

WaterSMART Grants: Small-Scale Water Efficiency Projects for Fiscal Year 2018

Funding Opportunity Announcement No. BOR-DO-18-F009

Cortaro Water Users' Association

As Agents for

Cortaro-Marana Irrigation District

12253 West Grier Road, Marana, Arizona 85653



Supervisory Control & Data Acquisition (SCADA) Project

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Technical Proposal and Evaluation Criteria

Executive Summary

Date: July 27, 2018

Applicant name: Cortaro Water Users' Association as Agents for Cortaro-Marana Irrigation District

City, County, State: Marana, Pima, Arizona

Project Summary

The proposed project will provide Supervisory Control and Data Acquisition (SCADA) to two of the Cortaro-Marana Irrigation District (CMID) wells and provide the necessary hardware and software to receive the data at the office. CMID wells deliver 30,000 acre-feet of water every irrigation season and currently rely on canal riders to monitor and operate wells while overseeing 65 miles of canals and pipelines. The proposed project will allow CWUA real-time access to changes in flow & operating conditions which will increase water efficiency and conservation. These sites are the beginning of a SCADA system that will eventually allow the district to remotely control wells and headgates across the District for greater efficiency and water and energy savings. See appendix, attachment A, Project Locations Map, for the locations that will be affected.

Length of Time and Estimated Completion Date

Most of the project will be installed in the November to January time frame when requests for irrigation water are at their lowest. Depending on when authorization is received we could begin installations as early as October 2018. The project would be completed no later than January of 2020 and could be completed in Spring of 2019 if authorization to proceed is received in early fall of 2018.

Federal Facility

The proposed SCADA Project will not be on a Federal facility.

Background Data

The Cortaro Water Users' Association (CWUA) is the agent for the Cortaro-Marana Irrigation District (CMID) who owns all the assets of the District. The District was organized in 1964 and the Cortaro Water Users' Association which has been known by various names was first organized in 1918 as Cortaro Farms. In 1946 holdings and land were sold to individuals and the Cortaro Water Users' Association was incorporated.

Currently CMID has a groundwater savings facility permit, a recovery well permit, and certificates of water rights. The groundwater savings facility can store up to 20,000 acre-feet of in-lieu water if the total withdrawn for the district is under 60,000 acre-feet. Certificate 33-43288 allows for 1800 acre-feet from the Santa Cruz River and Certificate 1292 allows for 29,190 acre-feet of appropriative surface water. Water withdrawn from wells in the lower part of the district is classified as groundwater.

The staff of CWUA maintains ditches, canals, and 42 wells and 3 pumps serving 10,950 acres of farm land in Pima County, Arizona. Delivered water has averaged 45,900 acre-feet over the last 5 years, with 10-15,000 acre-feet being in-lieu water that is delivered by the Cental Arizona Project and stored for customers including the Bureau of Reclamation, Arizona Water Banking Authority, Ak-Chin Community, Metro Water and others. Water deliveries varies based on crops and rainfall but is within +/- 5% of the average. Cotton and alfalfa are the main crops with wheat, barley, corn, and sorghum also being grown as crops are rotated. CWUA also maintains a pressurized non-potable system that provides landscaping water to 1193 homes, as well as parks and homeowners' associations in the area. This allows potable water providers to conserve their treated water.

The water delivery system for the irrigation of farm land consists of 65 miles of canals and pipelines. This includes 12 miles of underground cement and HDPE pipelines and 53 miles of open cement lined canals. The non-potable system consists of 16 miles of HDPE pipelines with another .6 miles to be added in the next year. Currently there are approximately 95 irrigation turnouts. There is currently no automated controls or SCADA within the district.

For 2018 CMID stored 2,000 acre-feet of water for the Bureau of Reclamation and 1,095 acre-feet for the Ak-Chin Community. This was the first year for both of those contracts which are anticipated to carry-on for many more years. The water for these customers and other in-lieu water customers is delivered to the district by the Cental Arizona Project (CAP) canal. CMID has been using the CAP to deliver water for storage for 20 years.

Project Location

The CWUA SCADA project is in Northern Pima County, Arizona in the Northwest part of the Town of Marana. See appendix, attachment B, for an area map with District and Water Users' boundaries. The latitude and longitude of the district office is 32 degrees 27 minutes 11.3 seconds North and 111degrees 13 minutes and 34.7 seconds West.

Technical Project Description

The proposed project will give canal riders and District staff immediate remote contact with wells 6, & 18 using Supervisory Control & Data Acquisition (SCADA) technology, utilizing both desktop and mobile technology. See appendix, attachment A, for a map of the wells locations. Real-time access will maximize data collection which will lead to well-informed, fact-driven decisions, ultimately increasing reliability of the water delivery systems and saving water in a drought-stricken area. The SCADA installation will provide for the automatic shut down and turn on control of the wells, as well as the sending of alarm notifications. All of which will provide real-time response to help save water, energy and reduce costly repairs caused by flooding.

Current CWUA delivery systems require canal riders and staff to travel to a well site to manually turn-on, shut-off, check to see if a pump is running, and to look for alarm conditions. Some of our well sites are in remote areas and others are in locations that can become inaccessible when rain occurs. Delayed responses result in, flooding, pumping of unneeded water, and damage to District assets. Power brown outs are year-round occurrences that also require manual checking of each well that was being used to see if it is still running. The farmers in the area use siphon hoses to get water from their canal to their fields. When water levels drop due to pumps going down, they must reset all their siphon hoses once the water levels return. If this occurs in the evening or at night the pipes won't be reset until morning causing the farmers and us to lose valuable hours that could have been used for irrigating and delaying us from moving on to the next customer. This is especially critical in the summer with an average of more than 50 days of over 100 degrees. With the SCADA system in place we will be able to immediately know which wells went down, troubleshoot them and restart them or other wells to keep things running smoothly. Timely information is critical when obtaining control, conserving water, and providing reliable service. This project will be the foundation for the system that will expand across the district. See appendix, attachment D, SCADA Master Plan Summary.

Evaluation Criterion A – Project Benefits (35 Points)

Describe the expected benefits and outcomes of implementing the proposed project. What are the benefits to the applicant's water supply delivery system?

Benefits of this project include the ability to remotely shut off and turn on wells in the event of severe weather, or if the canal rider is not immediately available in the area. We will also be able to receive alarm notifications immediately which will be very helpful during the frequent power brown outs. Well 6 is in an area where frequent weather and power events occur and was chosen for this initial phase due to this. This will conserve water by allowing us to immediately stop or start a well and only deliver water where and when it is needed. This is especially helpful during monsoon

season where one area of the district may need immediate shut off due to heavy rains and other areas may need to be restarted after a power failure to continue with irrigation. Shutting off the pumps in flooded areas will also prevent damage to the pumps and motors that could occur if they are left running. For the non-potable system (well 18) it will also give us the ability to track flow rates throughout the day. This will allow us to see the system capacity used and plan for when new wells need to be added to the system.

*If Other benefits are expected explain those as well. Consider the following:
Extent to which the proposed project improves overall water supply reliability*

The SCADA system will provide for a much more reliable irrigation system as it will allow wells to be turned on and off no matter where the canal riders are. When water deliveries are turned on they need to be timed to arrive at the given field at a specific time when the farmer is ready and available to take it. Likewise, when they are turned off it is critical to time the well shut off. If wells are not turned on or shut off at the appropriate time it can result in flooding or lack of water and the need to reset siphon pipes for nearby farmers.

For the non-potable water system (Well 18) receiving the fault messages in real-time will enable a quicker response time to get the system up and running again. Currently we only find problems with the system when a canal rider visits that location or when a customer calls to complain. Most of the time we find out about the system being down from customers who call to complain about low/no water pressure. Due to time constraints the canal rider can only visit the site 2-3 times a day.

The expected geographic scope benefits from the proposed project (e.g., local, sub-basin, basin)

This project will save the district money by conserving water and electricity, by enabling us to shut-off wells remotely so that they are only running for the exact amount of time that they are needed. The unused water will remain in the aquifer, for later use by us and other local water companies. The District is located along the Lower Santa Cruz River and within the Tucson Active Management Area (AMA) which is managed by the Arizona Department of Water Resources (ADWR). Saving groundwater in this area has been a focus of the state since 1980 and with the extreme drought and low reservoir levels in the lower Colorado River Basin it is even more critical today. The Bureau of Reclamation and ADWR are currently working on Drought Contingency Plans that include this area.

Extent to which the proposed project will increase collaboration and information sharing among water managers in the region.

The construction and results of this project will be shared with the Avra Valley Irrigation District, the Red Rock Irrigation District and the Town of Marana. CWUA board members/landowners serve on these irrigation district boards as well as the Town Council. Collaboration between these entities is already occurring and will continue going forward.

Any anticipated positive impacts/benefits to local sectors and economies (e.g., agriculture, environment, recreation, tourism)

This project will help the district to better control costs which will help agriculture in the area remain competitive by delivering water where and when it is needed to maximize crop yield.

Extent to which the project will complement work done in coordination with NRCS in the area (e.g., with a direct connection to the district's water supply). Describe any on-farm efficiency work that is currently being completed or is anticipated to be completed in the future using NRCS assistance through EQIP or other programs.

No work is currently being done with the NRCS. We do participate in the Tucson, Arizona Active Management Area Groundwater Users Advisory Council meetings which promote the conservation of water for the Tucson AMA.

Evaluation Criterion B – Planning Efforts Supporting the Project (35 Points)

Describe how your project is supported by an existing Planning effort.

This project is the result of a system analysis project done by the District and George Cairo Engineering. This is the first phase in a multi-phase plan to implement electronic controls across the district. See Appendix D for a Summary of the overall Plan.

Does the proposed project implement a goal or address a need or problem identified in the existing planning effort?

The system analysis revealed that the negative effects of delays in turning on and off wells and problem notification could be solved by having a Supervisory Control and Data Acquisition (SCADA) system with the immediate ability to receive system error messages and turn on and off wells. This will save water and energy, as well as prevent possible damage to the system.

Explain how the proposed project has been determined as a priority in the existing planning effort as opposed to other potential projects/measures.

The system analysis looked at where SCADA controls would be the most helpful, and where they could be implemented without expensive upgrades to the current wells. This project represents Phase I of the plan and the wells chosen will provide the base of a system which can easily be expanded to include other wells within the northern part of the District. As this is the District's first SCADA installation it was also determined to connect wells that were similar in their electrical configuration and that didn't require a lot of extra work to make them SCADA ready. These considerations determined which wells will be implemented during the first phase.

Evaluation Criterion C – Project Implementation (10 Points)

Describe the implementation plan for the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.

Major Tasks	
Date	Description
Sep-18	Complete Environmental Review with the BOR
Sep-18	Determine Hardware needed for each site
Sep-18	Determine Software Layout and programming needed
Oct-18	Replace Controller at Well 18
Nov-18	Installation of Hardware at all Sites
Dec-18	Installation and testing of all Hardware and Software
Jan-19	Complete punch lists items and testing of system

This schedule is based on approval by September 1, 2018. If approval is delayed beyond this, it may require parts of the installation to wait until Fall/Winter of 2019 when our water deliveries are at their lowest point.

Describe any permits that will be required, along with the process for obtaining such permits.

No Permits will be required as we are adding electronic components to existing sites and facilities. Radio towers from an old radio dispatch system can be used to transmit the data so no new construction will be needed in this phase.

Identify and describe any engineering or design work performed specifically in support of the proposed project.

George Cairo Engineering has been involved with the development of the SCADA Master Plan, Evaluation of Vendors and determining the site priority. Interactive Controls will be providing the software programming and design work for the SCADA system.

Describe any new policies or administrative actions required to implement the project.

Meetings to follow-up on tasks, and assignments will be held with staff and contractors. Training will need to be done to teach the canal riders and staff how to view and operate the SCADA equipment remotely.

Describe how the environmental compliance estimate was developed. Have the compliance costs been discussed with the local Reclamation office?

The environmental compliance estimate was developed in consultation with Jessica Asbill-Case of the local Phoenix Bureau of Reclamation office. Installation will be on current CMID sites, little or no environmental issues are anticipated.

Evaluation Criterion D – Nexus to Reclamation (10 Points)

Is the proposed project connected to a Reclamation project or activity? If so how? Please consider the following:

Does the applicant receive Reclamation project water?

We receive water from the Central Arizona Project (CAP). For 2018 we are scheduled to receive 15,282 acre-feet of water through the CAP. Including 2,000 acre-feet from the Bureau of Reclamation, 1,095 acre-feet of water for the Ak-Chin Community and 2,500 acre-feet of water for the Arizona Water Banking Authority. We also receive water through CAP for two local municipal water companies. Our customer number is 1080. The water we receive from CAP is our customers water and we use it for irrigation and under our in-lieu water permit they receive credit for storing the water.

Is the project on Reclamation project lands or involving Reclamation facilities?

This project is not on Reclamation lands and does not involve Reclamation facilities.

Is the project in the same basin as a Reclamation project or activity?

This project is in the same basin as the Central Arizona Project which delivers water throughout Central and Southern Arizona.

Will the proposed work contribute water to a basin where a Reclamation project is located?

This project will help to conserve water in the Tucson Active Management Area which is currently experiencing drought conditions. The Central Arizona Project is also located in this area.

Will the project benefit any tribe(s)?

This phase of the project will not directly benefit any tribe. Later phases will indirectly benefit tribes as we will be able to more closely control and monitor any water that they store with us.

Evaluation Criterion E – Department of the Interior Priorities (10 Points)

This Project supports the following Department of the Interior Priorities.

1a. Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment.

We will be working with companies who have implemented this technology for other irrigation districts and water companies. This will ensure that we are using the best technology for our situation and that we will be successful with our implementation.

2. Ensure American Energy is available to meet our security and economic needs.

By using SCADA technology, we can conserve water and energy on the wells that will be updated. This will occur by running the wells only for the time they are needed and being able to shut them off in an emergency without having to go to the site.

3a. Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands.

This project's plan, implementation, and learnings will be shared with the Avra Valley and Red Rock Irrigation Districts and the Town of Marana where most of our District is located.

3b. Expand the lines of communication with Governors, state natural resource offices, Fish and Wildlife offices, water authorities, county commissioners, Tribes and local communities.

We have been in contact with the Town of Marana, viewing their SCADA system and capabilities. We have also talked with other irrigation and water districts in the area about their technology and will continue to share information with the Red Rock and Avra Valley Irrigation Districts so that they can duplicate the processes that would meet their needs.

Project Budget

Funding Plan and Letters of Commitment

The non-Federal share of the project cost will be paid by the Cortaro Water Users' Association as agents for Cortaro-Marana Irrigation District. These contributions will be monetary. The funds will come from tax revenue as well as water sales revenue. There is no funding from other Federal or non-Federal Partners.

Costs incurred before the project start Date

Some Engineering costs will be incurred before the project start date. They will be paid by CWUA and will not be a part of this project.

Summary of Non-Federal and Federal Funding Sources

Funding Sources Non-Federal Entities	Amount
CWUA as agents for CMID	\$20,050
Other Federal Entities-None	\$ 0
Requested Reclamation Funding	\$20,000
Total Amount of Project	\$40,050

Budget Proposal

Budget Item Description	\$/Unit	Quantity	Type	Total
Salaries and Wages				\$
Fringe Benefits				\$
Equipment				\$
Supplies & Materials				\$
Contractual				
Remote Terminal Unit & Install	\$11,000	2	each	\$22,000
Wonderware SCADA Software	\$3,400	1	each	\$ 3,400
Win911 Software	\$3,450	1	each	\$ 3,450
PLC Replacement Well 18	\$3,000	1	each	\$ 3,000
Local Operator Display	\$3,000	1	each	\$ 3,000
Electrical Installation	\$1,350	2	each	\$ 2,700
Office Master Station	\$3,000	1	each	\$ 3,000
Environmental & Regulatory Compliance per BOR recommendation				\$ 2,500
			\$	
Total Direct Costs				\$43,050

Budget Narrative

No Salaries or Fringe benefits were put into the budget as installation will be done by outside contractors. Wonderware software purchased will have 500-tag capability which will allow us to expand to other well sites without additional purchases. Win911 software will allow us to send alarm messages to operator smartphones, tablets, and computers. Both are standards in the industry that will allow us to fully utilize SCADA capabilities. Well 18 currently has a controller that is not capable of handling SCADA. It will need to be replaced and a new local operator screen installed. Remote Terminal Units (RTU) will need to be installed at each well site. Electrical Installation will consist of placing cabinets, conduit, and wires to provide power to the RTUs. The office installation will provide for a master station with surge protectors and battery back-up. Interactive Controls was selected to do the RTU and master station installation, as well as the programming and software installation. This was based on our previous experience with them as well as the similar projects they have done throughout Arizona, New Mexico, California, and Nevada. The Environmental and Regulatory Compliance costs were determined with Jessica Asbill-Case of the Phoenix BOR office. No issues are anticipated as we are installing electrical equipment at two existing well sites and our office.

Environmental and Cultural Resources Compliance

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The project does not take place in an environmentally sensitive area. Installations will be on existing well sites. Water is available on site if needed to minimize dust, No effect on water quality or animal habitat.

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project.

No endangered species or designated critical habitat are within the well sites.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.

There are no wetlands or other surface waters in our well sites.

When was the water delivery system constructed?

The wells were originally drilled in the late 1930's to mid-1950's. They are typically pulled every 5-10 years and parts are replaced as needed. The district has a program of updating 2-3 wells per year with new electronics including soft start controllers. The wells in this appropriation are some of our most technically advanced wells making it easier to install the SCADA system.

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

No headgates, canals or flumes will be modified for this first phase. We do plan to install self-leveling gates with SCADA capability in a later phase of our master plan.

Are any buildings, structures or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? Are there any known archeological sites in the proposed project area?

There are no buildings, structures or features in the irrigation district listed on the National Register of Historic Places. There are some known archeological sites within and bordering the district but none of the well sites to be upgraded are near them.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

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

Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

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.

Required Permits or Approvals

No Permits or approvals are required for installation of the SCADA equipment.

Official Resolution

The Official Resolution will be passed at the August 14th Board meeting and will be forwarded to the appropriate office that same week. See appendix C for an unsigned copy of the Official Resolution.

Unique Entity Identifier and System for Award Management

Cortaro Water Users' Association is currently registered with in the System for Award (SAM). Our CAGE code is 6RM36 and our DUNS number is 072434467.

Appendix - Following 4 pages

Attachment A

Project Location Map

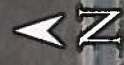
Legend

Well

Office

Well 6

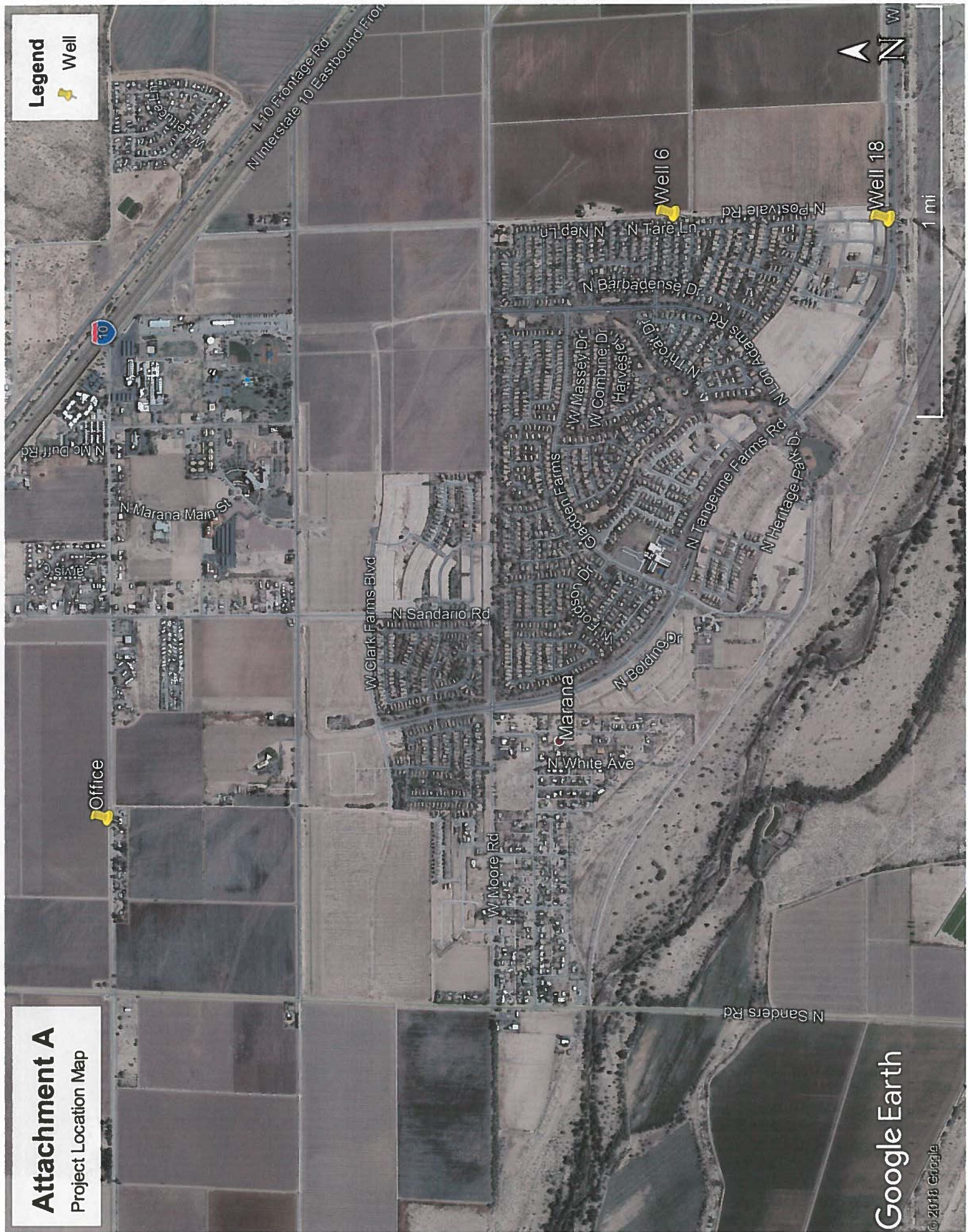
Well 18



1 mi

Google Earth

© 2013 Google



Attachment B

Cortaro Water Users' Association Boundaries

Cortaro-Marana Irrigation District Boundaries



Appendix Attachment C

RESOLUTION NO. 2018-8-14 Cortaro Water Users Association

As agents for **Cortaro-Marana Irrigation District**

WHEREAS, The Cortaro Water Users' Association Board must maintain, provide for, and service the water delivery system,

WHEREAS, The Board sees the need to construct the Supervisory Control and Data Acquisition (SCADA) Project to improve water and energy efficiency,

WHEREAS, The Board desires to obtain grant funding from the Bureau of Reclamation through the WaterSMART: Small-Scale Water Efficiency Grant.

NOW THEREFORE, BE IT RESOLVED that the Board of Directors, agrees and authorizes that:

1. The WaterSMART: Small-Scale Water Efficiency Grant application has been reviewed by the Board of Directors and supports the contents therein;
2. The Cortaro Water Users' Association is capable of providing the amount of funding specified in the funding plan; and
3. If selected for a WaterSMART: Small-Scale Water Efficiency Grant, the Board will work with the Bureau of Reclamation to meet established deadlines for entering into a cooperative agreement.

DATED: 14 August 2018

SIGNED:

Daniel Post, Chairman CMID & CWUA

ATTEST:

Laurie Hughes, Secretary

Appendix Attachment D SCADA Master Plan Summary

Phase 1

Purchase and installation of Wonderware and Win911 Software that can be used across all well sites and on head gates. Installation of a Master station at the office to receive signals from the well sites and installation at well sites 18 (non-potable system well) and 6.

Phase 2

Continue installation at well sites that are difficult to get to and may not be reachable during storm conditions and most used well sites. This include Wells 16F1, 21C2, 17I1, 16D1, 16D2, 8J, 36H, 26J3, 14, & 15.

Phase 3

Installation of SCADA on Main canal Gates and flood control gates to avoid damage to District assets and increase control and measurement along the main canal.

Phase 4

Installation at well sites that experience frequent down time. This phase will evaluate all of the remaining wells that have been upgraded with a controller and determine which priority of installation based on usage, distance, and accessibility.

Phase 5

Installation of SCADA at remaining wells. Controller upgrades will be done at the same time as SCADA control installations. This phase may require several years based on cost. Again usage distance and accessibility will be evaluated for priority.