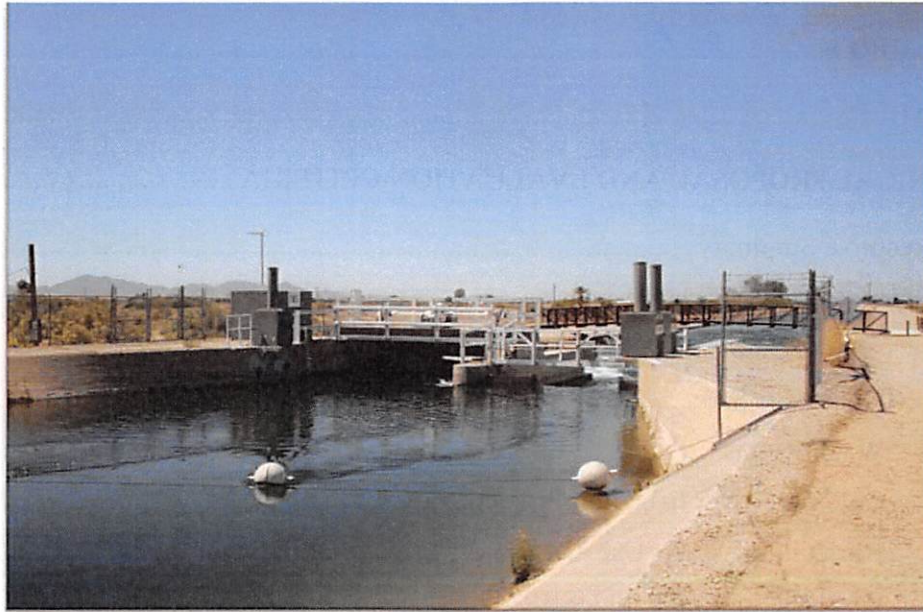


Grant Application

Colorado River Irrigation Project SCADA System Modernization



Submitted to:



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
Denver, Colorado
Attn: Mr. Darren Olson

*WaterSMART: Water and Energy Efficiency Grant Program for FY2019
Funding Opportunity Announcement No. BOR-DO-19-F004*

March 19, 2019

Submitted by:

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1 TECHNICAL PROPOSAL AND EVALUATION CRITERIA

Date: March 19, 2019
Applicant: Colorado River Indian Tribes
Address: Parker, La Paz County, AZ

1.1 Executive Summary

The Colorado River Indian Tribes (CRIT) are pleased to submit this proposal to the United States Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant program. CRIT believes that there is a clear need to take a prominent role in managing the water resources that sustain their culture and livelihoods. The project’s goal is to modernize the existing Supervisory Control and Data Acquisition (SCADA) System on the Colorado River Irrigation Project (CRIP) to result in enhanced irrigation water control and management. Expected results of this project include more accurate accounting of water diversions, distribution and usage, improved water delivery service to water users, water savings, decreased O&M costs, and overall better water management and sustainability. This proposed activity is estimated to cost \$550,000 and is being submitted in the Funding Group I category. The proposed project is expected to be completed within two years of award. The proposed project is located on the Colorado River Irrigation Project, which is owned and operated by the US Bureau of Indian Affairs (BIA) in trust for the Colorado River Indian Tribes.

1.2 Project Title and Location

This proposed project is titled: “Colorado River Irrigation Project SCADA System Modernization”, and it is located entirely on the Colorado River Indian Reservation. The Colorado River Indian Tribes are a federally recognized Indian Tribe. The Colorado River Irrigation Project (CRIP or Project) is located in La Paz County, Arizona. The project latitude is 33°56’N and longitude is 114°26’W. The Project area is approximately 80,000 acres (125 square miles). The map presented in Figure 1 shows an overview of the Reservation and the project area as well as its geographic location on the Colorado River in southwest Arizona / southeast California.

1.3 Background Data

The Colorado River Indian Reservation was established March 3, 1865 by the Federal Government for the Indian Tribes of the Colorado River and its tributaries. The Tribes include the Mohave, whose aboriginal territory includes the Reservation lands along the River, the Chemehuevi who were displaced when Parker Dam was constructed, and Navajo and Hopi who were relocated to the Reservation. The Mohave, Chemehuevi, Hopi, and Navajo Tribes, are collectively, the Colorado River Indian Tribes.

The Colorado River Indian Reservation lies entirely within the Lower Colorado River Valley (LCRV) which is the largest, hottest, and driest subdivision of the Sonora and Mohave Deserts (University of Arizona, 2008). The Reservation encompasses a total of 432 square miles (1,119 square kilometers), the majority of which is in the Parker Valley of Arizona (Colorado River Indian Reservation, 2009). The Colorado River runs through the Reservation delineating its Arizona and California land areas. Most of the Reservation is in western La Paz County in Arizona. Parts of the Reservation also lie in southeastern San Bernardino County, California, and northeastern Riverside County, California. However, the project area only falls within La Paz County, Arizona.

Tribal government was established under authority of the Indian Reorganization Act, (48 Stat. 984) 1934. Tribal government was established under authority of the Indian Reorganization Act,



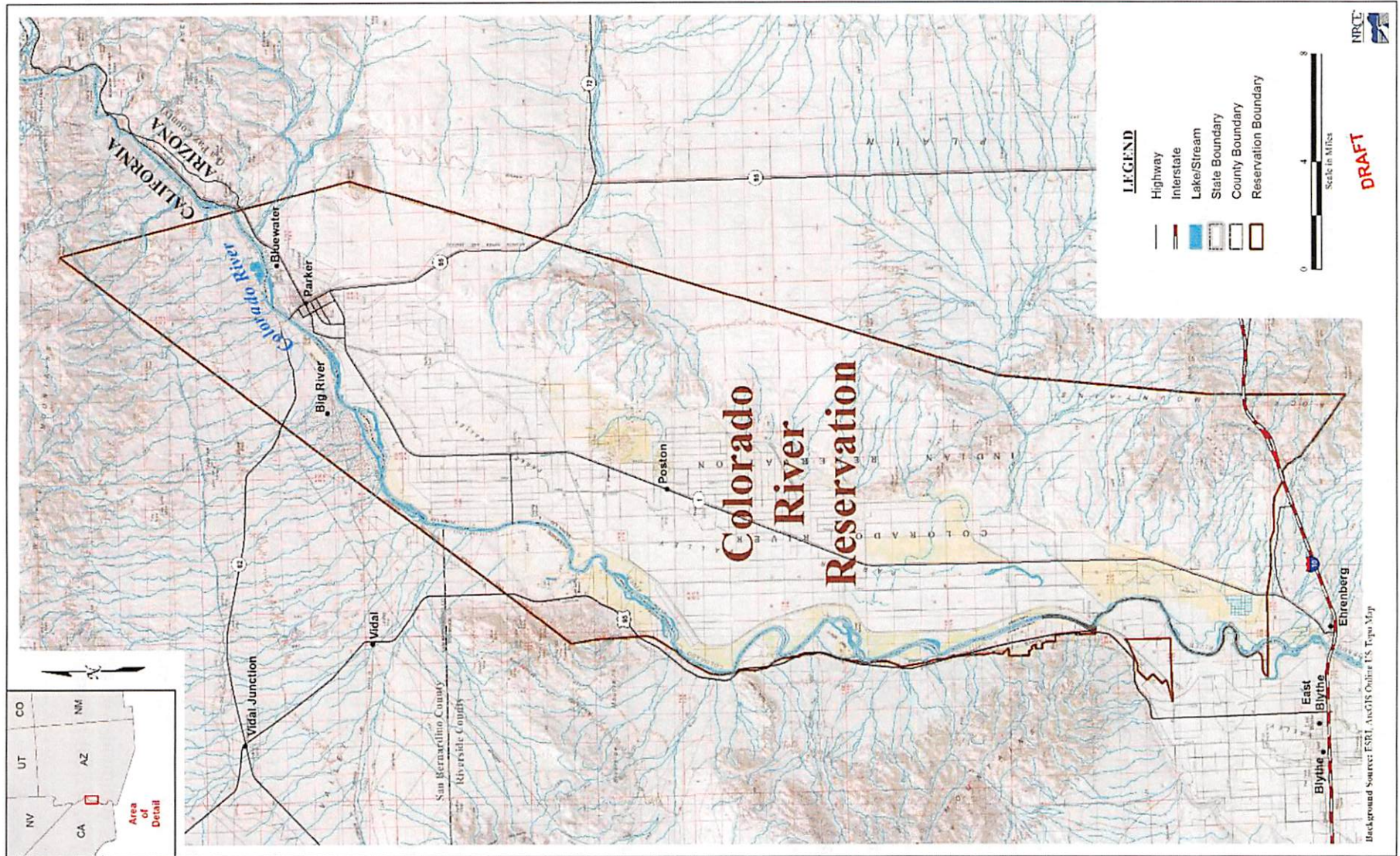


Figure 1. Overview Map of the Colorado River Indian Reservation.





(48 Stat. 984)1934. The Tribes are governed by a 9-member council including a Chair and Vice Chair. Council Members serve 4-year terms. All Council Members represent the entire Reservation.

The primary urban area on the Reservation is the town of Parker. Parker is the county seat of La Paz County, Arizona, and is located approximately 150 miles west of Phoenix and 150 miles south of Las Vegas. CRIT Tribal Headquarters are located in Parker, as is the U.S. Bureau of Indian Affairs (BIA), Colorado River Agency. Other urban areas on the Reservation include the Town of Poston and several small resort communities located along the Colorado River. The Colorado River provides major recreational activity and attracts visitors and tourists to the area. CRIT owns and operates the Blue Water Resort and Casino, a 200-room hotel with a variety of attractions approximately two miles east of Parker.

1.3.1 Hydrology

The Colorado River is a significant and, in general, the only source of water for the Reservation providing for agriculture in an arid environment as well as for recreation and tourism (University of Arizona, 2008).

The Reservation is located in an area characterized as an arid climate with hot, dry summers, and mild winters. Table 1 presents a summary of weather data for the period 1996-2015 collected at the Arizona Meteorological Network (AZMET) climate station at Parker, Arizona (Parker No. 1). Maximum air temperature averages around 105 °F in July and August, with winter minimum air temperatures averaging around 36-37 °F. Total annual grass reference evapotranspiration (ET_o) is estimated at 77.89 inches per year. Total annual precipitation is very low, averaging 3.12 inches per year.

Table 1. Mean Monthly and Annual Average Weather Data and Grass Reference Evapotranspiration, 1996-2015, for the Colorado River Indian Reservation (source: AZMET, <http://ag.arizona.edu/AZMET/08.htm>).

	Max. Temp. (°F)	Min. Temp. (°F)	Precipitation (inches)	Relative Humidity (%)	Wind Speed (mph)	Solar Radiation (Langley's)	ET _o (inches)
Jan	68.46	37.12	0.48	52.40	4.93	289.49	3.04
Feb	71.43	40.52	0.57	53.05	5.26	369.62	3.51
Mar	79.22	45.24	0.29	45.71	5.81	509.94	5.86
Apr	84.56	51.07	0.08	39.41	6.85	622.46	7.64
May	94.47	59.76	0.06	35.30	6.67	692.26	9.68
Jun	101.32	66.12	0.01	34.27	6.46	717.75	10.37
Jul	104.79	74.53	0.23	42.46	6.01	640.49	10.17
Aug	104.73	74.35	0.31	45.19	5.50	592.97	9.17
Sep	100.44	67.31	0.37	46.32	4.63	521.65	7.10
Oct	88.94	54.21	0.22	44.76	4.71	419.67	5.38
Nov	76.58	43.08	0.23	48.31	4.31	313.74	3.35
Dec	66.42	35.90	0.27	54.17	4.76	263.55	2.64
Annual	86.78	54.10	3.12	45.11	5.49	496.13	77.89





Historically, and currently, surface water diversions from the Colorado River make up the primary source of irrigation water supply for the Reservation. Reclamation prepares annual water accounting reports to provide final records of diversions of water from the mainstream of the Colorado River, return flows to the mainstream, and the consumptive use of such water within the Lower Colorado River Basin States of Arizona, California, and Nevada. The accounting reports document quantities of water drawn by surface diversion from the mainstream of the Colorado River, pumped directly from the mainstream, or pumped from wells in the alluvial flood plain.

Diversions for Colorado River Indian Reservation are reported for both Arizona and California in the USBR decree accounting reports. Diversions to Reservation land served by the Colorado River Irrigation Project (CRIP) are made at Headgate Rock Dam and are measured using the US Geological Survey (USGS) gage: 09428500 Colorado River Indian Reservation Main Canal near Parker, Arizona. Other diversions to Reservation lands in Arizona not served by CRIP are also reported for decree accounting purposes.

Return flows of water to the mainstem of the Colorado River are categorized as measured and unmeasured. Measured returns have historically been recorded at the following spill and wasteway gaging stations operated by the USGS:

- USGS Gage 09428505: Gardner Lateral Spill Near Parker, AZ
- USGS Gage 09428508 CRIR Upper Main Drain near Poston
- USGS Gage 09428510: Poston Wasteway Near Poston, AZ
- USGS Gage 09429030: Palo Verde Drain Near Parker, AZ
- USGS Gage 09429060 CRIR Lower Main Drain near Parker
- USGS Gage 09429070: CRIR Lower Main Drain Below Tyson Wasteway Near Ehrenberg, AZ

USGS Gage 09428510 replaced USGS Gage 09428508 CRIR Upper Main Drain near Poston in WY2010. USGS Gage 09429070 replaced USGS Gage 09429060 CRIR Lower Main Drain near Parker in WY2010.

There currently is no use of groundwater and wells to supply water for irrigation on the Reservation. The Reservation is situated within the Parker Basin of western Arizona. Stratigraphy within the basin consists of, in ascending order, bedrock exposed in the surrounding hills and mountains, fanglomerate deposits locally-exposed on the piedmont slopes of the mountains, the marine sedimentary deposits of the Bouse Formation, older alluvium, and alluvial deposits of the Colorado River and its floodplain (Metzger, Loeltz, & Ireland, 1973).

Groundwater in the floodplain alluvial deposits is hydraulically connected to the River. Shallow groundwater in the floodplain generally reflects the chemical characteristics of Colorado River water (Metzger, Loeltz, & Ireland, 1973). Wells completed in the sandy upper part of the Bouse Formation find groundwater under unconfined conditions. Deeper wells, drilled through the lower finer-grained parts of the Bouse Formation and into the underlying fanglomerate unit, find groundwater under confined (artesian) conditions.

Groundwater development in the basin is small as a consequence of the availability of surface water for irrigation and the low population in the basin. The ADWR estimated that less than 4,000





acre-feet were withdrawn in 1985 (ADWR, 2006). Current groundwater use in the basin is generally not reported and/or records are unavailable.

1.3.2 Water Rights

The Colorado River Indian Tribes have Colorado River water rights decreed by the United States Supreme Court in the case: Arizona v. California, 547 U.S. 150 (2006), also known as the 2006 Consolidated Decree. CRIT’s Colorado River water rights are the lesser of: 719,248 acre-feet of diversions from the mainstream, or, the quantity of mainstream water needed to supply the consumptive use required for irrigation of 107,903 acres of land and satisfaction of related uses. The rights are “present perfected rights” meaning they are considered to be in existence prior to the effective date of the Boulder Canyon Project Act, and that with respect to Federal reserved water rights they are rights to use of water on Federal reserved lands under Federal law whether or not the water has been applied to beneficial use (Arizona v. California, 2006).

The Colorado River Indian Reservation land is divided between the states of Arizona and California, and the water rights are accordingly partitioned for use in the two states. Priority dates are associated with the dates that CRIT land was reserved under Executive Order. The Arizona and California apportionments, land areas, and associated priority dates are summarized in Table 2 below. CRIT has the right to divert the lesser of 662,402 acre-feet of water from the mainstream, or, the quantity of mainstream water needed to supply the consumptive use required for irrigation of 99,375 acres of land and satisfaction of related uses in Arizona; and, the right to divert the lesser of 56,846 acre-feet of water from the mainstream, or, the quantity of mainstream water needed to supply the consumptive use required for irrigation of 8,528 acres of land and satisfaction of related uses in California. A unit diversion quantity of 6.67 ac-ft/ac applies in both states.

Table 2. Summary of CRIT Colorado River Water Rights. Source: Arizona v. California (2006).

State	Annual Diversion (ac-ft)	Area (ac)	Priority Date
Arizona	358,400	53,768	Mar. 3, 1865
Arizona	252,016	37,808	Nov. 22, 1873
Arizona	51,986	7,799	Nov. 16, 1874
Arizona Total	662,402	99,375	
California	10,745	1,612	Nov. 22, 1873
California	40,241	6,037	Nov. 16, 1876
California	5,860	879	May 15, 1876
California Total	56,846	8,528	
CRIT Total	719,248	107,903	

In the 2006 Consolidated Decree, the Supreme Court refers to the CRIT water rights as a quantity of water necessary to supply the consumptive use required for irrigation of crops on a certain quantity of land. However, they note that this is the means for determining the quantity of the adjudicated rights and does not mean the rights are restricted to irrigation or other agricultural usage.





1.3.3 Colorado River Irrigation Project

The primary economic activity on the Reservation has traditionally been dominated by irrigated agriculture. The main crops produced are alfalfa, wheat and other small grains, cotton, Bermuda grass hay, Sudan, and miscellaneous vegetable and other crops (onions, garlic, broccoli, potato, flowers). The Colorado River Irrigation Project (CRIP or Project) was initiated under the 1867 Appropriations Act, which included funding for the construction of canals from the Colorado River to serve the Indians on the Reservation. Additional appropriations were made in 1868 and 1872. Special appropriations for irrigation structures continued in the early 20th century.

Major expansion was completed in the 1940's to supply irrigation water to the Japanese internment camp on the Reservation at Poston. This included construction of Headgate Rock Dam in 1942. The Project is a federal irrigation project governed by 25 USC §381 et seq and 25 CFR Part 171. It is operated by the U.S. Department of Interior Bureau of Indian Affairs (BIA) for the benefit of the Colorado River Indian Tribes.

The Project is managed by the BIA and serves the majority of irrigated lands on the Reservation, with the exception of a few small leases on CRIT California lands, and one lease in AZ outside the Project service area. The Project serves approximately 80,000 acres of land that are assessed an annual fee for irrigation system operation and maintenance.

The primary diversion for the Project occurs at Headgate Rock Dam near the City of Parker. Headgate Rock Dam forms Lake Moovalya on the Colorado River. Water is diverted at the Dam into the Main Canal, which has a capacity of approximately 2,000 cfs (SFC, 1992). The Main Canal serves several lower order canals for conveyance and distribution of irrigation water throughout the Project service area. Several in-line structures are placed along the canals to adjust and maintain water levels throughout the system in order to provide relatively stable upstream head conditions at lateral inlets and farm gate turnouts. Farm irrigation operations take control of water delivery at the farm gate turnout and are responsible for irrigation water conveyance and distribution to the individual farm fields served by the turnout. The majority of the Project acreage is irrigated using surface flood irrigation methods, including graded border and level basin methods. The drainage network consists of approximately 50 spills to wasteways or open surface drains from supply canal overflow points or endpoints (BIA, 2002). Project drains collect spill and surface and subsurface return flow and convey this water to the Colorado River at several points located throughout the Project.

Approximately 232 miles of supply canals, which consist of the Main Canal, laterals, sublaterals, and sub-sublaterals, are used to convey water under gravity flow conditions from Headgate Rock Dam to Project farms (BIA, 2002). Of the 232 miles of supply canals, 90 miles are concrete lined and 142 miles are unlined earthen channels. The Project Main Canal is 18 miles long, 15 miles of which are concrete-lined. There are eight principal lateral canal offtakes from the Main Canal (19R, 19L, 27R, 27L, 42L, 46R, 73 and 90), not including smaller laterals, which are considered to reflect the function of lower order "sublateral" canals. Lateral canals comprise a total of 65 miles of channel, 36 miles of which are concrete-lined. In addition, there are 149 miles of lower order supply canals, of which 39 miles are concrete-lined.

There are six principal drains in the Project with additional feeder drains and wasteway ditches, comprising a total of 133 miles of drainage channels (BIA, 2002). Principal drains include the East





Drain, Upper and Lower Main Drains, Mesa Drain, Tyson Wasteway, Palo Verde Drain, and the Pump Drain.

There are no storage facilities on the Project.

Figure 2 provides an overview of the Project including the system canals, structures, and drains.

The Project has a Supervisory Control and Data Acquisition (SCADA) system (described in more detail below) which is operated by the BIA for remote monitoring of flow rates and water levels, and remote control of regulation structures. The CRIT Water Resources Department (WRD) is contracted by the BIA to manage SCADA sites and other continuous flow measurement sites on the Project through an Indian Self-Determination and Education Assistance Act, as amended, P.L. 93-638, 25 USC 450 et. seq. contract. The purpose is to support irrigation project operations. The purpose of these sites is to facilitate operational management and water delivery accounting. This includes continuous recording at the Main Canal and major lateral headings, inflow and outflow on 4 sublaterals serving 4 large leases, and at two primary high-volume spill locations. CRIT WRD provides maintenance and field troubleshooting support of SCADA infrastructure.

Periodic manual measurements at over 40 lateral and sub-lateral spill sites (generally to wasteways or open drains) is also contracted by the BIA through the WRD. The purpose of these measurements is an attempt to improve accounting of operational waste on the Project.

1.3.4 Agricultural Water Use and Project Irrigation Efficiency

NRCE (2016) performed an annual water balance at the irrigation project level to estimate overall Project irrigation efficiencies and to estimate operational water losses on the CRIP. The extent to which such losses are avoidable and recoverable represents a gross quantification of the potential volume of water that may be conserved. The period of study was 1996-2015. Total Project diversions and measured return flows were estimated using daily streamflow data for the USGS gage stations discussed above.

Measured diversions of water from the mainstream of the Colorado River into the CRIP Main Canal represent total inflows. Surface return flows to the mainstream are measured at four USGS gages. The USBR began including estimates of unmeasured return flows as a percentage of diversions beginning in 2003, and in the case of CRIP, unmeasured return flows were estimated to be 5.6 percent of diversions. That return flow factor was used to estimate unmeasured return flows for the prior years: 1996-2002 in the study period. Total return flows for each year of the study period were subsequently computed as the sum of the measured and unmeasured return flows. Consumptive use is computed as the difference between total diversions and total return flows for the CRIP. This difference includes not only crop consumptive use, but also open water evaporation, water use by phreatophytes and riparian vegetation on Project lands, as well as water that may be going into or being released from surface and groundwater storage. The above method is used in the USBR decree accounting reports previously discussed.





While it is not a true measure of Project irrigation efficiency, the annual ratio of estimated annual consumptive use to annual diversions was adopted as a quasi-project irrigation efficiency for the CRIP.

Total annual diversions from the Colorado River into the CRIP Main Canal, total Project measured and unmeasured return flows, estimated annual consumptive use using the decree accounting method, and estimated quasi-overall Project irrigation efficiency are presented in Table 3 for the period 1996-2015. Diversion flows and measured return flows presented in the table were prepared by NRCE using stream gage data directly from the USGS NWIS web site and thus may be slightly different than the data values in the USBR annual decree accounting reports. Trends in Project inflows, return flows, computed consumptive use and quasi-project irrigation efficiency over the 1996-2015 period studied are shown in Figure 3. An average quasi-Project irrigation efficiency of 55 percent is computed, with a range from 50-61 percent.

Diversions from and total return flows to the Colorado River show a slightly increasing trend over the period. This is especially apparent over the period 2005 to 2015. Return flows tend to follow the same trend as diversions suggesting the annual return flow volumes are responsive to diversion volumes. Surface water storage on the project is limited to small open water areas such as 12-mile slough and the total canal storage volume. On an annual time step the change in surface water storage is considered negligible. Total annual return flows are relatively stable suggesting the system is operating in nearly steady state condition. Thereby, annual return flow volumes do not appear to be heavily affected by increases or decreases in groundwater storage. In which case, the resulting consumptive use and efficiency estimates are not affected by the lag time for subsurface return flows to enter surface drains. Estimated quasi-Project irrigation efficiency shows a generally decreasing trend over the period studied, especially for the latter part of the period (2007-2015).

Estimated consumptive use is noted to decrease over the study period ranging from 296,935 AFY to 425,492 AFY. The estimated consumptive use by this approach lumps crop consumptive use together with open water evaporation losses and water use by phreatophytes and other riparian vegetation that are occurring on the CRIP. Thus, it should be noted that the overall Project efficiency estimates using this approach will be biased to the high side, since typically the Project agricultural water use efficiency would be computed using only agricultural crop consumptive use. Open water evaporation losses and water use by phreatophytes and other riparian vegetation are typically considered irrecoverable consumptive water losses that are incidental uses to the main purpose of applying irrigation water for crop production. Such incidental uses can be reduced, which would allow reduction in diversions, and lead to improved efficiency of agricultural water use. It is recognized that some phreatophyte/riparian water use, and therefore maintenance of green vegetation, is intentional, and, may be considered beneficial to the local ecosystem, providing for wildlife habitat and/or other Tribal cultural values. When such is the case, the consumptive use by non-agricultural species is considered a beneficial use. In this case, efforts should focus on developing or restoring desirable vegetation (e.g., mesquite) and removal of non-desirable vegetation (e.g., salt cedar). It should be noted that the consumptive use estimates by this approach also contains the error introduced in the estimates of unmeasured return flows.





Table 3. Estimated Overall System Efficiency for the Colorado River Irrigation Project based on USBR Decree Accounting Methodology for Estimated Consumptive Use (NRCE, 2016).

Year	Inflows (AFY)	Outflows (AFY)						CRIP Consumptive Use Estimate (AFY)	Overall Irrigation Efficiency Estimate (%)
	09428500	Measured return flows				Unmeasured Return Flows	Total		
		09428505	09428510	09429030	09429060/ 09429070				
1996	701,036	2,381	85,749	8,286	139,869	39,258	275,543	425,492	61
1997	616,359	2,540	85,954	10,301	140,258	34,516	273,569	342,790	56
1998	579,774	2,472	80,333	23,459	133,983	32,467	272,715	307,060	53
1999	586,058	1,654	78,016	24,946	151,688	32,819	289,123	296,935	51
2000	620,971	1,205	69,320	16,655	149,106	34,774	271,061	349,910	56
2001	578,220	833	80,281	26,402	136,066	32,380	275,962	302,258	52
2002	604,006	804	74,785	26,235	127,672	33,824	263,321	340,686	56
2003	595,920	2,078	65,647	21,882	124,513	33,347	247,467	348,453	58
2004	571,743	2,454	79,563	20,456	127,582	32,205	262,260	309,483	54
2005	575,980	2,654	81,517	19,920	112,592	31,785	248,468	327,512	57
2006	592,189	4,371	84,506	22,836	118,358	33,813	263,884	328,305	55
2007	600,890	3,576	72,621	20,003	119,190	33,696	249,086	351,804	59
2008	631,590	4,001	75,921	16,328	125,449	35,378	257,077	374,513	59
2009	638,178	4,351	80,598	14,065	145,289	35,727	280,030	358,147	56
2010	632,604	3,211	98,920	12,504	155,129	35,393	305,156	327,448	52
2011	643,612	4,420	100,623	12,615	154,861	35,824	308,344	335,268	52
2012	636,599	4,113	113,236	13,542	152,160	35,421	318,472	318,127	50
2013	608,959	4,831	106,439	13,726	135,160	33,908	294,063	314,896	52
2014	615,493	5,585	102,520	12,161	142,491	34,275	297,031	318,462	52
2015	590,209	6,247	113,719	9,502	127,062	32,838	289,368	300,841	51
Mean	611,019	3,189	86,513	17,291	135,924	34,182	277,100	333,919	55
Std Deviation	30,959	1,537	14,321	5,786	12,921	1,725	20,524	30,159	3
Coeff of Variation, CV, (Std Dev/Mean)	5%	48%	17%	33%	10%	5%	7%	9%	6%
95% Conf. Int (+/-)	61,918	3,074	28,642	11,571	25,842	3,450	41,049	60,317	6
Low	549,101	115	57,871	5,720	110,082	30,733	236,051	273,602	48
High	672,938	6,263	115,155	28,862	161,765	37,632	318,149	394,237	61



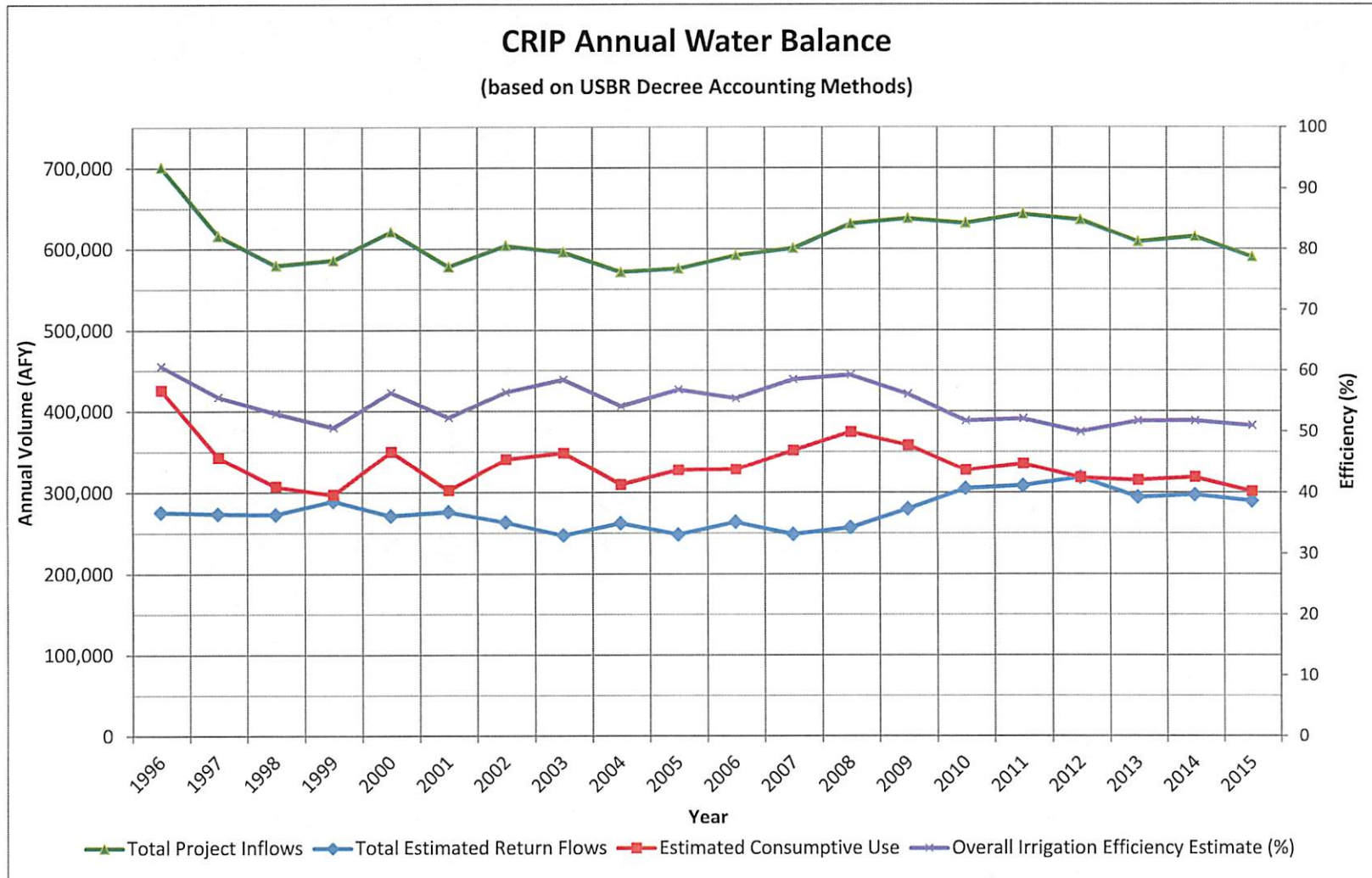


Figure 3. Water balance components and estimated project efficiency based on USBR Decree Accounting methodology for estimated consumptive use.





1.3.5 Past Relationship with USBR

CRIT coordinates regularly with the USBR Yuma Area Office on matters related to maintenance activities in the reach of the Colorado River that passes through the Reservation. These include planning and implementation of projects to improve backwaters and side channels along the reach, removal of alluvial wash sediment outflow fans, etc.

CRIT has and is currently participating in the Pilot Program established by Reclamation and four municipal entities in July 2014 to fund the creation of Colorado River system water through voluntary water conservation. See Table 4 below.

Table 4. Summary of CRIT Pilot System Conservation Agreements with USBR.

Project	Description	Date
System Conservation Implementation Agreement (SCIA) No. 16-XX-30-W0606	Water conservation through a reduction of consumptive use on the CRIP by fallowing of 1,591 acres of irrigated cropland for the period October 1, 2016 – September 30, 2018	September 14, 2016
SCIA No. 18-XX-30-W0634	Water conservation through a reduction of consumptive use on the CRIP by fallowing of 1,884 acres of irrigated cropland for the period October 1, 2018 – September 30, 2019	September 14, 2018
SCIA No. 19-XX-30-W0647	Water conservation through a reduction of consumptive use on the CRIP by fallowing of 3,705 acres of irrigated cropland for the period January 1, 2019 – December 31, 2019	February 25, 2019

1.4 Technical Project Description

1.4.1 Need for Assistance and Problem Statement

Problem Statement

The Colorado River Indian Tribes operate an existing Supervisory Control and Data Acquisition (SCADA) system on the Colorado River Irrigation Project. In addition to local automation at each site, the existing SCADA system provides remote monitoring of key operational parameters (flow, water level, gate positions); remote adjustment of target and alarm setpoints; and automatic alarm notification and report generation. Many of the existing SCADA sites are over 15 years old and are due for hardware modernization. The existing radio telemetry system is based on technology and equipment that has been discontinued and is no longer supported by its original manufacturer. In addition to not being technically supported the Project is no longer able to obtain replacement parts for the system in the event of an equipment failure. Also, the system no longer meets FCC operation requirements for narrow banding operation. Several control sites require replacement of outdated remote terminal units. There have been significant amounts of historical data either inaccessible or lost due to the current limited data management system. Some data are inaccessible, were lost., or were used only for realtime operations and not archived.





This project proposes to modernize the CRIP SCADA system by:

- upgrading the existing 900 MHz MDS serial radio system with a modern Hi-Speed Ethernet Radio System. The new proposed system will incorporate the implementation of high speed ethernet based radio communications network to provide stable and reliable communications throughout the entire Project area. It also provides the Project with the operational bandwidth to support modern SCADA equipment.
- replacing older remote terminal units (RTUs) at five of the current water level control, measurement, and monitoring locations with current generation RTUs. The proposed RTU incorporates the requirements similar to other existing SCADA sites with instrumentation and will operate seamlessly with other system sites currently in operation.
- replacing the current SCADA system computer workstation and installing new software SCADA HMI software and data management software. Typical SCADA computer functions will be maintained (alarming, data gathering, historical data, graphics, and user security) and combined with advanced alarm notification, secure multiuser remote access and report connectivity. A firewall will be installed during project implementation to ensure the system is protected from potential cyber security threats. New data archival and reporting software will also be installed and will offer much greater flexibility in accessing historical data and generating custom reports.

The proposed system as designed has enhanced flexibility for system expansion. NRCE (2017a; b) has identified and prioritized several sub-lateral headings and small spill sites where there is currently no water monitoring and measurement. The prioritized sites are recommended to be added to the SCADA system after it is modernized to improve operation and control of water distribution by system operators and thereby reduce water losses.

1.4.2 Status of Existing SCADA System

Supervisory Control and Data Acquisition (SCADA) equipment is installed at several locations on the CRIP to provide remote monitoring and control canal water surface elevations for flow regulation, and to measure and record parameters necessary to determine discharge rates (water velocity, stage or both). Stage of flow and rate of flow are measured on a continuous, frequent basis and logged on 15-minute intervals. Remote monitoring data are transmitted to a central computer system located in the BIA Poston Irrigation Office for processing, display, and storage. System operators monitor the stage and rate of flow and remotely operate the SCADA gates to change water level or flow rates to meet irrigation demand in various parts of the system. The two primary canal spill locations on the Project are also equipped with SCADA equipment: Main Canal spill to Poston Wasteway and Lateral 90 spill to Tyson Wash. There are currently 13 CRIP SCADA sites which provide flow measurement and/or upstream water level regulation, including 11 canal headings or along-canal sites, and the two main spill sites. These are listed in Table 5 below.

The existing radio system is based on technology and equipment that has been discontinued and is no longer supported by its original manufacturer. In addition to not being technically supported, the Project is no longer able to obtain replacement parts for the system in the event of an equipment failure. Also, the system no longer meets FCC operation requirements for narrow band operation.

There have been significant amounts of historical data either inaccessible or lost due to the current limited data management system. The period of record shown in Table 5 is based on 2006





commissioning of Phase 1 and 2010 completion of Phase 2 of the SCADA implementation plan. However, data from the period prior to May 2011 are inaccessible, were lost, or used only for realtime operations and not archived. In addition, while data for some SCADA sites at headings (Laterals 27R, 27L, and 42L) have apparently been collected, logged, and archived; the ability to extract any data for these headings has not been possible.

Table 5. Continuous regulation and measurement sites on the Colorado River Irrigation Project SCADA System.

Canal or Spill Site	Lat (dec)	Long (dec)	Period of Record	Operation
Main Canal Heading	34.16763	-114.277	2006 to present	Duplicate flow measurement, gate discharge. Flow control into Main Canal
Main Canal Check 185	34.13328	-114.315	2006 to present	Check 185 gate control and flow measurement and control into Laterals 19R and 19L
Main Canal Check 270	34.11148	-114.325	2010 to present	Check 270 gate control and flow measurement and control into Laterals 27R and 27L
Main Canal Check 420	34.07141	-114.324	2010 to present	Check 420 gate control and flow measurement and control into Lateral 42L
Main Canal Check 560	34.03446	-114.343	2006 to present	Head control for flow into 46R and Main Canal flow monitoring and measurement
Main Canal Check 730	34.01311	-114.39	2006 to present	Check 730 gate control and flow measurement and control into Lateral 73
End of Main Canal/Lateral 90 Heading	33.99938	-114.443	2006 to present	Head control and flow control and measurement into Lateral 90. Regulation of spill gate at end of Main Canal and measurement of spill into Poston wasteway
Lateral 90 Check 7 Bifurcation	33.86554	-114.478	2006 to present	Head control and flow control and measurement into Lateral 90-56 and Lower 90
Lower 90 Check 13 and Spill / Tyson Wasteway	33.74478	-114.477	2010 to present	Head control. Regulation of spill gate at end of Lower 90 and measurement of spill into Tyson wasteway

Additional details on the status of water monitoring and measurement on the Project have been assembled in a Water Measurement Inventory prepared by NRCE for CRIT (see NRCE, 2017a).

1.4.3 Project Objectives and Activities

CRIT proposes to contract with the Irrigation Training and Research Center at Cal Poly in San Luis Obispo CA and Sierra Controls in Reno NV to implement this project. Both have had long-standing work relationships with CRIT Water Resources and the CRIP SCADA system. Because of this long-standing work relationship and both entities have detailed knowledge of the Project SCADA System, it is proposed that both will be prime sub-contractors on this proposed project. Contracts with these firms is intermittent, but ongoing with CRIT. It would be extremely inefficient to change providers at this juncture in the Project history.

IIRC will be contracted to provide SCADA Plan development, code programming and commissioning. IIRC also provides quality control recommendations as needed to help identify corrective work.





Sierra Controls will be contracted as system integrator to provide equipment and hardware, build new RTUs, sensor terminations, radio installation and commissioning and office computer workstation installation and software programming.

Angie Ingram is the Acting Director for the CRIT Water Resources Department and project manager. She has attended a 1-week SCADA short course hosted at Cal Poly, ITRC and has received additional training in the field. She actively manages and maintains remote site SCADA equipment for the Project SCADA System.

Mr. Gary Colvin heads the BIA Irrigation office in Poston, AZ and was formerly the CRIT Water Resources Project Engineer in Irrigation. Mr. Colvin has also attended ITRC's SCADA short course and has managed the implementation of the existing SCADA system. Due to his extensive local experience, it is anticipated that he will be available for support and recommendations, if necessary.

The project scope includes the following specific modernization elements:

- Install a new computer workstation and software for reporting at the BIA Irrigation Office in Poston;
- Replace radio telemetry equipment as follows: Poston Repeating Tower Radio System, Parker Repeating Tower Radio System, Tyson Wash Site Radio, Headworks Site Radio, Station 185 Site Radio, Check 19R Site Radio, Check 270 Site Radio, Check 420 Site Radio, 46R Site Radio, Check 560 Site Radio, Check 730 Site Radio, Station 11/90 Site Radio, Poston Office Radio, Lateral 73 Check 2 Radio, Lateral 73 Check 3 Radio, Lateral 90 Check 7 (Lateral 90-56 and Lower 90) Site Radio, and Parker Office Radio;
- RTU replacement with modern RTUs at 5 locations: Headworks, Check 560, Check 730, Check 11/90, Lateral 90 Check 7 (laterals 90-56 and Lower 90).

Proposed project scheduling is shown in Table 6.

Objective 1: Develop SCADA Plan and Specifications

ITRC and Sierra Controls will meet with the CRIT Project Manager and perform site-by-site field visits of control and measurement structures, existing SCADA sites and the office. During each visit, the existing hardware is inventoried and functional levels are assigned. Additional details are gathered on existing communications, radio and sensor performance, functional requirements, database software, Internet services, data pathways, hardware and software specifications, etc. This will include review of radio path survey work accomplished and determination as to whether additional radio path survey work is needed. Additionally, a work plan for implementation will be discussed and agreed upon with the BIA Irrigation System Manager to ensure logistics and schedules will be carefully coordinated with Project water delivery operations.

Information gathered will form the basis of a SCADA Plan and Specifications for SCADA improvements listed in the above scope. This Plan will be prepared by ITRC.





Objective 2: Update Equipment for Compliance with Specifications, Procure Equipment, and build RTUs

As equipment supplier and system integrator, Sierra Controls will review its preliminary equipment recommendations and update as necessary to fully comply with the SCADA Plan and Specifications. Updated equipment lists and cost estimates will be prepared and submitted to the Project Manager.

Upon approval of the updated equipment lists and cost estimates, Sierra Controls will procure equipment and assemble the RTUs. Due to the age and equipment availability from the manufacturers many of the components that were utilized to build the existing RTUs are now discontinued thus requiring RTU rebuild with newer styled components

Objective 3: Prepare and Install New Computer Workstation, Software and Firewall

Sierra Controls will prepare the computer workstation , install software, configure the machine to run as a ClearScada HMI server, and test the computer system prior to shipping to CRIT. When the system is installed, Sierra Controls will migrate data from the current workstation to the new workstation. Sierra Controls shall transition CRIT reports from the existing internal ClearSCADA SQL Reports to Dream Reports.

A new firewall will be installed during project implementation to ensure the system is protected from potential cyber related security attacks as well as to provide continued security of the system going forward.

Objective 4: Prepare Control Code Programming

With factory wiring diagrams, the PLC code can be developed using International Electrotechnical Commission (IEC) 61131-3 standard languages. Any planned automation will be developed by ITRC with what is known as “distributed control”. Distributed control is a framework for robust and flexible canal control. Distributed control enables office operators to remotely monitor the status of the check structures, flows, etc. and to change target flow rates from the office.

Distributed control differs from “centralized” control by the exact location of where gate adjustments are calculated. Minute-to-minute closed loop automation computations are computed on-site by the local Programmable Logic Controllers (PLCs) installed at each automated site.

ITRC has an over 20-year history with canal automation, and more specifically at least 15 years of experience successfully providing all existing canal automation programming for CRIT. There are several key items related to the control code:

1. The control code must have quick reactions to unexpected flow changes and be capable of achieving a new steady state gate position within a reasonable amount of time.
2. All control code must be “tuned” to match the site-specific canals and structures. That is, the formulas have “constants” that are different for each structure. It is critical that tuning not begin in the field. Depending on the application, an appropriate unsteady canal model, simulation and optimization tools is required.



**Objective 5: Install, Test, and Commission New Radio Telemetry Equipment**

Sierra Controls will install, configure, calibrate and test the new radio telemetry equipment. Once the radios are installed and tested, software in the computer base station is updated.

Sierra Controls will commission the radio system upon verification of successful data polling from all remote sites.

Objective 6: Install RTU Upgrades at 5 Remote Sites

Sierra Controls will replace the existing site RTUs and will independently handle the complete removal of old equipment and installation of new equipment. New RTUs will interface with existing ClearSCADA HMI package and will operate identically to the previous RTU with the exception that a modern IDEC color touchscreen screen will be installed similar to the ones used at other more modern RTU locations on the Project.

Five sites listed above in the scope will be equipped with new RTUs in this manner

ITRC will develop programmable logic controller (PLC) code based on the combined results of unsteady hydraulic canal models, optimization and simulation (as needed). Logical bench testing is conducted to minimize field troubleshooting. The majority of the software work and physical wiring is verified remotely from an office. Successful remote testing results are an indicator of system readiness for PLC testing.

A field visit(s) are conducted to test and commission each PLC program at each of the new RTUs.

Objective 7: Documentation and Training

Each contractor shall prepare documentation respective to each of their individual technical contributions to the modernization.

Training of CRIT and BIA personnel in the operation and use of the computer base station, new SCADA components, data management and reporting will be provided. Because ditch riders tend to operate in specific sections of the Project, it is important to provide extensive training so that the local ditch riders become aware of the new responsibilities and are familiarized with expected automation performance and constraints. Structured staff training will be conducted on new system operations and maintenance as well.





Table 6. Project Implementation Plan and Schedule.

Objective No.	Description	Activity Timeline (months after notice to proceed)															
		3		6		12		15		18		24					
1	Develop SCADA Plan and Specifications	█	█														
2	Update Equipment for Compliance with Specifications, Procure Equipment, and Build RTUs		█	█	█	█											
3	Prepare and Install New Computer Workstation, Software and Firewall			█	█	█	█										
4	Prepare Control Code Programming				█	█	█	█									
5	Install, Test, and Commission New Radio Telemetry Equipment						█			█		█		█			
6	Install RTU Upgrades at 5 Remote Sites and Commissioning						█		█		█		█				
7	Documentation and Training															█	█



1.5 Evaluation Criteria

1.5.1 Evaluation Criterion A – Quantifiable Water Savings

NRCE conducted an inventory and assessment of Project flow measurement sites in 2016, including Project SCADA sites, continuous record sites, periodic measurement spill sites, and canal heading sites. A comprehensive report has been prepared to summarize findings and recommendations (NRCE, 2017a). A well-designed and maintained water measurement program is required for good water management and efficient water use at all levels of the irrigation project. Maintaining records of flow measurement is required to monitor water use and efficiency in time.

As discussed above, Supervisory Control and Data Acquisition (SCADA) has been established for several sites on the Project, with additional sites targeted for installation. SCADA installations involve remote monitoring and remote control of water levels and flows. Site installations include water level and flow sensors, automated gate structures, and data logging and communications equipment. NRCE (2017a) has identified approximately 40 sublateral headings and 35 active canal spill locations which do not have adequate water measurement/monitoring, nor SCADA, infrastructure installed. These include canal headings which serve approximately 5 or more turnouts, and all active non-SCADA spill locations in the CRIT WRD measurement program. NRCE has prioritized site improvements according to service acreage, spill volume, or other factors. Planning for SCADA needs to be coordinated with BIA Project staff, the Tribes, and water users to ensure effective implementation. The BIA System Manager has also expressed to NRCE the need for automation on Lateral 90 check structures in order to minimize spill flows into Tyson Wasteway. There are 14 check structures along Lateral 90 and only 2 are currently on SCADA: Check 7 at the Lower 90 / Lateral 90-56 bifurcation and the Check 13 Spill at Tyson Wasteway.

Improved monitoring and control of diversions and distribution of water, along with improved flow measurement, will result from the SCADA system modernization proposed in this project. Over time, this is expected to result in water savings. SCADA upgrades can bring operational benefits not directly associated with water savings, such as reduced operational costs and improved delivery service. A conservation plan for the Imperial Irrigation District estimated that 15,400 AFY could be saved after implementing SCADA for 61 lateral canals, on average 250 AFY per lateral (Davids Engineering et al., 2009).

Using data available for the period 2011-15, NRCE (2017b) estimated:

- operational spills at the two main spill points on the CRIP (Poston and Tyson wasteways) average approximately 60,000 AFY using flow records recorded by the existing SCADA equipment; and,
- the total annual losses due to minor operational spills at 42 spill sites (not currently equipped with water measurement and SCADA) averages 56,000 AFY. This estimate is based on periodic measurements made by CRIT WRD staff to estimate flows at these sites. Periodic measurements were transformed into a synthesized daily record and then aggregated by site and across all sites to monthly and annual estimates. The periodic nature of the measurements and the lack of accurate water measurement infrastructure at most of these sites contributes to a relatively high level of uncertainty in the discharge estimates at these sites.





Operational spills enter wasteways and open surface drains and eventually return to Colorado River. SCADA system modernization and upgrades will allow the system to be efficiently expanded with multiple additional water measurement/monitoring sites. NRCE estimated that 25% of spills from sites not equipped with SCADA could be saved through flow measurement and SCADA upgrades, and, from improved operations at sites already equipped. Water savings are conservatively estimated to be between 10,000 and 14,000 AFY. The range considers the uncertainty in the flow records collected at the periodic spill measurement sites.

1.5.2 Evaluation Criterion B—Water Supply Reliability

The proposed project modernizes the CRIP SCADA system. Future expansion of the SCADA system with the addition of several more water measurement sites will be facilitated. Improved data management—from collection to processing to custom report preparation to data archival is a direct benefit of the proposal. All of these in concert directly benefit the Colorado River Indian Tribes by providing improved and more accurate accounting of their Colorado River water allocation. This improved control, measurement, and accounting capability is fundamental to successful implementation of current and future Project improvements envisioned by the Tribes including fallowing, cropping pattern changes, operational spill capture and use, drainage water reuse, and others, that will allow the Tribes to increase the economic benefit derived from their Colorado River water rights, while also protecting those rights.

CRIT has openly expressed a desire to assist with drought planning and mitigation and currently is negotiating a key agreement with the State of Arizona to provide 50,000 AF/year for three years, during 2020-2022, as part of Arizona's Drought Contingency Plan (AZ DCP). CRIT's contribution will be stored in Lake Mead and help to stave off the declaration of a shortage. This action along with other components of the AZ DCP increase the water supply reliability to the State of AZ and the Lower Colorado River Basin. At the same time, CRIT Tribal Council strongly desires to maintain an agricultural economy on the Reservation, keeping current irrigated acreages in production. The key to this requires implementation of multiple water conservation interventions to increase efficiencies and reduce losses. The fundamental base for this is modernized water control and measurement on the Project. This proposed project provides that capability.

1.5.3 Evaluation Criterion D – Complementing On-Farm Irrigation Improvements

The majority of acreage on the Colorado River Irrigation Project is irrigated using low gradient border to near-level basin irrigation methods. Local stakeholders have described that crop scalding can occur with water ponded on fields during high temperature periods, so that fields are preferred to have some slope to avoid ponding. There are approximately 50,000 acres on the Project with unimproved conditions with respect to efficient flood irrigation. Farm losses to field tail-water runoff are unknown, however, based on information provided by the BIA Irrigation System Manager, they are small, and the greater on-farm losses occur as on-farm ditch seepage losses and deep percolation of water applied to farm fields.

NRCE (2017b) recommended that the Tribes encourage participation in the NRCS Environmental Quality Incentives Program (EQIP). Eligible measures related to irrigation include land leveling, ditch lining, large-flow turnouts, sprinkler irrigation systems, drip irrigation systems, irrigation pipelines, and others. Participants work with the local NRCS office to develop a conservation plan





for the proposed project. The participant must also obtain signature approval from the BIA Superintendent and the Tribal Council Chairman, as well as archaeology clearance from the Tribes and State Historic Preservation Office. After this, applications are submitted to the NRCS for award consideration. If successful, the participant moves forward with implementation of the project. NRCS approval is required for the design prior to construction and for the implemented project post-construction. After approval of the constructed project, NRCS distributes the reimbursement funds to the participant. The EQIP program has not been utilized recently on the CRIP, which is mainly attributed to land lease constraints, including inadequate lease duration for the participant to recuperate expenses. NRCE (2017b) recommended that the Tribes consider alternative lease conditions or other means to encourage participation in the EQIP. Farm lands operated and maintained by CRIT Farms Tribal farming enterprise are not subject to these constraints. A conservation plan for improvements on a 600-acre CRIT Farms tract was submitted in early 2018 but was not accepted to the EQIP program due to an NRCS assessment finding insufficient conservation benefits.

This proposed SCADA modernization project is expected to ultimately result in improved farm gate water deliveries in terms of the flow rate, timing, quantity, and duration of the delivery. All of these factors facilitate on-farm water management and improved application efficiencies. The proposed project is but one component and is a necessary first step to improving on-farm efficiency and overall project efficiency.

NRCE (2017b) has estimated aggregate costs for a typical improved flood irrigation scenario including precision land leveling, concrete-lined ditch construction, and large-flow turnout installation. Cost data are based on NRCS conservation practice fund distribution rates under the Environmental Quality Incentives Program (EQIP). A simple case (e.g., existing concrete ditch and acceptable field dimensions) may require only land leveling, with costs of approximately \$670 per acre. A more intensive case may require ditch construction and concrete-lining, field reconfiguration (shorter lengths of run) and leveling, with estimated cost of \$2,710 per acre. The key with these improvements is to design the field or border size with correct width, length, and slope to match the supply flow rate and soil conditions in the field. In order to estimate costs and water savings for Project-wide improvements, NRCE estimated that between 25,000 to 50,000 acres may ultimately be improved at an average cost of \$1,950 per acre (the average of the simple and intensive cases above) corresponding to approximately \$50 million for improvement of 25,000 acres. Water savings are estimated to be approximately 1 AFY per acre (AFY/ac). This assumes farm delivery of 7 AFY/ac and improvement in on-farm efficiency from 60 to 75%, corresponding to approximately 25,000 AFY savings if 25,000 acres are improved.

1.5.4 Evaluation Criterion E – Department of the Interior Priorities

The proposed project directly supports the Department of Interior priority in support of the White House PPP Initiative to modernize US infrastructure. The PPP Initiative is significantly enhanced in this proposal as a sovereign Federally recognized Native American Tribe—CRIT is a strong partner in this proposed effort to modernize facilities owned and operated by the US BIA in trust and on behalf of CRIT.





1.5.5 Evaluation Criterion F – Implementation and Results

1.5.5.1 Subcriterion F.1— Project Planning

Over the period 1015-2017, NRCE implemented and completed three studies for CRIT Tribal Council which effectively serve the purposes of a Water Conservation Plan. These studies had objectives of assessing water use efficiency, gaining an understanding of opportunities for both conserving water and improving beneficial use of CRIT’s water resources, and evaluating the economic returns of various Tribal water uses, while preserving and protecting CRIT’s Colorado River water rights. CRIT has expressed a desire to improve the economic return on its Colorado River water allocation as well as to improve irrigation efficiency to conserve water. CRIT is keenly aware of water shortage conditions in the Lower Colorado River Basin and is interested in making conserved water available under different mechanisms to forestall system shortages or to make water available for other system users who may be at risk if shortages are declared.

- *Agricultural Resource Management Plan: Phase I—Irrigated Agriculture Inventory and Issues* (NRCE, 2016). The primary focus of the study was to collect baseline information and data on water supply and use on the CRIP. Information and data over the period 1996-2015 were collected and summarized—weather and climate, soil and land resources, total cropped area, cropping patterns/crop mix, sources and characterization of water supply quantity and quality, CRIP water delivery and distribution system infrastructure, water delivery operations and management, flow distribution and control, methods of water ordering, water rates and allocation, and preliminary identification of potential structural and operational issues. On-farm irrigation methods and practices were characterized. Irrigation water requirements for the crops and cropped areas of the CRIP and water balance analyses of: (1) the Project inflows, return flows and consumptive use, and, (2) the Colorado River reach from below Parker dam to below the Palo Verde diversion dam were performed to develop estimates of Project level agricultural water use efficiency.
- *Water Measurement Inventory, Colorado River Irrigation Project* (2017a). The purpose of this study was to locate and describe all water measurement sites that are on, or, are related to the Project. A technical assessment of each water measurement site was performed to develop estimates of the accuracy and reliability of the measured flow rate data, describe any issues/deficiencies of the site (physical infrastructure, measurement location, type of measurement, rating equation used for conversion to flow rate, etc.), and recommend corrective measures. The water measurement data management system—data storage, archival, backup, processing, reporting, etc.--where do the collected raw data reside, what data QA/QC processes are used, who has access, how, what standard data processing and reporting is in place was evaluated. Water measurement site operation and maintenance procedures were reviewed. Locations on the Project where additional water measurements are needed were identified.
- *Agricultural Resource Management Plan: Phase II—Efficiency Analyses and Potential Water Conservation, Colorado River Irrigation Project* (NRCE, 2017b). This study assessed the conditions and operations of the Colorado River Irrigation Project and identified potential mechanisms to improve efficiency, with a goal of conserving water to allow expansion of irrigated acreage and/or make water available for alternate uses.





Appraisal level estimates of costs and water savings for conveyance and farm level improvements across the Project were developed. Of the total average annual Project diversion of 610,000 AFY, an estimated 300,000 AFY spills, seeps, or evaporates as non-beneficial use. Multiple system infrastructure rehabilitation needs were identified as first priority for improvements to improve system functionality. System modernization and other upgrades, including expansion of flow measurement and SCADA operations on the Project, construction and automation of re-regulation reservoirs, canal lining, and drain water capture and re-use are recommended. Improvements on-farm level to address significant water losses and improve crop production are also needed.

This proposed project to modernize the existing CRIP SCADA system is a necessary first step to (1) operational improvements and reliable water control and measurements, and, (2) reliable system expansion with fully compatible modern equipment. Both elements are required to achieve the estimated water savings. Improved data management and reporting will contribute immediately to better system accounting allowing trends in diversions and deliveries and spill to be monitored and analyzed. In addition, USBR decree accounting can be monitored in near real time to assess changes in CRIT diversions, return flows and consumptive use.

1.5.5.2 Subcriterion F.2— Performance Measures

The studies described above in Section 1.5.5.1 provide estimates of baseline Project conditions— estimates of Project diversion, consumptive use, and return flows, overall Project irrigation efficiency—prior to any improvements. Once the SCADA system modernization is completed, water balance analyses similar to those implemented and discussed in NRCE (2017b) will be repeated to identify changes in Project inflows (diversions) and outflows (crop water use, operational spills, seepage loss, evaporation, deep percolation). Note that: (1) diversion, consumptive use, and return flow components will necessarily need to be adjusted to reflect impacts of CRIT's proposed compensated System Conservation agreement with the State of Arizona (as part of the Arizona Drought Contingency Plan) on Project water balance components in order to allow comparison with pre-project water balance analyses, and, (2) it may take more than one complete year of post-project data and analyses to determine effectiveness of the SCADA modernization with confidence. Because of annual variability a 3-year post project analysis period is recommended.

1.5.6 Evaluation Criterion G – Nexus to Reclamation Project Activities

The proposed project is located on the Colorado River Irrigation Project which is owned and operated by the US Bureau of Indian Affairs in trust on behalf of the Colorado River Indian Tribes. The proposed project directly benefits CRIT by improving the overall control and efficiency of use of their Colorado River water rights.

The USBR Lower Colorado Region office in Boulder City NV manages operations in the Lower Colorado River Basin at the Boulder Canyon Operations Office. Daily water orders compiled by the CRIP BIA Irrigation office are transmitted to the Boulder Canyon Operations Office for release and delivery scheduling.

The 43 Code of Federal Regulations, Part 417 (Part 417) obligates the Secretary of the Interior to see that releases of Colorado River water to Colorado River tribal entities will not exceed those





reasonably required for beneficial use. CRIT prepares and submits an estimate of the Tribes' twelve-month Colorado River diversion rate and anticipated monthly diversion schedules to the BIA for the following calendar year. The BIA is directed by Part 417 to consult with Colorado River tribal entities each year regarding water conservation measures, operating practices, and the beneficial use of Colorado River water. CRIT and BIA engage in the Part 417 Consultation with the USBR each year.

1.5.7 Evaluation Criterion H – Additional Non-Federal Funding

Not applicable.

2 PROJECT BUDGET

2.1 Funding Plan and Letters of Commitment

The estimated total cost of the proposed CRIP SCADA System Modernization Project is \$550,000. Colorado River Indian Tribes requests Federal funding equal to \$250,000. CRIT is committed to contributing a matching amount of \$250,000 as a monetary contribution from the Tribe’s Funds. The balance of \$50,000 is in-kind contribution cost share under a BIA Colorado River Agency PL93-638 contract with CRIT Water Resources Department for Irrigation Engineering Services. CRIT Water Resources work under the 93-638 contract is current and on-going. The proposed in-kind cost share funding of this project is to designate project management costs and procurement of spare equipment in support of the project. No other in-kind contributions or costs will be incurred before the start of the project.

Table 7 is a summary of Federal and non-Federal funding sources for the proposed project.

Table 7. Summary of Federal and Non-Federal funding sources.

Funding Sources	Funding Amount
Non-Federal Entities	
1. Colorado River Indian Tribes	\$250,000.00
Non-Federal Subtotal	\$250,000.00
Other Federal Entities	
1. Other Federal Subtotal (PL 93-638 contract)	\$50,000.00
Other Federal Subtotal	\$50,000.00
Requested Reclamation Funding	\$250,000.00
Total Project Funding	\$550,000.00

2.2 Budget Proposal

Table 8 provides details of the estimated project costs in the format provided in the Funding Opportunity Announcement.





Table 8. Details of Budget Proposal.

Budget Item Description	Computation		Quantity Type	Total Cost	In-kind Contributions
	\$/Unit	Quantity			
Salaries and Wages (Labor and Overhead)					
Angie Ingram	165.00	200	Hours		\$33,000.00
Equipment					
Spare radio	2000.00	2	EA		\$4000.00
Spare pressure transducers	750.00	3	EA		2250.00
Spare SonTek ADV	5000.00	1	EA		5000.00
Spare Ultrasonic WL sensor	1300.00	1	EA		1300.00
Spare Celesco Position sensor	1100.00	3	EA		3300.00
Supplies and Materials					
Misc conduit, wire, cable, hand tools, etc	1150.00	1	EA		\$1150.00
Contracts					
Sierra Controls	308,650.00	1	EA	308,640.00	
IIRC	132,510.00	1	EA	132,510.00	
Environmental and Regulatory Compliance					
Tribal Historic Preservation	85.00	10	Man-days	850.00	
Other					
Contingencies				\$58,000.00	
Total Direct Costs	\$		-	\$500,000.00	\$50,000.00
Indirect Costs				\$0.00	
Total Estimated Projects Costs				\$550,000.00	

2.3 Budget Narrative

2.3.1 Salaries and Wages

Angie Ingram, Acting Director, CRIT Water Resources will be project manager. Labor expenses were included to cover the time necessary to efficiently coordinate the project, provide field support for contractors and maintain project schedules. The amount listed includes overhead costs.

2.3.2 Fringe Benefits

Project funds will not be used to support any fringe benefits. Overhead costs such as fringe benefits are included in the salaries and wages amount.





2.3.3 Travel

None. Travel expenses including mileage for round trip field visits to project sites for CRIT staff as required for Project field support and implementation is considered within the scope of normal duties.

2.3.4 Equipment

Some equipment will be purchased and kept as spare parts such as radios and sensors.

2.3.5 Materials and Supplies

Some materials and supplies will be purchased or made available from existing inventory to facilitate field implementation.

2.3.6 Contractual

Contractual costs for each of Sierra Controls and ITRC are detailed below.

2.3.6.1 Sierra Controls

Sierra Controls, as system integrator, has provided the details of their cost estimate (labor, travel, and materials) for the proposed scope of work in Table 9. The full price quote and description of services is included in Appendix A.

2.3.6.2 ITRC

ITRC, as SCADA Plan/specifications developer and PLC code programmer, has provided the details of their cost estimate for the proposed scope of work in Table 10. The full price quote and description of services is included in Appendix A.

2.3.7 Environmental and Regulatory Compliance Costs

Tribal personnel from the Tribes Historic Preservation Office are required to be on site whenever any earth-moving works are in progress. This is expected to be minimal unless a need arises to bury new conduit at any locations. Monitoring costs are \$85 per day per monitor.

2.3.8 Other Expenses

A contingency of \$58,000 is included to cover unanticipated expenses resulting from any required upgrades or changes to equipment to meet equipment specifications in the ITRC SCADA plan for the modernization project.

2.3.9 Indirect Costs

None.

2.3.10 Total Costs

The total cost of this project will be \$550,000.

CRIT requests Federal funds from the WaterSMART Water and Energy Efficiency grant program in the amount of \$250,000. CRIT will match this amount contributing \$250,000 to the project. The BIA 93-638 contract with CRIT Water Resources for Irrigation Engineering Services will provide \$50,000 in in-kind cost share toward the project's total costs.





2.4 Budget Form

The completed SF-424B, Budget Information for Non-Construction Programs is attached in Appendix B.

Table 9. Cost Estimate Details for Sierra Controls.

Pricing Summary: Item	Labor	Materials	Total
Replacement SCADA Computer and Software	\$ 42,260	\$ 10,250	\$ 52,510
Firewall Upgrade (Cyber Security)	\$ 1,145	\$ 930	\$ 2,075
Dream Reports Software Installation and Configuration	\$ 2,400	\$ 4,925	\$ 7,325
Full Reports with Remote Development	\$ 8,220	\$ -	\$ 8,220
Hi-Speed Ethernet Radio System Upgrade	\$ 25,850	\$ 17,255	\$ 43,105
Station 730 RTU	\$ 25,090	\$ 10,220	\$ 35,310
Station 560 RTU	\$ 25,170	\$ 10,140	\$ 35,310
Headworks RTU	\$ 25,170	\$ 10,140	\$ 35,310
9056 HDL / L90 Site RTU	\$ 25,170	\$ 10,140	\$ 35,310
11/90 Site RTU	\$ 25,895	\$ 10,220	\$ 36,115
Project Management, Professional Services, and Additional Field Tuning of System	\$ 15,000	\$ -	\$ 15,000
Total:	\$ 221,370	\$ 84,220	\$ 305,590

Project Notes:

1. Pricing does not include any permits or bonds.
2. Pricing is based upon standard SC wage rates
3. No tax is included in the quoted amounts provided. Project total will be the amounts provided plus any and all tribal tax costs required.
4. All mechanical installation, and modifications to field equipment runs shall be provided by the District. SC will terminate all RTU and Field connections during site commissioning.
5. Equipment provided to be placed in district supplied security enclosure if required.
6. This proposal represents the complete scope of work to be performed by SC. Any additional requirements, specifications, or construction details outside of this proposal have not been taken into consideration.
7. Pricing based on the use of Ubiquiti radio products. SC recommends an additional radio survey be conducted for any recommended radio prior to project to ensure validity of final radio communication recommendations.
8. Pricing to be updated once ITRC specifications are finalized and released.
9. ITRC to provide all programming for PLC's and OIT's.
10. SC to provide HMI development.
11. Pricing based on full project implementation of project as proposed





Table 10. Cost Estimate Details for ITRC.

Task		Director	Chairman	Senior Engineer	Controls Specialist	Technical Editor	
Develop SCADA Plan and Specs	Hours	10	23.5	75	44.5	8.6	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$2,050	\$5,053	\$11,625	\$6,008	\$774	\$25,509
PLC programming	Hours	0	0	57	263	0	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$8,835	\$35,505	\$0	\$44,340
Local User Interface programming	Hours	0	0	30	120	0	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$4,650	\$16,200	\$0	\$20,850
Field Testing and Commissioning	Hours	0	0	30	65	0	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$4,650	\$8,775	\$0	\$13,425
Documentation	Hours	0	0	62	42	10	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$9,610	\$5,670	\$900	\$16,180
Travel Labor	Hours	0	0	16	32	0	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$2,480	\$4,320	\$0	\$6,800
						Total labor	\$127,104
Other Expenses	Estimated Expense						
Maps/plotting	\$100						
Printing	\$300						
Hotels	\$1,560	Assumes \$130 per night					
Mileage	\$1,914	Assumes 1,100 miles per trip x 3 trips x \$0.58 / mile					
Per Diem	\$825	Assumes \$55/day x 15 days					
Subtotal	\$4,699						
15% indirect cost overhead	\$704.85						
						Total Other Expenses	\$5,404
Total Project Estimated Cost							\$132,508





3 ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

3.1 Environmental and Cultural Resources

- *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.*

No impacts to the environment are expected. The scope of the disturbance will be negligible, resulting from the installation of sensors and enclosures on existing CRIP system infrastructure. It is possible new conduit may need to be buried for encasement of wiring between sensors and RTUs. Disturbance will be minimal trenching across existing roads and other disturbed lands. Tribal personnel from the Tribes Historic Preservation Office will be on site whenever any earth-moving works are in progress.

- *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?*

According to the Fish and Wildlife Services IPAC tool there are a total of seven threatened or endangered species that are potentially affected by activities on the CRIP. These include three bird species (Southwestern Willow Flycatcher, Yellow-billed Cuckoo, and Yuma Clapper Rail), two reptile species (Desert Tortoise, and Northern Mexican Gartersnake), and two fish species (Bonytail Chub, and Razorback Sucker). The CRIP is outside of the final critical habitat published in the Federal Register for five of these species. The critical habitat for the Yuma Clapper Rail has not yet been designated. The CRIP is within the proposed critical habitat of the Yellow-billed Cuckoo published in the Federal Register on August 15, 2014. Yellow-billed cuckoos use wooded habitat with dense cover. In western states nests are often placed in willows along streams and rivers with nearby cottonwoods serving as foraging sites (USFWS, 2019). The minor scope of field work does not involve the removal of riparian habitat and is not expected to affect critical habitat of the Yellow-billed cuckoo or any other species listed or proposed to be listed as Federal threatened or endangered species.

- *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.*

No.

- *When was the water delivery system constructed?*

The water delivery system construction was originally authorized in the late 1860’s. Construction and expansion continued through the early 1900s. Major work was initiated in the 1940’s. The most recent canals and laterals were completed in the 1960’s and early 1970’s.





- *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.*

Minor alterations to existing infrastructure will be involved in the project such as the replacement of exposed metal conduit, installing new sensors and enclosures. The existing equipment was installed by USBR (Yuma office) beginning around 2002, with additional installation in 2006-2011.

- *Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.*

There are no structures listed or eligible for listing on the National Register of Historic Places within the project area that will be disturbed or modified.

- *Are there any known archeological sites in the proposed project area?*

There are no known archeological sites within the proposed project area that will experience disturbance or modification.

- *Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?*

No.

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

No.

- *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?*

No.

3.2 Federal Environmental and Cultural Resources Laws

3.2.1 National Environmental Policy Act

The project qualifies as Categorical Exclusion (CE) on Reclamation’s CE checklist (USDOI, not dated). This CE is for project implementation activities which include “Minor construction activities associated with authorized projects which correct unsatisfactory environmental conditions or which merely augment or supplement, or are enclosed within existing facilities.” Because the project qualifies as a CE, no further NEPA compliance measures are required.





3.2.2 National Historic Preservation Act

Since CRIT is proposing modernization of existing SCADA system components on existing irrigation infrastructure, no negative effects are foreseen to historic properties.

3.2.3 Endangered Species Act

Considering that the proposed project will only replace equipment on existing irrigation infrastructure and not add any new components or construction, it is anticipated no actions of the proposed activities will affect an endangered or threatened species.

4 REQUIRED PERMITS OR APPROVALS

Any project implementation activities which will require earth moving will require prior consultation and approval from CRIT's Tribal Historic Preservation Office (THPO). THPO personnel must be on site to monitor any earth moving activity.

Letters of Support

Letters of support/partnership are attached in Appendix B.

5 OFFICIAL RESOLUTION

The official resolution of the CRIT Tribal Council approving this WaterSMART grant application is currently under review and should be approved during their next meeting on March 18, 2019. As per the guidelines in Section D.2.2.8 in the Funding Opportunity Announcement, the endorsed resolution will be submitted within 30 days of the application deadline.

6 UNIQUE IDENTIFIER

The Colorado River Indian Tribes is currently registered in the System for Award Management (SAM), and maintains an active registration in SAM. The registration number is 074481706 / 3UHH4.

The organizational DUNS number for the Tribe is 074481706.





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USFWS (2019, March 15). *Species List: Arizona Ecological Services Field Office*. Official species list requested and received March 15, 2019 from FWS Arizona Ecological Field Office using IPAC online tool. <https://ecos.fws.gov/ipac/>.





APPENDIX A: CONTRACTOR COST ESTIMATES





SIERRA CONTROLS, LLC

WATER MEASUREMENT AND CONTROL SYSTEMS

DATE

March 8, 2019

QUOTATION NO.

18-5645 Rev 4

To: Colorado River Indian Tribes

Attention: Maria de los Angeles Ingram
Acting Director – Water Resources**Subject: SCADA System Modernization Project****Rev 4: Itemize labor and materials pricing separate. Additional project notes added.**

Sierra Controls, LLC (SC) is pleased to offer this quotation to modernize the Colorado River Indian Tribes (CRIT) SCADA system. The proposed RTU incorporates the requirements similar to other sites with instrumentation previously done by Sierra Controls and will operate seamlessly with other system sites currently in operation. In addition, the new system will also incorporate the implementation of high speed ethernet based radio communications network to provide stable and reliable communications throughout the entire district. The proposed system is designed to be fully expandable as may be required for future growth.

Item 1: Replacement SCADA Computer and Software

Labor	\$ 42,260
Materials	\$ 10,250
Total	\$ 52,510

A new Dell Precision T5280 will be installed and configured to run as a ClearScada HMI server. The ClearScada application combines typical HMI functions (alarms, data gathering, historical data, graphics, and user security) with advanced alarm notification, secure multiuser remote access and report connectivity. Advanced reporting software, configuration, and implementation are provided as Item 2 of this proposal.

Pricing includes: (1) Dell Precision T5820 SCADA Server Class computer with Windows Server 2012, (2) 24" Dell Wide Screen Monitor, (1) Netgear 8 Port Managed Ethernet Switch, New ClearScada 2017 – 5000 Tag License, TopView Alarm Notification Software, Parallels Remote Access Software, MS Office Suite, Snagit Screen Capture Software, WinZip Software and AVG Anti-Virus, Project Engineering / Design, Computer Assembly, Configuration, and Testing, Software Installation and Configuration, HMI Development, Alarm Development, Travel, Installation and Commissioning, and Documentation.

Item Notes:

- Additional "Small Screen" Development of existing district sites is included as part of this project.
- Alarm notifications and acknowledgements to be communicated via text and email system.
- District will provide 120VAC power for HMI Computer.
- Colorado River Indian Tribes shall plan on annual ongoing Software Support costs of approx. \$3,000 annually.
- District will provide internet access for the HMI Computer through the course of the project for remote communication and configuration of the SCADA system by SC.
- This item covers the purchase of hardware, configuration, installation, and the migration of data from the district's current ClearScada Workstation to the new Workstation provided as part of this proposal. Any additional software modifications required outside this scope can be provided part of a separate proposal based on standard SC T&M rates.
- Pricing is based on (1) Scada Tech and (1) Project Engineer Onsite for (3) days with additional travel to/from jobsite for installation.

5470 LOUIE LANE, STE 104 • RENO, NV 89511 • (775) 236-3350 • FAX (775) 657-6293
 9110 UNION PARK WAY, STE 114 • ELK GROVE, CA 95624 • (916) 685-4395
 250 S. WEST AVE, BLDG B • MERCED, CA 95340 • (209) 349-8950

California Contractors License No.: 732754

Nevada Contractors License No.: 0077744

Item 1A: Firewall Upgrade (Cyber Security)

Labor	\$ 1,145
Materials	\$ 930
Total	\$ 2,075

A new Dell TZ-300 Firewall will be installed during project implementation to ensure system is protected from potential cyber related security attacks as well as to provide continued security of the system going forward.

Pricing Includes: Dell TZ-300 Firewall Upgrade, Firewall Configuration, and Installation.

Item 1A Notes:

- Firewall will be installed during HMI Computer installation by SC.

Item 2. Dream Reports Software Installation and Configuration

Labor	\$ 2,400
Materials	\$ 4,925
Total	\$ 7,325

SC shall transition CRIT reports from the existing internal ClearSCADA SQL Reports to Dream Reports. This proposed item is based on limitations of the existing SQL Reports as the ClearSCADA system grows and the ability for Dream Reports to offer much greater flexibility in accessing historical data. The existing SQL reports include a large portion of the data in ClearSCADA: there are thirteen sites (reports) with between five and eighteen data points per site, for a total of 153 data points.

Pricing Includes: Dream Reports 250-tag license, installation and configuration of the software on the local workstation, and the first year of software support.

Note: (Also requires Item 2A)

Item 2A. Full Reports with Remote Development

Labor	\$ 8,220
Materials	\$ 0
Total	\$ 8,220

Pricing Includes: Migration of reports for thirteen sites and 153 points, developed remotely. Reports will have data in 15-minute intervals for each month and will generate to a Microsoft Excel .csv that will be emailed and saved locally.

Item 2 Notes:

- Colorado River Indian Tribes shall plan on annual ongoing Software Support costs of approx. \$750 to \$800 annually.
- SC Guarantees the performance and proper configuration of the reports provided as part of this proposal. All data displayed in the reports is based on the data collected and generated by the district and its system integrator. Any errors related to bad data collected from non-functional site locations are the responsibility of the district and its system integrator.
- Pricing based on remote installation, configuration, and implementation of district new reports.

Item 3. Hi-Speed Ethernet Radio System Upgrade

Labor	\$ 25,850
Materials	\$ 17,255
Total	\$ 43,105

Sierra Controls, LLC (SC) is pleased to offer this quotation to upgrade the existing 900 MHz MDS serial radio system with a modern Ubiquiti Hi-Speed Ethernet Radio System. The existing radio system is based on technology and equipment that has been discontinued and is no longer supported by its original manufacturer. In addition to not being technically supported the district is no longer able to obtain replacement parts for the system in the event of an equipment failure. Also, the system no longer meets FCC operation requirements for narrow banding operation. The new proposed system will incorporate the implementation of high speed ethernet based radio communications network to provide stable and reliable communications throughout the entire district for years to come. It also provides the district with the operational bandwidth to support modern SCADA equipment and if need both remote RTU programming and remote intranet access throughout the entire district.

Pricing includes: Poston Repeating Tower Radio System, Parker Repeating Tower Radio System, Tyson Wash Site Radio, Headworks Site Radio, Station 185 Site Radio, Check 19R Site Radio, Check 27-7 Site Radio, Check 42-8 Site Radio, 46R Site Radio, Station 56-3 Site Radio, Station 730-4 Site Radio, Station 11/90 Site Radio, Poston Office Radio, 73 Check 2 Radio, 73 Check 3 Radio, Station 90/56 Radio, and Parker Office Radio, System Programming, Factory Testing, Travel, Field-Testing, Training and Documentation.

Item 3 Notes:

- Project assumes the re-use of existing individual site radio masts for installation. District is responsible for replacement of existing mast(s) if determined replacement is required for structural stability of the specific installation.
- All programming, configurations, calibrations, and startups of any and all site equipment provided to the district as part of this or any other project are to be handled by the District's designated System Integrator. All liability and responsibilities related to the operation of the District's sites are entirely assigned to the District's System Integrator.

Item 4. Station 730 RTU

Labor	\$ 25,090
Materials	\$ 10,220
Total	\$ 35,310

SC will replace the existing Station 730 site RTU. The new RTU will interface with your existing SC ClearSCADA HMI package and will operate identically to the previous RTU with the exception that we will include a modern IDEC color touchscreen screen as a local OIT for your operators to use onsite, similar to the ones used at your other more modern RTU locations. Due to the age and equipment availability from the manufacturers many of the components that were utilized to build the previous RTU are now discontinued thus requiring SC to rebuild the site with newer styled components. SC will independently handle the complete demolition and installation of this site. Programming, calibration, commissioning and startup will be handled by others.

Pricing includes: NEMA 12 Hoffman Enclosure, Schneider Electric ScadaPack 357 or 357E Series PLC, (1) Schneider Electric Analog I/O Modules, Allen-Bradley Power Supply, IDEC Relays, N-TRON Ethernet Switch, IDEC 10" Touchscreen Operator Interface Panel, Polyphaser Lightning Protector, Allen-Bradley Terminals and Fuse Blocks, (3) Allen-Bradley Three Position Switches, (3) Allen-Bradley Spring return-to-center Switches, (2) Duracell Gel-Cell Batteries, Design Engineering, ClearSCADA HMI Programming, Fabrication, In-house Testing, Travel, Lodging, Final Termination Wiring, Field-testing and Documentation.

Item Notes:

- Project assumes the re-use of existing radio, antenna, and cabling for installation. If any of these communications items are determined to be non-functioning during site startup / commission additional charges to replace them will occur. Unless Item 3 is approved as part of this project.
- If Item 3 is approved as part of this project all radio and communications equipment will be replaced as defined in the Item 3 scope.
- Equipment will be provided to be placed in district supplied security enclosure if required.
- Pricing is based on (1) Scada Tech and (1) Project Engineer Onsite for (3) days with additional travel to/from jobsite for installation.
- All programming, configurations, calibrations, and startups of any and all site equipment provided to the district as part of this or any other project are to be handled by the District's designated System Integrator. All liability and responsibilities related to the operation of the District's sites are entirely assigned to the District's System Integrator.

Item 5. Station 560 RTU

Labor	\$ 25,170
Materials	\$ 10,140
Total	\$ 35,310

SC will replace the existing station 730 site RTU. The new RTU will interface with your existing SC ClearSCADA HMI package and will operate identically to the previous RTU with the exception that we will include a modern IDEC color touchscreen screen as a local OIT for your operators to use onsite, similar to the ones used at your other more modern RTU locations. Due to the age and equipment availability from the manufacturers many of the components that were utilized to build the previous RTU are now discontinued thus requiring SC to rebuild the site with newer styled components. SC will independently handle the complete demolition and installation of this site. Programming, calibration, commissioning and startup will be handled by others.

Pricing includes: NEMA 12 Hoffman Enclosure, Schneider Electric ScadaPack 357 or 357E Series PLC, (1) Schneider Electric Analog I/O Modules, Allen-Bradley Power Supply, IDEC Relays, N-TRON Ethernet Switch, IDEC 10" Touchscreen Operator Interface Panel, Polyphaser Lightning Protector, Allen-Bradley Terminals and Fuse Blocks, (2) Allen-Bradley Three Position Switches, (2) Allen-Bradley Spring return-to-center Switches, (2) Duracell Gel-Cell Batteries, Design Engineering, ClearSCADA HMI Programming, Fabrication, In-house Testing, Travel, Lodging, Final Termination Wiring, Field-testing and Documentation.

Item Notes:

- Project assumes the re-use of existing radio, antenna, and cabling for installation. If any of these communications items are determined to be non-functioning during site startup / commission additional charges to replace them will occur. Unless Item 3 is approved as part of this project.
- If Item 3 is approved as part of this project all radio and communications equipment will be replaced as defined in the Item 3 scope.
- Equipment will be provided to be placed in district supplied security enclosure if required.
- Pricing is based on (1) Scada Tech and (1) Project Engineer Onsite for (3) days with additional travel to/from jobsite for installation.
- All programming, configurations, calibrations, and startups of any and all site equipment provided to the district as part of this or any other project are to be handled by the District's designated System Integrator. All liability and responsibilities related to the operation of the District's sites are entirely assigned to the District's System Integrator.

Item 6. Headworks RTU

Labor	\$ 25,170
Materials	\$ 10,140
Total	\$ 35,310

SC will replace the existing Headworks site RTU. The new RTU will interface with your existing SC ClearSCADA HMI package and will operate identically to the previous RTU with the exception that we will include a modern IDEC color touchscreen screen as a local OIT for your operators to use onsite, similar to the ones used at your other more modern RTU locations. Due to the age and equipment availability from the manufacturers many of the components that were utilized to build the previous RTU are now discontinued thus requiring SC to rebuild the site with newer styled components. SC will independently handle the complete demolition and installation of this site. Programming, calibration, commissioning and startup will be handled by others.

Pricing includes: NEMA 12 Hoffman Enclosure, Schneider Electric ScadaPack 357 or 357ESeries PLC, (1) Schneider Electric Analog I/O Modules, Allen-Bradley Power Supply, IDEC Relays, N-TRON Ethernet Switch, IDEC 10" Touchscreen Operator Interface Panel, Polyphaser Lightning Protector, Allen-Bradley Terminals and Fuse Blocks, (2) Allen-Bradley Three Position Switches, (2) Allen-Bradley Spring return-to-center Switches, (2) Duracell Gel-Cell Batteries, Design Engineering, ClearSCADA HMI Programming, Fabrication, In-house Testing, Travel, Lodging, Final Termination Wiring, Field-testing and Documentation.

Item Notes:

- Project assumes the re-use of existing radio, antenna, and cabling for installation. If any of these communications items are determined to be non-functioning during site startup / commission additional charges to replace them will occur. Unless Item 3 is approved as part of this project.
- If Item 3 is approved as part of this project all radio and communications equipment will be replaced as defined in the Item 3 scope.
- Equipment will be provided to be placed in district supplied security enclosure if required.
- Pricing is based on (1) Scada Tech and (1) Project Engineer Onsite for (3) days with additional travel to/from jobsite for installation.
- All programming, configurations, calibrations, and startups of any and all site equipment provided to the district as part of this or any other project are to be handled by the District's designated System Integrator. All liability and responsibilities related to the operation of the District's sites are entirely assigned to the District's System Integrator.

Item 7. 9056 HDL / L90 Site RTU

Labor	\$ 25,170
Materials	\$ 10,140
Total	\$ 35,310

SC will replace the existing 9056 HDL / L90 Site RTU. The new RTU will interface with your existing SC ClearSCADA HMI package and will operate identically to the previous RTU with the exception that we will include a modern IDEC color touchscreen screen as a local OIT for your operators to use onsite, similar to the ones used at your other more modern RTU locations. Due to the age and equipment availability from the manufacturers many of the components that were utilized to build the previous RTU are now discontinued thus requiring SC to rebuild the site with newer styled components. SC will independently handle the complete demolition and installation of this site. Programming, calibration, commissioning and startup will be handled by others.

Pricing includes: NEMA 12 Hoffman Enclosure, Schneider Electric ScadaPack 357 or 357E Series PLC, (1) Schneider Electric Analog I/O Modules, Allen-Bradley Power Supply, IDEC Relays, N-TRON Ethernet Switch, IDEC 10" Touchscreen Operator Interface Panel, Polyphaser Lightning Protector, Allen-Bradley Terminals and Fuse Blocks, (2) Allen-Bradley Three Position Switches, (2) Allen-Bradley Spring return-to-center Switches, (2) Duracell Gel-Cell Batteries, Design Engineering, ClearSCADA HMI Programming, Fabrication, In-house Testing, Travel, Lodging, Final Termination Wiring, Field Electrical Testing and documentation.

Item Notes:

- Project assumes the re-use of existing radio, antenna, and cabling for installation. If any of these communications items are determined to be non-functioning during site startup / commission additional charges to replace them will occur. Unless Item 3 is approved as part of this project.
- If Item 3 is approved as part of this project all radio and communications equipment will be replaced as defined in the Item 3 scope.
- Equipment will be provided to be placed in district supplied security enclosure if required.
- Pricing is based on (1) Scada Tech and (1) Project Engineer Onsite for (3) days with additional travel to/from jobsite for installation.
- All programming, configurations, calibrations, and startups of any and all site equipment provided to the district as part of this or any other project are to be handled by the District's designated System Integrator. All liability and responsibilities related to the operation of the District's sites are entirely assigned to the District's System Integrator.

Item 8. 11/90 Site RTU

Labor	\$ 25,895
Materials	\$ 10,220
Total	\$ 36,115

Sierra Controls, LLC (SC) is pleased to offer this proposal to replace the existing 11/90 site RTU. The new RTU will interface with your existing SC ClearSCADA HMI package and will operate identically to the previous RTU with the exception that we will include a modern IDEC color touchscreen screen as a local OIT for your operators to use onsite, similar to the ones used at your other more modern RTU locations. Due to the age and equipment availability from the manufacturers many of the components that were utilized to build the previous RTU are now discontinued thus requiring SC to rebuild the site with newer styled components. SC will independently handle the complete demolition, installation, configuration and return to service of the site as part of this quote.

Pricing includes: NEMA 12 Hoffman Enclosure, Schneider Electric ScadaPack 357 or 357 ESeries PLC, (1) Schneider Electric Analog I/O Modules, Allen-Bradley Power Supply, IDEC Relays, N-TRON Ethernet Switch, IDEC 10" Touchscreen Operator Interface Panel, Polyphaser Lightning Protector, Allen-Bradley Terminals and Fuse Blocks, (3) Allen-Bradley Three Position Switches, (3) Allen-Bradley Spring return-to-center Switches, (2) Duracell Gel-Cell Batteries, Design Engineering, PLC and RTU Touchscreen Programming, ClearSCADA HMI Programming, Fabrication, In-house Testing, Travel, Lodging, Final Termination Wiring, Field-testing, Start-up and Documentation.

Item Notes:

- Pricing is based upon SC regular wage rates and does not include any provisions for Prevailing Wage or Davis-Bacon wages.
- Pricing does not include any permits or bonds.
- Project assumes the re-use of existing radio, antenna, and cabling for installation. If any of these communications items are determined to be non-functioning during site startup / commission additional charges to replace them will occur. Unless Item 3 is approved as part of this project.
- Equipment will be provided to be placed in district supplied security enclosure if required.
- If Item 3 is approved as part of this project all radio and communications equipment will be replaced as defined in the Item 3 scope.
- Pricing is based on (1) Scada Tech and (1) Project Engineer Onsite for (3) days with additional travel to/from jobsite for installation.
- All programming, configurations, calibrations, and startups of any and all site equipment provided to the district as part of this or any other project are to be handled by the District's designated System Integrator. All liability and responsibilities related to the operation of the District's sites are entirely assigned to the District's System Integrator.

Item 9. Project Management, Professional Services, and Additional Field Tuning of System

Labor	\$ 15,000
Materials	\$ 0
Total	\$ 15,000

Pricing Summary:

Item	Labor	Materials	Total
1	\$ 42,260	\$ 10,250	\$ 52,510
1A	\$ 1,145	\$ 930	\$ 2,075
2	\$ 2,400	\$ 4,925	\$ 7,325
2A	\$ 8,220	\$ -	\$ 8,220
3	\$ 25,850	\$ 17,255	\$ 43,105
4	\$ 25,090	\$ 10,220	\$ 35,310
5	\$ 25,170	\$ 10,140	\$ 35,310
6	\$ 25,170	\$ 10,140	\$ 35,310
7	\$ 25,170	\$ 10,140	\$ 35,310
8	\$ 25,895	\$ 10,220	\$ 36,115
9	\$ 15,000	\$ -	\$ 15,000
Total:	\$ 221,370	\$ 84,220	\$ 305,590

Project Notes:

1. Pricing does not include any permits or bonds.
2. Pricing is based upon standard SC wage rates
3. No tax is included in the quoted amounts provided. Project total will be the amounts provided plus any and all tribal tax costs required.
4. All mechanical installation, and modifications to field equipment runs shall be provided by the District. SC will terminate all RTU and Field connections during site commissioning.
5. Equipment provided to be placed in district supplied security enclosure if required.
6. This proposal represents the complete scope of work to be performed by SC. Any additional requirements, specifications, or construction details outside of this proposal have not been taken into consideration.
7. Pricing based on the use of Ubiquiti radio products. SC recommends an additional radio survey be conducted for any recommended radio prior to project to ensure validity of final radio communication recommendations.
8. Pricing to be updated once ITRC specifications are finalized and released.
9. ITRC to provide all programming for PLC's and OIT's.
10. SC to provide HMI development.
11. Pricing based on full project implementation of project as proposed

DELIVERY: As Scheduled
TERMS: NET 30
FOB: RENO, NV
Proposal good for 180 Days

**RESPECTFULLY SUBMITTED,
SIERRA CONTROLS, LLC**


Danny Hunsaker- General Manager

To proceed with this order please sign below with an authorized signature and return.

Signed _____ **PO Number** _____ **Date** _____ **Requested Delivery Date** _____

Date: March 13, 2019
 To: NRCE
 From: Kyle Feist, MS, P.E. – ITRC – Senior Engineer
 Subject: Colorado River Indian Tribes (CRIT) – Supervisory Control and Data Acquisition (SCADA) Upgrades

Background

The Colorado River Indian Tribes (CRIT) operates an existing Supervisory Control and Data Acquisition (SCADA) system. In addition to the local automation at each site, the existing SCADA system provides:

- Remote monitoring of key operational parameters
- Remote adjustment of target and alarm setpoints
- Automatic alarm notification and report generation

Many of the existing SCADA sites are over 15 years old and are due for hardware upgrades. With this understanding, CRIT has received initial cost estimates from an integration firm (Sierra Controls) to provide various SCADA system upgrades. The cost estimate provided by Sierra Controls is summarized in Table 1.

Table 1. Initial high-level scope of work and cost estimate for hardware and configuration services from the integration firm

ID	Item Description	Initial Cost Estimate from Integration Firm	Local Automation Description
1	Base station replacement	\$52,510	
2	Firewall replacement	\$2,075	
3	Report software	\$7,325	
4	Report development	\$8,220	
5	Radio upgrades	\$43,105	
6	Station 730 RTU upgrade	\$35,310	Upstream water level control with one or more lateral flow control gates
7	Station 560 RTU upgrade	\$35,310	Flow control with upstream level overrides and one or more lateral flow control gates
8	Headworks RTU upgrade	\$35,310	Flow control
9	Check 9056 RTU upgrade	\$35,310	Upstream water level control with one or more lateral flow control gates
10	Check 11/90 RTU upgrade	\$36,115	Upstream water level control or flow control (selectable) for main gates, with a spill gate with automatic upstream water level control
11	Project management	\$15,000	
Total		\$305,590	

The scope of work and integration firm cost estimates were developed without detailed specifications. There are potential risks and problems with this.

The development of a SCADA Plan and detailed specifications would resolve these potential problems and the risks that would arise if responsibilities and details are not clearly identified in advance. It is recommended that all parties meet with CRIT on site to collect information and data that will then be incorporated into a SCADA Plan and detailed specifications for the proposed system modernization. This may result in an increase in estimated equipment costs once the detailed specifications are incorporated.

Procedures and Framework Recommendations

It is recommended that the grant application incorporate the following:

1. The list of SCADA upgrades that have already been identified and the initial Sierra Controls cost estimate
2. The ITRC expenses to develop detailed specifications for the CRIP SCADA site upgrades already identified
3. Inclusion of a contingency cost line item for expenses for any changes necessary for compliance with the specifications in design and implementation
4. ITRC expenses to implement the control logic programming, testing and startup

A summary of ITRC's and Sierra Control's expenses and the total estimated expenses are provided in Table 2. Details of ITRC's estimated expenses are provided in Table 3.

Table 2. Summary of ITRC and Sierra Control expenses and total estimated expenses.

ID	Line Item	Integration Firm	ITRC
1	Preliminary cost estimate for hardware and integration firm implementation	\$305,590	
2	Detailed SCADA Plan with specifications		\$25,510
3	Additional expenses to comply with the new SCADA Plan and specifications for implementation	\$58,000	
4	ITRC implementation		\$107,000
Subtotals by entity		\$363,590	\$132,510
Total for existing list of projects		\$496,100	

Table 3. Details of ITRC's estimated expenses.

Task		Director	Chairman	Senior Engineer	Controls Specialist	Technical Editor	
Develop SCADA Plan and Specs	Hours	10	23.5	75	44.5	8.6	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$2,050	\$5,053	\$11,625	\$6,008	\$774	\$25,509
PLC programming	Hours	0	0	57	263	0	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$8,835	\$35,505	\$0	\$44,340
Local User Interface programming	Hours	0	0	30	120	0	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$4,650	\$16,200	\$0	\$20,850
Field Testing and Commissioning	Hours	0	0	30	65	0	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$4,650	\$8,775	\$0	\$13,425
Documentation	Hours	0	0	62	42	10	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$9,610	\$5,670	\$900	\$16,180
Travel Labor	Hours	0	0	16	32	0	
	Rate	\$205	\$215	\$155	\$135	\$90	Total
	Subtotal	\$0	\$0	\$2,480	\$4,320	\$0	\$6,800
						Total labor	\$127,104
Other Expenses	Estimated Expense						
Maps/plotting	\$100						
Printing	\$300						
Hotels	\$1,560	Assumes \$130 per night					
Mileage	\$1,914	Assumes 1,100 miles per trip x 3 trips x \$0.58 / mile					
Per Diem	\$825	Assumes \$55/day x 15 days					
Subtotal	\$4,699						
15% indirect cost overhead	\$704.85						
						Total Other Expenses	\$5,404
Total Project Estimated Cost							\$132,508



APPENDIX B: LETTERS OF SUPPORT





United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Colorado River Agency
12124 1st Avenue
Parker, Arizona 85344-2124



IN REPLY REFER TO:
Branch of Natural Resource
Irrigation O&M

MAR 19 2019

To Whom This May Concern,

This letter is provided to affirm the support of the Bureau of Indian Affairs Colorado River Agency for the approval of funding to the Colorado River Indian Tribes (“CRIT” or “Tribes”) under the Bureau of Reclamation’s WaterSMART Water and Energy Efficiency Program pursuant to Funding Opportunity Announcement No. BOR-DO-19-F004 to be used for SCADA System Modernization.

The project proposed to receive funding will make significant improvements to the BIA’s Colorado River Irrigation Project (“CRIP”), by modernizing and completing installation of SCADA measurement, monitoring and control system components throughout the entire CRIP. Presently, only a fraction of the CRIP is adequately measured and controlled using the incomplete and outdated SCADA equipment currently in place. These improvements will allow for more precise measurement and control throughout the CRIP, improving operational efficiency, reducing waste, allowing quicker identification of underperforming sectors of the system, and facilitating focused maintenance efforts.

Further, the Colorado River Indian Tribes will commit funding not only to match any grant-supplied funds, but also will provide additional resources to complete the SCADA system in a manner that ensures the new SCADA system components will integrate with existing BIA operations. These improvements also will enhance cyber-security protocols over the existing system, and include capacity to be expanded and updated as technical advances may arise.

For the reasons stated above, the Colorado River Agency fully supports the Tribes’ Application to receive funding through the Bureau of Reclamation’s WaterSMART Water and Energy Efficiency Program.

Any questions may be directed to Mr. Gary R. Colvin, Agriculture Engineer, at 928.662.4392.

Sincerely,

Superintendent



APPENDIX C: SF-424B BUDGET INFORMATION FOR NON-CONSTRUCTION PROGRAM



BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 01/31/2019

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Water and Energy Efficiency Grant Program for FY2019 FOA No. BOR-DO-19-F004	15.507	\$ <input type="text"/>	\$ <input type="text"/>	\$ 250,000.00	\$ <input type="text"/>	\$ 250,000.00
2. Colorado River Indian Tribes (CRIT)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	250,000.00	250,000.00
3. BIA Colo River Agency PL 93-638, contract with CRIT Water Resources for Irrigation Engineering Services	<input type="text"/>	<input type="text"/>	<input type="text"/>	50,000.00	<input type="text"/>	50,000.00
4. <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5. Totals		\$ <input type="text"/>	\$ <input type="text"/>	\$ 300,000.00	\$ 250,000.00	\$ 550,000.00

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total (5)
	(1)	(2)	(3)	(4)	
	Water and Energy Efficiency Grant Program for FY2019 FOA No. BOR-DO-19-F004	Colorado River Indian Tribes (CRIT)	BIA Colo River Agency PL 93-638, contract with CRIT Water Resources for Irrigation Engineering Services		
a. Personnel	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text" value="33,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="33,000.00"/>
b. Fringe Benefits	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
c. Travel	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
d. Equipment	<input type="text"/>	<input type="text"/>	<input type="text" value="15,850.00"/>	<input type="text"/>	<input type="text" value="15,850.00"/>
e. Supplies	<input type="text"/>	<input type="text"/>	<input type="text" value="1,150.00"/>	<input type="text"/>	<input type="text" value="1,150.00"/>
f. Contractual	<input type="text" value="250,000.00"/>	<input type="text" value="250,000.00"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="500,000.00"/>
g. Construction	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
h. Other	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
i. Total Direct Charges (sum of 6a-6h)	<input type="text" value="250,000.00"/>	<input type="text" value="250,000.00"/>	<input type="text" value="50,000.00"/>	<input type="text"/>	\$ <input type="text" value="550,000.00"/>
j. Indirect Charges	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	\$ <input type="text"/>
k. TOTALS (sum of 6i and 6j)	\$ <input type="text" value="250,000.00"/>	\$ <input type="text" value="250,000.00"/>	\$ <input type="text" value="50,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="550,000.00"/>
7. Program Income	\$ <input type="text" value="0.00"/>	\$ <input type="text" value="0.00"/>	\$ <input type="text" value="0.00"/>	\$ <input type="text"/>	\$ <input type="text" value="0.00"/>

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SECTION C - NON-FEDERAL RESOURCES					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS	
8. Water and Energy Efficiency Grant Program for FY2019 FOA No. BOR-DO-19-F004	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	
9. Colorado River Indian Tribes (CRIT)	250,000.00	0.00	0.00	250,000.00	
10. BIA Colo River Agency PL 93-638, contract with CRIT Water Resources for Irrigation Engineering Services	0.00	0.00	0.00	0.00	
11.					
12. TOTAL (sum of lines 8-11)	\$ 250,000.00	\$ 0.00	\$ 0.00	\$ 250,000.00	
SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ 200,000.00	\$ 75,000.00	\$ 75,000.00	\$ 25,000.00	\$ 25,000.00
14. Non-Federal	\$ 225,000.00	56,250.00	56,250.00	56,250.00	56,250.00
15. TOTAL (sum of lines 13 and 14)	\$ 425,000.00	\$ 131,250.00	\$ 131,250.00	\$ 81,250.00	\$ 81,250.00
SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT					
(a) Grant Program	FUTURE FUNDING PERIODS (YEARS)				
	(b) First	(c) Second	(d) Third	(e) Fourth	
16. Water and Energy Efficiency Grant Program for FY2019 FOA No. BOR-DO-19-F004	\$ 50,000.00				
17. Colorado River Indian Tribes (CRIT)	50,000.00				
18. BIA Colo River Agency PL 93-638, contract with CRIT Water Resources for Irrigation Engineering Services	25,000.00				
19.					
20. TOTAL (sum of lines 16 - 19)	\$ 125,000.00				
SECTION F - OTHER BUDGET INFORMATION					
21. Direct Charges: \$550,000.00		22. Indirect Charges: 0.00			
23. Remarks: This project is proposed as a 2 year project					

Reviewed by the Office of the Attorney General
of the Colorado River Indian Tribes

Date: 3/15/19 Initials: [Signature]

Resolution No. _____

**RESOLUTION
COLORADO RIVER TRIBAL COUNCIL**

A Resolution to Authorize the CRIT Water Resources Department to Apply for the U.S. Bureau of Reclamation WaterSMART Water and Energy Efficiency Program's 2019 Grant Funding Opportunity to support the upgrade, replacement, and modernization of several features of the CRIP SCADA system.

Be it resolved by the Tribal Council of the Colorado River Indian Tribes in ~~Regular~~/Special meeting assembled on March 18, 2019,

WHEREAS, the Colorado River Indian Tribes (hereinafter "CRIT" or "Tribes") is a federally recognized Indian tribe, duly organized with a tribal governing body known as the Tribal Council, according to the provisions contained in the Indian Reorganization Act of June 18, 1934; and

WHEREAS, Article VI, Section 1(f) of the Constitution of the Colorado River Indian Tribes authorizes the Tribal Council to accept grants or donations of money or property from any persons, State or the United States, or from community enterprises; and

WHEREAS, the Colorado River Irrigation Project ("CRIP") is a critical component of the Tribal economy, and its continued operation and efficiency depends on regular maintenance and technological improvements; and

WHEREAS, the Water Resources Department seeks authorization to request Federal funds from the WaterSMART Water and Energy Efficiency grant program in the amount of \$250,000 for improvements to the CRIP SCADA system; and

WHEREAS, this funding will be used to improve the CRIP SCADA system by:

- a) replacing the obsolete radio communication system with a modern, FCC-compliant, technically supportable Ethernet-based high-speed system, which adds needed bandwidth and improves signal stability, reliability, and security,
- b) by replacing Remote Terminal Units at key water measurement, monitoring, and control points, to create seamless operations and data management across the entire System, and
- c) by replacing the current SCADA computer workstation with a modern, multi-featured system that improves cyber security, data retrieval and archiving, and allows the SCADA system to be expanded to include all points not yet monitored, measured or controlled efficiently; and

WHEREAS, CRIT must provide 50% matching funds to take advantage of the USBR WaterSMART Water and Energy Efficiency Program funding opportunity, CRIT will match the requested funding amount by

contributing \$250,000 to the project. The BIA 93-638 contract with CRIT Water Resources for Irrigation Engineering Services will provide an additional \$50,000 in in-kind cost share toward the project's total costs which will be \$550,000.

NOW THEREFORE BE IT RESOLVED that the Water Resources Department is hereby authorized to apply for grant funds available under the 2019 USBR WaterSMART Water and Energy Efficiency Program in order to receive project funding in the amount of \$250,000.00 for CRIP SCADA system upgrades, improvements, expansion and related activities; and

BE IT FURTHER RESOLVED that if additional funding becomes available under the USBR WaterSMART Water and Energy Efficiency Program in future years, the Water Resources Department is hereby authorized to apply for said funds upon submission in advance to Tribal Council of a revised workplan and budget describing the qualified projects suited to the funding opportunity, and the need for the funds applied for, and

BE IT FURTHER AND FINALLY RESOLVED that the Tribal Council Chairman and Secretary, or their designated representatives, are hereby authorized and directed to execute any and all documents necessary to implement this action.