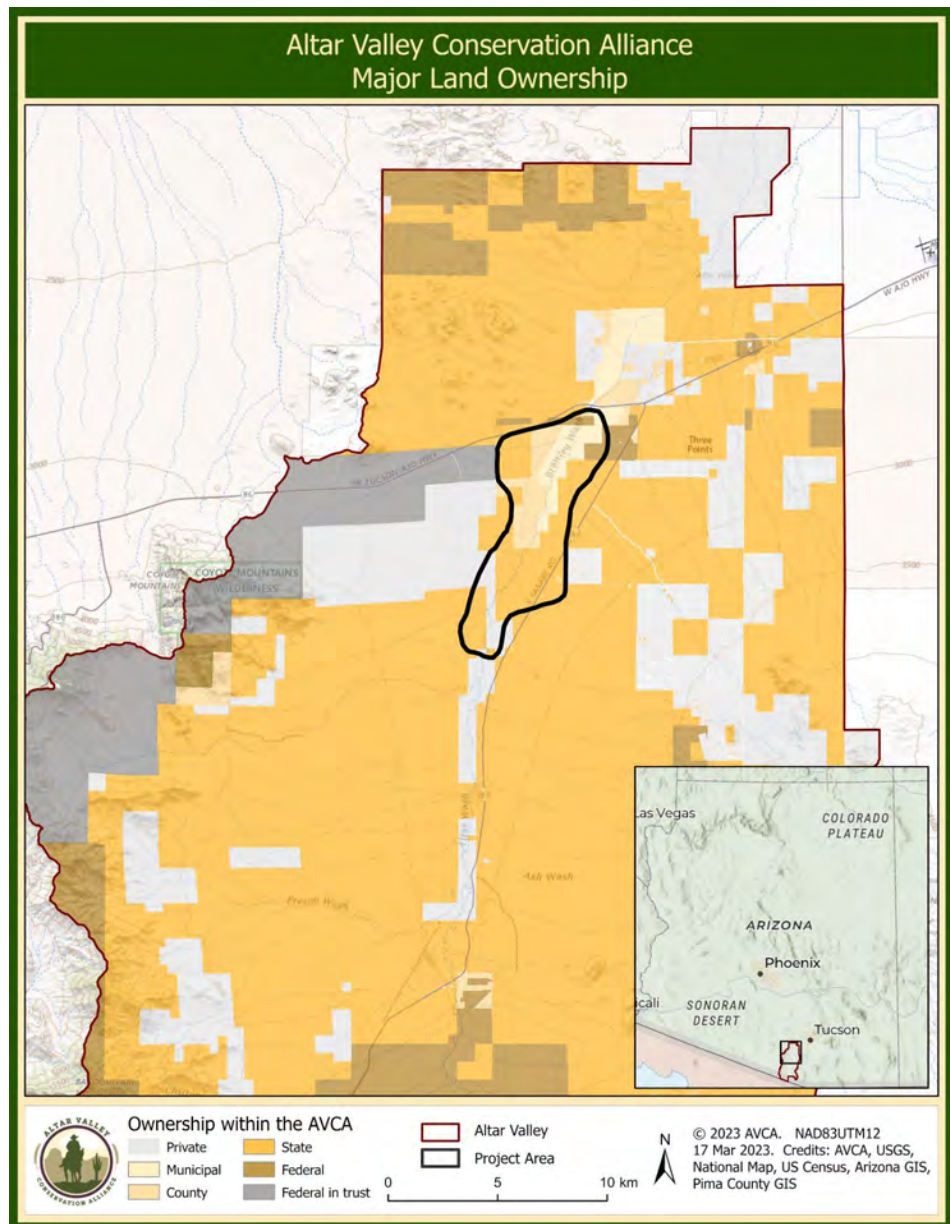




Table 1. Project area nexus with other regulatory and planning projects

Regulatory or Planning Project	Purpose
<a href="#">Pima County Sonoran Desert Conservation Plan (SDCP) (2001)</a>	Land use regulation and growth management
<a href="#">Pima County Multi-species Conservation Plan (MSCP) (2016)</a>	Endangered species compliance
<a href="#">Pima County Conservation Land System</a>	Mitigation for actions permitted by the MSHCP
Pima County Altar Valley Resource Management Plan (in progress)	Management plan for Pima County owned conservation lands in Altar Valley
<a href="#">Tucson Water Drought Preparedness and Response Plan (2006, updated 2021)</a>	Municipal water system recharge
<a href="#">Altar Valley Watershed Plan (2022)</a>	Watershed conservation goals and priority projects
<a href="#">Brawley PL-566</a> (in progress)	Planning for restoration activities in the Brawley Wash downstream of the Altar Valley, led by the US Natural Resource Conservation Service and the Pima County Regional Flood Control District
<a href="#">Altar Valley Fire Management Plan (2007)</a>	Endangered Species Act compliance for prescribed fire
Programmatic Safe Harbor Agreement for the Masked Bobwhite Quail (in progress)	Facilitate endangered species management on private lands

## Technical Project Description

AVCA and its Category A partner, the Pima County Regional Flood Control District (PCRFD), propose to complete final planning, compliance, installation and monitoring of a suite of integrated watershed treatments on conservation land owned by Pima County, water recharge land owned by the City of Tucson and managed by their Tucson Water division, and private and State of Arizona land associated with the Anvil Ranch. The project will utilize Natural Infrastructure in Dryland Stream (NIDS), which are “structures naturally or anthropogenically created from earth, wood, debris, or rock that can restore implicit

function of these systems” (Norman et al, 2022). The NIDS will be grouped as follows:

- **Water Harvesting** - treatment of existing roads, levees, dikes, and retention basins
- **Tributaries** - treatment of small tributaries systems with low tech rock structures installed by hand or machine
- **Altar Wash Floodplain** - treatment within the main stem of the Altar Wash to expand and enhance floodplain features

AVCA will provide project management as well as technical services for the project, and will work with Pima County to hire contractors. Both parties will work cooperatively with the Bureau of Reclamation (BOR) to complete necessary compliance. AVCA’s geographic information system manager (Arizona GIS) will support all phases of the project. Advisory services will be provided by the Altar Valley Watershed Working Group (WWG), as well as AVCA’s Board of Directors (BOD), and Science Advisory Board (SAB). This technical description will address:

- Choice of project area
- Geographic description
- Background regarding proposed treatments
- Approach to project

## Choice of Project Area

The 8,985 acre project area includes the intersection of numerous high-priority projects identified by the Altar Valley Watershed Plan (2022) (Watershed Plan), funded by a BOR WaterSmart Phase 1 grant. Long standing commitments to conservation partnership with the AVCA brought Pima County to the table as a Category A partner for this proposal, with a \$750,000 match commitment (see Appendix A). Discussions between AVCA and Pima County narrowed the project’s focal point to an area located in the northern end of the Altar Wash that was identified as important to multiple parties in the Watershed Plan during the Phase 1 process. The AVCA Board of Directors ratified the project area choice at its March 13, 2023 meeting (see Official Resolution). This project will implement all or portions of the following projects in the Watershed Plan: Duval Pond Modifications, Western Altar Wash: Increasing Water Infiltration and Reducing Erosion, Altar Wash Floodplain Enhancement, Road Treatments on Pima County Lands, and Duval Site - Channel Meander Erosion Mitigation. See Appendix B for the complete list of projects from the Watershed Plan.

## Geographic Description

Trends occurring in the Altar Valley mirror many areas of the arid Southwestern U.S. Rich and productive soils of ephemeral river systems and their floodplains have been impacted by severe erosion at many scales throughout watersheds. The focal point of the project area is a portion of the Altar Wash itself, the floodplains that are now disconnected from the channel, and similar dynamics at a smaller scale in tributaries delivering water to the Wash.

As background, the Altar Valley consists of four major geologic landforms: (1) mountains, in the upper reaches of the watershed; (2) pediments, which run from the base of the mountains to an average of one mile below the mountains; (3) alluvial fans or bajadas



below the pediments; and (4) the central bottomlands or floodplain, which contains the Altar Wash. The bajadas and central bottomlands consist of deep, unconsolidated material and generally represent the valley's richest soils. The project area is located within these potentially rich bottomlands as well as the alluvial fans upstream. This geologic makeup determines the area's hydrology. Rainfall runs quickly off the mountains surrounding the valley, across the pediments, and into the alluvia of the bajadas and bottomlands where it infiltrates into the groundwater. As a result of the geology and precipitation regime, the Altar Wash does not support perennial water, but flows only during heavy rain or flood events.

The climate of the planning area is semi-arid with relatively low precipitation, low humidity, and high summer temperatures. Precipitation, which is highly variable, averages between 12 to 24 inches per year depending on elevation. Precipitation primarily occurs during the winter season and summer monsoon season. The project area is identified as vulnerable to climate change, as discussed in Section E.1.6.1 Subcriterion No. E1: Climate Change.

At one time, water flows in the Altar Valley were absorbed by relatively flat, broad floodplains that supported sacaton (*Sporobolus wrightii*). Sacaton riparian wetlands provide essential ecosystem services by absorbing flood flows, controlling soil erosion, and intercepting and retaining sediment. It is exceptionally drought resistant due to extensive and deep root systems (Borderlands Restoration Network). The majority of these historic wetlands and floodplains have disappeared due to entrenched channels that have been disconnected from their natural floodplain (AVCA 2001) both in the Altar Wash itself and tributary systems. The change in hydrologic patterns caused a loss of floodplain grasses; over time they were replaced with brush and mesquite which survive on deeper water.

It must also be noted that 20th century water management activities associated with agriculture have dramatically affected the project area and areas further south within the Altar Valley. The project area is characterized by agricultural fields last used in the 1970s and associated irrigation channels, dikes, berms and roads used to manage them. These structures influence surface water flows, soils, and vegetation (Nichols et al. 2023). The AVCA Geographic Information System (GIS) includes geospatial data on earthen water control structures provided by Dr. Mary Nichols.

## Background regarding proposed treatments

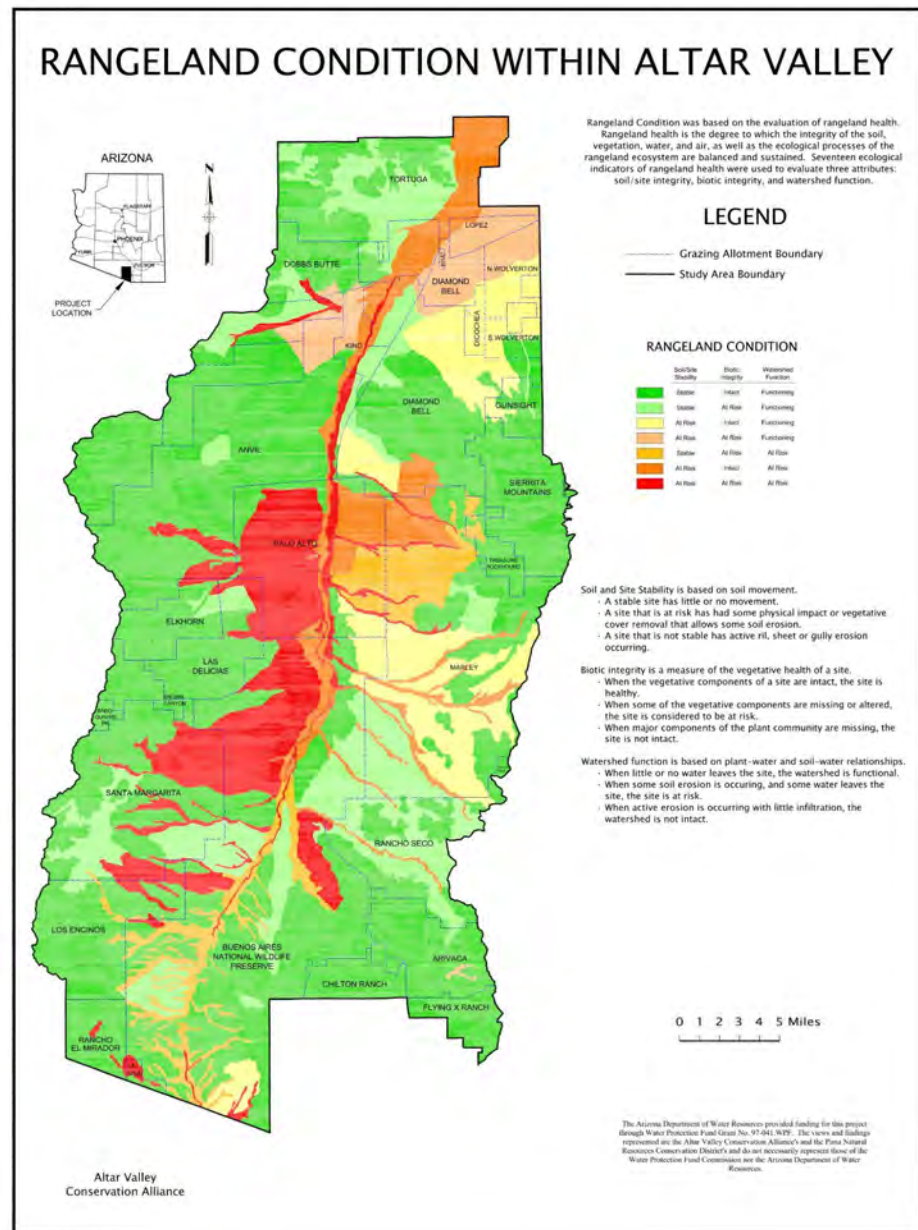
Altar Valley ranchers and partners have witnessed significant change due to erosion in the Altar Wash, as well as tributary systems. The Anvil Ranch, portions of which are in the southern project area, has experienced significant change due to entrenchment of the Altar Wash. In the late 1800s, the ranch headquarters sat on the edge of the sacaton riparian area that stretched to the west and absorbed flood waters; today the 50 foot wide entrenched channel of the Altar Wash is a half mile from headquarters. Ranchlands upstream from the Altar Wash are impacted by head cuts moving upstream in many areas, and the resulting loss of floodplain structure and vegetation at smaller scales.

Debate has occurred for decades about how to approach erosion problems in the Altar Valley, particularly as related to the Altar Wash. One widely discussed idea over the years

has been building large soil retention structures in the Altar Wash. In 1992 the U.S. Natural Resource Conservation Service (NRCS) issued a report titled “Brawley Wash Natural Resource Restoration Plan.” This document was prepared at the request of the Pima Natural Resource Conservation District (Pima NRCD) with the objective of developing alternatives to control erosion adversely impacting the area’s natural resources, land values and structural features. The recommendation of the NRCS study was to construct a “demonstration” grade control structure with the addition of vegetative management practices. To date, this type of structure has never been built due to cost and concern about risk of failure.

Figure 3. Range condition within Altar Valley circa 2000

When Altar Valley ranchers began to work together as AVCA in 1995, the question of what to do with the Altar Wash remained a daunting challenge. The AVCA’s first major project, a Watershed Action Plan funded by the Arizona Department of Water Resources (ADWR) Water Protection Fund (WPF) (Grant No. 97-041) demonstrated the impact of channelization of the Altar Wash and related loss of floodplain (see Figure 3). One of the recommendations of that plan was to construct a baffle-chute structure on the Altar Wash to decrease erosion in the natural channel and prevent the advance of head cutting in the tributaries (AVCA 2001).



[https://altarvalleyconservation.org/wp-content/uploads/2020/02/range\\_condition.pdf](https://altarvalleyconservation.org/wp-content/uploads/2020/02/range_condition.pdf)

In 2005, the AVCA was introduced to Bill Zeedyk's low-tech approach to watershed restoration, and it marked a turning point in the approach to erosion restoration in the Altar Valley. A series of small pilot projects were installed that used rock to arrest head cutting in small tributary systems and instigate soil deposition. In addition, Zeedyk encouraged people to look more broadly at their project areas to understand the local circumstances causing erosion impacts. In many cases, the interruption of water sheet flow across the landscape by roads, and subsequent delivery of more water into a channel than would have naturally occurred, is a primary cause of local erosion problems (Zeedyk 2009). Project design increasingly focused on draining water from roads and the tributaries themselves. This both stopped further channel entrenchment and erosion, as well as moved the channelized water back onto the arid landscape.

In 2012, the AVCA installed the Elkhorn/Las Delicias Watershed Demonstration Project that drained 3 miles of road with 52 rolling dips and installed 378 rock structures (with 920 tons of rock) in and adjacent to 8 channels. The project has been continually monitored and 10 year analysis results indicated positive impacts with regard to vegetation stability during drought (See Appendix D). During this time frame, the AVCA and Pima County partners launched restoration work on the abandoned agricultural fields of the 98 Ranch (within this project area) by building berms to encourage water infiltration.

In 2015, AVCA convened a multi-day workshop with landowners, partners, academics, and other experts regarding long-standing Altar Wash concerns relative to new experiences working in tributary systems. Outcomes generated included:

1. *The launch of the Altar Valley Watershed Working Group (WWG):* Agreement that participants valued the collaborative science based approach used at the workshop and generated commitment from those in attendance to continue to work together as the WWG.
2. *AVCA's cutting-edge GIS system:* During this workshop, emphasis was placed on the access to data and the ability to integrate data from different sources and information. Realizing that this was a critical component lacking in the AVCA's toolbox, the AVCA invested in cutting-edge GIS systems via Arizona GIS, and that mapping foundation has been essential to work planning in the years since.
3. *Jennifer Duan's hydrology work in the Altar Valley:* The consensus at this workshop was that the possibilities for restoration of the Altar Wash itself would be highly dependent on soil, and that harvesting soil from one part of the watershed to rebuild downstream features would be counterproductive. Inspired by these conversations, Pima County hired University of Arizona hydrologist Jennifer Duan to evaluate the changes in channel profiles throughout the Altar Valley (Duan et al. 2018).
4. *JE Fuller's Altar Wash Restoration Conceptual Evaluation of Alternative Methods:* The Altar Wash itself continued to spark serious debate at the workshop, ranging from proponents of big structures to working within the broad channel to no action. Sparked by this, AVCA contracted a reputable Tucson based hydrologic engineering firm, JE Fuller Hydrology & Geomorphology, Inc., to study the system and make recommendations (JE Fuller Hydrology & Geomorphology 2017).
5. *Mary Nichol's Berm and Earthen Structures Studies:* Sparked by discussion during the workshop, Mary Nichols, a hydrologist with the USDA-ARS Southwest Watershed

Research Center, began to conduct inventories of agricultural berms throughout the Altar Valley in an effort to assess their impacts on the landscape.

This momentum led AVCA to apply for a BOR Phase 1 WaterSmart grant unsuccessfully in 2016 and successfully in 2018. This funding supported completion of the Altar Valley Watershed Plan in 2022 by the WWG, with support from contractors JE Fuller, Arizona GIS, and Southwest Decision Resources. Concept plans or “15% plans” were developed for 29 projects, of which 5 fall within this project area (see Appendix B). These plans address different aspects of the project area geography – the Altar Wash itself, abandoned agricultural fields that were once floodplain, and eroding tributaries.

The recommendations and planning for this project have evolved from over 50 years of dedicated thought and study about how to address the downcutting of the Altar Wash and its tributaries. It is now generally accepted that returning the Altar Wash to the sacaton riparian area of a century ago is impossible, but there are many interventions that will stabilize the landscape, reverse negative trends, and improve resilience in the face of climate change and drought. AVCA and partners have determined that the most effective way to increase water availability for the environment in the Altar Valley is to incorporate work in the uplands, tributaries, and the mainstem of the Altar Wash (JE Fuller 2017, Altar Valley Watershed Working Group 2022).

During recent decades, projects have occurred in many southwestern watersheds that utilize various forms of low-tech approaches. As these projects have been installed and studied, the state of knowledge is evolving. Norman et al (2022) recently published a critically important work for the field of arid land river system restoration called: *Natural infrastructure in dryland streams (NIDS) can establish regenerative wetland sinks that reverse desertification and strengthen climate resilience*. This article is the first place where the term NIDS is utilized; and the AVCA finds it to be a useful way to describe the suite of treatments that will be deployed at this project area.

The structures employed in the project area will be Natural Infrastructure in Dryland Stream (NIDS). These are structures that are “created from earth, wood, debris, or rock that can restore implicit function” of dryland fluvial ecosystems. NIDS are generally designed to “retain sediment and organic matter and detain water, allowing it to slowly pass through” (Norman et al, 2022). Norman et al (2022) summarizes research related to NIDS concerning climate adaptation and mitigation and hydro-meteorological risk services. Benefits were found related to:

- Climate adaptation and mitigation, with:
  - Increased water availability
  - Sediment storage, formation, and productivity
  - Carbon sequestration and storage
  - Flood attenuation and water quality protection
  - Increases vegetation viability
  - Decreases temperatures and climate variability
- Hydro-meteorological risk, buffering against:
  - Drought

- Water shortage
- Flooding
- Heatwaves
- Dust storms
- Wildlife
- Biodiversity losses
- Food insecurity

The overarching goal for the project is to slow down water within the project area. This slowing, created by the project’s design and placement of NIDS, will restore sheet flow of water over the landscape, stabilize head-cut erosion and channel deepening, and most importantly, facilitate restoration of floodplain features at all scales, both within the Altar Wash and its tributaries. Initial success will be primarily evident through vegetation response, which will revitalize natural cycles that contribute to restoration of dryland systems of the project area. While the NIDS chosen may be low tech, they will require substantial field evaluation and analysis to locate and size them properly, and determine the appropriate materials. Table 2 summarizes the NIDS that will be utilized.

Table 2. Natural infrastructure in dryland stream treatments planned for the project area

Project Sites	Natural infrastructure in dryland stream (NIDS) treatments		
	Water harvesting	Tributaries	Altar Wash Floodplain
	Treatment of existing roads, levees, dikes, and retention basins	Treatment of small tributaries systems with low tech rock structures installed by hand or machine	Treatment within the main stem of the Altar Wash to expand and enhance floodplain features
Duval Pond Modifications	X		
Western Altar Wash: Increasing Water Infiltration and Reducing Erosion	X	X	
Altar Wash Floodplain Enhancement	X		X
Road Treatments on Pima County Lands	X	X	
Duval Site – Channel Meander Erosion Mitigation			X

## Approach to Project

To complete this project, the AVCA and partners will accomplish activities in the following task areas: (1) Project management, (2) Planning, (3) Compliance, (4) Installation, and (5) Monitoring and Data Management Plan.

### Task 1. Project Management

The AVCA Executive Director (ED) will serve as the Project Director. Project management and technical services will be provided by the AVCA staff consisting of the AVCA ED, Conservation and Science Director (CSD), Finance Administrator (FA) and a Restoration Technician (RT).

Project management work products will include:

- Project flow chart with project milestones, resource needs, and deliverables
- Google calendar available to project team members and partners
- Requests for proposal and documentation of proposals received, review of proposals, and final decision
- Executed contracts and accompanying paperwork (Form W-4 and evidence of workers' compensation insurance)
- Quickbooks and/or supplementary spreadsheet reports to track revenue and expenses, as well as match contributions from Pima County and project partners
- Meeting management tools (agenda, sign-in sheets, presentations, facilitation plan, and notes)
- Reports required by the grant agreement

Advisory services will be provided by three entities: the AVCA Board of Directors (BOD), the AVCA Science Advisory Board (SAB), and the Watershed Working Group (WWG). All of these groups will be updated on a regular basis and engaged in strategic discussion, as well as project oversight when appropriate. The 13 member BOD meets quarterly and has fiduciary, strategic, and staff oversight responsibilities; and it will be involved in coordination between landowners in the Altar Valley within and proximate to the project area. The 15 member SAB meets 3-4 times per year to advise the BOD and AVCA projects; and it will be particularly involved in providing technical assistance on the project monitoring program. The WWG meets 2-3 times per year, with supplemental meetings of its Technical Teams (TT). The WWG was the collaborative body of partners that worked together to build the Watershed Plan (2022); and AVCA will use this group to advise on project implementation. The WWG will engage at key points in the project, to assure that the best available science and management practices are utilized and to help with problem solving, compliance, and other issues that may arise. The four TTs provide an additional layer of depth in the areas of Hydrology, Vegetation, Wildlife, and Community.

Contracting teams will be employed as well. The categories of contractors will include:

- 1) Geographic Information System work to produce maps and perform analysis (by AVCA's CSD and on-call contractor Arizona GIS)
- 2) Watershed restoration team to do project planning, installation, and monitoring of structural integrity (to be determined via request for proposals)

- 3) Facilitation services to convene the Watershed Working Group and related Technical Team meetings (by Southwest Decision Resources)
- 4) Compliance work (likely to include hydrologic modeling, cultural resource surveys, and endangered species surveys (to be determined based on needs))

The proposed budget includes two iPad devices with Verizon data plans that will be used primarily by the Conservation and Science Director and the Restoration Technician. These tools will be used at the project site for all phases of the project, to support and assist all contractors. These tools will bring the mapping and analytic power of the Altar Valley GIS to the field; and enable planning concepts to be mapped and documented.

## Task 2. Planning

The watershed restoration contractor determined after the start of the project via a request for proposals will be the lead author of this plan, with technical oversight by the AVCA Conservation and Science Director, assisted by the AVCA Restoration Technician. This task will require additional coordination with project partners, via the WWG and its TTs, the restoration contractor, and the AVCA. The AVCA GIS on-call contractor will assist with analysis and map work. Additional watershed modeling may be required for some portions of the project area, which would be directed and funded by Pima County.

This work will advance the 15% plans crafted for the Altar Valley Watershed Plan (2022) into detailed treatment plans, and will gather data necessary to inform compliance. It is expected that a treatment plan will be approximately 90% complete prior to initiation of compliance work. Mapping the exact areas where treatment will occur, as well as site access and material staging, is critical, as this information will narrow the scope of compliance. The treatment plan will also include information needed for environmental compliance and/or describe additional information needs. The treatment plan will be refined to the 100% completion point when any mitigation or avoidance measures identified during compliance have been addressed.

## Task 3. Compliance

The AVCA Project Director, assisted by AVCA staff, will be responsible for coordination with other entities to complete necessary compliance. The AVCA anticipates that the AVCA, Pima County, and the BOR will collaborate to address compliance needs identified by the treatment plan. Expected compliance tasks will include: National Environmental Policy Act (NEPA), Endangered Species Act (ESA), National Historic Preservation Act, and the Pima County Floodplain Ordinance, and possibly preliminary jurisdictional delineation of Waters of the United States (WOTUS). It is expected that the WWG will provide technical assistance and coordination regarding compliance work. It is likely that cultural resource surveys will be required; but previous surveys completed on 542.44 acres in 2015 may lessen the workload. Surveys for the endangered Pima pineapple cactus are also likely. Pima County has committed to funding analysis and compliance work. AVCA has coordinated with Lisa Rivera, a Natural Resources Specialist at the BOR Phoenix Area Office, and will include \$100,000 in the project budget to support BOR assistance on compliance work.



## Task 4. Installation

AVCA staff will coordinate with the watershed restoration contractor installing the project. The Conservation and Science Director will supervise this coordination between the parties, assisted by the Restoration Technician. The watershed restoration contractor will be responsible for project installation and all logistics necessary to support that work. The installation process will involve marking treatment sites on the ground as well as material stockpile locations and access routes for hauling materials or machinery to treatment sites. Work will be accomplished by hand, using the conservation corps team, as well as by machine. The order of operations and logistics will have been detailed during Task 2 planning. Completion of work will also include rehabilitation of access routes and material stockpile locations. Necessary machinery, installation materials, and tools are listed below.

Machinery needs will include:

- Work trucks (one with diesel tank) to move people and refuel heavy machinery throughout project areas
- A 4WD 2 seat all-terrain vehicle (such as John Deere Gator) to move people and hand tools throughout project area throughout project areas
- Front end loader to load rock into dump truck
- Single axle 5-6 cubic yard dump truck to distribute rock throughout project site
- D5 or D6 dozer with 6 way blade and ripper for road work and earth work
- Backhoe with thumb or excavator such as Caterpillar 305 to place rock by machine

Installation materials will include:

- 6 - 12 inch rock for hand-built structures
- 18 - 30 inch or larger rock for machine-built structures
- Native seed mix applied at approximately 8-12 pounds per acres for grasses or 2-5 pounds per acre for forbs (Gornish personal communication)

Tool needs will include:

- Porta potty with trailer
- Marking tools: temporary wood stakes, flagging, outdoor marking paint, rebar or metal t-posts, metal tags (to permanently mark monitoring locations)
- Tools: shovels, hard rake, pry bar, hand saw, loppers, wheelbarrow, rock carrying litter
- Clinometer and/or leveling tools

## Task 5. Monitoring and Data Management Plan

Performance measures will be evaluated via a monitoring and data management plan that will be designed and managed by AVCA staff and its on-call GIS contractor, with guidance from the WWG and AVCA SAB. The AVCA Conservation and Science Director will be the principal author. This plan will address monitoring activities that will occur during the 3 active years of BOR support of the project and for 5 years following project completion. Chosen monitoring techniques are meant to be responsive to project goals and objectives as well as logistically and financially feasible for the 5 year period following active BOR support of the project. Note that the methods chosen integrate with existing monitoring systems operated by Pima County and use publicly available data, with the exception of

completion of annual long-term monitoring photos at a limited number of locations. The monitoring plan will also include an essential maintenance component after the first summer monsoon, which is typically active during July, August and September. The watershed restoration contractor will return to the project after that first seasonal event to evaluate structural integrity of the treatment sites and address any maintenance problems.

During the active years of the project, monitoring steps include:

1. Establish a monitoring and data management plan concurrent with planning
2. Install equipment to monitor progress and conservation outcomes, including photo points and measurement equipment, prior to installation
3. Initiate data collection to establish pre-treatment baseline conditions
4. Complete up to 6 months of post-installation monitoring of conservation outcomes after installation of the on-the-ground project, including post-monsoon structural integrity monitoring and repairs
5. Long-term monitoring for an additional 5 years in cooperation with Pima County

Specific monitoring techniques will be developed in the monitoring plan, as well as methods of data collection, storage and access. Data gathered will be stored in a mapping interface within the AVCA's existing ESRI ArcGIS database. Field monitors will use ESRI's cellular data iPad applications to gather data and instantly update to the map. Table 3 lists performance measures and the monitoring techniques that will be used to measure progress.

Table 3. Performance measures and related monitoring techniques

<b>Performance Measure</b>	<b>Monitoring Technique</b>
<b><i>Within 3 years of active project work</i></b>	
Acres treated	Field mapping with ESRI cell phone application
Number of project partners	Compilation of meeting sign in sheets
Treatment site photos and notes	Field mapping with ESRI cell phone application
Surface water presence	If feasible, use of Modified Normalized Difference Water Index from multispectral satellite imagery
<b><i>Within 3 years of active project work and for 5 years following project completion</i></b>	
Long-term monitoring photos at 15 locations	Field mapping with ESRI cell phone application and via installation of 6 field cameras with cellular data to continuously monitor for 2 years
Soil moisture at 12 locations	Installation of HOBO soil moisture devices
Vegetation presence/absence and changes to the amount of green biomass	Normalized Difference Vegetation Index analysis using publicly available data
Vegetation composition: herbaceous, shrub, and tree cover	Range Condition Monitoring and Assessment and Projection Map publicly available data

# Applicant Category and Eligibility of Applicant

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The AVCA is a Category B applicant, as a 501(c)3 non-profit conservation organization incorporated and located in the state of Arizona. Pima County is the Category A entity on this project, and qualifies as such as a regional, county authority in Arizona; the Pima County Regional Flood Control District would be the primary County entity participating on this project. Pima County committed a match of \$750,000 towards this project. These funds would be directed towards construction costs on Pima County owned lands, as well as project analysis and compliance costs. A cooperative agreement between AVCA and Pima County was signed in 2016, and is currently being updated to a Memorandum of Understanding. A letter of commitment signed by Pima County Administrator Jan Leshar is attached as Appendix A.

## Performance Measures

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Performance measures include elements that will be evaluated during the 3 year project time frame and for 5 years following project completion.

The following will be measured within the 3 year project time frame:

- Acres treated within 3 year project time frame
- Number of partner organizations engaged within 3 year project time frame
- Completion of treatment site monitoring photos (with notations concerning treatment type and structural integrity) embedded within GIS at 3 phases - baseline, as-built, and following first monsoon season
- Surface water presence in limited portion of project area

The following will be measured and analyzed within the 3 year time frame and for 5 years following project completion.

- Completion of annual long-term monitoring photo points at 15 representative sites throughout the project area embedded within GIS
- Vegetation presence or absence
- Vegetation composition - bare ground, grass, forb, shrub, or tree
- Soil moisture at 12 sites

Methods for measuring performance measures will be described in the monitoring and data management plan previously described in Task 5. The cost for Task 5 Monitoring and Data Management is \$109,045 which is 6% of the project total, and thus does not exceed 25% of the total project cost. The total cost is derived from: Personnel - \$53,470, Fringe - \$8555, Travel - \$8272, Supplies - \$10,748, and Contractual - \$109,045.

# Evaluation Criteria

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## Evaluation Criterion A: Project Benefits

### E.1.1.1 Subcriterion A.1: Project Benefits

#### E.1.1.1.1 General Project Benefits

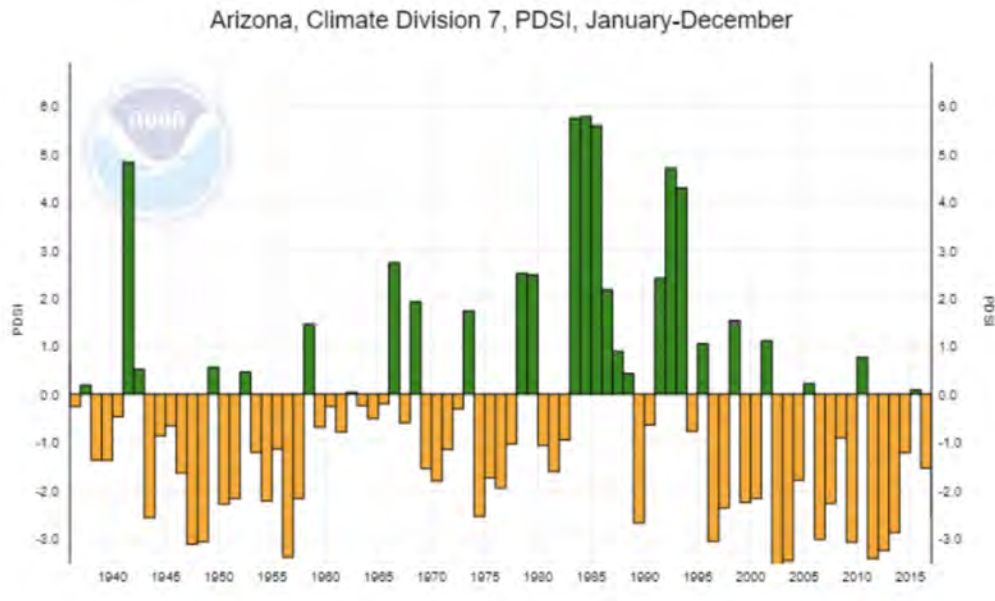
Soils are eroding drastically in the Altar Valley (Altar Valley Watershed Working Group 2022), and a cornerstone of this project is stabilizing soils by constructing rock and earthen structures that retain sediment, build soil, and increase the diversity of soil microbial communities (Martyn et al. 2022). Water is a critical component of soil health, as it provides the hydration necessary to support microbial communities and vegetation - yet high peak flows in the Valley's ephemeral systems have scoured soils and caused destabilization. The structures constructed through this project will both increase the volume and duration of soil moisture present and deliver it to soils more slowly, thereby reducing the scouring power of peak flows (Norman et al 2022).

One of the most important ecological resources of the Altar Valley is its vegetation, which provides forage, cover, and breeding habitat for the wildlife and livestock the community depends on. Vegetation in the project area has suffered in past decades along with decreases in precipitation, increases in summer temperatures, and soil loss (Altar Valley Watershed Working Group 2022). Native grasses and forbs are being replaced by shrubs and trees that have access to deeper groundwater (Altar Valley Conservation Alliance 2001). This project will increase cover and diversity of native grasses and forbs in uplands and on riparian floodplains through directing surface water to areas that can best support vegetation, delivering water slowly so that it infiltrates into the top soil layers and is held for a longer duration, retaining sediment that supports new establishment of vegetation, and providing additional native seeds to the system. In an analogous project monitored from 2012-2022, structures similar to those implemented in this project increased presence and diversity of native vegetation in drought years when surrounding vegetation cover and greenness decreased (Ossanna et al. 2023).

The Altar Valley is experiencing extreme drought conditions. One of the most common measures of drought is the Palmer Drought Severity Index (PDSI), a meteorological drought index used to assess the severity of dry or wet weather. PDSI is analyzed by the National Oceanic and Atmospheric Administration (NOAA), and is based on the principles of a balance between moisture supply and demand. The index generally ranges from -6 to +6, with negative values indicating dry, and positive values wet. PDSI values 0 to -0.5 are considered normal. Values from -0.5 to -1.0 are "incipient drought;" -1.0 to -2.0 are "mild drought;" -2.0 to -3.0 are "moderate drought;" -3.0 to -4.0 are "severe drought;" and greater than -4.0 is "extreme drought." Magnitudes of +7 or -7 are rarely seen. Similar adjectives are attached to positive values of wet weather.

In 2017, Dr. Jennifer Duan et al. analyzed the PDSI for Climate Division 7 from 1936 to 2016; the results are shown in Figure 4 (Duan et al. 2017).

Figure 4. Palmer Drought Severity Index Results, 1936-2016



The PDSI analysis indicates that in 54 of the 81 years of the analysis (67%), conditions were dry (negative). Within the last 16 years of the analysis (2000-2016), only four years (25%) had positive (relatively wet) values, and the Valley is anticipated to become hotter and drier into the future. The prevalence of drought is of great concern for land owners, agricultural producers, natural resource managers, and scientists within the Altar Valley.

The project is designed to directly address issues of drought and climate change through creating more dependable water sources, creating microclimates that allow vegetation to persist in low-precipitation conditions (Appendix D, Reversing Erosion on Semi-Arid Grassland Ranches), and sequestering carbon. The structures will increase ecohydrological integrity by supporting variability that enables biotic communities to thrive. Diverse composition and structure of plant communities' aids in water harvesting to resist drought and helps plants recover from drought (Norman et al. 2022).

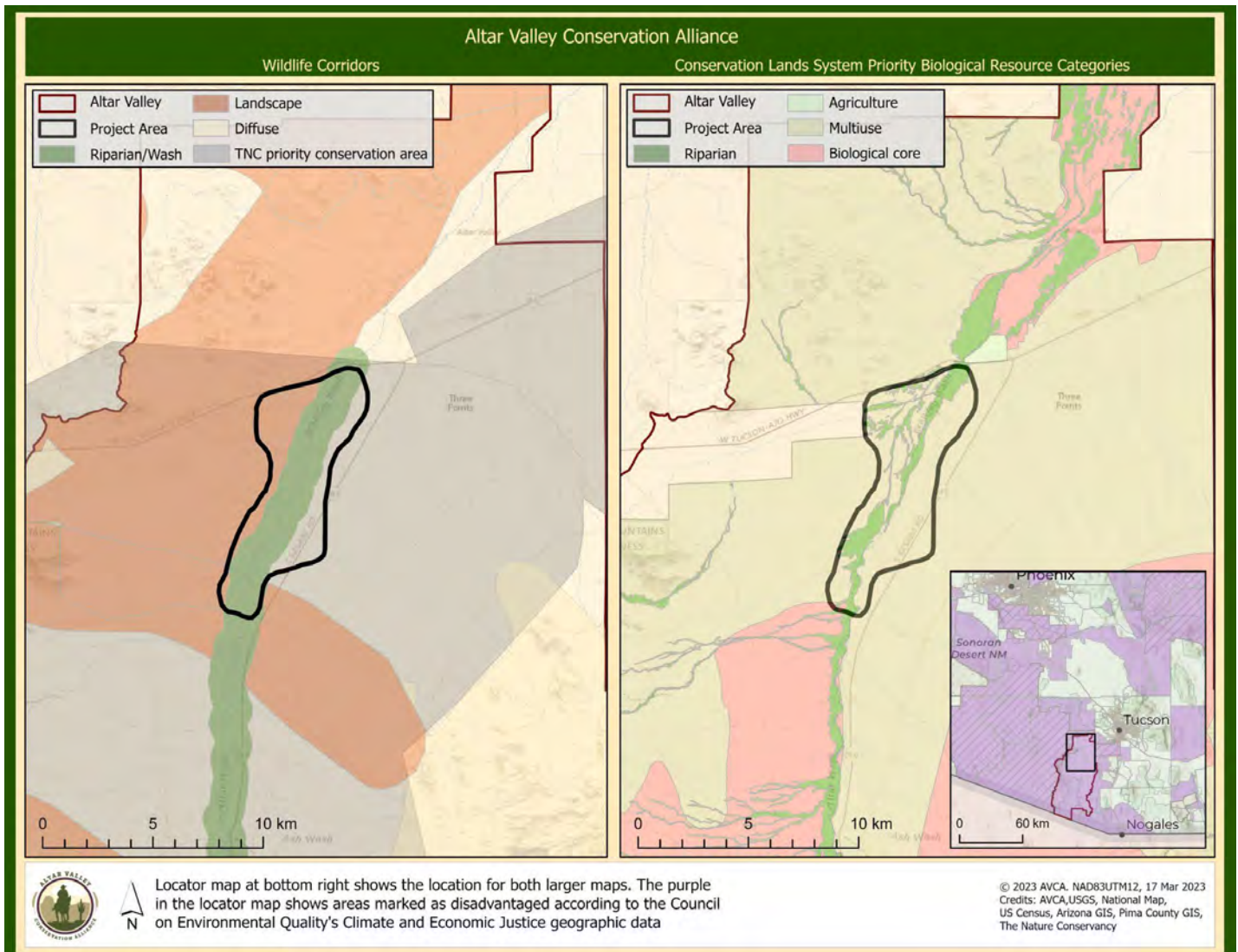
Regarding wildlife, the project will improve riparian habitat, which composes only 0.4 percent of Arizona's land area, yet supports 80 percent of its vertebrate species (University of Arizona Cooperative Extension 2007). The structures will increase vegetation, and increase volume and duration of surface water available for wildlife. In the Altar Valley, the only perennial surface water sources are ponds and cattle tanks (Noel et al. 2023), so this project's routing of water to retention basins and facilitation of water pooling of water in riparian areas are anticipated to be highly utilized by wildlife.

Riparian and aquatic species supported by the project include the federally threatened Chiricahua leopard frog, which requires surface water and is dependent on ponds and tanks in the Altar Valley (Noel et al. 2023), the federally endangered Southwestern willow

flycatcher, the federally threatened Western yellow-billed cuckoo, the pie-billed grebe, the mallard duck, and western sandpiper. In the uplands, grassland obligates such as the Cactus Ferruginous Pygmy Owl, (currently considered for re-listing under the Endangered Species Act), Abert's towhee, crested caracara, western screech owl, rufous-winged sparrow, peregrine falcon, Swainson's hawk, mule deer, white-tailed deer, and black-tailed jackrabbit will benefit from increased vegetation cover and diversity.

The project also contains habitats identified by Pima County in the Sonoran Desert Conservation Plan as biological core areas, important riparian areas, and inter-mountain wildlife corridors (Pima County 2001). Figure 5 is a map of the project area overlaid with the relevant biological core areas, important riparian areas, and wildlife linkages.

Figure 5. Wildlife Corridors and Conservation Lands System Priority Biological Resource Categories



The fundamental goal of this project is to slow down movement of water, thus increasing soil moisture and vegetation. Vegetation provides further stability, creating a positive feedback loop that increases water supply for ecosystem functions. Treatments within the project area will take place in different areas and the ways in which water supply is increased also vary. In the case of road treatments, road drain structures called rolling dips essentially harvest water caught in ranch roads and redistribute water to mimic sheet flow that occurred prior to presence of the road. In the case of tributary treatments, NIDS promote reinvigoration of floodplain features that act as sponges to hold water and promote vegetation. In the abandoned agricultural fields that were once floodplain for the Altar Wash, rock treatments and earthen berms will enhance or create riparian (and possibly wetland habitat) that will be utilized by water-dependent species and make water supply more reliable for those species by increasing the volume and duration of available surface water. In the Altar Wash itself, treatment will focus on spreading water within the large channel and enhancing floodplain features similarly to the tributaries but at a larger scale. Structures installed through this project will increase water availability, reduce erosion and promote soil formation and productivity, store carbon and nitrogen, control stormwater runoff and filter water, increase vegetation viability, and decrease temperatures and climate variability (Norman et al. 2022).

The project does not directly impact existing environmental nor compliance obligations under Federal or State law. However the project will enhance the quality of land owned by Pima County in association with the Pima County Conservation Land System (referenced in Table 1), which serves as mitigation for development in the greater Tucson area, via the Multi-species Conservation Plan. It is not located in a river basin adversely impacted by a BOR water project.

#### E.1.1.1.2 Water Conservation and Efficiency Project Benefits

The water that is currently running off the surface is mostly being "lost" to evaporation, along with in-stream transport downstream via the Altar Wash. By installing structures and promoting vegetation, the water will be allowed to go under the soil surface to be stored longer, put to use for vegetation uptake (ET), and flow downstream in greater discharge columns, but with decreased peaks, (Norman 2016, Norman, 2014, and Norman 2022).

All surface flows affected by this project will initially either infiltrate to soils or be used by animals. The structures built will detain surface flows, which will temporarily pool on the surface and then sink into the soil. The majority of water will infiltrate into the soils, but in the retention basins and landscape depressions where water is routed by this project, water will remain on the surface and provide water sources for wildlife.

The water that infiltrates into soil will either be utilized by plants such as native grasses, cacti, and forbs, or percolate deeper into groundwater aquifer and serve as groundwater recharge. In arid systems of the Southwest, little water is available to recharge aquifers and other soil-water sinks during drought periods, and this is exacerbated by the effect of warming temperatures on evapotranspiration (Uhlman et al. 2020); this project will contribute much-needed groundwater recharge in this drought-prone system.



In the desert, where water availability is a major limiting factor for wildlife populations and plant viability (University of Arizona 2007), any water left on the surface or top levels of soil is important for the environment. We are proposing increasing the volume and duration instream flows within ephemeral channels as well as in upland ponds, swales, and landscape depressions to increase the organisms' ability to persist in an increasingly drought-prone area.

No formal mechanism will be used to allocate water for environmental use, but a group of over 100 diverse partners (the Altar Valley Watershed Working Group) and the AVCA Science Advisory Board will ensure the project is conducted effectively. An example of the depth and breadth of the WWG's knowledge is the Altar Valley Watershed Plan, a BOR WaterSmart Phase 1 project, for which partners collaborated to agree on shared goals and desired conditions for the watershed (discussed further in Evaluation Criterion B: Collaborative Planning).

#### E.1.1.1.3 Water Management and Infrastructure Improvement Benefits

The Natural infrastructure in dryland streams (NIDS) will create a longer duration of surface water, soil moisture, and vegetation greenness. The project location is a drought prone area where the only perennial surface waters are ponds and tanks, and will benefit from additional water retention on the landscape.

#### E.1.1.1.4 Restoration Project Benefits

This project does not involve removal of invasive species; however, native species will be seeded and the expected result is that, native species will establish and increase the overall species diversity of the project area. In a similar project in the Altar Valley utilizing rock detention structures seeded with a mix of native grasses, forbs, and sub-shrubs, a variety of native species persisted 10 years after the project was implemented, despite the presence of invasive buffelgrass and Lehmann lovegrass in the project area (Ossanna 2023).

This project does not occur in a fire-prone area, as it is very sparsely vegetated. However, the structures built will help filter and retain sediment that will wash down the watershed when the next burn event occurs at higher elevations.

#### E.1.1.1 Subcriterion A.2: Multiple Benefits

This project has many multiple benefits, including positive impacts to agriculture in the area, easing downstream flooding impacts, facilitation of watershed health and collaborative conservation work, as well as benefits to wildlife.

This project will benefit water uses of all landowners in the project area, plus unincorporated Pima County and Marana, which is part of the Tucson metropolitan area. Landowners are the Anvil Ranch, which is a fifth generation ranch that has grazed cattle since 1895, Pima County, which will be implementing its Sonoran Desert Conservation Plan

through this project, the City of Tucson, which has high interest in conserving water for the benefit of the community, and the Pima County Regional Flood Control District, which manages water for community safety and wellbeing. All of these landowners serve the county and watershed through natural resources that depend on the water being conserved through this project.

Agriculture in the Altar Valley is a large use of the landscape. In this project area, the Anvil Ranch and the lands owned by Pima County are used for agricultural grazing. This project will benefit all agricultural operations within the project area by retaining water on the landscape that can be used for livestock, as well as retaining water that will increase forage productivity. This project also proposes to aid in road maintenance and restoration, thereby facilitating work needed for agricultural operations. Additionally, this project can help reduce water conflicts within the Altar Valley watershed by preventing problems on lands owned by one entity from traveling upstream or downstream to another.

This project will reduce peak flows of the Altar Wash, which flows into unincorporated Pima County and Marana, which is part of the Tucson metropolitan area. The structures built in uplands, tributaries, and floodplains of the Altar Wash will decrease the speed and volume of flows in the Altar Wash. This will benefit public safety by making floods less intense in urban areas, and reducing damages to roadways, infrastructure, homes, and other buildings.

This project will enhance the health of the watershed by combining the most effective watershed restoration methods known by the AVCA and project partners, along with positively facilitating collaborative watershed group management on the landscape. In the 2019-2022 Altar Valley Watershed Planning effort, the 100-partner Watershed Working Group came together to identify strategies for preventing water and soil loss throughout the watershed. By building upon existing studies (including Altar Valley Conservation Alliance 2001, JE Fuller 2017, Duan 2018), modeling and analyzing current watershed conditions, and observing conditions on the ground, they determined that the most important actions were to modify earthen structures and add low-impact water detention structures in the uplands, treat tributaries with low-technology rock and/or brush structures to decrease entrenchment, and to enhance natural functions and floodplains in the Altar Wash. This project includes all of those strategies in one project area, and will be the first opportunity the AVCA has had to treat the watershed from the uplands to tributaries to the mainstem of the Altar Wash in an integrated manner. This project will be the direct result of the Altar Valley community's collaborative planning process.

Finally, wildlife benefits are many. These benefits are discussed in Section E.1.1.1.1 General Project Benefits and Section E.1.6.1 Subcriterion No. E1: Climate Change.

## Evaluation Criterion B: Collaborative Planning

This project was developed entirely based on a collaborative planning process. The collaborative process of the Altar Valley Watershed Plan occurred from 2019-2022, as a part of a BOR WaterSmart Phase 1 grant. Plan development was led by AVCA, a watershed

group, through facilitation of the collaborative Watershed Working Group (WWG), a broad group of individuals, organizations, agencies, and technical teams focused on Vegetation, Hydrology and Erosion, Community Resources, and Wildlife. The process drew on decades of partnership and learning by Altar Valley partners. The Plan is designed to be updated regularly and reflect the needs of the Altar Valley. AVCA and the WWG meet the statutory definition of watershed group (as defined by Section 6001(6) of the Cooperative Management Act), as they are non-regulatory entities that address water availability and quality and promote sustainable use of water resources, operate on a consensus basis, and represent diverse stakeholders.

The WWG has been working together formally for nearly a decade, and includes all landowners within the project area (Anvil Ranch, City of Tucson, and Pima County). The Pima County Regional Flood Control District, as the Category A partner on this grant, is also a Watershed Working Group (WWG) partner, and is committed to mitigating flood flows into the Tucson metropolitan area. It is because of these strong partnerships that the project can be designed for maximum environmental benefit and not compromise results because of the project area's complex land ownership.

The Watershed Plan (<https://altarvalleyconservation.org/altarvalleywatershedplan>) builds upon decades of collaborative work in the Altar Valley to clarify shared goals, identify critical issues, determine the best stewardship practices to achieve those goals, describe where and how to deploy these practices, and build a strong foundation from which to seek appropriate project partners and funding. The plan aims to:

- Provide a comprehensive overview of current and desired conditions in the Valley
- Provide a concise reference and, a unified source of guidance to agencies and organizations working in the Altar Valley, with a focus on shared goals
- Promote solutions to complex problems and effective, sustainable management practices in the Altar Valley
- Offer a "toolbox" of information and resources on stewardship practices, permitting, monitoring, and other topics
- Identify, prioritize, and design general concepts for restoration projects important to accomplish across the Valley over the next 25 years
- Outline a framework for continued monitoring, adaptive management, and collaboration in the Altar Valley.

The plan describes strategies, projects, best management practices, and available resources for accomplishing the general goals outlined above. It is meant to be a dynamic, interactive, living compilation of resources that is consistently updated by diverse stakeholders in the watershed and adapted as progress is made and new challenges arise. Appendix B of this application contains a table titled *Priority Projects from the Altar Valley Watershed Plan* with those projects pulled from the Watershed Plan, and in bold are the specific ones that will be engaged in this proposed project.

In the Watershed Plan, the WWG committed to the following collaborative management goals relevant to this project:

- Connect tributaries to floodplains - in uplands and/or connections to the Altar Wash mainstem

- Repair the Altar Wash - where resources valued by the community need protection from erosion
- Restore channels - focusing on tributaries connected to the Altar Wash
- Treat and maintain roads - where we can remediate channels, increase infiltration, and divert water from roads
- Decrease road density - where redundant roads may be removed
- Remove or maintain water control structures - where structures influence water flows that affect human or ecological resources
- Sustain all types of water sources (perennial, ephemeral, etc.) - where they benefit terrestrial and/or aquatic species

The above goals align strongly with those of this project, and the WWG has specifically identified the actions associated with this project as a high priority (Altar Valley Watershed Working Group 2022). WWG members will contribute important knowledge and perspectives for designing, implementing, monitoring, and maintaining the project so that it is sustainable; for example, they will help design the project so it meets the stated goals during and after implementation, maintain relationships necessary for accessing project sites on multiple ownerships, and gather resources for maintaining and potentially expanding the project. In addition, the project will serve as an example of a successful way to utilize flows for the environment, and the WWG will process and distribute information about the project to facilitate the use of similar methods elsewhere.

## Evaluation Criterion C: Stakeholder Support for Proposed Project

Diverse stakeholders and partners support is a hallmark of AVCA's work and that is continued on this project, as demonstrated by 18 letters of support provided as Appendix C. Pima County, AVCA's Category A partner, has pledged \$750,000 to this project (see Appendix A). Landowner support (within and near the project area) is demonstrated by letters from Pima County, Tucson Water, the Anvil Ranch and the Elkhorn Ranch.

The Nature Conservancy, whose Tucson Field Office is engaged in the Altar Valley, and the Arizona Land and Water Trust are two environmental organizations that support this project. Agencies responsible for wildlife management at the federal and state level support the project, as demonstrated by letters from the Arizona Game and Fish Department, the US Fish and Wildlife Service Ecological Services, and the Buenos Aires National Wildlife Refuge.

Strong support from researchers and academia is included, via University of Arizona scientists Dr. Elise Gornish, Dr. George Ruyle, and Dr. Larry Fisher. These researchers have shown keen interest in the effects of this project on the landscape. Dr. Gornish, in particular, has expressed an interest in coordinating students and research on the project, if this grant is funded. Additionally, Dr. Mary Nichols with the USDA-ARS Southwest Watershed Research Center supports this project. Finally, Dr. Laura Norman with the Department of Interior U.S. Geological Survey Western Geographic Science Center has expressed strong

support for this project, which is backed by over 15 years of research on similar project sites, and she is interested in participating in the monitoring program.

This project is supported by watershed restoration practitioners in our region, who are actively involved in the installation of similar projects. Those practitioners include: Steve Carson, Brad Lancaster, and Omar Ore-Giron. It is also supported by individuals and organizations engaged in landscape level conservation, including the Western Landowners Alliance and Wildvisions Arizona.

AVCA is proud of the support and commitment reflected in these letters. One individual summed up their support saying, "They [AVCA] have a proven and engaged cadre of technical, public and landowner partners committed to restoring the Valley fundamental watershed health. They have both the organizational and visionary capacity to make the project as outlined in the application a success. With over 40 years in conservation management, I have seldom run into a small local NGO equipped and in the right place at the right time, to support." These letters reflect decades of partnership and collaborative conservation in the Altar Valley. Many of these individuals, and others, actively participate in groups that will provide advisory services for this project: the Watershed Working Group, the AVCA Board of Directors, and the AVCA Science Advisory Board. These groups contributed significantly to completion of the Watershed Plan (2022); and AVCA expects this trend to continue for this project. AVCA is unaware of any opposition to the project.

## Evaluation Criterion D: Readiness to Proceed

AVCA will be prepared to formally launch this 3 year project January 1, 2024 and complete the project by December 31, 2026. This timing allows the last 6 months of the project to focus on monitoring the treatment sites during and after the Arizona summer monsoon season, both with regard to the effects of the treatment and the structural integrity of the structures. If the project cannot launch January 1, 2024, AVCA would negotiate with BOR to structure project dates and expectations such that this critical period of performance monitoring may occur within the 3 year project time frame.

Accomplishing this project within the 3 year time frame will be facilitated by focused coordination with Pima County prior to formal project initiation, so that contracting the watershed restoration and facilitation teams can begin as soon as possible following the formal launch date for the project. Relationships forged via the WWG and Watershed Plan (2022) development will facilitate accomplishing this pre-work, for which AVCA would not request BOR funding.

Implementation schedule highlights are as follows (based on January 1, 2024 start date):

- Jan - March 31, 2024 (3 mo): Assemble team, estimate permitting and analysis needs
- March - June 30, 2024 (3 mo): Draft treatment plan, including treatment areas of impact
- July - Sept 30, 2024 (3 mo): Draft monitoring and data management plan, acquire equipment

- Oct - Dec 31, 2024 (3 mo): Install baseline monitoring
- Jan - March 31, 2025 (3 mo): Phase 1 installation of road or other treatments, if compliance allows, and monitor as-built treatments
- September 30, 2025 (18 mo): Planning and compliance 100% complete
- Oct - Dec 31, 2025 (3 mo): Phase 2 installation and monitor as-built treatments, repeat monitoring
- Jan - June 30, 2026 (6 mo): Phase 3 installation and monitor as-built treatments
- July - Sept, 2026 (3 mo): Monitoring of monsoon activity on-site
- Oct - Dec, 2026 (3 mo): Post-monsoon and structural integrity monitoring, repeat monitoring
- Dec 31, 2026: Project complete

Table 4. Implementation Plan

IMPLEMENTATION PLAN		TASKS					ADVISOR		
Time	Milestones	1	2	3	4	5	ENGAGEMENT		
		PM	PLAN	COMP	INST	MON	WWG	BOD	SAB
< Y 1	Prepare RFP for restoration contractor	X						X	X
	Prepare scope of work for facilitator	X						X	
	Pre-project coordination w/ Pima County	X	X	X					
Y1-Q1	Hire watershed restoration contractor	X	X						X
	Build work area in GIS for mapping & analysis	X	X	X				X	X
	Engage partners - estimate analysis & compliance nee	X	X	X			M1 WWG		
Y1-Q2	Project area orientation field event	X	X				M2 TT		X
	Planning 90% complete	X	X					X	X
	Initiate compliance / hire contractors	X							
Y1-Q3	Continue compliance	X	X	X				X	
	Monitoring & data plan complete	X				X			X
Y1-Q4	Install baseline monitoring (post monsoon)	X				X	M3 WWG		
	Continue compliance	X		X				X	
	Annual report to Reclamation*	X							
Y2-Q1	Continue compliance / revise planning	X	X	X			M4 TT	X	
	Phase 1 installation - road work (if compliance allows)	X			X				
Y2-Q2	Continue planning & compliance	X	X	X			M5 WWG	X	
Y2-Q3	Planning 100% complete	X	X				M6 TT	X	X
Y2-Q4	Installation	X			X				
	Monitoring	X				X	M7 WWG	X	X
	Annual report to Reclamation*	X							
Y3-Q1	Installation	X			X			X	
Y3-Q2	Installation complete / monitor as-built complete	X			X	X	M8 TT	X	X
Y3-Q3	Draft final report / field visits during monsoon	X				X	M9 WWG	X	X
Y3-Q4	Monitoring	X				X			X
	Structural integrity monitoring & repair	X		X		X	WWG Mt	X	X
	Final report to Reclamation*	X				X			

Notes \* Or other reporting as per grant agreement

Abbreviations: Project Management (PM), Planning (PLAN), Compliance (COMP), Installation (INST), Monitoring (MON), Watershed Working Group (WWG), AVCA Board of Directors (BOD), AVCA Science Advisory Board (BOD), Meeting (MT) of WWG or Tech Team (TT)



The implementation schedule (see Table 4, above) also includes approximate time-frames and related milestones for engagement of the advisory groups.

The budget narrative spreadsheet provides assumptions for project costs. The compliance aspect of the budget may not be refined until planning is underway and compliance and analysis needs are determined. The proposed budget contains generous line items for this work, including \$250,000 from Pima County and \$100,000 for BOR technical assistance. The implementation schedule includes 18 months for compliance.

With regard to National Environmental Policy Act compliance, we anticipate the project being a Categorical Exclusion with no report. According to the December 21, 2020 U.S. Department of Interior Existing Categorical Exclusion list<sup>1</sup> “the construction of new, or the addition of, small structures or improvements, including structures and improvements for the restoration of wetland, riparian, instream, or native habitats, which result in no or only minor changes in the use of the affected local area,” may qualify for a categorical exclusion under the National Environmental Policy Act (NEPA). We will continue to work with the local BOR office to work through the NEPA process so that we are in compliance with NEPA and can begin project construction in a timely manner.

We communicated with Lisa Rivera, a Natural Resources Specialist at the BOR Phoenix Area Office via email on March 20, 2023, to better understand the environmental and cultural resources compliance needs of the project. She recommended that the following compliance areas be considered: cultural resources, biological resources and threatened and endangered species, preliminary jurisdictional delineation of Waters of the United States (WOTUS). (See Appendix E).

Note that a *Cultural Resources Class III Inventory Survey for the Northern Altar Watershed Area Restoration Project* was completed November 24, 2015 for 542.44 acres of the project area at the request of Pima County (Whitney 2015). Additional compliance activities will include Pima County Floodplain Ordinance and Land Treatment Application (for Arizona State Trust land).

This project’s treatments are priority projects identified in the Altar Valley Watershed Plan (2022). (<https://altarvalleyconservation.org/altarvalleywatershedplan/>). Five of the 29 projects fall all or partially within the project area. Concept or 15% plans have been prepared for these projects by the WWG with assistance from JE Fuller Hydrology and Geomorphology. These project plans are in the Altar Valley project dashboard (<https://avca.maps.arcgis.com/apps/dashboards/390bc1d6731e43378370ac2b06d5fd7d>).

To date, AVCA does not have legal access to the project site, however the Category A applicant on this project, Pima County, owns and has access to a large portion of the proposed project area. Additionally, the Anvil Ranch has acknowledged in its letter of support that they will participate in having this project on their ranch. AVCA and/or its contractors have conducted project work on Pima County owned land previously as well as Anvil Ranch. Work has been done under the auspices of a cooperative agreement. AVCA

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<sup>1</sup> <https://www.doi.gov/sites/doi.gov/files/doi-and-bureau-categorical-exclusions-dec2020.pdf>



and PC have initiated work on the revised cooperative agreement, and expect that topics such as legal access, resource sharing, and data sharing will be addressed. In addition, Pima County and the City of Tucson are updating their agreements to facilitate collaborative project work. The project area does not encompass federal land.

## Evaluation Criterion E: Performance Measures

Performance measures include elements that will be evaluated during the 3 year project time frame and for 5 years following project completion.

The following will be measured within the 3 year project time frame:

- Acres treated within 3 year project time frame
- Number of partner organizations engaged within 3 year project time frame
- Completion of treatment site monitoring photos (with notations concerning treatment type and structural integrity) embedded within GIS at 3 phases - baseline, as-built, and following first monsoon season
- Surface water presence in limited portion of project area

The following will be measured and analyzed within the 3 year time frame and for 5 years following project completion.

- Completion of annual long-term monitoring photo points at 15 representative sites  
Vegetation presence or absence
- Vegetation composition - bare ground, grass, forb, shrub, or tree
- Soil moisture at 12 sites

Performance measures and related monitoring techniques were carefully chosen to assure that the program can continue over time, past the 3 years of active BOR funding. When possible, publicly available remote sensing data will be utilized to a greater extent than field measurement. Vegetation abundance and diversity is part of the overall project goal, and serves as a proxy for presence of water. Photographs that are publicly available via GIS provide data and reference material that may be used by many interested parties at very low cost. Continuing the collaboration that built the Watershed Plan (2022) is essential to AVCA and its partners, and the best collaboration occurs on the ground where people may debate and learn together.

AVCA staff will establish a monitoring and data management plan concurrent with planning. This will involve installing camera equipment, setting up photo points, and soil moisture data collectors to monitor progress and conservation outcomes prior to installation. Data collection and remote sensing analysis will establish baseline conditions prior to installation. They will complete up to 6 months of post-installation monitoring of conservation outcomes after installation of the on-the-ground project, including post-monsoon structural integrity monitoring and repairs. Long-term monitoring will continue for an additional 5 years in cooperation with Pima County. In addition, at least two researchers (Dr. Elise Gornish and Dr. Laura Norman) have expressed interest in studying the project and AVCA intends to engage them in long-term monitoring.

## Evaluation Criterion F: Presidential & DOI Priorities

### E.1.6.1 Subcriterion No. E1: Climate Change

This project will build resilience to climate change by increasing ecological drought resilience and sequestering carbon. Drought resilience will be increased by supporting the establishment and persistence of diverse native vegetation species, which provide cooler micro-climates and serve as habitat refugia for wildlife (Norman et al. 2022). Local effects of the project's methods have been tested locally in the Altar Valley at a rock detention structure installation. Monitoring data indicated that over 10 years, native vegetation persistence through drought periods was significantly higher in treated channels than in untreated channels (Ossanna et al. 2023). There are no signs that these effects will lessen in the near future, and we anticipate this project to provide habitat refugia in the face of climate change. The vegetation produced through this project are anticipated to provide habitat, food, and shade during drought periods when these resources are most needed.

In addition, this project will increase the volume and duration of surface water available for wildlife by building structures that guide surface flows to natural pools, depressions, and man-made ponds. Since no perennial streams exist in the watershed, wildlife depend on these types of water sources, which become more and more rare as climate change causes hotter and drier conditions. A major aim of this project is to prolong surface water availability to support the ability of wildlife to adapt to climate change.

The project will sequester carbon in soils built up behind rock and earthen structures as well as support carbon-fixing vegetation. A goal of this project is to conserve and build up soil organic matter in the watershed, rather than allowing it to destabilize and wash away downstream. These soils contain carbon, and the rock and earthen structures constructed will retain soils and support growth of carbon-fixing vegetation. Rock detention structures have been shown to facilitate sediment retention and carbon sequestration (Norman et al. 2022), and a 10-year study of a local rock detention structure project showed that sediment increased significantly within channels treated with rocks to retain soil and water. The same local study showed that the carbon content of soils treated using structures similar to those in this project increased significantly where structures occurred than in untreated channels (Ossanna et al. 2023).

The rock and earthen structures built through this project will also initiate feedback loops that perpetuate further sequestration of carbon. The structures built will retain sediment behind them, which will accumulate and support more vegetation as rain events occur. The islands of vegetation that grow around the structures and on the Altar Wash floodplains will fix carbon (as well as other key nutrients and microorganisms) in the soil and create more vegetation (Norman et al. 2022). This process will continue, perpetuating a cycle of carbon sequestration in the watershed.

In addition to drought resiliency benefits, this project will reduce peak flows of the Altar Wash, which flows into greater Pima County and the Tucson metropolitan area. The structures built in uplands, tributaries, and floodplains of the Altar Wash will decrease the

speed and volume of flows in the Wash, making floods less intense in urban areas. The project will utilize natural materials such as rock, brush, and dirt, which are extremely sustainable as long as they are maintained. It will reduce the need to build large-scale urban structures that hold back or channelize water for protection of structures. By dissipating the energy of hydrologic flows at their beginning in a natural setting, we are decreasing the need for active water management at larger scales downstream.

Additionally, air quality is a concern in Arizona, especially with denuded areas caused by abandoned agricultural fields. Mitigating dust storms and poor air quality starts with increasing ground cover, and this project will use natural rain events to increase ground cover and keep particulate matter on the ground. Also, increasing vegetation cover in and around channels provides shade and cooler temperatures.

This proposed project has a strong conservation component that will promote healthy lands and soils, along with protecting water supplies via water infiltration for soil retention and vegetation enhancement. The installation of natural infrastructure in dryland streams (NIDS) will retain sediment and organic matter and detain water (Norman 2022). Water will percolate into the groundwater table, watering the aquifer that provides groundwater used for agricultural operations and municipalities. Vegetation will be increased, allowing for benefit to the landscape, as well as multi-use benefit to agriculture in the area.

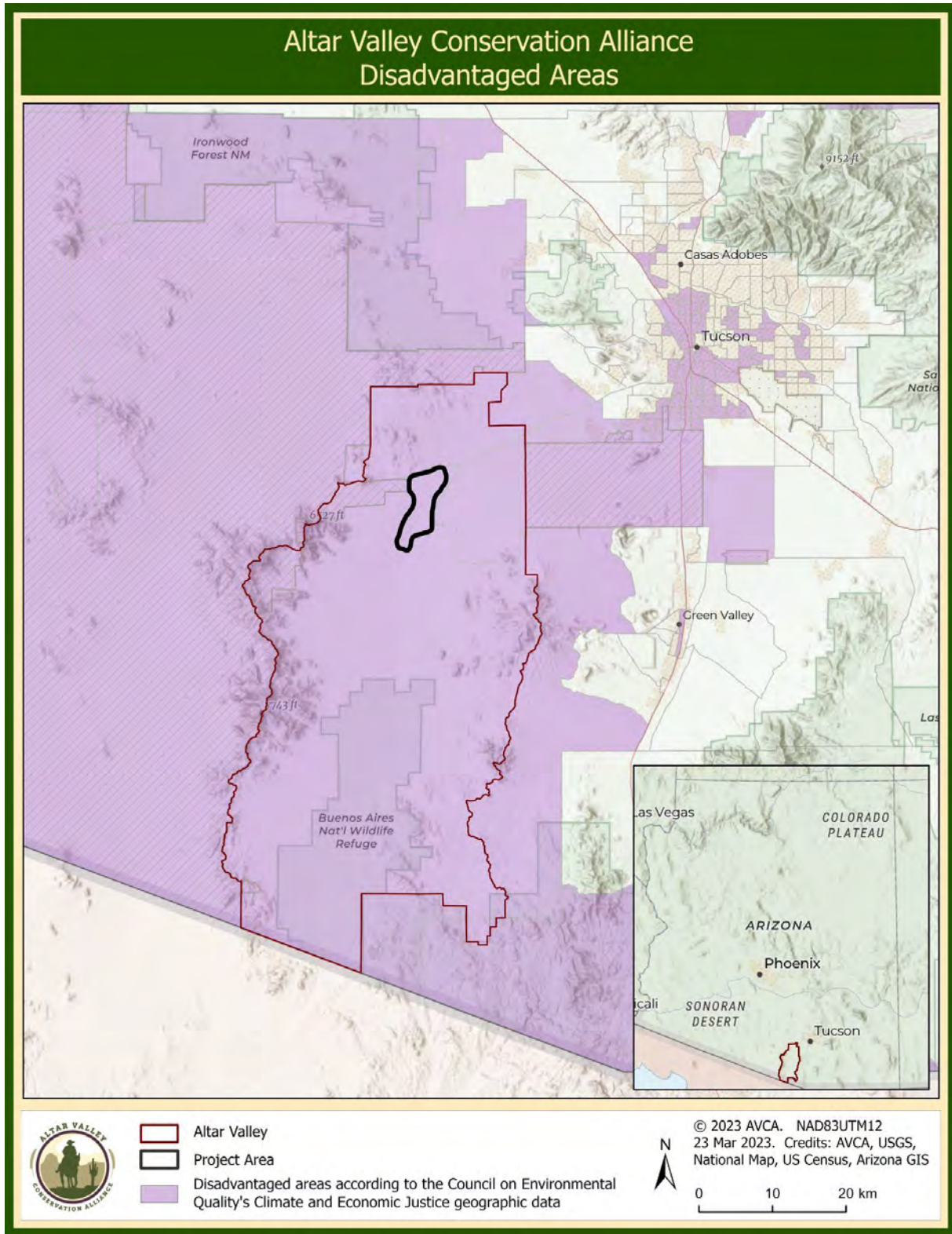
#### E.1.6.2 Subcriterion No. E2: Disadvantaged or Underserved Communities

The entire project falls within a disadvantaged tract as identified by the Biden-Harris Administration's Climate and Economic Justice Screening Tool. (See Figure 6. Disadvantaged Areas Map on the following page.) This tract is considered disadvantaged because it meets more than one burden threshold as well as an associated socioeconomic threshold. Of particular note to the Altar Valley Conservation Alliance and its work on agricultural lands, the region is in the 98th percentile in regards to the expected agriculture loss rate and the economic loss to agricultural value resulting from natural hazards each year as a result of climate change. It is also in the 96th percentile for expected building loss rate and economic loss to building value resulting from natural hazards each year as a result of climate change. The region is also in the 94th percentile for projected wildfire risk and projected risk to properties from wildfire from fire fuels, weather, humans, and fire movement in 30 years. In addition to these climatic factors, the region is also identified as low income and is in the 79th percentile for households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher education.

#### E.1.6.3 Subcriterion No. E.3: Tribal Benefits

This project does not directly benefit a Tribe. It is adjacent to the Tohono O'odham Nation, and the AVCA will work to engage the Tribe in conversations about the work planned. We hope that it might be an opportunity to catalyze future partnerships.

Figure 6. Disadvantaged Areas Map



# Project Budget

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## Funding Plan and Letter of Commitment

The total cost of the project will be \$1,999,014. Non-Federal entities would provide \$785,205 and AVCA would request \$1,213,809 from BOR, resulting in a 61:41 cost share (see Tables 1 and 2).

A Letter of Commitment from AVCA's Category A partner, Pima County, is attached as Appendix A. A cooperative agreement between AVCA and Pima County was signed in 2016, and is currently being updated to a Memorandum of Understanding.

Budget Table 1. Summary of Non-Federal and Federal Funding Sources

<b>Funding sources</b>	<b>Amount</b>
Non-Federal entities	
Pima County Regional Flood Control District	\$750,000
Altar Valley Conservation Alliance (BOD and SAB)	\$11,805
Watershed Working Group partners	\$23,400
<b>Non-Federal subtotal</b>	<b>\$785,205</b>
<b>REQUESTED Reclamation funding</b>	<b>\$1,213,809</b>

Budget Table 2. Total Project Cost

<b>Source</b>	<b>Amount</b>
Cost to be reimbursed with the requested Federal funding	\$1,213,809
Costs to be paid by the applicant	\$11,805
Value of third-party contributions	\$773,400
<b>TOTAL project cost</b>	<b>\$1,999,014</b>

# Budget Proposal

The budget proposal is attached as Budget Table 3.

There are three project management tasks outlined in the Implementation Plan (see Table 4) that AVCA would complete prior to formal initiation of the project, and they would not be considered project costs. Otherwise, neither AVCA nor Pima County intend to incur any costs prior to award. Should unforeseen circumstances arise warranting costs prior to the date of award, AVCA would negotiate with Reclamation and would provide: the project expenditure and amount, date of cost incurrence, and how the expenditure benefits the project.

Budget Table 3. Budget Proposal

<b>Summary</b>			
<b>6. Budget Object Category</b>	<b>Total Cost</b>	<b>Federal Estimated Amount</b>	<b>Non-Federal Estimated Amount</b>
<b>a. Personnel</b>	<b>\$349,250</b>		
<b>b. Fringe Benefits</b>	<b>\$39,880</b>		
<b>c. Travel</b>	<b>\$13,686</b>		
<b>d. Equipment</b>	<b>\$0</b>		
<b>e. Supplies</b>	<b>\$10,748</b>		
<b>f. Contractual</b>	<b>\$1,057,552</b>		
<b>g. Construction</b>	<b>\$351,375</b>		
<b>h. Other Direct Costs</b>	<b>\$145,166</b>		
<b>i. Total Direct Costs</b>	<b>\$1,967,657</b>		
<b>i. Indirect Charges</b>	<b>\$31,356</b>		
<b>Total Costs</b>	<b>\$1,999,014</b>	<b>\$1,213,809</b>	<b>\$785,205</b>
	<b>Cost Share Percentage</b>	<b>61%</b>	<b>39%</b>

## Budget Narrative

AVCA elects to utilize the Budget Detail and Narrative spreadsheet provided by Reclamation for the budget narrative. The following notes concerning contractors are supplemental to the budget narrative:

- The budget includes \$100,000 for Bureau of Reclamation technical assistance on compliance, within the Other Direct Costs category.
- AVCA intends to issue a Request for Proposal (RFP) for the watershed restoration contractor. Based on previous experience contracting for work of a similar nature, it is possible that several individual restoration contractors may form a team of 3-5 people. The following criteria, at minimum, would be utilized in the RFP:
  - Technical knowledge of NDIS approaches to restoration
  - Proven experience with watershed project planning, estimating resource needs, needed, managing resources to complete project installation, and

safeguarding safety and well being of team members and the project area environment

- Proven field experience installing and/or directing installation of handbuilt and machine built NIDS treatments
- Willingness and ability to travel to and do field work at the project area near Three Points, Arizona
- AVCA has found that facilitation services have been an essential aspect of setting up the WWG and its TTs for success. The WWG is a large group, with a mailing list of 103 individuals, and typically 25 - 50 people attend meetings (with TT meetings being smaller but more technical). Most WWG and TT participants are professional resource managers from local, State, and federal agencies and/or the University of Arizona. These groups truly drive collaboration in the Altar Valley. AVCA has engaged the services of a Tucson based facilitation contractor, Southwest Decision Resources (SDR), to operate the WWG and TT meetings and will continue this practice for this project. SDR will manage all WWG and TT meetings, including developing the agenda, meeting materials, and notes. Meetings will be a combination of in-person, zoom and field events. SDR is uniquely qualified, as it provided these services for development of the Altar Valley Watershed Plan, has extensive experience working with Altar Valley partners, and specializes in applying collaboration to challenging natural resource, environmental and community planning. Their involvement is critical to assure that meetings meet targets and that partners' time is used efficiently and creatively.
- Arizona GIS manages the AVCA GIS system and provides on-call analysis and mapping services using that system.
- Additional contractors will be required to complete compliance and/or analysis tasks. These contractors will be identified when their scope of work is clear. It is expected that Pima County's cost-share will be utilized to pay these contractors.

# Environmental and Cultural Resources Compliance

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This project will require environmental and cultural resource compliance, triggered by use of federal funds. The BOR will serve as the lead agency for completion of environmental and cultural resources compliance. AVCA staff and contractors, hired with financial support from Pima County, will collaborate with BOR to complete this work. It is anticipated that the WWG will serve as a forum for networking and problem solving to facilitate compliance work and related mitigation.

The AVCA Project Director, assisted by AVCA staff, will be responsible for coordination with other entities to complete necessary compliance. The AVCA anticipates that the AVCA, Pima County, and the BOR will collaborate to address compliance needs identified by the treatment plan. Expected compliance tasks will include: National Environmental Policy Act (NEPA), Endangered Species Act (ESA), National Historic Preservation Act, and the Pima County Floodplain Ordinance. It is expected that the WWG will provide technical assistance and coordination regarding compliance work. It is likely that cultural resource surveys will be required; but previous surveys completed on 542.44 acres in 2015 may lessen the workload.

With regard to National Environmental Policy Act compliance, we anticipate the project being a Categorical Exclusion with no report. According to the December 21, 2020 U.S. Department of Interior Existing Categorical Exclusion list<sup>2</sup> “the construction of new, or the addition of, small structures or improvements, including structures and improvements for the restoration of wetland, riparian, instream, or native habitats, which result in no or only minor changes in the use of the affected local area,” may qualify for a categorical exclusion under the National Environmental Policy Act (NEPA). We will continue to work with the local BOR office to work through the NEPA process so that we are in compliance with NEPA and can begin project construction in a timely manner.

We communicated with Lisa Rivera, a Natural Resources Specialist at the BOR Phoenix Area Office via email on March 20, 2023, to better understand the environmental and cultural resources compliance needs of the project. She recommended that the following compliance areas be considered: cultural resources, biological resources and threatened and endangered species, preliminary jurisdictional delineation of Waters of the United States (WOTUS). (See Appendix E).

Temporary impacts from use of heavy machinery to access work areas, stockpile and distribute rock, and install treatments will occur. Short-term local air quality will be negatively impacted due to dust from heavy machinery work. Upfront planning regarding the order of work operations, routes for rock delivery, and post construction site rehabilitation will minimize impacts. Installation activities will be planned for relatively dry times of year, to avoid unnecessary tracks from machines. Sensitive areas identified as such during planning and compliance would be avoided.

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<sup>2</sup> <https://www.doi.gov/sites/doi.gov/files/doi-and-bureau-categorical-exclusions-dec2020.pdf>



Project work within the main channel of the Altar Wash will possibly fall under Clean Water Act jurisdiction as "Waters of the United States". AVCA and Pima County Regional Flood Control District will work proactively with the Army Corps of Engineers to clarify compliance steps.

Given that the overall intent of the project is to improve watershed conditions, it is not expected that there would be long-term impacts on listed or candidate threatened or endangered species or critical habitat. However, there could be short term impacts during the installation phase. Avoidance will be the most likely mitigation strategy, and possibly timing to avoid key time periods for nesting birds. Surveys for Pima pineapple cactus, a Federally endangered species will likely be needed. Additional threatened or endangered animal species that should be considered are: the threatened Chiricahua leopard frog, the endangered Southwestern willow flycatcher, the threatened Western yellow-billed cuckoo, and the Cactus Ferruginous Pygmy Owl (currently considered for re-listing under the Endangered Species Act). Jaguar critical habitat occurs in the Altar Valley, but is outside the project area (Unit 1, Baboquivari Unit, approximately 25,549 ha (63,134 ac) Baboquivari, Saucito, Quinlan, and Coyote Mountains in Pima County, Arizona) (Federal Register 2014).

There are no buildings, structures, or irrigation features that will be involved in the project, and thus none eligible for listing on the National Register of Historic Places.

*A Cultural Resources Class III Inventory Survey for the Northern Altar Watershed Area Restoration Project* was completed November 24, 2015 for 542.44 acres of the project area at the request of Pima County (Whitney 2015). There is a known site within that boundary that project work would avoid.

The proposed project will not have a disproportionately high and adverse effect on low income or minority populations.

The proposed project will not limit access to, and ceremonial use of, Indian sacred sites or result in other impacts on Tribal lands.

The proposed project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area. Seeding will occur in the NIDS installed, but will only occur with native seed, and will provide competition for any non-native invasive species in the area.

## Required Permits or Approvals

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The AVCA Project Director, assisted by AVCA staff, will be responsible for coordination with other entities to complete necessary compliance. The AVCA anticipates that the AVCA, Pima County, and the BOR will collaborate to address compliance needs identified by the treatment plan. Expected compliance tasks will include: National Environmental Policy Act (NEPA), Endangered Species Act (ESA), National Historic Preservation Act, and the Pima County Floodplain Ordinance. Project work within the main channel of the Altar Wash will possibly fall under Clean Water Act jurisdiction as “Waters of the United States”. It is expected that the WWG will provide technical assistance and coordination regarding compliance work. It is likely that cultural resource surveys will be required; but previous surveys completed on 542.44 acres in 2015 may lessen the workload. Surveys for the endangered Pima pineapple cactus are also likely.

We communicated with Lisa Rivera, a Natural Resources Specialist at the BOR Phoenix Area Office via email on March 20, 2023, to better understand the environmental and cultural resources compliance needs of the project. She recommended that the following compliance areas be considered: cultural resources, biological resources and threatened and endangered species, preliminary jurisdictional delineation of Waters of the United States (WOTUS). (See Appendix E).

Additional compliance activities will include Pima County Floodplain Ordinance and Land Treatment Application (for Arizona State Trust land).

## Overlap or Duplication of Effort Statement

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The proposal submitted for consideration under this program does not duplicate any proposal or project that has been, or will be, submitted for funding consideration to any other potential funding source. AVCA or partners could potentially pursue funding for similar NIDS restoration projects located elsewhere in the Altar Valley during this time frame, but any other project areas submitted elsewhere for funding would not overlap with this project area, though goals might be the same.

# Conflict of Interest Disclosure Statement

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The AVCA is composed of landowners throughout the Altar Valley, along with Community Representatives. As such, work that AVCA does is frequently of benefit to board members, both directly and indirectly. The AVCA Board of Directors Conflict of Interest statement is reviewed and signed annually, and the text of it is below. Board members recuse themselves of votes that directly affect them.

In this project, the Anvil Ranch includes an AVCA board member as well as an AVCA staff member.

## **CONFLICT OF INTEREST STATEMENT** *(Excerpted from the AVCA Policy Manual)*

As an Altar Valley Conservation Alliance Director, I understand that I am expected to use good judgment, to adhere to high ethical standards, and to act in such a manner as to avoid any actual or potential conflict of interest. A conflict of interest occurs when the personal, professional, or business interests of an employee or Board member conflict with the interests of the organization. Both the fact and the appearance of a conflict of interest should be avoided.

The mission of this organization focuses on the Altar Valley watershed as a whole, which is composed of land areas owned or leased by BOD members. Thus it is expected that BOD would participate in decisions implicating the watershed as a whole, and only impact their land or business operations by virtue of the fact that they are part of the watershed. This would not constitute a conflict of interest nor would it require recusal. Board members should consistently check that decisions support the AVCA strategic plan.

If a decision is made that applies AVCA funds or grants to a project that primarily impacts a BOD member's private land or leased land, that member should recuse themselves.

If there is a lack of clarity about whether a conflict of interest exists, a BOD should at minimum declare their concerns and note them in meeting minutes. In the event of any question regarding the need to recuse, the President (or officer chairing the meeting) shall make the decision.

I certify that I have reviewed the Altar Valley Conservation Alliance Conflict of interest policy and that I will act accordingly.

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PRINTED NAME

SIGNATURE

DATE

# Official Resolution

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RESOLUTION  
of the  
ALTAR VALLEY CONSERVATION ALLIANCE  
BOARD OF DIRECTORS

A Resolution authorizing the Submission of a Grant Proposal to the  
Bureau of Reclamation 2023 Environmental Water Resources Projects Program

WHEREAS, the Altar Valley Conservation Alliance (AVCA) is a local non-profit corporation whose mission is to work through a strongly collaborative, science-based, community driven and integrated approach to:

- CONSERVE healthy and productive working landscapes, including soil and water conservation, wildfire management, habitat conservation and protection of endangered species, and other environmental initiatives;
- PROMOTE a thriving agricultural economy by encouraging improved ranching and farming practices, diversification and innovation, and by supporting programs and policies that support more effective, long-term economic development; and
- SUSTAIN a resilient rural community by retaining and renewing cultural and historical traditions; and

WHEREAS, according to the By-Laws of AVCA, the President of AVCA has the authority to enter into contracts or other instruments authorized by the Board of Directors which are necessary or appropriate to the purposes and activities of the Corporation; and

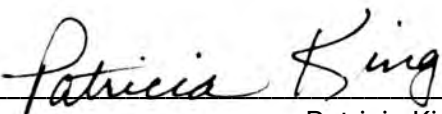
WHEREAS, the President of AVCA has the authority to name a designee to perform certain tasks required in the administration of operations of the Corporation;

BE IT RESOLVED, that the AVCA Board of Directors supports the grant application to the Bureau of Reclamation 2023 Environmental Water Resources Projects Program and has authorized Sarah King, AVCA's Executive Director, to be the key contact with grant administrators for this program. Said support was duly voted upon and passed by the members of the Board of Directors at the regular board meeting on March 13, 2023.

BE IT FURTHER RESOLVED, that AVCA has the capability and capacity to carry out this proposal and facilitate the amount of funding and in-kind contributions specified in the budget proposal.

BE IT FURTHER RESOLVED, that AVCA will work with the Bureau of Reclamation to meet established deadlines for entering into a cooperative financial assistance agreement.

DATED this 13th day of March 2023, on behalf of the Altar Valley Conservation Alliance.

  
\_\_\_\_\_  
Patricia King  
President, AVCA

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# Appendix A. Letter of Commitment from Category A Partner Pima County

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*Letter begins on the next page*



## COUNTY ADMINISTRATOR'S OFFICE

PIMA COUNTY GOVERNMENTAL CENTER  
115 N. CHURCH AVE., 2<sup>nd</sup> FLOOR, Suite 231, TUCSON, AZ 85701-1317  
520-724-8661, FAX 520-724-8171

JAN LESHER  
County Administrator

March 6, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: **Surface Water Conservation for Drought and Climate Resilience in the Altar Valley Watershed, Pima County, Arizona, an Application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023)**

Dear EWRP Review Committee:

Pima County strongly supports the Altar Valley Conservation Alliance (Alliance) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona*. The County's support for this grant will include participation as a "Category A" partner via a commitment of staff time and a cost-share match for project installation and project consultant services of up to \$750,000.

At over 700,000 acres, the Altar Valley has diverse communities of flora and fauna, some of the most productive grasslands in southern Arizona, and a rich cultural history. Despite its relatively close proximity to Tucson, the watershed has remained remarkably unfragmented, allowing most areas to remain in relatively stable environmental condition and allowing family ranching to maintain viability. The valley's geographic position and unfragmented nature provide critical groundwater recharge services to the City of Tucson's potable water supply.

The Altar Valley is a key focal area in Pima County's widely acclaimed Sonoran Desert Conservation Plan (SDCP), which seeks to promote strategic urban development while protecting our unique and diverse natural and cultural resources. In the information gathering stage of the SDCCP, the extraordinary natural and cultural capital values of the Altar Valley became clear, leading the way for Pima County to invest over \$50 million in land acquisitions from 2004-2009 to protect the watershed. Our commitment to the Altar Valley has grown to include a range of restoration actions and conservation ranching aimed at improving watershed conditions. At every stage of the process—from land purchases to restoration

Bureau of Reclamation

Re: **Surface Water Conservation for Drought and Climate Resilience in the Altar Valley Watershed, Pima County, Arizona, an Application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023)**

March 6, 2023

Page 2

and planning—the Alliance has been an indispensable partner by leveraging our commitments, bringing together diverse partners, adding local voices into the process, and implementing restoration projects.

Most recently, Pima County partnered on the Alliance’s project titled *Collaborative Watershed Restoration Plan for the Altar Valley Watershed, Pima County, Arizona* that was funded via the BOR’s WaterSmart: Cooperative Watershed Management Program (Fiscal Year 2018). This grant facilitated the creation of the Altar Valley Watershed Plan, which was collaboratively developed by the Altar Valley Watershed Working Group and its associated technical teams. The Watershed Plan is now a key document that guides the conservation actions of partners, including the County. In fact, the County is leveraging the Alliance’s WaterSmart grant products, tools, and technical expertise to embark on our own management planning process for the 82,000 acres of land owned and leased by Pima County in the Altar Valley.

Pima County’s main priority within the Watershed Plan is to address large-scale soil erosion and flooding issues and mitigation of peak flows in the Altar Valley and into the City of Tucson. During the creation of the Watershed Plan, we provided a cost-share match that was used to determine appropriate locations and methods to address erosion and water conservation issues, and participated in the Watershed Working Group and Hydrology Technical Team. These teams will continue providing important support for collaborative project planning and implementation in the ERWP project.

Pima County is pleased that collaboratively-vetted projects derived from the Watershed Plan are being proposed for implementation. EWRP funding for the Alliance’s proposed project would enable the installation of several critical large-scale erosion-control projects using low-tech water detention structures that would increase both surface water infiltration and soil retention. Together, these projects will increase resilience to drought and climate change, which are already impacting the valley. Reducing peak flows of the Altar Wash (which flows into the Santa Cruz River in Marana, AZ) and conserving surface water would provide important support for other regional conservation initiatives of the County and our partner jurisdictions.

Pima County’s commitment to this project includes matching resources in the form of financial support for the regional analysis, hydrology assessment, planning, as well as the installation of a significant project on Pima County lands on the north end of the Altar Valley.

Pima County remains committed to advancing on-the-ground conservation in the Altar Valley, and we are pleased that the Alliance is pursuing immediate implementation of projects from the USBR WaterSmart Phase I grant and the resulting Watershed Plan. Pima County has been a partner of the Alliance for over 25 years and is proud of their many accomplishments as a

Bureau of Reclamation

Re: **Surface Water Conservation for Drought and Climate Resilience in the Altar Valley Watershed, Pima County, Arizona, an Application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023)**

March 6, 2023

Page 3

collaborate watershed planning group. We are confident that a grant awarded to the Alliance is a sound investment, and we look forward to the project outcomes. We strongly endorse this proposal and believe it exemplifies successful community-led collaboration that will have tremendous outcomes for surface water, ground water, and landscape conservation.

Sincerely,



Jan Lesher  
County Administrator

c: Carmine DeBonis, Jr., Deputy County Administrator  
Eric Shepp, Director, Regional Flood Control District  
Sarah King, Executive Director, Altar Valley Conservation Alliance

## Appendix B. Priority Projects from the Altar Valley Watershed Plan (2022)

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<b>Rank</b>	<b>Project</b> (projects addressed by this proposal are in <b><i>bold italicized font</i></b> )	<b>Score</b>	<b>Tech Team</b>
1	Well improvements for wildlife on the BANWR	5	Wildlife
2	Altar Valley Fire Operations Plan	4.8	Vegetation
<b>3</b>	<b><i>Duval Property Pond Modifications</i></b>	<b>4.625</b>	<b><i>Hydrology</i></b>
4	Outreach campaign to minimize recreational/hunting impacts on cultural resources	4.6	Community
5	Lower Altar Valley Range Ecology Assessment	4.5	Vegetation
6	Analysis of brush treatment results	4.5	Vegetation
<b>7</b>	<b><i>Road Treatments on Pima County Lands*</i></b>	<b>4.25</b>	<b><i>Hydrology</i></b>
8	<i>Legunita Tank-Outlet Modifications</i>	4.25	<i>Hydrology</i>
9	Roundhill Area Plug and Spread Treatment*	4.125	Hydrology
10	Rancho Seco abandoned mine remediation	4.1	Community
11	Prescribed fire "pipeline"	4.1	Vegetation
12	La Osa Wells Riparian Project	4.1	Wildlife
13	Altar Valley Brush Treatment Corridor	4.1	Vegetation
<b>14</b>	<b><i>Western Altar Wash water infiltration and headcut reduction*</i></b>	<b>4</b>	<b><i>Hydrology</i></b>
15	Ecosystem restoration in the Altar Valley: Leveraging key ecological processes to enhance the benefits of rock detention structures*	4	Wildlife
16	Fencing and corridors for wildlife	3.9	Wildlife
<b>17</b>	<b><i>Duval Site – Channel Meander Erosion Mitigation</i></b>	<b>3.875</b>	<b><i>Hydrology</i></b>
18	Wildlife water enhancements	3.8	Wildlife

19	Lievres Tank – Erosion Mitigation Diversion Berm	3.75	Hydrology
<b>20</b>	<b><i>Altar Wash – Floodplain Restoration</i></b>	<b>3.75</b>	<b><i>Hydrology</i></b>
21	Old Hayhook structure rehabilitation	3.5	Community
22	Moyza Field rehabilitation	3.5	Vegetation
23	Montano Camp building assessment and/or rehabilitation	3.5	Community
24	Diamond Bell Stewardship and Community Engagement	3.5	Community
25	Arivaca Creek enhancement and sub-watershed plan	3.5	Community
26	Arivaca Wash Floodplain Restoration	3.25	Hydrology
27	Small-game habitat enhancement in the northern Altar Valley	2.9	Wildlife
28	Altar Wash – Channel Meander Erosion Mitigation Sites 2 and 3 (Palo Alto Ranch)	2.625	Hydrology
29	Baboquivari fence improvements	1.8	Wildlife



# Appendix C. Letters of Support

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*Listed in the order discussed in the text*

Tucson Water  
Anvil Ranch  
Elkhorn Ranch  
The Nature Conservancy  
Arizona Land & Water Trust  
Arizona Game and Fish Department  
USFWS Ecological Services  
USFWS Buenos Aires National Wildlife Refuge  
Dr. Elise Gornish, UA  
Dr. George Ruyle, UA  
Dr. Larry Fisher, UA  
Dr. Mary Nichols  
Dr. Laura Norman  
Steve Carson  
Brad Lancaster  
Omar Ore-Giron  
Western Landowners Alliance  
Wildvisions Arizona



John Kmiec  
Director  
Tucson Water  
(520) 791-2666  
john.kmiec@tucsonaz.gov

March 10, 2023

**Bureau of Reclamation**

Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

**Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)**

Dear EWRP Review Committee:

I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled, *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona*.

As the owner and steward of several thousand acres of former farmland in the Altar Valley and the neighboring Avra Valley, Tucson Water shares AVCA's conservation goals in the region.




This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. This was a process that Tucson Water participated in and strongly endorsed. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has Tucson Water's full support, and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,

John Kmiec  
Director, Tucson Water

P.O. Box 27210, Tucson, AZ 85726 | Director's Office (520) 791-2666

tucsonaz.gov/water |   

**4**

King's Anvil Ranch  
14990 South Sasabe Road  
Tucson, Arizona 85736

March 9, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

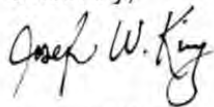
I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for the *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona* project.

The Anvil Ranch is a family-owned ranch that has been in operation since 1895. We have a long history of conservation work on our ranch. The Anvil Ranch was a founding member of the AVCA and has been an active participant in conservation activities over the AVCA's 28-year history. The AVCA does an excellent job of collaborating with producers in the Altar Valley, coordinating projects, and helping us to work for the betterment of the Valley as a whole.

The Anvil Ranch participated in the development process of the Altar Valley Watershed Plan, via a BOR Phase I WaterSmart grant. We contributed discussion about large-scale erosion in the Valley, particularly related to the Altar Wash and its tributaries as they relate to our ranch. Our headquarters sits not far from the Altar Wash, and it has long been our family's goal to see work done in and around the Wash to arrest channel incision and stop surface water from leaving the landscape. We are pleased with the project concepts developed collaboratively by the Watershed Working Group and we are excited to see this project implemented on the ground.

The Anvil Ranch is excited about the potential of this proposal for our ranch and the Altar Valley and we appreciate your consideration of this proposal.

Sincerely,



Joseph W. King  
King's Anvil Ranch



March 20, 2023

Regarding: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089).*

Dear EWRP Review Committee:

Elkhorn Ranch raises horses and operates a guest ranch eco-tourism business in the Altar Valley, in the foothills of the Baboquivari Mountains. Since 1995, we have been proud to participate in collaborative conservation projects envisioned by the Altar Valley Conservation Alliance (AVCA). We enthusiastically support this proposal to the Bureau of Reclamation; and the opportunity to install a project described in the Altar Valley Watershed Plan (2022).

We have had the opportunity to work with AVCA, neighbors and partners on conservation projects related to watershed restoration and grassland restoration. In both cases, AVCA played a critical role in gathering experts and all the important stakeholders so that the projects were done effectively and with excellent support from all parties. The Elkhorn / Las Delicias Watershed Demonstration Project built in 2012 is partially located on our ranch. The results have been outstanding and have made our country more productive and resilient through difficult years of drought. The treatments have arrested active head-cutting, and launched cycles of vegetation growth and soil regeneration.

Our ranch is up against the mountains, about 5 miles from the Altar Wash. As we travel up and down the valley, we are keenly aware of the complex interplay between the severe erosion of the Altar Wash and its tributaries. After thinking about these issues for decades, we advocate working at various scales. The work in small tributaries is proven technology, worthy of repetition; and we are interested in seeing what can be accomplished in the Altar Wash itself to enhance the ecological value of this important riparian area.

Sincerely,

*/s/ Mary and Charley Miller*  
*AVCA EWRP FY23 Proposal*



March 9, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to express The Nature Conservancy's (TNC) support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.*

We are very familiar with, and a proud ally of AVCA's collaborative efforts to improve watershed-wide conservation planning, conserve surface water resources, and address the most natural resource concerns in the Altar Valley for the benefit of people and nature. TNC has worked in this landscape since the late 1970s and we believe AVCA's unique approach of integrating large-scale stakeholder engagement and watershed-wide planning with on-the-ground restoration projects is a model for the type of collaborative conservation needed to address climate change impacts.

This proposed project originates in the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. I have personally participated in this effort and highly endorse it. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has my full support, and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,



Damian Rawoot  
Land & Water Protection Manager  
[Damian.rawoot@tnc.org](mailto:Damian.rawoot@tnc.org)



Bureau of Reclamation March 7, 2023

Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

President  
*Diana Freshwater*

Vice President  
*Ben Brophy*

Secretary  
*George Ruyle*

Treasurer  
*Britton Simmons*

*Laura Brown*  
*Les Corey*  
*Fred Frelinghuysen*  
*Charlotte Hanson*  
*Pat Lopez, III*  
*Clint Mabie*  
*Nanette Pageau*  
*Chuck Pettis*  
*Karen Riggs*  
*Bill Roe*  
*Peggy Rowley*  
*Bill Shaw*

Executive Director  
*Michael McDonald*

Dear EWRP Review Committee:

I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.*

The Arizona Land and Water Trust (Trust) has worked to preserve Southern Arizona's western landscapes, farms and ranches, wildlife habitat and the waters that sustain them since 1978. The Trust achieves its mission to protect land and water by working with private landowners who are interested in voluntarily conserving their lands. The Trust also works with partners on developing local and community conservation plans and goals. As part of the Trust's work I have participated in AVCA's annual community meetings as well as AVCA's efforts to create a large-scale watershed plan for the Altar Valley.

This proposed project is derived from that Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. The plan reflects a wide array of stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project seeks to address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has my full support and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,

Cameron Becker  
Land Program Director

cc: Michael McDonald  
Executive Director







March 6, 2023

Bureau of Reclamation  
Mail code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: **Surface Water Conservation for Drought and Climate Resilience in the Altar Valley Watershed, Pima County, AZ (Notice of Funding Opportunity No. R23AS00089)**

Dear EWRP Review Committee:

The Arizona Game and Fish Department (Department) is pleased to express support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona. The mission of the Department is to conserve and protect Arizona's diverse fish and wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations. The Department works closely with numerous federal and state agencies, non-governmental organizations, and private partners, including the AVCA, to effectively meet the trust responsibilities of wildlife management.

The Department has partnered with AVCA for two decades on a variety of wildlife projects throughout the Altar Valley, including development of the Altar Valley Watershed Plan which reflects stakeholders' goals for the future of conservation in the Altar Valley. The plan has identified the need to address large-scale soil and surface water loss in the Valley and this proposal aligns with those goals.

The proposed AVCA project will bolster ongoing conservation efforts important to the Department's mission as well as local communities, using techniques to implement collaboratively vetted projects at a meaningful scale. The Department is confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape. Thank you for considering the AVCA's application for a BOR Watersmart grant. Please feel free to contact Raul Vega, Regional Supervisor in Tucson, with any questions about the Department's support for this project at [rvega@azgfd.gov](mailto:rvega@azgfd.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Luke Thompson".

Luke Thompson  
Habitat Branch Chief

AZGFD M23-03074414

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**azgfd.gov | 520.628.5376**

**TUCSON OFFICE: 555 N. GREASEWOOD ROAD, TUCSON AZ 85745**

**GOVERNOR: KATIE HOBBS COMMISSIONERS: CHAIRMAN JAMES E. GOUGHNOUR, PAYSON | TODD G. GEILER, PRESCOTT | CLAY HERNANDEZ, TUCSON  
MARSHA PETRIE SUE, SCOTTSDALE | LELAND S. "BILL" BRAKE, ELGIN DIRECTOR: TY E. GRAY DEPUTY DIRECTOR: TOM P. FINLEY**



## United States Department of the Interior

**Fish and Wildlife Service**  
**Arizona Ecological Services Office**  
9828 North 31<sup>st</sup> Avenue, Suite C3  
Phoenix, Arizona 85051

Telephone: (602) 242-0210 Fax: (602) 242-2513



**In reply refer to:**

AESO/SE  
AVCA SUPLET

March 17, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to express the support of the U.S. Fish and Wildlife Service (Service) for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.*

The Service has worked with the AVCA for many years as partners in the conservation of the unique desert grasslands, oak woodlands, and Sonoran Desert communities found in the Altar Valley of southern Arizona. The Altar Valley is an area that supports some of the highest biodiversity in the United States, including species protected under the Endangered Species Act. The AVCA is a committed group of ranchers supported by a wide variety of agencies and nongovernmental organizations. The AVCA has worked cooperatively for many years with a wide range of partners to maintain and restore the Altar Valley as a functioning ecosystem. The Service is the Federal agency charged with the implementation of the Endangered Species Act, and is specifically interested in local land use and planning activities for landscapes and habitats important to the conservation of listed species. The Service's Buenos Aires National Wildlife Refuge is located in the Altar Valley and the AVCA has been an important partner in working with the Refuge to meet its objectives.

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. This was a process that the Fish and Wildlife Service participated in and highly endorse. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries,



and we are pleased to see this proposed project address those concerns. The Altar Watershed provides habitat for listed species, as well as an important landscape linkage for a number of other important waterways and mountain ranges that surround the Altar Valley. This entire watershed provides valuable resources for wildlife, including many species listed under the Endangered Species Act. This project will provide valuable benefits to those species and their habitats.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has our full support and we are confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape. Funding through the Bureau of Reclamation's Water SMART grant program would enhance the ability of the AVCA to continue their excellent efforts to support continuing efforts for ecosystem restoration, and build community support and understanding for the valuable environmental resources found in the Altar Valley. The resources under the Service's management authority have benefitted from the ongoing conservation work being planned and implemented by the AVCA.

We fully support their application for funding through the Bureau of Reclamation's WaterSMART program. The AVCA is a group deserving of this funding and we are confident that their use of the funding will benefit community priorities related to the Altar Valley watershed and environment. We appreciate your consideration of the AVCA for this grant funding.

Sincerely,

**WILLIAM  
RICHARDSON**

Digitally signed by  
WILLIAM RICHARDSON  
Date: 2023.03.17  
09:42:29 -07'00'

For Heather Whitlaw  
Field Supervisor



# United States Department of the Interior



## FISH AND WILDLIFE SERVICE

BUENOS AIRES NWR

P.O. Box 109  
Sasabe, AZ 85633  
520-823-4251

March 8, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.

The U.S. Fish & Wildlife Service (Service) protects and manages important upland at Buenos Aires National Wildlife Refuge. This refuge was established to restore, conserve, and manage the natural abundance and diversity of wildlife and habitat utilizing strategies that focus on environmental and biological integrity. For many years, the Service has worked closely with private landowners and the AVCA to study and develop recommendations for managing and restoring various landscape attributes. Additionally, the Service has an existing positive working relationship with the Bureau of Reclamation (Bureau) conducting various monitoring and research activities on the refuge.

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. This was a process that I participated in and highly endorse. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has my full support and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,

Richard Albers  
Refuge Manager



Date: 3/2/23

To: Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

From: Dr. Elise S. Gornish, Cooperative Extension Specialist

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

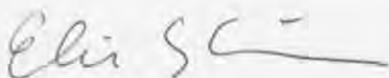
I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.*

I have been working closely with AVCA since 2017 on multiple projects aimed at enhancing rangelands across the Altar Valley through a variety of approaches. I have also served as a Science Advisory Board member for AVCA for the past three years and during that time have had the opportunity to really understand the thought process, priorities and methods of the organization. It is truly astonishing what this group is capable of. All of their work is directed by local priorities with outcomes that tend to also benefit regional producers. Funding AVCA and their work is one of the best investments we can make in SE AZ for on the ground environmental projects that will produce successful results for everyone living on and close to the region.

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. This was a process that I participated in and highly endorse. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has my full support and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,



Elise Gornish





THE UNIVERSITY OF ARIZONA  
COOPERATIVE EXTENSION

## Natural Resource Users Law & Policy Center

A collaboration between the  
James E. Rogers College of Law and  
the College of Agriculture & Life Sciences

George Ruyle, Director  
John C. Lacy, Director  
EnR2-Room 353  
1064 E. Lowell St.  
P.O. Box 210137  
Tucson, AZ 85721-0137  
Phone: (520) 621-1384

March 9, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona*.

As Co-director of the Natural Resource Users Law and Policy Center (NRULPC) I fully support the above-named proposal. NRULPC is a collaboration among UArizona's College of Agriculture and Life Sciences, Cooperative Extension and the College of Law. The Center's overall aim is to help landowners, farmers, ranchers & small-scale miners in Arizona navigate the legal and regulatory hurdles in using the land. We feel that this proposal and the work of AVCA in general, support this goal and provides critical information for large landscape conservation.

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. This was a process that I participated in and highly endorse. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I believe this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and beyond. This project would use proven techniques to implement collaboratively developed applications to surface water conservation at a meaningful scale. This project has my full support, and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,

George Ruyle, Professor and Extension Specialist  
Marley Endowed Chair for Sustainable Rangeland Stewardship  
Co-director NRULPC



March 03, 2023

EWRP Review Committee  
Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225**Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)**

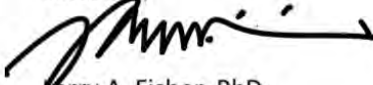
I am writing to offer my strong support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation's WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona*.

The University of Arizona's School of Natural Resources and the Environment has worked in close partnership with the Alliance over the past two decades, conducting joint research, providing undergraduate and graduate internships, and in convening critical dialogues over the state and future of ranching in the Southwest. Several SNRE faculty, including myself, serve on AVCA's Science Advisory Board and provide regular input into the organization's programs and ranching practices.

This proposed project is an outcome of the Altar Valley Watershed Plan, an effort created through a Phase I WaterSmart grant, and developed through broad-based collaboration, including the active involvement of UA scientists and researchers. I worked closely with other scientists, agency technical staff, and Altar Valley ranchers in developing the plan, and it reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly in the Altar Wash and its tributaries. This this proposed project is an important effort to address those concerns. Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale.

This project has my full support and I will continue to contribute actively to its development. I'm confident that BOR's funding will have a long-term positive impact on the Altar Valley landscape.

Sincerely,

Larry A. Fisher, PhD  
Research Professor  
School of Natural Resources and the Environment  
University of Arizona



March 8, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.

The USDA-Agricultural Research Service- Southwest Watershed Research Center has been collaborating with the Altar Valley Conservation Alliance for the past several years to conduct research and develop the Altar Valley Watershed Plan. My research has focused on documenting and interpreting the impacts of rangeland soil and water conservation structures built since the early 1900's. Understanding the impacts of legacy structures is critical to addressing future water supply and ecosystem health in the valley, and the results of this research have been an important consideration in developing the Watershed Plan.

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. This was a process that I participated in and highly endorse. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has my full support and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,

Mary Nichols, PhD

Research Hydraulic Engineer, Scientist  
USDA-ARS Southwest Watershed Research Center  
2000 E. Allen Rd.  
Tucson, AZ 85719

Southwest Watershed Research Center  
2000 E. Allen Rd., Tucson, Arizona 85719  
Voice 520.343.0038 Fax 520.670.5550 email [mary.nichols@usda.gov](mailto:mary.nichols@usda.gov)  
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# United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Western Geographic Science Center  
520 N. Park Avenue, Tucson, AZ 85719

March 21, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to support the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.*

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface-water loss in the Valley, particularly related to the Altar Wash and its tributaries, and this proposal well addresses those concerns.

More specifically, the proposed use of Natural Infrastructure in Dryland Streams (NIDS), which are structures naturally or anthropogenically created from earth, wood, debris, or rock, that can restore implicit function of this landscape is essential. My work has been focused on studying rock detention structures for the past 15 years, with findings critically beneficial to the ecosystem. NIDS can establish regenerative wetland sinks that reverse desertification and strengthen climate resilience!

Soil and water conservation is critical in the Altar Valley and the proposed use of NIDS can help restore the natural biogeochemical feedback loops and support adaptation to and protection from climate-related disturbances and stressors. This funding could have a long-term positive impact on the Altar Valley landscape of the southwestern United States.

Sincerely, 

Laura M. Norman, Ph.D.  
Supervisory Research Physical Scientist



New Mexico License #56670

**Watershed Restoration Surface Water Management Services**

46 County Road 84A, Santa Fe New Mexico 87506

Office/Home 505-455-0012 / Cell 470-3542 / Email: [rangehands@gmail.com](mailto:rangehands@gmail.com)

3/6/2023

**Letter in Support of the Collaborative Watershed Plan, Altar Valley, Pima County  
Arizona grant proposal to the Bureau of Reclamation Water Smart Program**

**I have been working in the Altar Valley of southern Arizona as a geomorphologist field practitioner since 2005 providing contract services to the Altar Valley Conservation Alliance. I have had the pleasure to assess, design and implement a number of uplands watershed restoration project for the AVCA. I have also done a number of valley wide watershed condition recon assessments. These assessments were conducted using aircraft, horseback, foot travel and motorized vehicles. In doing so I have developed a good working knowledge of the watershed conditions in the Altar Valley and the related problems.**

**Base on my experience in the Altar Valley I strongly support the grant applications to do a watershed based plan that focused on incised channels and mesquite enchantment along with other associated degraded conditions in the uplands. Such a plan will enable the valley's partners to focus and prioritize the work that needs to be conducted to stabilize this degraded watershed.**

**Steve Carson  
VP Rangeland Hands, Inc.**





Brad Lancaster  
813 N. 9<sup>th</sup> Avenue, Tucson, AZ 85705  
[brad@HarvestingRainwater.com](mailto:brad@HarvestingRainwater.com)  
[www.HarvestingRainwater.com](http://www.HarvestingRainwater.com)

March 8, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona*.

For many years I have been participating in site assessment, land and water restoration projects, and documenting the effects of these projects with the Altar Valley Conservation Alliance, and have taught a number of hands-on workshops with the organization. It has been inspiring and informative to see the beneficial results of this work, some of which I have shared in the new editions of my books *Rainwater Harvesting for Drylands and Beyond*, and [website](#). I have found the techniques applied to be effective in both the rural and more urbanized sections of the watershed, and I continue to work with others to spread the awareness of, and the continual evolution of, these strategies. It is essential that more of the public and professionals be exposed to this work and how we can enhance the health and hydration of this environment.

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. This was a process that I participated

in and highly endorse. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has my full support and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,

Brad Lancaster

[HarvestingRainwater.com](http://HarvestingRainwater.com)

[NeighborhoodForesters.org](http://NeighborhoodForesters.org)

**Confluence Construction and Consulting LLC**  
**1037 N Perry Ave**  
**Tucson, AZ 85705**

March 9, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to express my support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: *Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.*

For the past 10 years I have closely followed AVCA through their work in the Altar Valley, as a participant in the public workshops and now as a professional. I am the operator of Confluence Construction and Consulting, a land, stream and wetland restoration contractor based in Tucson. As a consultant in the southwest I have seen the economic and ecological impact that projects of this scale can provide to communities. This project would be a boon to communities both human and non human.

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant. This was a process that I participated in and highly endorse. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has my full support and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Sincerely,  
Omar Ore-Giron





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The Western Landowners Alliance advances policies and practices that sustain working lands, connected landscapes and native species.

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March 2, 2023

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, CO 80225

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity No. R23AS00089)

Dear EWRP Review Committee:

I am writing today to express support for the Altar Valley Conservation Alliance (AVCA) application to the Bureau of Reclamation WaterSmart: Environmental Water Resources Projects Program (2023), for its project titled: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.

Western Landowners Alliance is a landowner-led organization dedicated to sustaining working lands, connected landscapes and native species in the American West. In our experience, the most successful and enduring conservation and restoration projects emerge through local, collaborative partnerships. AVCA exemplifies this approach with a solid track record of bringing together diverse stakeholders to design effective solutions for the benefit of this important desert ecosystem, area ranchers and surrounding communities.

This proposed project is derived from the Altar Valley Watershed Plan, which was collaboratively created via a Phase I WaterSmart grant and which we also endorsed. The plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to the Altar Wash and its tributaries, and I am pleased to see this proposed project address those concerns.

Surface water conservation is critical in the Altar Valley and the AVCA's project would use proven techniques to implement collaboratively vetted projects at a meaningful scale. This project has full support of the Western Landowners Alliance and I am confident that BOR's funding would have a long-term positive impact on the Altar Valley landscape.

Thank you for your consideration.

Sincerely,

Lesli Allison  
Executive Director

## ***Wildvisions Arizona***

6127 W. Tucson Estates

Tucson, AZ 85713

Bureau of Reclamation  
Mail Code: 84-27814  
P.O. Box 25007  
Denver, Colorado 80225

March 6, 2023

Re: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona (Notice of Funding Opportunity R23AS00089)

Dear EWRP Review Committee:

This letter is being submitted to you as my strong support for the Altar Valley Conservation Alliance (AVCA) application to the BOR Water Smart: Environmental Water Resources Projects Program (2023), for its project titled: Surface water conservation for drought and climate resilience in the Altar Valley watershed, Pima County, Arizona.

For well over the past two decades, I have interacted with the members of AVCA on landscape level conservation efforts. Most of that time as the Natural Resources Division manager for Pima County but since my retirement, as a member of the AVCA Science Advisory Board. The Altar Valley is one of the least developed of the southern Arizona valley watersheds. The Altar has been designated by Pima County as a significant bioserve and significant lands for conservation have been acquired in the Vally as mitigation under the USFW/Pima County section 10 permit in place.

This proposed project is derived from the Altar Valley Watershed Plan, that was collaboratively created via a Phase 1 Water Smart grant. This was a process that I participated in and highly endorse the outcomes. The Plan reflects stakeholders' goals for the future of conservation in the Altar Valley. A major concern identified in the plan was large-scale soil and surface water loss in the Valley, particularly related to Altar Wash and its tributaries.

Much preliminary work has already gone on and plan elements and support technical expertise has been identified. Now, the AVCA effort needs additional support to pull all the elements together and institutionalize the vision across all the conservation partners actively involved in the Valley. AVCA has pulled together and funded a GIS based database that stands as a model

for such an organization of its size and they maintain a Watershed Working group to facilitate a collaborative approach to implementation and updating of the Altar Watershed Plan.

I strongly encourage the review committee to look closely at the AVCA application. They have the major elements covered to ensure any effort funded will be successful. They have a base environment in need of ecological restoration and the land available to support small scale to landscape level projects. They have a proven and engaged cadre of technical, public and landowner partners committed to restoring the Valley fundamental watershed health. They have both the organizational and visionary capacity to make the project as outlined in the application a success. With over 40 years in conservation management, I have seldom run into a small local NGO equipped and in the right place at the right time, to support.

Surface water conservation is critical in the Altar Valley and AVCA's project would use proven techniques to implement well vetted projects at a meaningful scale. This project has my full support, and I am confident the BOR funding would have a long-term positive impact on the Altar Valley ecological function and landscape.

Sincerely,

**Kerry Baldwin**