1501

Arizona Water Protection Fund
Application Cover Page
FY 2015

Title of Project: Enhancing flow in Sabino Creek Shallow Groundwater Area through a holistic community-based approach

Type of Project:
- [x] Capital or Other
- [ ] Water Conservation
- [ ] Research

Stream Type:
- [ ] Perennial
- [x] Intermittent
- [ ] Ephemeral

Your level of commitment to maintenance of project benefits and capital improvements:
- [ ] < 5 years
- [x] 5-10 years
- [ ] 11-15 years
- [ ] 16-20 years

Applicant Information:

Name/Organization:	Watershed Management Group
Address 1:	1137 N Dodge Blvd
Address 2:	
City:	Tucson
State:	Arizona
ZIP Code:	85716
Phone:	520-396-3266
Fax:	520-300-6700
Tax ID No.:	[redacted]

Inside an AMA: Yes [x] No [ ]

If yes, which AMA:
- [ ] Phoenix
- [x] Tucson
- [ ] Prescott
- [ ] Pinal
- [ ] Santa Cruz

Type of Application:
- [x] New
- [ ] Continuation

Contact Person:

Name:	Catlow Shipek
Title:	Senior Program Manager
Phone:	520-396-3266
Fax:	520-300-6700
e-mail:	catlow@watershedmg.org

Any Previous AWPF Grants:
- [ ] Yes
- [ ] No

If yes, please provide Grant #(s):

Arizona Water Protection Fund Grant Amount Requested:

$ 194,426.00

If the application is funded, will the Grantee intend to request an advance:
- [x] **Yes**
- [ ] **No**

Matching Funds Obtained and Secured:

Applicant/Agency/Organization:	Amount ($):
1. ~~Applicant~~ Sabino Advisory Com	12,000
2. Pima Assoc of Governments	1,650
3. WMG	10,722
Total:	24,402

Has your legal counsel or contracting authority reviewed and accepted the Grant Award Contract General Provisions?
- [x] Yes
- [ ] No
- [ ] N/A

Signature of the undersigned certifies understanding and compliance with all terms, conditions and specifications in the attached application. Additionally, signature certifies that all information provided by the applicant is true and accurate. The undersigned acknowledges that intentional presentation of any false or fraudulent information, or knowingly concealing a material fact regarding this application is subject to criminal penalties as provided in A.R.S. Title 13. The Arizona Water Protection Fund Commission may approve Grant Awards with modifications to scope items, methodology, schedule, final products and/or budget.

Catlow Shipek	Senior Program Manager 520 396-3266
Typed Name of Applicant or Applicant's Authorized Representative	**Title and Telephone Number**
Catlow Shipek	5/14/15
Signature	**Date Signed**

(C1)

Title: Enhancing flow in Sabino Creek Shallow Groundwater Area through a Holistic Community-based Approach

Executive Summary

Watershed Management Group (WMG) and partners will conduct a feasibility study to identify and plan for a long-term multi-pronged restoration approach to benefit lower Sabino Creek surface flows and associated riparian habitat. The resulting study will inform the selection, design, implementation, and monitoring of 1 – 2 restoration site demonstrations in partnership with local landowners.

The proposed 4-year project includes extensive outreach to residents within and nearby to the Sabino Creek shallow groundwater area. Engagement of residents will consist of direct mailings, presentations, and on-the-ground restoration and monitoring activities. The goal will be to strengthen landowners' connections to and ultimately stewardship of the creek which is critical for long-term health of lower Sabino Creek and viability of the restoration features.

The feasibility study phase of the proposed project will:

1. Identify upland tributary and creek restoration opportunities for immediate and future projects to enhance habitat and local recharge of the shallow groundwater aquifer;
2. Conduct an aquifer characterization analysis to inform potential impact of restoration features to enhance recharge, preserve baseflow, and restore the natural hydrology;
3. Identify conservation opportunities to reduce local groundwater demand; and
4. Develop a long-term restoration strategy with site specific plans based on the best available science.

Based on the feasibility study findings, the demonstration and monitoring phase will select 1 – 2 pilot restoration sites to demonstrate restoration practices which restore natural hydrologic processes. The restoration sites will be intensively monitored before and after installation to measure impacts and inform future restoration strategies. The selected restoration sites will be chosen to:

1. Enhance recharge of storm-event surface flows from tributaries to the Sabino Creek shallow groundwater area to impact perennial baseflow of lower Sabino Creek
2. Improve riparian habitat along degraded reaches of tributary channels and lower Sabino Creek
3. Provide a community-supported restoration demonstration to engage landowners and promote long-term stewardship of the creek.

WMG will work directly with Pima County, Tucson Audubon, Sky Island Alliance, Pima Association of Governments, University of Arizona, local residents, homeowners associations, businesses, Metro Water, Tucson Water, American Rivers, and consultants to develop and pilot a community supported restoration plan.

Project Overview

The story of Tucson's watersheds is a devastating story of loss, leading ultimately to the loss of the once perennial Santa Cruz River. The Santa Cruz and its major tributaries in Tucson are now dry washes, flowing only after large storms. Perennial flow in the river was lost just 60 years ago, when excessive groundwater pumping disconnected groundwater from surface flow. Watershed Management Group (WMG) is working to reverse the trend of groundwater depletion and loss of riparian areas through community education programs, water harvesting and green infrastructure training and demonstration, tributary and creek restoration, and water management best practice and policy change. Residents and visitors to Tucson have come to see dry creeks and rivers as the norm. Through this program, we will reconnect people with our heritage of flowing desert rivers.

While most groundwater levels in the Tucson Basin are 200 feet or more below the land surface, local studies have identified areas of shallow groundwater. These areas, where groundwater is less than 50 feet below the surface, support the few remaining pockets of essential riparian habitat. These are the remnants of our once extensive corridors connecting mountain creeks to the Santa Cruz River. Because these pockets of shallow groundwater are often perched aquifers, semi-independent of the larger groundwater supply, they are more vulnerable to being depleted through over-pumping and more responsive to recharge efforts—showing recovery within years, rather than decades, following a reduction in pumping activities. Sabino Creek is one such area where loss of shallow groundwater has resulted in significant depletion of flows, reducing this once-perennial stream that supports important habitat for plants and animals to an intermittent and ephemeral waterway that flows only after large storm events.

Watershed Management Group and partners have launched a community campaign to restore habitat and surface flow to the lower Sabino Creek watershed. This section of the creek, located downstream of Sabino Canyon Recreation Area in northeast Tucson, passes through low-density residential development and joins Tanque Verde Creek. The riparian vegetation community supported along these lower reaches includes stands of velvet mesquite, Fremont cottonwood, Arizona sycamore, Arizona walnut and willow, and other mixed broadleaf species (PAG, 2000a).

Through the feasibility study, local outreach, and restoration demonstrations proposed in this project, we will begin to reverse the historic decline of groundwater levels through a multi-pronged community-based approach. This approach includes restoring natural hydrology to support perennial surface flow and associated riparian vegetation. Our project will engage 60 people in on-the-ground restoration activities and 400 people in direct outreach actions. In addition, we will continue to engage thousands of people through our ongoing Restore Sabino Creek educational and advocacy campaign.

This project complements recommendations in Pima Association of Governments Shallow Groundwater Areas in Eastern Pima County, Arizona: Water Well Inventory & Pumping Trend Analysis Report (2012). It aligns with Pima County's Sonoran Desert Conservation Plan (SDCP) for balancing the conservation and protection of our cultural and natural resource heritage with our efforts to maintain an economically vigorous and fiscally responsible community. The project area overlaps with an area identified for priority purchase through Pima County's open space bond and Floodplain Acquisition Fund. In addition, the project will build off of gains in groundwater recovery realized through the discontinuation of pumping in 2006 from a nearby Tucson Water municipal well field.

Goal: To pilot a holistic community-based restoration model in lower Sabino Creek to preserve and enhance surface flows in shallow groundwater areas.

Objectives:

1) Develop a comprehensive riparian restoration plan for lower Sabino Creek
2) Evaluate a restoration demonstration for actual impact to enhanced recharge and habitat
3) Develop a Sabino Creek water balance and well inventory to understand potential water conservation impacts.

Statement of Problems/Causes. As outlined by PAG, the Sabino Canyon Shallow Groundwater Area has a high density of wells: 286 wells total and 17.9 wells per square mile. Historically, groundwater levels have declined until 2005 when several municipal non-exempt wells discontinued production and led to a slight recovery of local aquifer levels. However, this area has seen high numbers of new non-exempt wells installed: 15 new wells from 2000 – 2012. It is estimated that the percentage withdrawn in this area from non-exempt wells is 92.5%. PAG identified Sabino Canyon Shallow Groundwater Area as a high priority for additional study due to water withdrawal characteristics. (PAG 2012)

Statement of Solutions. Watershed Management Group's multi-pronged approach to preserve and enhance streamflow in Sabino Creek recognizes that no single strategy will protect the creek for the long-term. To mitigate exacerbating factors including climate change, drought, invasive species, and continued pressure from wells will require a holistic approach. The proposed project will focus efforts to 1) enhance surface runoff recharge through upstream and floodplain restoration activities; 2) promote water conservation and incentive programs to reduce withdrawals from local wells; and 3) promote use of renewable supplies via rainwater harvesting and reclaimed water for non-potable needs.

To support these efforts, Watershed Management Group has formed the Sabino Canyon Advisory Committee to strategically guide the program's efforts and suggest policy initiatives. The committee is made up of four Sabino Creek landowners, representatives of Tucson and Metro Water Companies, Pima County, City of Tucson, the University of Arizona, and other organizations/agencies working in the watershed. We will continue to build this committee to help us plan and guide the proposed work.

Statement of Project Years of Benefit to the resource and general public. This 4-year project will enhance and restore stream and riparian resources in Sabino Creek that will provide direct improvements to surface flows and address degraded watershed health conditions through implementation of scientifically-based restoration projects. The restoration plan will address additional benefits including flood mitigation, water quality, and increased value to adjacent properties. Beyond the grant funded years our community-based approach to develop stewardship and leverage community partners we will ensure long-term maintenance of the portion of the river and stream and associated riparian habitat that are enhanced by the project. This project includes broad based local involvement and support and directly benefits Sabino Creek and downstream riparian habitat. Matching monies or assets including in kind contributions have been provided by other sources.

Project Location & Environmental Contaminant Information FY 2015

Project Location Information

1. County: Pima	2. Section: ~~22, 28, 27~~ 15, 16, 21, 33	3. Township: 13	4. Range: 15

5. Watershed: Upper Santa Cruz
6. 8 or 10 Digit Hydrologic Unit Code (HUC): 15050301
7. Name of USGS Topographic Map where project area is located: Sabino Canyon
8. State Legislative District: 09, 10
   (Information available at: http://azredistricting.org/districtlocator/
9. Land ownership of project area: Private and Pima County
10. Current land use of project area: Residential
11. Size of project area (in acres): 900 DIRECT
12. Stream Name: Sabino Creek
13. Length of stream through project area: 4 miles
14. Miles of stream benefited: 4+ miles
15. Acres of riparian habitat: 20+ acres will be:
    - [x] Enhanced
    - [ ] Maintained
    - [x] Restored
    - [ ] Created
16. General description and/or delineation for the area of impact of the project within the watershed.
    The Sabino Creek channel and floodplain, and tributary drainages.
17. Provide directions to the project site from the nearest city or town. List any special access requirements:
    From downtown Tucson take Sixth Avenue to Grant Road, go east on Grant Rd to Tanque Verde Road, go left and continue east on Tanque Verde Rd to Sabino Canyon Road and go North.

Environmental Contaminant Location Information

1. Does your project site contain known environmental contaminants? ☐ **YES** ■ **NO** If yes, please identify the contaminant(s) and enclose data about the location and levels of contaminants:
2. Are there known environmental contaminants in the project vicinity? ☐ **YES** ■ **NO** If yes, please identify the contaminant(s) and enclose data about the location and levels of contaminants:
3. Are you asking for Arizona Water Protection Fund monies to identify whether or not environmental contaminants are present? ☐ **YES** ■ **NO**

Project Activities Outline

Task 1: Carry out feasibility study to identify and select restoration sites for Phase One demonstration projects and Phase Two work to enhance shallow groundwater aquifer recharge, restore geomorphic processes, increase flow and hydro-period, and benefit riparian habitat and wildlife.

Description: Activities under this task include:

- Synthesize past research on the hydrology, geomorphology, habitat, and vegetation community structure to develop a baseline of information and identify data gaps. See Bibliography/References for a list of pertinent studies.
- Enter into an access agreement with interested landowners to conduct study.
- Conduct interviews with longtime residents, researchers and managers to identify trends and other important information.
- Survey and assess parcels within the shallow groundwater area to identify potential restoration project areas
- Assess connectivity of restoration sites with local aquifer (task #2 results)
- Collect representative longitudinal profiles and cross-sections to assess geomorphic problems, constraints, and opportunities.
- Develop GIS coverages that include cottonwood-willow stands, cottonwood-willow recruitment, erosional areas, areas of aggradation, geomorphology and geologic control, invasive species, and length and duration of flows.
- In coordination with landowners and partners, develop a process to prioritize sites most in need of restoration.

The proposed study reach of Sabino Creek starts at the Coronado National Forest boundary just below the Sabino Canyon Recreation Area at an elevation of 2670 feet and continues downstream just over 4 miles to the confluence with the Tanque Verde Wash at 2500 feet. Along this 4-mile reach we have identified 53 private landowners; in addition Pima County owns approximately 27.5 acres in six parcels and an additional 200 acres along Bear Creek, an important tributary to Sabino Creek.

Because the majority of the lower creek is on private property we have identified 11 sites to begin studying: a private 12-acre parcel (Hidden Valley HOA), a private 40-acre parcel (Woodin), a private 8-acre parcel (Madden), a private 4.5-acre parcel (Hughes), and a 16-acre parcel owned by Pima County at the top of Bear Creek, a 3.5-acre county-owned parcel in the middle section of the study reach, and a cluster of five county-owned parcels totaling 8 acres at the bottom of the study reach. In addition we are in communication with the newly-acquired University of Arizona horse farm (59 acres), Canyon Ranch Spa (33 acres), and the Fenster School property owners (140 acres) to gain access and potentially add them to the feasibility study.

Purpose: to select restoration site(s) to begin planning for pilot demonstration and associated monitoring.
Responsible Personnel: Catlow Shipek and Trevor Hare, Watershed Management Group
Deliverable Description: Technical memo with supporting maps and signed landowner restoration project agreements.
Deliverable Due Date: Month 6
Task Cost: $29,255

Task 2: Inventory private exempt and non-exempt wells to refine water use estimation and develop a water balance model for the lower Sabino Creek shallow groundwater area
Description: Activities under this task will include:

- Outreach to private well owners about project goals and request to participate in an anonymous monitoring program in coordination with Gary Hix of In2Wells Inc., former president of the Southern Arizona Water Well Association
- Evaluate available historical data of well use in area
- Monitor well use of new participants to help refine water use estimates
- Evaluate seasonal static water depth fluctuations in wells to correlate with aquifer connectivity and response
- Develop a surface/groundwater based water balance model to identify priority areas for conservation and/or enhanced recharge to influence stream flow in coordination with Lacher Hydrological Consulting

Purpose: To develop a water balance model to inform spatial prioritization of conservation and/or enhanced recharge practices and allow for setting scientifically-based goals. In addition this will provide information we can share with well owners that will correlate and quantify response in surface flow in the creek to reduced pumping.

Responsible Personnel: In2Wells Inc. and Lacher Hydrological Consulting
Deliverable Description: Technical memo and supporting maps
Deliverable Due Date: Month 9
Task Cost: $43,750

Task 3: Initiate monitoring of wells and selected pilot restoration site(s) to collect baseline information.
Description: Activities under this task include:

- Obtain permission and implement monitoring of wells near or downstream of restoration site(s)
- Conduct seasonal wet/dry mapping of Sabino Creek
- Install piezometers immediately downstream of restoration site to measure vadose zone water fluxes.

Purpose: To inform planning we will work with the Arizona Water Well Association and In2Wells Inc. to develop a private well monitoring reporting mechanism. This will enable us to remotely monitor groundwater levels. In addition we will institute a semiannual wet-dry mapping exercise to monitor surface water. We will also install piezometers to monitor the interaction of surface and groundwater and the influence of restoration. The data collected will also form part of our baseline conditions and help in the development of a long-term monitoring and management plan.

Responsible Personnel: Watershed Management Group, In2Wells Inc., and Lacher Hydrological Consulting
Deliverable Description: Technical memo and supporting maps
Deliverable Due Date: Month 12

Task Cost: $17,905

Task 4: Design and plan for pilot restoration demonstration.
Description: Activities under this task include:

- Develop project scopes and site-specific restoration plans in collaboration with selected parcel owners.
- Develop budgets to implement restoration plans and identify potential funding sources for future work.

Each priority site specific restoration plan will include information on past conditions and events that have caused degradation, desired future conditions and a goal statement along with objectives, descriptions of restoration techniques and expected result, and a long-term monitoring and management plan. We will design all the work to improve human safety and enjoyment, wildlife habitat, and flood control. The budget for each plan will be include assessment, planning and design work, cultural clearance and permitting, baseline monitoring and implementation activities, the development of a long-term monitoring and management plan, and communications and reporting.

Purpose: To address urgent restoration needs and to prove efficacy of our approach and arid land restoration techniques.

Responsible Personnel: Watershed Management Group
Deliverable Description: Technical memo and supporting maps
Deliverable Due Date: Month 12
Task Cost: $11,728

Task 5: Obtain permits for pilot restoration demonstration
Description: Obtain and submit to the Project Manager all permits, authorizations, clearances and agreements, and perform any consultations necessary to complete the tasks listed in this Scope of Work. These may include but are not limited to:

- State Historic Preservation Office (SHPO) clearance
- National Environmental Policy Act (NEPA) compliance
- Endangered Species Act Section 7 consultation with US Fish & Wildlife Service
- Access agreement(s) between Grantee and Landowner(s) (if different)
- Pima County Floodplain Use Permit
- Clean Water Act Section 401 Certification from Arizona Department of Environmental Quality
- Clean Water Act Section 404 permit from the Army Corps of Engineers

Purpose: To comply with all local, state, and federal permit requirements, environmental laws such as NEPA and obtain legal access to project area.
Responsible Personnel: Watershed Management Group
Deliverable Description: Copies of all approved permits, authorizations, clearances and agreements.
Deliverable Due Date: Month 18
Task Cost: $5,000

Task 6: Conduct conservation outreach to local residents and well users
Description: WMG has produced a video series and will develop and distribute additional informational materials regarding shallow groundwater, water conservation strategies, and creek restoration.

The primary materials in this campaign will include:

- Restoring Hope videos, a 3-video series on shallow groundwater and Sabino Creek (already developed)
- Get Wet Guide: Sabino Creek, a pocket guide to the Sabino Creek area highlighting riparian function and connecting to recreational activities, including birding, hiking, biking, and more outside of private land areas (to be developed)
- Brochures and presentations for public meetings and community groups (to be developed)

Purpose: We will use these materials and our contacts through the Sabino Canyon Advisory Committee including the local water utilities to promote awareness about value of Sabino Creek and restoration efforts and inspire implementation of water saving strategies such as water harvesting to reduce groundwater pumping for outdoor irrigation use.

Responsible Personnel: Watershed Management Group and Pima Association of Governments
Deliverable Description: 1 – 2 mailings to residents, 2 – 3 community presentations, distribution of information to broad audiences through email bulletins and social media
Deliverable Due Date: Months 2 – 12
Task Cost: $6,800

Task 7: Implementation of 1 – 2 pilot restoration demonstration site(s).
Description: The restoration sites will be designed to restore the natural hydrologic function to portions of Sabino Creek and protect public and private property against flood-caused erosion. We will use arid land wash restoration techniques utilizing natural channel design approaches including juniper post and rock structures which are cost effective and easy to maintain, and water harvesting and native revegetation techniques to increase plant diversity and abundance. The work will include restoration of wildlife habitat including pollinator and bird-friendly plantings. The number of demonstration sites will be dependent on priority (need, urgency, and feasibility), scope, and complexity to remain within our proposed project budget.

Purpose: To address urgent restoration needs and to prove efficacy of our approach and the selected arid land restoration techniques.

Responsible Personnel: Watershed Management Group
Deliverable Description: Technical memo and supporting maps
Deliverable Due Date: Month 30
Task Cost: $33,428

Task 8: Monitor pilot restoration demonstration(s).
Description: We will monitor the response of the creek geomorphology, surface water flows, and the vegetation to implemented restoration projects. Methods will include cross-section and longitudinal

profile surveys which will show trends toward a stable channel configuration, photo-points to show vegetation and channel response, wet-dry mapping to show trends in hydro-period, and greenline vegetation monitoring (Winward, 2000) to show trends in increased bank storage and channel stability through vegetation response.

Purpose: To prove efficacy of our approach and arid land restoration techniques, and to inform future restoration work along the creek. The monitoring methods will further engage local residents as participants to develop long-term stewardship and understanding of Sabino Creek.

Responsible Personnel: Watershed Management Group
Deliverable Description: Technical memo and supporting maps
Deliverable Due Date: Month 40
Task Cost: $8,533

Task 9: Develop and submit a final report and oral presentation.
Description: The final task of the project is to be submitted along with an oral presentation

Purpose: To summarize project accomplishments, identify next steps, and convey lessons learned.

Responsible Personnel: Catlow Shipek, Watershed Management Group
Deliverable Description: Final report and oral presentation
Deliverable Due Date: Month 48
Task Cost: $7,950

6 & 7) Detailed Budget Breakdown including Matching Funds (see Excel file)

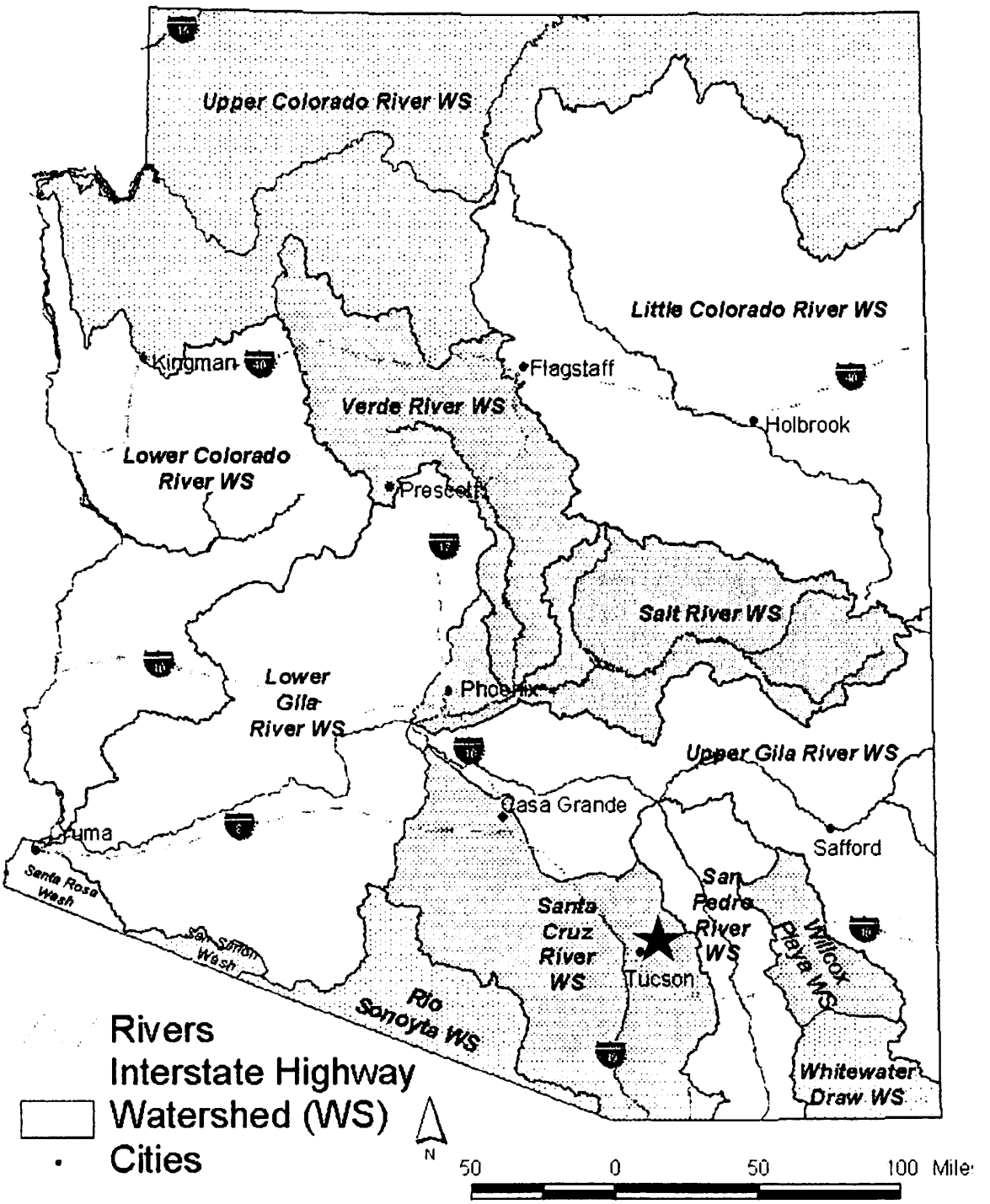
Personnel	Description	Requested Funds	Matching Funds	Total
Program Advisor, Catlow Shipek	Advise and administer project. 2 hrs per week for 4yrs	$ 20,800		$ 20,800
GIS Technician Intern	Intern to assist with recording and analyzing spatial data, and creating maps, 10hrs per week for 6months per year		$ 1,008	$ 1,008
PHASE 1 ——— ——				
Task 1: Conduct the feasibility study to identify and select restoration site(s)				
Program Advisor, Catlow Shipek	Technical oversight of feasibility study, 2hrs for 3/4yr	$ 3,900		$ 3,900
WMG Project Manager	Lead feasibility study analysis, site identification and selection. 10hrs for 3/4year	$ 19,500		$ 19,500
Materials and Equipment	1 new laptop & software, survey equipment, purchasing historic aerial and ground-based photos	$ 4,000		$ 4,000
Printing and Mailing	Outreach with information materials to landowners	$ 1,000		$ 1,000
Graphic Design Consultant	graphical design and layout of outreach materials	$ 600		$ 600
Travel, WMG Staff	20 trips, 25 miles each @$0.51/mi	$ 255		$ 255
Stakeholder Advisory Group	10 advisors @ 40 hours each for 4years, estimated hourly rate: $30/hr.		$ 12,000	$ 12,000
Task 2: Inventory private exempt and non-exempt wells & develop a water balance model				
Program Advisor, Catlow Shipek	Coordinate with contracted consultants to conduct private well inventory and assessment, 50hrs	$ 2,500		$ 2,500
Gary Hix, In2Wells	Conduct well inventory and outreach to homeowners	$ 7,500		$ 7,500
Laurel Lacher, Lacher Hydrological Consulting	Develop a surface/groundwater based water balance model	$ 3,750		$ 3,750
Consultant, Hydrogeophysics, Inc	Aquifer characterization analysis using two 1/2mile electroresistivity transect method	$ 20,000		$ 20,000
Web programmer	Create online module for residential well reporting through Arizona's Water Well Users Website	$ 5,000		$ 5,000
WMG Communications Coordinator, Karilyn Roach	Assist with development and administer outreach mailings, 50hrs	$ 2,000		$ 2,000

Pima Association of Governments, Mead Mier	Providing technial expertise for restoration planning and in-house graphic design services for educational materials	$ 2,000	$ 1,680	$ 3,680
Printing and Mailing	Outreach to private well owners	$ 1,000		$ 1,000
Task 3: Initiate Monitoring of wells and and selected pilot restoration site(s)				
Program Advisor, Catlow Shipek	Provide technical assistance, 40hrs	$ 2,000		$ 2,000
WMG Project Manager	Develop monitoring sites, analyze and submit reports, conduct wet-dry mapping, 100hrs	$ 5,000		$ 5,000
Gary Hix, In2Wells	Assist with outreach and set up of well monitoring	$ 1,500		$ 1,500
Laurel Lacher, Lacher Hydrological Consulting	Analyze results of data collected of baseline conditions and refine water balance model	$ 3,750		$ 3,750
Materials and Equipment	Piezometers to monitor sub-surface moisture fluxes, data loggers	$ 5,000		$ 5,000
Printing	survey logs, outreach materials	$ 400		$ 400
Travel, WMG Staff	20 trips, 25 miles each @$0.51/mi	$ 255		$ 255
Task 4: Design and plan for pilot restoration demonstration(s)				
Program Advisor, Catlow Shipek	Provide technical assistance, 40hrs	$ 2,000		$ 2,000
WMG Project Manager	Develop site specific plans, 110hrs	$ 5,500		$ 5,500
Consultant: Civil Engineer	Review designs	$ 4,000		$ 4,000
Printing	print plans	$ 100		$ 100
Travel, WMG Staff	10 trips, 25 miles each @$0.51/mi	$ 128		$ 128
PHASE 2				
Task 5: Obtain permits for pilot restoration demonstration(s)				
WMG Project Manager	Develop and submit permit applications, 100hrs	$ 5,000		$ 5,000
Task 6: Conduct conservation outreach to local residents and well users				
Program Advisor, Catlow Shipek	Provide technical assistance and coordinate outreach activities, and provide presentations, 40hrs	$ 2,000		$ 2,000
WMG Project Manager	Provide presentations 40hrs	$ 2,000		$ 2,000
WMG Communications Coordinator, Karilyn Roach	Assist with development and administer outreach mailings, 30hrs	$ 1,200		$ 1,200

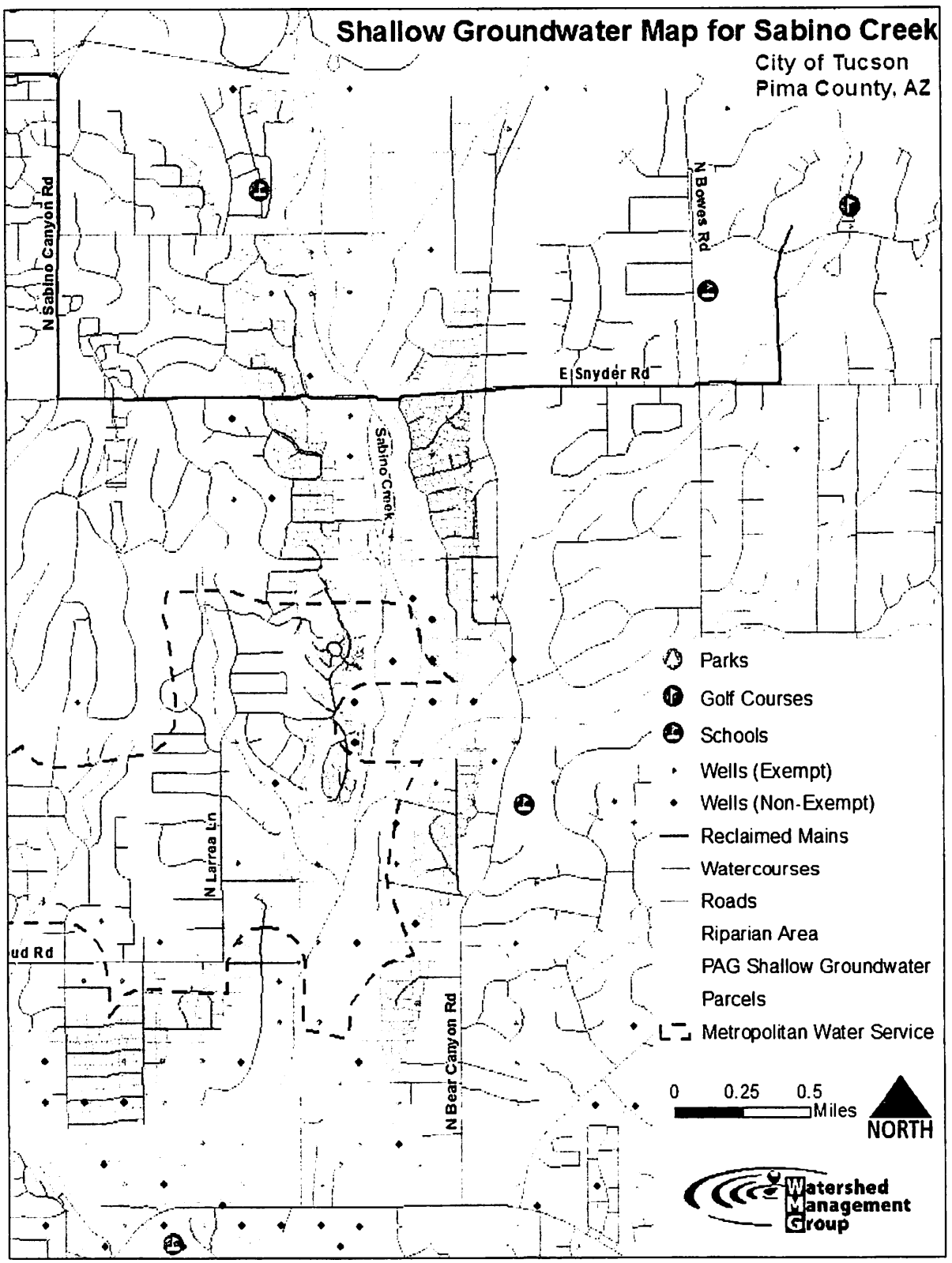
Printing and Mailing	1-2 mailings and outreach guides to landowners about conservation and restoration site demonstration(s)	$ 1,000		$ 1,000
Graphic Design Consultant	graphical design and layout of outreach materials (mailings)	$ 600		$ 600
Task 7: Implementation of 1-2 pilot restoration demonstration site(s)				
Program Advisor, Catlow Shipek	Technical oversight of restoration site development, 50hrs	$ 2,500		$ 2,500
WMG Project Manager	Demonstration site development, 100hrs	$ 5,000		$ 5,000
Volunteer Labor	3 workshops x 5hrs x 15 people x $20.25/hr		$ 4,556	$ 4,556
Contracted, Excavator	Excavation and hauling services	$ 8,000		$ 8,000
Tools	Hand tools and power tools needed for hands-on, volunteer based workshops; Match: value of the tools WMG owns for workshops including hand tools, wheelbarrows, jackhammers, and power tools for workshops with up to 15 people.	$ 800	$ 2,500	$ 3,300
Materials and Equipment	Rock, plants, restoration seed mix, driwater & tubes	$ 15,000		$ 15,000
Contracted, Water Truck	Dust control during excavation and establishment of vegetation	$ 2,000		$ 2,000
Travel, WMG Staff	10 trips, 25 miles each @$0.51/mi	$ 128		$ 128
Task 8: Monitoring of Pilot Restoration Site Demonstration(s)				
Program Advisor, Catlow Shipek	Provide technical assistance, 20hrs	$ 1,000		$ 1,000
WMG Project Manager	Survey, photo, and vegetation monitoring for 1 year, 120hrs	$ 6,000		$ 6,000
Volunteer Labor	3 people x 2hrs per month for 12months x $20.25/hr		$ 1,458	$ 1,458
Materials and Equipment	Piezometers to monitor sub-surface moisture fluxes, data loggers; Match: WMG camera, video, and GPS	$ 1,000	$ 1,200	$ 2,200
Printing	survey logs, outreach materials	$ 400		$ 400
Travel, WMG Staff	12 trips, 25 miles each @$0.51/mi	$ 153		$ 153
Task 9: Develop and submit final report and oral presentations				
Program Advisor, Catlow Shipek	Provide technical and editorial assistance, present results, 50hrs	$ 2,500		$ 2,500
WMG Project Manager	Develop final report, present results, 75hrs	$ 3,750		$ 3,750
Graphic Design Consultant	graphical design and layout of final report and outreach summary documents	$ 1,200		$ 1,200

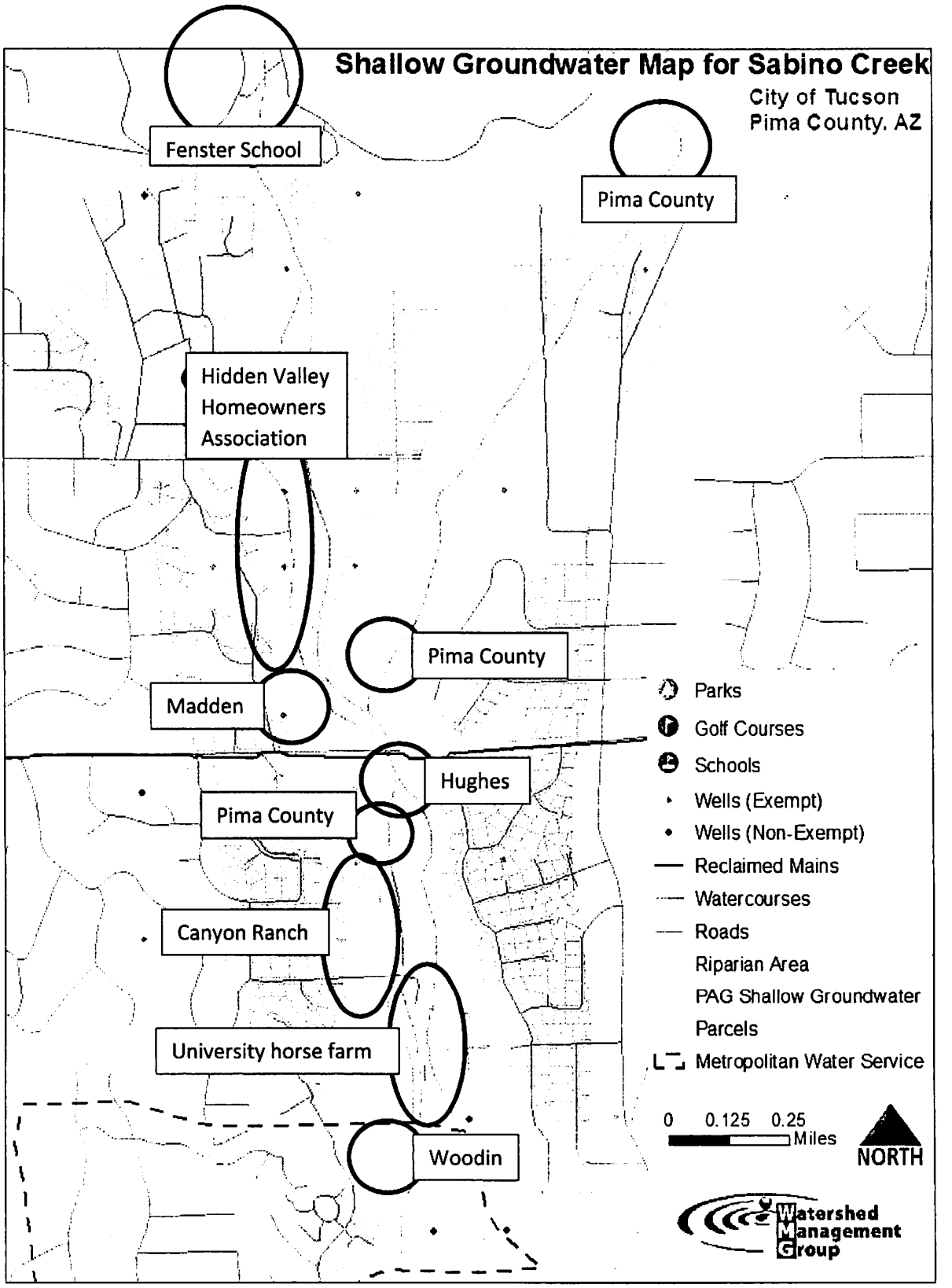
Printing	Final report copies	$ 500		$ 500
Other				
Indirect Costs	5%	$ 9,258	$ -	$ 9,258
TOTAL		**$ 194,426**	**$ 24,402**	**$ 218,829**

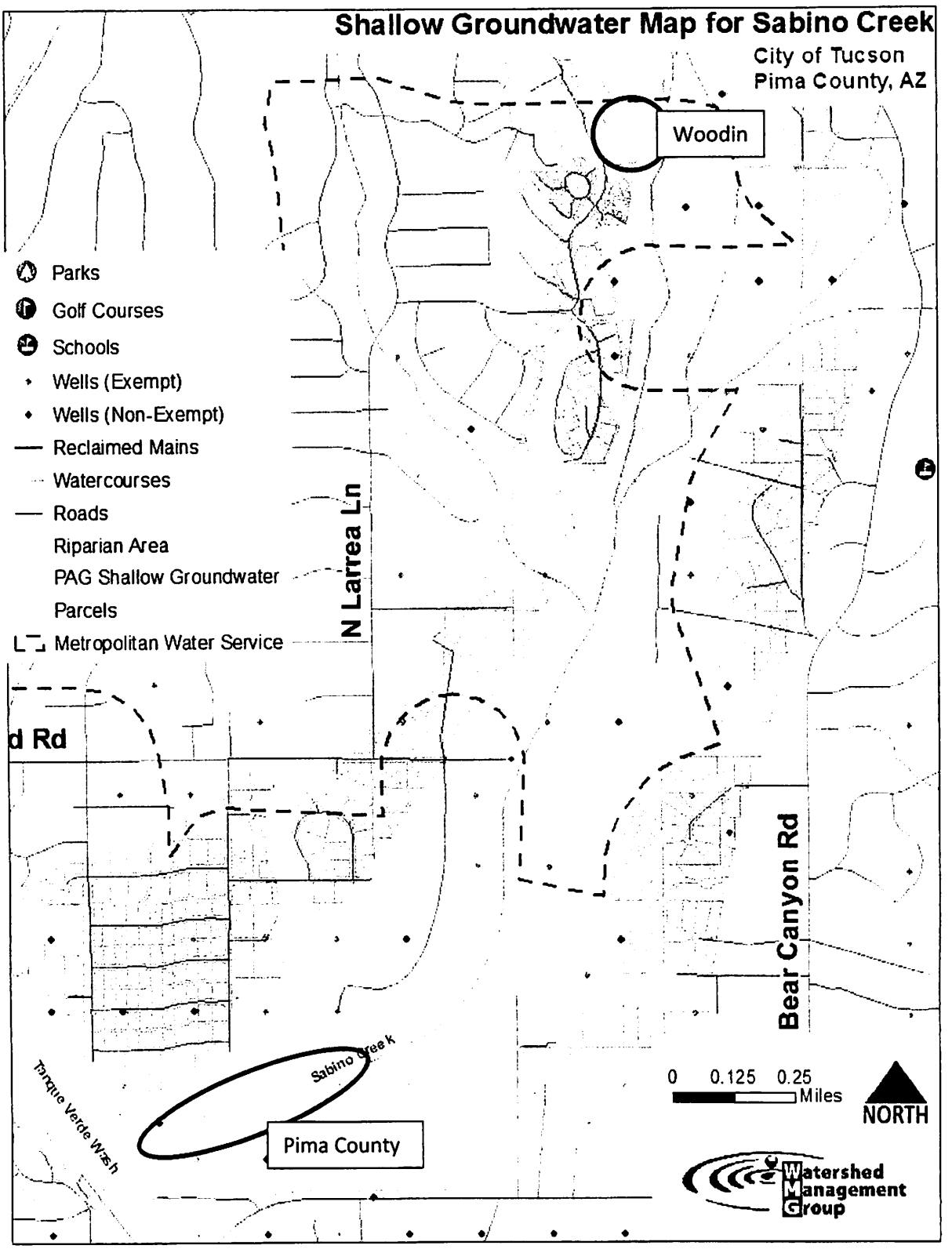
8) Project Maps and Schematic
Arizona Watershed Map *



Project Location/Ownership Map(s)


Shallow Groundwater Map for Sabino Creek
City of Tucson
Pima County, AZ
N Sabino Canyon Rd
N Bowes Rd
E Snyder Rd
Sabino Creek
N Larrea Ln
N Bear Canyon Rd
Parks
Golf Courses
Schools
Wells (Exempt)
Wells (Non-Exempt)
Reclaimed Mains
Watercourses
Roads
Riparian Area
PAG Shallow Groundwater
Parcels
Metropolitan Water Service
0 0.25 0.5
Miles
NORTH
Watershed Management Group


Shallow Groundwater Map for Sabino Creek
City of Tucson
Pima County, AZ
Fenster School
Pima County
Hidden Valley Homeowners Association
Pima County
Madden
Hughes
Pima County
Canyon Ranch
University horse farm
Woodin
Parks
Golf Courses
Schools
Wells (Exempt)
Wells (Non-Exempt)
Reclaimed Mains
Watercourses
Roads
Riparian Area
PAG Shallow Groundwater
Parcels
Metropolitan Water Service
0 0.125 0.25
Miles
NORTH
Watershed Management Group


Shallow Groundwater Map for Sabino Creek
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Parcels
Metropolitan Water Service
N Larrea Ln
d Rd
Bear Canyon Rd
Sabino Creek
Tanque Verde Wash
Pima County
0 0.125 0.25
Miles
NORTH
Watershed Management Group

STATE HISTORIC PRESERVATION OFFICE
Review Form

In accordance with the State Historic Preservation Act (SHPO), A.R.S. 41-861 *et seq*, effective July 24, 1982, each State agency must consider the potential of activities or projects to impact significant cultural resources. Also, each State agency is required to consult with the State Historic Preservation Officer with regard to those activities or projects that may impact cultural resources. Therefore, it is understood that **recipients of state funds are required to comply with this law** throughout the project period. All projects that affect the ground-surface that are funded by AWPF require SHPO clearance, **including those on private and federal lands.**

The State Historic Preservation Office (SHPO) must review each grant application recommended for funding in order to determine the effect, if any, a proposed project may have on archaeological or cultural resources. To assist the SHPO in this review, the following information MUST be submitted with each application for funding assistance:

- A completed copy of this form, and
- A United States Geological Survey (USGS) 7.5 minute map
- A copy of the cultural resources survey report if a survey of the property has been conducted, and
- A copy of any comments of the land managing agency/landowner (i.e., state, federal, county, municipal) on potential impacts of the project on historic properties.
  NOTE: If a federal agency is involved, the agency must consult with SHPO pursuant to the National Historic Preservation Act (NHPA); a state agency must consult with SHPO pursuant to the State Historic Preservation Act (SHPA).
  OR
- A copy of SHPO comments if the survey report has already been reviewed by SHPO.

Please answer the following questions:

1. Grant Program: Arizona Water Protection Fund
2. Project Title: Enhancing flow in Sabino Creek
3. Applicant Name and Address: Watershed Management Group 1137 N. Dodge Blvd, Tucson AZ, 85716
4. Current Land Owner/Manager(s): Private and County
5. Project Location, including Township, Range, Section: T13, R15, S. 15, 16, 21, 22, 28, 27
6. Total Project Area in Acres (or total miles if trail): 900
7. Does the proposed project have the potential to disturb the surface and/or subsurface of the ground? ☐ YES ■ NO
8. Please provide a brief description of the proposed project and specifically identify any surface or subsurface impacts that are expected: ____
   Installation of low-tech grade control structures in flow channels and floodplains

9. Describe the condition of the current ground surface within the entire project boundary area (for example, is the ground in a natural undisturbed condition, or has it been bladed, paved, graded, etc.). Estimate horizontal and vertical extent of existing disturbance. Also, attach photographs of project area to document condition: Residential area with natural conditions along Creek

10. Are there any known prehistoric and/or historic archaeological sites in or near the project area? ■ YES ☐ NO

11. Has the project area been previously surveyed for cultural resources by a qualified archaeologist? ☐ YES ☐ NO ■ UNKOWN

If YES, submit a copy of the survey report. Please attach any comments on the survey report made by the managing agency and/or SHPO

12. Are there any buildings or structures (including mines, bridges, dams, canals, etc.), which are 50-years or older in or adjacent to the project area? ☐ YES ■ NO

If YES, complete an Arizona Historic Property Inventory Form for each building or structure, attach it to this form and submit it with your application.

13. Is your project area within or near a historic district? ☐YES ■ NO

If YES, name of the district:

Please sign on the line below certifying all information provided for this application is accurate to the best of your knowledge.

Catlow Shipek 5/14/15

Applicant Signature /Date Applicant Printed Name

FOR SHPO USE ONLY
SHPO Finding: ☐ Funding this project will not affect historic properties. ☐ Survey necessary – further GRANTS/SHPO consultation required (*grant funds will not be released until consultation has been completed*) ☐ Cultural resources present – further GRANTS/SHPO consultation required (*grant funds will not be released until consultation has been completed*)
SHPO Comments
For State Historic Preservation Office: Date:

Organizational and staff expertise, qualifications and knowledge:
Watershed Management Group has the programmatic capabilities and ability to successfully implement and manage the Sabino Creek Restoration project. The staff members and partners involved in this project are skilled educators and practitioners who have fostered knowledge, skills, and passion in a diverse audience that includes both adults and youth.

All WMG staff members working on this project help teach WMG's Water Harvesting Certification course and Stream Restoration Technical Training, which focuses on techniques of water conservation that can help reduce shallow groundwater pumping and preserve riparian areas. The key staff members on this project also have combined experience in leading over 250 educational workshops with volunteers to implement a variety of green technologies at residential, neighborhood, and stream restoration sites.

Organizational experience and past history: WMG has the ability to successfully implement the Sabino Creek Feasibility Study. We have a history of success in running a wide variety of watershed management, planning, and educational programs in Arizona, California, and internationally, including 1) Public Water Harvesting Demonstration Sites, 2) a Green Living Residential Co-op, 3) Restoring Rivers, 4) Water Harvesting Certification courses, 5) Schoolyard Water Education, and 6) Green Streets/Green Neighborhoods. These programs have been funded through federal and state government grants, foundation grants, private donations, and fees for service. Here are some of the highlights of what WMG has achieved through these programs over the past six years:

- Created dozens of green infrastructure demonstration sites in public, residential, and commercial settings through public volunteer and professional training workshops in Arizona, California, and Sonora Mexico.
- Spearheaded planning of Arid Low Impact Development conference in Tucson in March of 2012, including coordination of planning committee and speakers from Arizona, New Mexico, and California.
- Developed K-12 water conservation curriculum and implemented hands-on rain garden installation projects with 12 different K-12 public schools in Tucson and Phoenix.
- Led three technical trainings on stream restoration techniques and over a half dozen stream restoration projects.
- Trained 200+ professionals from across the US, Canada, and Mexico through our 7-day Water Harvesting Certification program (the only one of its kind in the nation).
- Created a unique Co-op to implement affordable backyard sustainability projects with families through a sweat equity model; we have run 195 half-day workshops in Tucson and Phoenix since 2008 to install cisterns, greywater systems, vegetable gardens, chicken coops, and native habitat gardens.
- Created a series of design details for urban retrofit green infrastructure features in residential streets and rights-of-way that were adopted by the City of Tucson.
- Received the American Planning Association, Arizona Chapter's "Making Arizona Competitive in the 21st Century Award" for our neighborhood-scale model for retrofitting urban neighborhoods with green infrastructure.
- Published the most comprehensive guide on green infrastructure in the Southwest, "Green Infrastructure for Southwestern Neighborhoods," which downloaded more than

1,000 times and now is being translated into Spanish to be officially adopted by the City of La Paz, Mexico.

Key Personnel

Catlow Shipek, Senior Program Manager and WMG Co-Founder, will advise on the technical, design, and educational components of the program, as well as lead hands-on restoration activities. Catlow brings a diverse range of skills to this project, including substantial experience leading hands-on resource management workshops, designing green technology, managing federal grants, developing outreach materials, and working with low-income and disadvantaged populations through community-based conservation projects in the U.S. and abroad. Catlow has technical experience in soil conservation and management through 5 years of work with the Southwest Watershed Research Center as a technician studying soil erosion and sedimentation. Catlow has worked with the City of Tucson to develop green infrastructure design details and with the State of Arizona to develop a residential composting toilet design, and brings a wealth of knowledge about the basis and design of watershed restoration features to the project.

Trevor Hare, Restoration Ecologist and Restoration Project Manager, will lead the Restoration Feasibility Study, the selection of demonstration sites, and the assessment, planning, design, implementation, and monitoring of the sites. Trevor graduated from the University of Arizona in 1991 with a degree in Ecology. For ten years he studied the ecology of rattlesnakes and Gila monsters in the face of suburban development. Trevor worked as the Sky Island Alliance Restoration Program manager for the last 11 years and developed a robust methodology for the assessment, planning and design of riparian and upland restoration projects, which resulted in over $800,000 of restoration work. Trevor serves as the Science Advisor for the Coalition for Sonoran Desert Protection, and sits on the Pima County Conservation Acquisition Commission, and as a board member of the Ciénega Watershed Partnership.

Karilyn Roach, Senior Communications Associate and Program Coordinator, will coordinate design and printing of outreach materials, and have primary responsibility for recruiting participants and promoting events. Karilyn brings a strong background in written communications and direct outreach to promote sustainability and community building in a way that has direct impacts for human communities and the natural environment. As Coordinator for the Community Water Coalition, a group of 21 member organizations and businesses that work toward comprehensive, sustainable water policies for our region, she has built strong relationships with local leaders, partner organizations, and influential members of the community. Karilyn developed curriculum for youth and piloted the Youth Advocates for Restoring Rivers campaign in 2014. Karilyn is a graduate of the University of Arizona with a MS in Urban Planning, specializing in community development and cultural resources and holds a BA in English Literature from San Francisco State University.

Joaquin Murrieta-Saldivar, Project Manager, will advise on the watershed restoration and educational components of the program, as well as lead hands-on restoration activities. Joaquin's specialty is in building resilience in diverse communities by strengthening the connections between people, culture, and natural resources. Joaquin brings vast experience on the multicultural border region between the US and Mexico, where he has implemented several

community-based approaches to watershed management, river restoration, geo-tourism, conservation of native peoples, and best management practices for the ranching community. In addition to project management, Joaquin oversees WMG's Schoolyard Water Education program, and has strong relationships with area schools and experience teaching young people about a broad range of sustainability issues. Joaquin is a graduate of the University of Arizona with MSc in Natural Resources and Agricultural Economics and a PhD in Renewable Natural Resources Studies with an emphasis on management, policy and economics of natural resources. A native of Sonora, Mexico and resident of Arizona, Joaquin is fluent in both Spanish and English.

Andrew D'Arezzo, Project Manager will advise on watershed restoration and assist in planning. Andrew's background includes eight years of experience in residential construction, and he graduated from the University of Arizona in 2014 with a bachelor's degree in Civil Engineering (3.2 GPA). Area of study emphasis was hydrological and structural engineering, including large-scale watershed analysis, flood depth modeling, open channel flow, including interdisciplinary coursework on bridge design focusing on channel behavior and scour analysis as related to bridge footings and pylons. At Watershed Management Group, D'Arezzo applies his hydrological, geotechnical, and mechanical engineering training to analyzing drainage and erosion issues at residential sites, developing integrated rainwater harvesting site plans, sizing and designing tank collection systems, designing landscape greywater systems and creating integrated earthwork detention and retention basin systems.

Contracted Consultants
hydroGEOPHYSICS is a Geophysical firm in Tucson, AZ that specializes in subsurface imaging using non-invasive geophysical practices. They have provided geophysical surveys in support of other hydro related projects near the Sabino Creek area and other river restoration projects within Tucson. With the specific knowledge of bedrock depths and existence of shallow groundwater in the area they have proposed the use of electrical resistivity imaging in two profiles located in the axis of the Sabino Creek to help understand the shallow aquifer unit that will in turn support the broader conceptual model for the feasibility of the Sabino Creek Restoration project.

Lacher Hydrological Consulting, Laurel Lacher specializes in groundwater modeling to support baseflows in desert streams, water resources investigation, and water supply development for government entities. Also serves as technical expert in water rights and water supply damages litigation. Areas of expertise include: groundwater modeling, drought analysis, surface water modeling, flood-plain mapping, water supply well design and development, aquifer testing, and natural resources and water utility policy development.

In2Wells, Inc, Gary Hix is a registered professional geologist in Arizona and a certified well driller and pump installer. He is past president of the Southern Arizona Water Well Users Association and also a local resident in the Sabino Creek area and is trusted by many of the area's residents with regards to groundwater well pumping.

List of government funded assistance agreements: WMG has received three federal grant awards of similar size, scope and relevance to this proposal.

1. **Border 2012 Grant**, awarded in 2010, Grant Title: Building Community Capacity to Implement Stormwater Harvesting Practices in the Arizona Border Region, Grant Award # TAA11-001, 18 month project budget of $110,293. This grant was successfully managed and completed in October 2012.

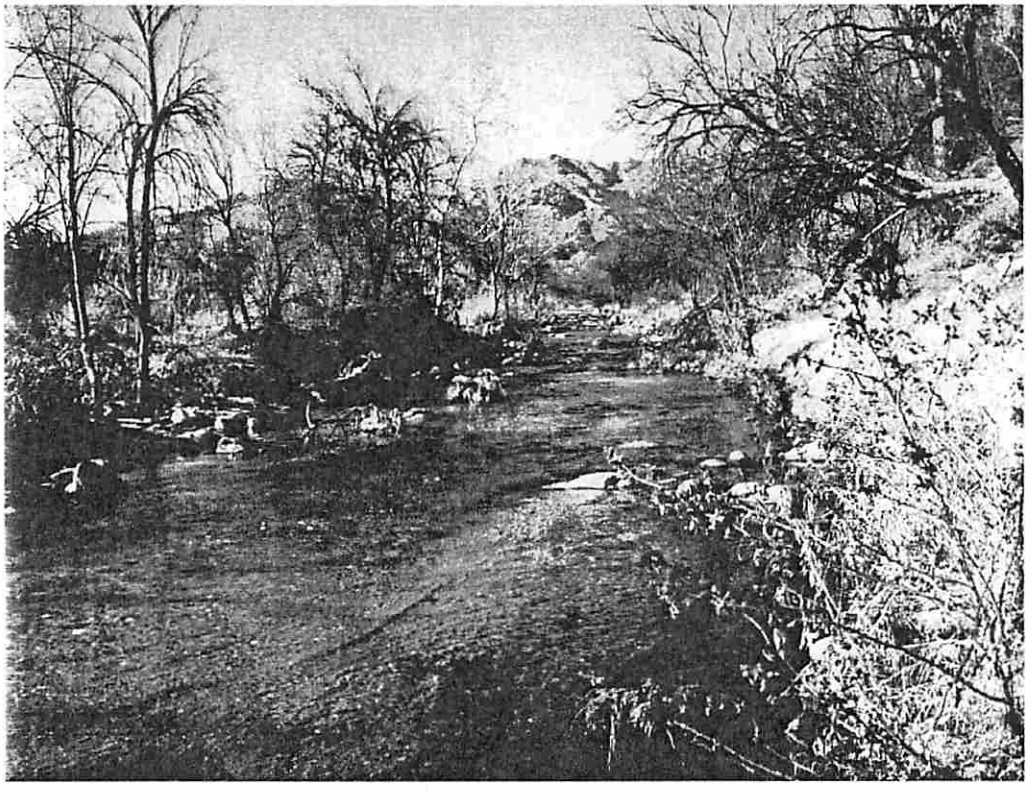
2. **EPA EE Grant**: awarded in 2010, Grant Title: Community-Based Green Streets – Green Neighborhoods Project, Grant Award #NE-83484001-0, Project Budget of $75,734. This grant was successfully managed and completed in March 2012.

3. **EPA EE Grant:** awarded in 2011, Grant Title: Closing the Nutrient Loop: A Community Desert Soils Education and Action Program, Grant Award #00T5881, Project Budget of $165,032. This grant was successfully managed and completed in May 2014

All three grants listed above were successfully managed and met all reporting requirements, including adequate and timely progress reports on achievement of the expected outputs and outcomes of the agreements and acceptable final technical reports.

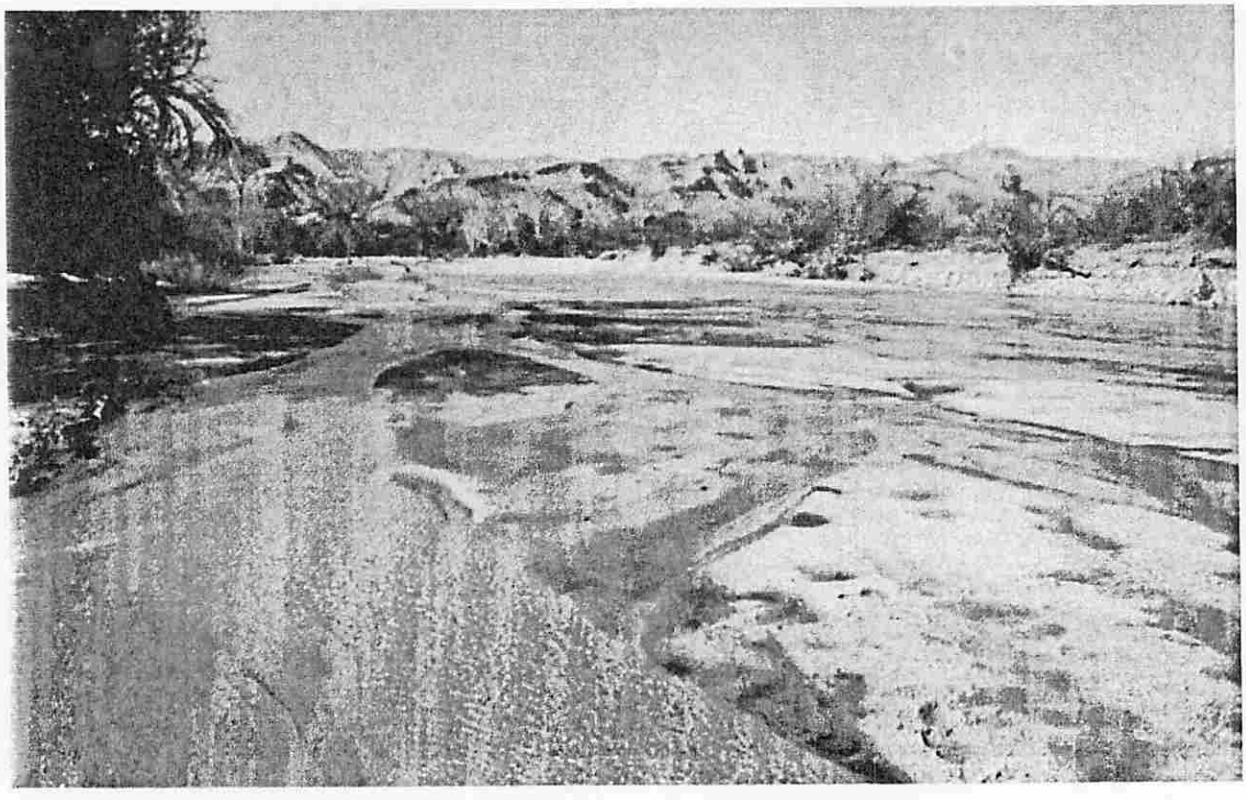
WMG staff successfully manages and completes these types of agreements by developing detailed work plans for accomplishing the vision, goals, outputs and outcomes of the agreements and implementing work plans in a timely, professional manner. Another key to WMG's success in meeting the objectives of these agreements is a high level of collaboration among staff members, as well as creative collaboration and clear communication with multiple project partners. WMG also has the detailed accounting system and other administrative infrastructure, including a full-time administrative staff member, necessary to support the successful management of grant agreements of this proposal's structure and scope.

Sabino Creek. Hughes Parcel. 2007 - Post 2006 Flood.

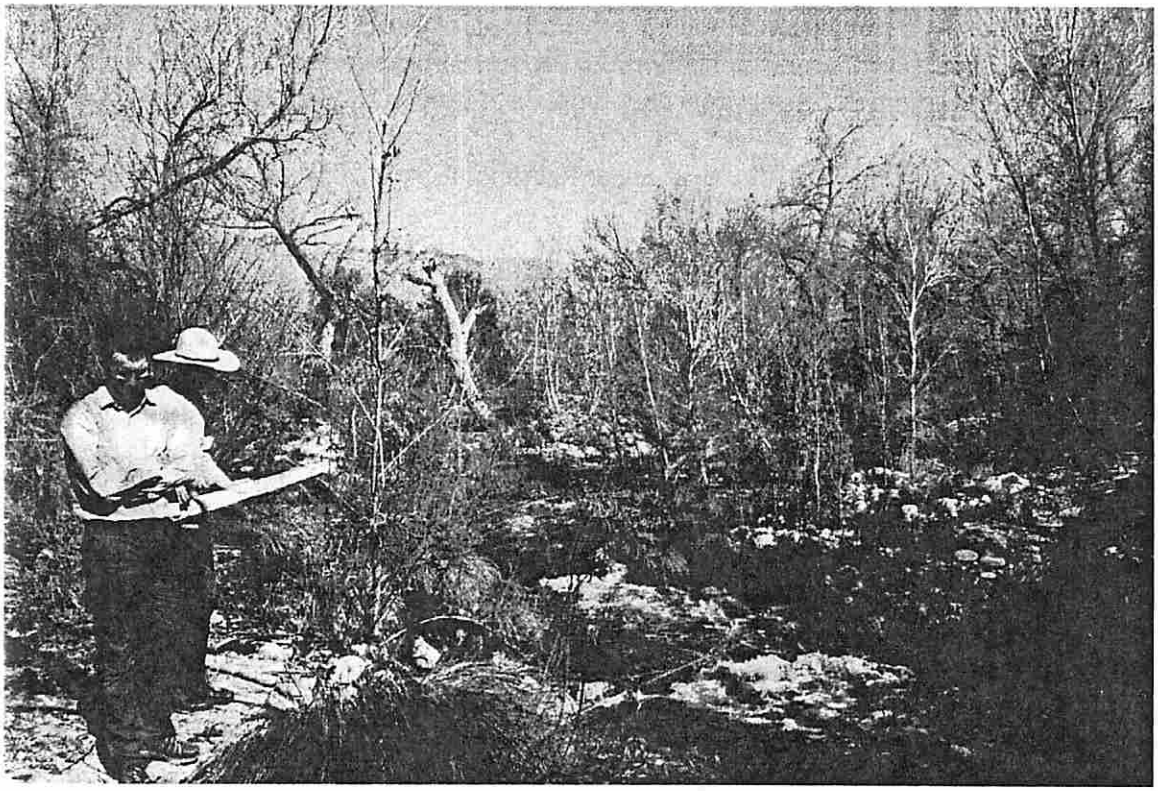


Sabino Creek. Hughes Parcel. Feb 14, 2009

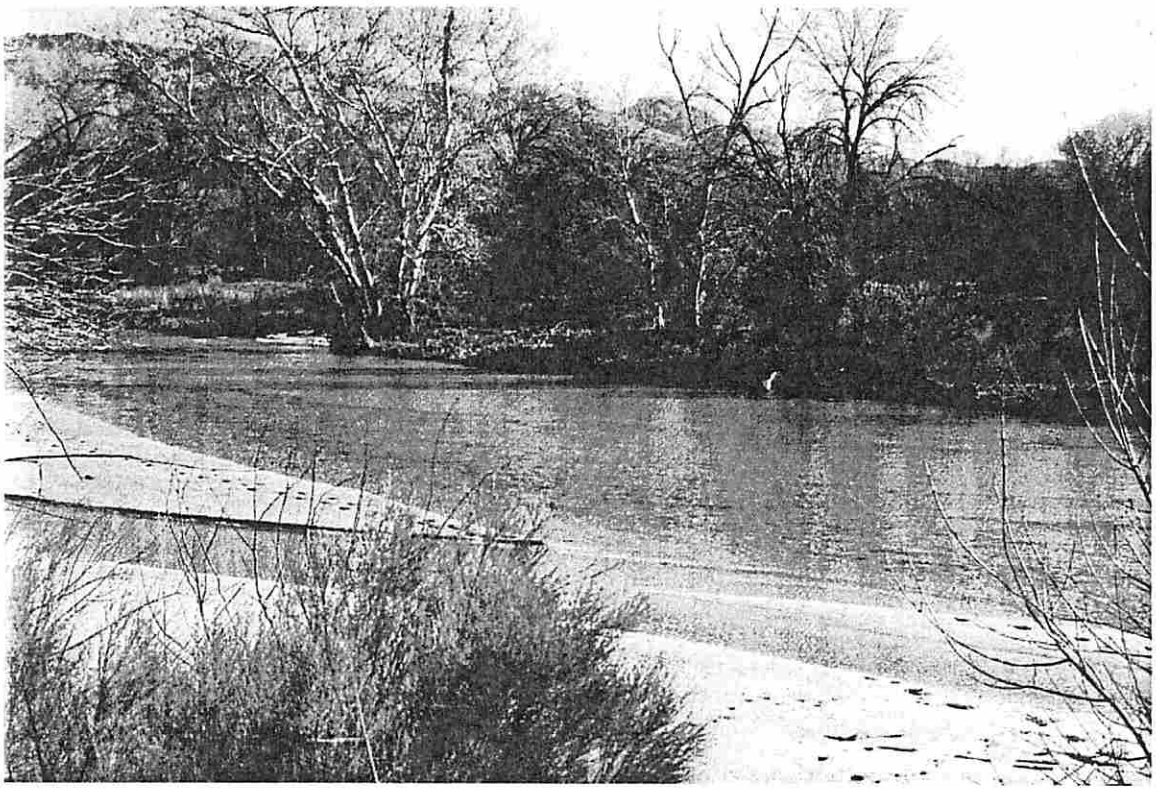
Sabino Creek. Woodin Parcel. Mid 1950s



Sabino Creek. Woodin Parcel. April 2008



Sabino Creek. At Hidden Valley HOA Park. Feb 2015



Sabino Creek. At Cloud Road. Feb 2015

Existing Plans, Reports, Information Relevant to the Project (summary paragraph for each plan/report with relevant portion or full report attached as an appendix)
Pima Association of Governments has produced a number of reports on shallow groundwater areas including:
Sonoran Desert Conservation Plan: GIS Coverages of Perennial Streams, Intermittent Streams and Areas of Shallow Groundwater. January 2000.
Sonoran Desert Conservation Plan: Water Usage along Selected Streams in Pima County, Arizona. July 2000.
Bingham Cienega Source Water Study. February 2001.
Water Usage near Shallow Groundwater in Pima County. March 2007.
Groundwater Withdrawals in Shallow Groundwater Areas: Eastern Pima County, Arizona 1984-2006. September 2008.
Shallow Groundwater Areas in Eastern Pima County, Arizona: Water Well Inventory and Pumping Trend Analysis. October 2012

As noted above Pima County, Pima Association of Governments, and Sonoran Institute have all been involved in recent work on shallow groundwater areas. In addition Pima County's Ecological Monitoring Program is monitoring groundwater, habitats, and species in priority areas (http://www.pima.gov/cmo/sdcp/monitoring/).

Arizona Land and Water Trust actively works throughout the region on the protection of open space and prioritizes areas with shallow groundwater and riparian habitats.

The Nature Conservancy is active in protecting and restoring shallow groundwater areas to benefit the San Pedro River.

The Central Arizona Phoenix Long-term Ecological Research Project is studying how urbanization and community norms impact desert systems including riparian areas.

In the Riparian Protection Technical Paper Water and Wastewater Infrastructure, Supply and Planning Study, Phase II. May 2009, the City of Tucson and Pima County explored opportunities for protecting environmentally sensitive natural riparian areas in Eastern Pima County connected to areas of shallow groundwater and perennial and intermittent streams supporting unique riparian vegetation. They noted that "multiple benefits accrue from protecting these sensitive areas, including slowing flood flows, reducing and preventing erosion, improving water quality, and conserving wildlife habitat, recreational opportunities, and scenic values."
Recommendations included:

- Continue exploring options for protection and enhancement of environmentally sensitive
- shallow groundwater areas.
- Evaluate the effectiveness of City and County programs and policies regarding the protection of environmentally sensitive areas from groundwater withdrawal, surface water diversions and riparian impairment.
- Where legally possible, prohibit new non-exempt wells and limit pumping of new exempt
- groundwater wells within and near shallow groundwater ecosystems.
- Initiate a public awareness and conservation campaign targeting exempt well owners in

- sensitive shallow groundwater areas to educate them on the important connection
- between water and riparian areas.
- The County, City, other jurisdictions and/or local water providers need to support water
- level data collection and aquifer monitoring programs in shallow groundwater areas.

The Water Resources Research Center at the University of Arizona has two projects, among many, that have direct connections to this proposed project - The Desert Water Harvesting Initiative and The Connecting Environmental Water Needs to Arizona Water Planning project.

The Desert Water Harvesting Initiative enhances outreach and communication between utilities, practitioners of water harvesting, academics, and interested citizens. The Initiative includes a two-year WaterSMART research grant to develop a decision guide to rainwater and stormwater harvesting; an online data clearinghouse for research and publications on water harvesting, low-impact development, and green infrastructure; and the Rainwater-Stormwater Professionals Networks that meets semi-annually at the WRRC to keep members abreast of current and planned activities, resources, and data. The tools developed through this project are aimed primarily at professionals and decision makers and will be very useful in our outreach to those groups, and as a model for the development of outreach strategies to community members. The project website -https://wrrc.arizona.edu/DWHI, has some preliminary resources, with the final products coming online late this year.

The Connecting Environmental Water Needs to Arizona Water Planning project uses information from the WRRC's 2010 Arizona Environmental Water Needs Assessment and other resources to collaborate with individuals and groups at the local, regional and state levels to explore what it means to consider the environment in water planning. The project has three aspects: 1) provide information on environmental water demands; 2) provide technical support to communities for their water management and planning; and 3) create a stakeholder driven "Roadmap" for considering the environment in Arizona water planning and management. With the goal to establish dialog among water users about voluntary, stakeholder-driven options for addressing the environment in the context of limited water supplies and existing water rights.

The Sonoran Institute has on going work on shallow groundwater areas through their Santa Cruz River Initiative with four components: Science-based Outreach; Water Harvesting and Restoration; Innovative Policy; and Water for the Environment
http://www.sonoraninstitute.org/where-we-work/southwest/santa-cruz-river.html

Pima County Office of Sustainability and Conservation has ongoing monitoring, as described above, in priority shallow groundwater areas. Pima County Regional Flood Control has management responsibility for many parcels of land in shallow groundwater areas. Flood Control has two .5 FTEs assigned to the management of these areas where they have holdings and over the next two years will be developing management plans for each property or complex of properties. They participated in the Joint City of Tucson and Pima County Water and Wastewater Study Oversight Committee that produced the recommendation cited above. Flood Control staff is very excited about this project and has pledged significant involvement in this project.

The proposed restoration efforts fits in well with efforts (see letters of support) to eradicate a previously widespread invasion of Arundo donax or Giant cane in Sabino Creek, an effort that also has garnered AWPF support (WPF 14-182). Their proposal to better understand the water budget of the watershed will help put this effort into perspective, particularly the likely redistribution of previously transpired Arundo water toward the health and regeneration of more native species. This effort (mostly prior to AWPF support) has logged about 10,000 volunteer hours, possibly removing 100,000 cane stems, which possibly were transpiring a million gallons (~3 af) of water a year.

Letters of Community Support
Please see attached letters of support

Evidence of Control and Tenure of Land including legal access
Please see attached Landowner Agreements

Citations:
Pima Association of Governments (PAG). 2000a. Sonoran Desert Conservation Plan: GIS Coverages of Perennial Streams, Intermittent Streams and Areas of Shallow Groundwater. January 2000.

Pima Association of Governments (PAG). 2012. Shallow Groundwater Areas in Eastern Pima County, Arizona. October 2012.

Winward AH. 2000. Monitoring the vegetation resources in riparian areas. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT

Table of project task timeline.

	Project Quarter and Year															
	2015	2016				2017				2018				2019		
Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																
2																
3																
4																
5																
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7																
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9																

PIMA COUNTY
FLOOD CONTROL

RIGHT OF ENTRY FOR FEASIBILITY STUDY

The Pima County Regional Flood Control District (the County), a political subdivision of the state of Arizona, hereby grants to the **Watershed Management Group** (Grantee(s)), permission to enter upon the following described land:

County-owned parcels 114-08-003E, 114-08-004A, 114-08-006A, 114-08-008C, 114-08-0700, 114-08-3460, 114-19-010N, 114-46-003D, 114-49-007F, 114-49-1170, 114-49-1180, 114-49-1200, 114-49-1210, 114-49-1220, 114-49-1230 (the Property), shown in Exhibit A.

This Right of Entry shall be for the purpose of **a Feasibility Study including geophysical, geomorphological, hydrological and habitat assessments** in accordance with the Arizona Water Protection Fund Lower Sabino Canyon Restoration Plan Grant Landowner agreement (exhibit B).

Conditions:

1. The work day must start no earlier than 7:00 a.m. and end no later than 6:00 p.m.

2. Grantee(s) are responsible for repairing any damage to County improvements. No native vegetation shall be removed without specific written permission from the County.

3. Grantee(s) shall be responsible for acquiring local, state and federal permits necessary, if any, to conduct the requested activity.

4. Grantee(s) shall keep the property in as good an order, condition and repair as reasonable use will permit and shall leave the Property free of trash to the extent feasible.

5. The County shall have the right, without notice or payment of any compensation to Grantee(s), to sell, destroy, or dispose of any personal property left on the Property after Grantee(s) has vacated or abandoned the Property or when this Right of Entry has been terminated.

6. Grantee(s) shall be responsible for avoiding any construction or maintenance activities that may be underway.

Suzanne Shields, P.E., Director
[illegible] • Phone: [illegible] • Fax: [illegible]

7. Grantee(s) shall indemnify, defend and hold harmless the County from any or all present or future claims, demands, causes of action or equity resulting from activities in connection with this Right of Entry.

8. Within 90 days of the completion of the project, Grantee(s) shall provide the County a copy of any final published reports, surveys or studies resulting from the permitted activities. Please mail documents to:

   Ms. Janice Hughes, PE, Civil Engineer
   Pima County Regional Flood Control District
   97 E. Congress Street, 2nd Floor
   Tucson, Arizona 85701

   You may also email documents (size permitting) to: janice.hughes@pima.gov.

9. At a minimum, a two (2) week notice shall be given to the County prior to any scheduled event on the Property. For parcel no. 114-08-006A, notification shall also be given to the the Property tenant a minimum of two weeks prior to any planned event date on the Property. Furthermore, the Property tenant shall be notified again 48 hours in advance of any planned event date as to the exact date and time the Grantee will be on-site. Tenant contact information will be provided to the Grantee(s) by the County upon issuance of this Right of Entry.

10. This permission shall commence **June 1, 2015** and terminate **June 1, 2020**.

PIMA COUNTY REGIONAL FLOOD CONTROL DISTRICT

By: _____ 5-11-15
William E. Zimmerman, Deputy Director — Date

ACCEPTANCE:

By: _____ 5-13-15
Date

Title: SR. PROGRAM MANAGER

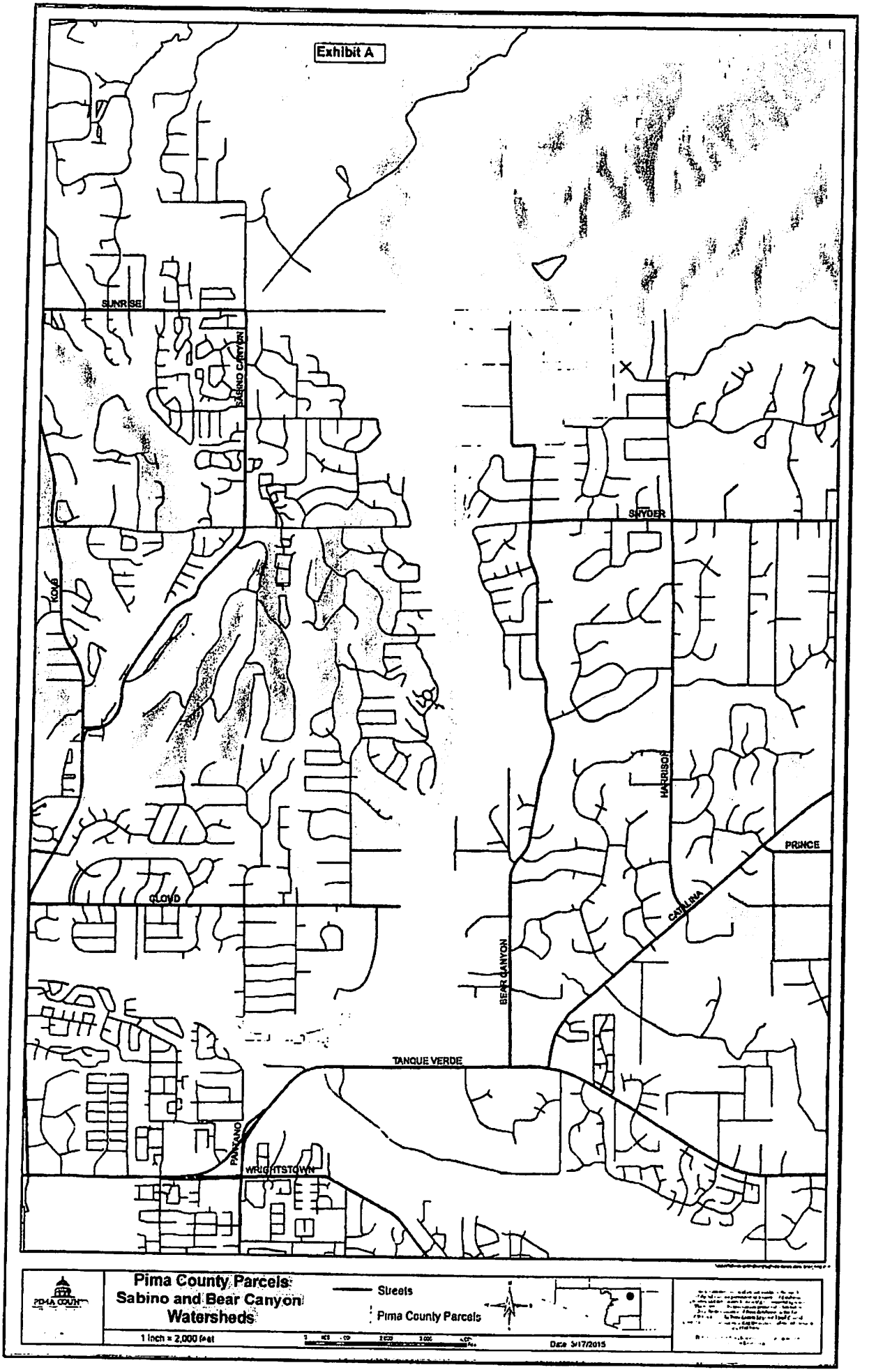


Exhibit A
SUNRISE
SABINO CANYON
SNYDER
HARRISON
PRINCE
CATALINA
BEAR CANYON
TANQUE VERDE
WRIGHTSTOWN
PANTANO
CLOUD
Pima County Parcels
Sabino and Bear Canyon
Watersheds
Streets
Pima County Parcels
1 Inch = 2,000 feet
Date 3/17/2015

Exhibit B
Watershed Management Group and Sabino Creek Landowner
Cooperation Memorandum of Understanding

This Landowner Agreement (Agreement), dated May 12, 2015 between Pima County Regional Flood Control District (Landowner) and Watershed Management Group (WMG), is entered into pursuant to shared objectives in protecting and restoring the Sabino Creek watershed.

Landowner hereby agrees to participate with WMG in conducting certain land and water studies on lands owned or managed in Pima County, State of Arizona, described as follows: all of, or within, Pima County-owned parcels 114-08-003E, 114-08-004A, 114-08-006A, 114-08-008C, 114-08-0700, 114-08-3460, 114-19-010N, 114-46-003D, 114-49-007F, 114-49-1170, 114-49-1180, 114-49-1200, 114-49-1210, 114-49-1220, 114-49-1230 (the Property).

The term of this Agreement will be for five years and be completed on May 12, 2020. This Agreement may be modified at any time by mutual written consent of the parties. It may be terminated by either party upon 30 days advance written notice to the other party(ies).

Landowner:
The Landowner or his/her land manager, with legal authority over land management decisions, guarantees ownership of the above-described land and warrants that there are no outstanding rights that interfere with this Landowner Agreement.

The Landowner will notify WMG of planned or pending changes in ownership. A change of ownership shall not change the terms of this Agreement. The Agreement and terms shall be in effect on the described land for the term of the Agreement.

The Landowner agrees to allow access (with advance notice) to WMG and the other cooperating partners to conduct the feasibility study as described in the work plan. If the site is selected for a restoration demonstration a separate agreement will be drafted, reviewed, and signed by the Landowner.

The Landowner retains all rights to control trespass and retains all responsibility for taxes, assessments, and damage claims.

WMG:
WMG will work with the Landowner throughout the entire Agreement term to support actions needed to ensure that the feasibility study is conducted per the Agreement.

WMG, its agents, or assignees will provide advanced notice prior to accessing the Landowner's property to conduct the feasibility study described in Attachment A, *A community-based approach to enhance flow in Sabino Creek Shallow Groundwater Area.*

WMG assumes no liability for damage or injury other than that caused by its own negligence, on the above acreage. WMG does not assume jurisdiction over the premises by this Agreement.

Project Description:
WMG is developing a lower Sabino Creek Restoration Plan as part of a Feasibility Study proposed to Arizona Water Protection Fund. The feasibility study will conduct geophysical, geomorphological, hydrological and habitat assessments along Lower Sabino Creek (USFS boundary down to the confluence with Tanque Verde Creek), and Bear Creek (USFS boundary down to the confluence with Sabino Creek). In addition and if agreed upon WMG will monitor private-well water levels to be used solely and anonymously to help develop a regional water balance.

Through the work described above WMG will develop a list of priority sites for restoration, and will then develop site specific plans and budgets to carry out restoration for selected sites.

WMG is partnering in this project with American Rivers, City of Tucson, Mayor's office, Metro Water, Pima Association of Governments, Pima County, Tucson Audubon Society, Tucson Water, University of Arizona Water Resources Research Center, US Geological Survey, US Forest Service, and the Arizona Water Well Association.

Signatures:

William E. Zimmerman, Deputy Director — 5-13-15 Date

Catlow Shipek, Watershed Management Group — 5-13-15 Date

Watershed Management Group and Sabino Creek Landowner Cooperation Memorandum of Understanding

This Landowner Agreement (Agreement), dated May 5, 2015, between Landowner and Watershed Management Group (WMG), is entered into pursuant to shared objectives in protecting and restoring the Sabino Creek watershed.

Landowner hereby agrees to participate with WMG in conducting certain land and water studies on lands owned or managed in Pima County, State of Arizona, described as follows: all of, or within, parcels 114-20-065R and 114-20-065Q.

The term of this Agreement will be for five years and be completed on May 4, 2020. This Agreement may be modified at any time by mutual written consent of the parties. It may be terminated by either party upon 30 days advance written notice to the other party(ies).

Landowner:
The Landowner or his/her land manager, with legal authority over land management decisions, guarantees ownership of the above-described land and warrants that there are no outstanding rights that interfere with this Landowner Agreement.

The Landowner will notify WMG of planned or pending changes in ownership. A change of ownership shall not change the terms of this Agreement. The Agreement and terms shall be in effect on the described land for the term of the Agreement.

The Landowner agrees to allow access (with advance notice) to WMG and the other cooperating partners to conduct the feasibility study as described in the work plan. If the site is selected for a restoration demonstration a separate agreement will be drafted, reviewed, and signed by the Landowner.

The Landowner retains all rights to control trespass and retains all responsibility for taxes, assessments, and damage claims.

WMG:
WMG will work with the Landowner throughout the entire Agreement term to support actions needed to ensure that the feasibility study is conducted per the Agreement.

WMG, its agents, or assignees will provide advanced notice prior to accessing the Landowner's property to conduct the feasibility study described in Attachment A, *A community-based approach to enhance flow in Sabino Creek Shallow Groundwater Area.*

WMG assumes no liability for damage or injury other than that caused by its own negligence, on the above acreage. WMG does not assume jurisdiction over the premises by this Agreement.

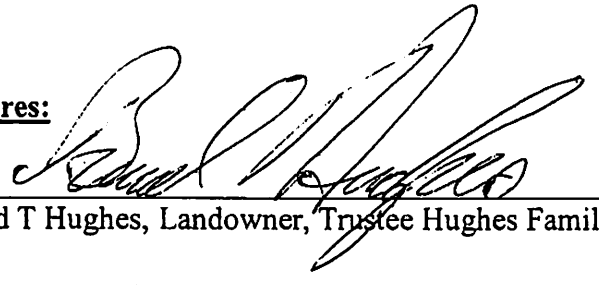
Project Description:
WMG is developing a lower Sabino Creek Restoration Plan as part of a Feasibility Study proposed to Arizona Water Protection Fund. The feasibility study will conduct geophysical, geomorphological, hydrological and habitat assessments along Lower Sabino Creek (USFS

boundary down to the confluence with Tanque Verde Creek), and Bear Creek (USFS boundary down to the confluence with Sabino Creek). In addition and if agreed upon WMG will monitor private-well water levels to be used solely and anonymously to help develop a regional water balance.

Through the work described above WMG will develop a list of priority sites for restoration, and will then develop site specific plans and budgets to carry out restoration for selected sites.

WMG is partnering in this project with American Rivers, City of Tucson, Mayor's office, Metro Water, Pima Association of Governments, Pima County, Tucson Audubon Society, Tucson Water, University of Arizona Water Resources Research Center, US Geological Survey, US Forest Service, and the Arizona Water Well Association.

Signatures:



Bradford T Hughes, Landowner, Trustee Hughes Family Trust — Date 5/14/15

Janice M Bedford-Hughes, Landowner, Trustee Hughes Family Trust — Date 5/10/15

Catlow Shipek, Watershed Management Group — Date

Watershed Management Group and Sabino Creek Watershed Landowner Cooperation Memorandum of Understanding

This Landowner Agreement (Agreement), dated April 18, 2015, between Landowner and Watershed Management Group (WMG), is entered into pursuant to shared objectives in protecting and restoring the Sabino Creek watershed.

Landowner hereby agrees to participate with WMG in conducting certain land and water studies on lands owned or managed in Pima County, State of Arizona, described as follows: all of, or within, 3600 N Larrea Lane Tucson AZ 85750-2474.

The term of this Agreement will be for five years and be completed on April 17, 2020. This Agreement may be modified at any time by mutual written consent of the parties. It may be terminated by either party upon 30 days advance written notice to the other party(ies).

Landowner:
The Landowner or his/her land manager, with legal authority over land management decisions, guarantees ownership of the above-described land and warrants that there are no outstanding rights that interfere with this Landowner Agreement.

The Landowner will notify WMG of planned or pending changes in ownership. A change of ownership shall not change the terms of this Agreement. The Agreement and terms shall be in effect on the described land for the term of the Agreement.

The Landowner agrees to allow access (with advance notice) to WMG and the other cooperating partners to conduct the feasibility study as described in the work plan. If the site is selected for a restoration demonstration a separate agreement will be drafted, reviewed, and signed by the Landowner.

The Landowner retains all rights to control trespass and retains all responsibility for taxes, assessments, and damage claims.

WMG:
WMG will work with the Landowner throughout the entire Agreement term to support actions needed to ensure that the feasibility study is conducted per the Agreement.

WMG, its agents, or assignees will provide advanced notice prior to accessing the Landowner's property to conduct the feasibility study described in Attachment A.

WMG assumes no liability for damage or injury other than that caused by its own negligence, on the above acreage. WMG does not assume jurisdiction over the premises by this Agreement.

Project Description:
WMG is developing a lower Sabino Creek Restoration Plan as part of a Feasibility Study proposed to Arizona Water Protection Fund. The feasibility study will conduct geophysical, geomorphological, hydrological and habitat assessments along Lower Sabino Creek (USFS boundary down to the confluence with Tanque Verde Creek), and Bear Creek (USFS boundary

down to the confluence with Sabino Creek). In addition and if agreed upon WMG will monitor private-well water levels to be used solely and anonymously to help develop a regional water balance.

Through the work described above WMG will develop a list of priority sites for restoration, and will then develop site specific plans and budgets to carry out restoration for selected sites.

WMG is partnering in this project with American Rivers, City of Tucson, Mayor's office, Metro Water, Pima Association of Governments, Pima County, Tucson Audubon Society, Tucson Water, University of Arizona Water Resources Research Center, US Geological Survey, US Forest Service, and the Arizona Water Well Association.

Signatures:

R K Woodin III — Apr 12, 2015

Name, Landowner(s) (Insert more signature lines if needed) — Date

Caitlow Shipek — 5-13-15

Caitlow Shipek, Watershed Management Group — Date

In2Wells, LLC

Gary L. Hix, Water Well Consultant
2470 N. Aileen Ave.
Tucson, AZ. 85715

gary.hix@cox.net
(520) 631-7113

May 11, 2015

Re: Support for Watershed Management Group's Proposal for Enhancing flow in the Sabino Creek Shallow Groundwater Area.

To Whom It May Concern,

I am writing on behalf of In2Wells, LLC to convey my support for Watershed Management Group's (WMG) grant proposal to the Arizona Water Protection Fund. Their proposal is to restore Sabino Creek using a holistic community-based restoration model in lower Sabino Creek to preserve and enhance surface flows within a shallow groundwater area.

WMG is developing a policy and advocacy with support from partnerships to link individual water conservation efforts to local riparian restoration, with an emphasis on surface flow enhancement. This unique initiative has identified the Sabino Creek Shallow Ground Water area as an ideal pilot location to innovate and test community based efforts. Preliminary stakeholder support for the effort has been positive based on a number of outreach efforts undertaken by WMG.

Funding received from the Arizona Water Protection Fund will enable WMG to expand the early stages of this initiative into a long-term project. WMG's success is critical to mutual efforts to preserve and restore surface flows in an expanding dryland, urban environment. Restoration and maintenance of surface water flows is vital to many homeowners in the Sabino Creek area who private water wells are directly linked to this precious resource.

This goal reflects the greater regional need to reduce urban water consumption, and the environmental and economic impacts associated with water withdrawals and diversions. Additionally, on-the-ground conservation and restoration actions as proposed will kick start local appreciation for the benefits of healthy urban watersheds and communities, which in turn fosters long-term behavior change and social adaptation to resilient dryland living. In addition, In2Wells will assist Watershed Management Group in coordination with other partner organizations by:

- Becoming a representative of a stakeholder group (local private well owners) with an interest in developing a long term restoration plan for Sabino Creek.

- Hydro-geologic and field technical assistance for planning and implementing stream restoration projects.

- Providing information and resources for the project principally in the area of private water well information, i.e., total number of domestic water wells, collection of water well data, interpretation of well construction and equipment installed, determination of typical annual water use by private well owners.

- Participating in outreach efforts to private well owners with personal contacts, conducting informative presentations-workshops, providing well maintenance materials, conducting well evaluations and groundwater audits for participating stakeholders.

The estimated value of my contribution to the successful completion of the grant objectives to be counted toward the match for this grant including personal time contributed and materials supplied is $ 5,000.00.

Sincerely,

Gary L. Hix

Gary L. Hix, R.G., CWD/PI

5/11/15

Re: Support for Watershed Management Group's AWPF Proposal

To Whom It May Concern,

I am writing in support of Watershed Management Group's grant proposal to the Arizona Water Protection Fund to Enhancing flow in the Sabino Creek Shallow Groundwater Area through a holistic community-based approach.

As I understand it, WMG is developing policy and advocacy initiatives to link individual water conservation efforts to local riparian restoration, with an emphasis on surface flow enhancement. This unique initiative has identified the Sabino Creek Shallow Groundwater area as an ideal pilot location to innovate and test community-based efforts. Preliminary stakeholder support for the effort has been positive based on a number of outreach efforts undertaken by WMG. Funding received from the Arizona Water Protection Fund will enable WMG to expand the early stages of this initiative into a long-term project. A key benefit of this program will be to empower riparian property owners to become better stewards of their riparian environment through community-based conservation and restoration actions. Another key outcome will be greater local appreciation for and understanding of basic riparian hydrology, which will foster sustained water use changes and community-wide recognition of resilient dryland living strategies.

This effort dove-tails with my efforts to eradicate a previously widespread invasion of Arundo donax or Giant cane in Sabino Creek, an effort that also has garnered AWPF support (WPF 14-182). Their proposal to better understand the water budget of the watershed will help put my effort into perspective, particularly the likely redistribution of previously transpired Arundo water toward the health and re-generation of more native species. This effort (mostly prior to AWPF support) has logged about 10,000 volunteer hours, possibly removing 100,000 cane stems, which possibly were transpiring a million gallons (~3 af) of water a year. I stand ready to support their effort through sharing my extensive knowledge of the "lay-of-the-land" and building on the positive land-owner response that we have had.

Sincerely,

James Washburne

Coordinator, Sabino Arundo Eradication Effort
and Adj. Asst. Prof. of Hydrology and Water Resources
The University of Arizona
POB 210011
Tucson, AZ 85721-0011
jwash@hwr.arizona.edu; 520-626-4107

PIMA COUNTY
SUSTAINABILITY & CONSERVATION

201 N. Stone Ave., 6th floor
Tucson AZ 85701

May 11, 2015

Re: Support for Watershed Management Group's Sabino Creek Proposal

Dear Water Protection Fund,

I am writing on behalf of Pima County Office of Sustainability and Conservation to convey our support for Watershed Management Group's grant proposal to the Arizona Water Protection Fund (AWPF).

The proposal to restore Sabino Creek fits well with the County's biological and riparian goals, which focus on maintaining ecosystem functions. Sabino Creek is one of the most important streams in eastern Pima County, and in the National Forest, is well-known as a recreation site. This proposal focuses on the downstream reaches, which are entirely non-federal.

As a former AWPF project manager, I believe Watershed Management Group (WMG) has the capacity to deliver a quality project under the grant conditions that meets the Fund's purposes. WMG is a well-run organization with an excellent track record. At Sabino Canyon, they are bringing the right people together to develop policy and advocacy initiatives that would link individual water conservation efforts to local riparian restoration, with an emphasis on surface flow enhancement. If successful, this approach could be a useful model for replication on non-federal lands elsewhere in the state.

The Sabino Creek Shallow Ground Water area is a great location to innovate and test community based efforts. Preliminary stakeholder support for the effort has been positive based on a number of outreach efforts undertaken by WMG. Funding received from the Arizona Water Protection Fund will enable WMG to expand the early stages of this initiative into a long-term project. WMG's success is critical to our mutual efforts to preserve and restore surface flows in an expanding dryland, urban environment.

Our office will assist Watershed Management Group in coordination with other partner organizations by:

- Appointing a representative to the stakeholder group tasked with developing the restoration plan for Sabino Creek;
- Providing assistance for planning and implementing stream restoration projects;

The estimated value of our contribution to the successful completion of the grant objectives to be counted toward the match for this grant is $2500.

Sincerely,

Julia Fonseca

Julia Fonseca
Environmental Planning Manager

C: Linda Mayro, Director

TUCSON AUDUBON SOCIETY

Leaders in conservation and education since 1949
Main Office
300 E. University Blvd., #120
Tucson AZ 85705
TEL 520.629.0510
FAX 520.623.3476

Jonathan Horst
Restoration Ecologist
520.971.6238
jhorst@tucsonaudubon.org

May 11, 2015

Re: Support for Watershed Management Group's Proposal for Enhancing flow in the Sabino Creek Shallow Groundwater Area through a holistic community-based approach

To Whom It May Concern,

I am writing on behalf of Tucson Audubon Society to convey our support for Watershed Management Group's grant proposal to the Arizona Water Protection Fund.

The proposal to restore Sabino Creek and its stated mission to pilot a holistic community-based restoration model in lower Sabino Creek to preserve and enhance surface flows in Shallow Groundwater Areas fits well with Tucson Audubon Society's mission to protect and maintain regional biodiversity through enjoyment of birds and their habitats. Further, Sabino Creek is an officially recognized Important Bird Area which Tucson Audubon Society has been working to protect and maintain.

With support from many partnerships WMG is developing policy and advocacy initiatives to link individual water conservation efforts to local riparian restoration, with an emphasis on surface flow enhancement. This unique initiative has identified the Sabino Creek Shallow Ground Water area as an ideal pilot location to innovate and test community based efforts. Preliminary stakeholder support for the effort has been positive based on a number of outreach efforts undertaken by WMG. Funding received from the Arizona Water Protection Fund will enable WMG to expand the early stages of this initiative into a long-term project. WMG's success is critical to our mutual efforts to preserve and restore surface flows in an expanding dryland, urban environment. This goal reflects the greater regional need to reduce urban water consumption, and the environmental and economic impacts associated with water withdrawals and diversions. Additionally, on-the-ground conservation and restoration actions as proposed will jumpstart local appreciation for the benefits of healthy urban watersheds and communities, which in turn fosters long-term behavior change and social adaptation to resilient dryland living.

In addition, Tucson Audubon Society will assist Watershed Management Group in coordination with other partner organizations by:

- Appointing a representative to the stakeholder group tasked with developing the restoration plan for Sabino Creek
- Technical assistance for planning and implementing stream restoration projects
- Soliciting volunteers for the restoration work from our membership

The estimated value of our contribution to the successful completion of the grant objectives to be counted toward the match for this grant is $600.

Sincerely,

Jonathan Horst

Karen Fogas, Executive Director

May 12, 2015

Re: Support for Watershed Management Group's Proposal for Enhancing flow in the Sabino Creek Shallow Groundwater Area through a holistic community-based approach

To Whom It May Concern,

Pima Association of Governments (PAG) is pleased support Watershed Management Group's grant proposal to the Arizona Water Protection Fund.

The proposal fits well with PAG's mission for sustainable and integrated regional watershed planning. PAG will be able to utilize the pilot results to develop region-wide strategies to benefit vulnerable areas and achieve groundwater balance across the greater Santa Cruz basin. PAG's riparian health assessments show that our local watershed is experiencing increasingly severe drought in an expanding urban environment. WMG's success is critical to our mutual efforts to preserve our region's rare lowland perennial creeks by fostering long-term social adaptation for resilient dryland living.

In support of this project, PAG can provide staff support valued at $1,680 as an in-kind contribution. Staff anticipates:

- Participating in the stakeholder group tasked with developing the strategic plan for Sabino Creek (provide venue for gathering input and advise on policies)
- Technical assistance for planning and implementing stream restoration projects (provide available data from PAG's shallow groundwater well inventory, flow mapping strategies and protocols we developed and have been adopted across the state, drought assessment data, available graphics, outreach, connections to contacts)

Sincerely,

Cherie Campbell
PAG Deputy Director
Pima Association of Governments

Pima Association of Governments 177 N. Church Ave, Suite 405, Tucson, AZ 85701 (520) 792-1093 *[tel]* (520) 620-6981 *[fax]* www.PAGnet.org *[web]*

METRO WATER DISTRICT

May 11, 2015

Re: Support for Watershed Management Group's Proposal for enhancing flow in the Sabino Creek Shallow Groundwater Area

To Whom It May Concern:

Metropolitan Domestic Water Improvement District supports the Watershed Management Group's grant proposal to the Arizona Water Protection Fund. As one of the smaller water providers in the lower Sabino Creek area, Metro Water District recognizes the benefits of Watershed Management Group's proposal to enhance Sabino Creek streamflow and to pilot a holistic community-based flow restoration model in lower Sabino Creek to preserve and enhance surface flows in shallow groundwater areas within the Tucson Active Management Area.

With support from many local partnerships, the Watershed Management Group is developing policy and advocacy initiatives to promote individual water conservation efforts as a means to restore surface flow impacted by historical groundwater pumping. This unique initiative has identified the Sabino Creek Shallow Groundwater Area as an ideal pilot location to innovate and test community based water conservation efforts. Preliminary stakeholder support for the effort has been positive based on a number of outreach efforts undertaken by the Watershed Management Group. Funding received from the Arizona Water Protection Fund will enable the Watershed Management Group to expand the early stages of this community initiative into a viable project. The sustainability of this effort is critical to preserve and restore surface flows in an urban environment and prolonged drought. This goal reflects the greater regional need to manage important water resources as well as understand the environmental and economic impacts associated with water withdrawals and diversions.

In addition, Metro Water District will assist the Watershed Management Group in coordination with other partner organizations by:

- Appointing a representative to the stakeholder group tasked with developing surface flow restoration plan for Sabino Creek.
- Technical assistance for planning and implementing stream flow restoration projects.
- Providing public information and outreach resources for the implementation phase associated with the project.

Sincerely,

Joseph Olsen, P.E.
General Manager

Metropolitan Domestic Water Improvement District
P.O. Box 36870 Tucson, Arizona 85740 (520) 575-8100 (520) 575-8454 FAX www.metrowater.com